Guide to Bovine Clinics

4th Edition

Chris Pasquini
Susan Pasquini

SUDZ PUBLISHING

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Abbreviations: See last page of guide

Clinical pathology values: See inside of back cover

Quick Reference

BM&S: *Bovine Med & Sx*, Arnstutz, 1980
Br: *Bovine Med, Dizs & Husbandry*, Andrew,1992
BR-hb: *Pocket Vet Med*, Blood, 1994
BR: *Vet. Med - 8th*, Radostits, Blood, 1994
C3T: *Current Vet Tx 3*, Howard, 1993
C2T: *Current Vet Tx 2*, Howard, 1986
C1T: *Current Vet Tx*, Howard, 1981
DC: *Dizs of Dairy Cattle*. Rebhun, 1995
DDX: *A manual of Dx Cattle*, Blood, 1990
Derm: *Large Animal Dermatology*. Scott, 1988
G: *Bovine Medi & Sx*, Gibbons, 1970
GI: *Vet Gastroenterology*, Anderson, 1992
IM: *Lg Anim Internal Med- 2*, Smith, 1996
L: *Lameness in Cattle*. Greenough,1972
Mk: *The Merck Vet Manual*-7th, 1991
N-L: *Lg Animal Neurology*, Mayhew, 1989
Pa: *Thompson's Vet Pathology-2*, Carlton, 1995
Plc: *Color Atlas of Dizs of Cattle*, Blowey, 1991
PP/USA/C: *Poisonous Plants - US & Canada*, Kingsbury, 1964
PP/Mt, PP/O, PP/A *Poisonous Plants/Mt, Ok. or Al.*
R-M: Current Tx in Therio-2, Marrow, 1986
S-O: *Textbook of Lg Anim Sx*, Oehme, 1988
S-J: *Practice of Lg Anim Sx*, Jennings, 1984
S-T: *Techniques in Lg Anim Sx*, Turner, McIlwraith, 1989
S-N: *Food Animal Sx*-2nd, Nordsy, 1989
S-UG: *B & E Urogenital Sx*, Walkens,1980
Tox: *Clinical & Dx Vet Tox*, Osweiler, 1985
VC: *Vet Clinics of N Amer, Food Animal Prac.*
VC/T: *Female Bovine Infertility*, Braun, 9(2) 1993
VC/S: *Sx - Bovine GI*, Bristol, 6(2) 1990
VC/F: *Metabolic Dizs*. Herdt, 4(2) 1988
VC/L: *Bovine Lameness*, Ferguson, 1(1) 1985
VC/M: *B. Mastitis*, Anderson, 9(3) 1993
VC/N: *B. Neurologic Dizs*, Backer, 3(1) 1987

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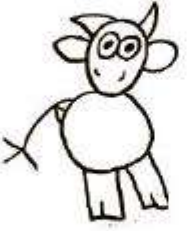
4th Edition



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to

Butch Ketel

one of the few down to earth veterinary teachers,
always having the most fun,
and a true friend

The C-Section

The phone rang. It was four o'clock... the
other four o'clock.
A worried voice came on the line, "Sorry to
wake ya, Doc,
But I've got a calvy heifer I think's in trouble,
some.
I can't see nothin' but the tail. I'm wonderin',
could ya come?"

Next thing I know I'm in his barn and starin' at
this beast.
Ten feet tall, she was, I swear, and big as a
bus, at least.
I laid a ladder 'gainst her flank. A C-section, I
decide.
After proper preparations there's a window in
her side.

I poke my head inside the hole to have a look
around
A pair of parakeets fly out and flutter to the
ground.
Followed by a barkin' dog and blur of Gambel's
quail.
A hunter in fluorescent orange, hot on the
covey' tail.

I climbed on in and smelled the air. No doubt,
Progesterone.
I leaned against the rumen wall and heard a
slide trombone!
A corps of cuds came chomping by in step with
a marching band
All tooting on a catheter. I was Alice in
Kidneyland.

A school of pies came slicing by: meringues,
mangos and minces
And dignitaries like the Queen and Michigan
Pork Princess.
A set of Holstein heifers with their tassels all
a'twirl.
The Sheep Producer's lobbyist and Snap On
calendar girl.

On they came, the A.I. techs with pipette fife and drum,
A pair of unborn senators, Fetaldee and Fetaldum.
This entire cast of characters was headed for the womb
And ridin' drag in this parade was me behind a broom.
I passed a Winchell's Donut Shop at Pancreas and Colon
And saw a New Ages singles group reliving lives and trollin'
Then took a left on Ileum and asked the Pelvic Nerve
Where I could find the Uterus, His Dendrite made a curve

And pointed to the Oviduct that seemed to swing and sway.
I saw a blinking neon sign, said BABY CALF THIS WAY.
The cotyledons bumped my head and as I went sliding' down
"There he is," I said, at last. The calf had run, aground.

I hefted up a cloven hoof and started for the door.
Then like a flash the lights came on! I slipped upon the floor,
A scream like I ain't never heard was ringin' in my head.
I opened up my eyes and saw me standing' by my bed.

My wife was clingin' to the post and tangled in the sheets
The slide trombone had died away as had the parakeets.
I slowly came awake to find my dream had gone kaput.
I looked down at her layin' there and let go of her foot!

By Baxter Black

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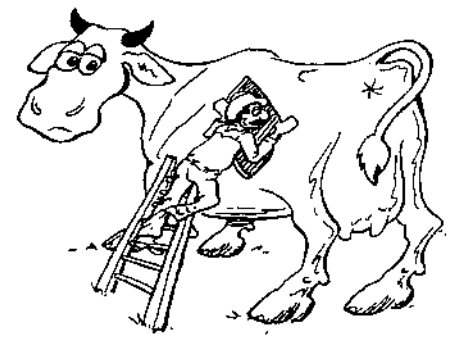

Quick Reference:

Each condition is keyed by abbreviations and page number to the below commonly used reference books:

BM&S: *Bovine Medicine & Surgery*, HE Amstutz, Amer Vet Pub Inc, 1980

Br: *Bovine Medicine, Diseases & Husbandry of Cattle*, AH Andrew, Blackwell Scientific Publ, 1992

BR-hb: *Pocket Companion to Veterinary Medicine*, DC Blood, Bailliere Tindall, 1994

BR: *Veterinary Medicine - 8th*, DM Radostits, DC Blood, CC Gay, Bailliere Tindall, 1994

C3T: *Current Veterinary Therapy 3, Food Animal Practice*, JL Howard, WB Saunders Co, 1993

C2T: *Current Veterinary Therapy 2, Food Animal Practice*, JL Howard, WB Saunders Co, 1986

C1T: *Current Therapy in Food Animal Practice*, JL Howard, WB Saunders Co, 1981

DC: *Diseases of Dairy Cattle*, SC Rebhun, Williams & Wilkins, 1995

DDX: *A Manual of Diagnosis: Diseases of Cattle*, DC Blood, P Brightling, MT Larcomb, Bailliere Tindall,1990

Derm: *Large Animal Dermatology*, DW Scott, WB Saunders, 1988

G: *Bovine Medicine & Surgery*, WJ Gibbons, EJ Catcott, JF Smithcors, Amer Vet Publ, Inc, 1970

GI: *Veterinary Gastroenterology*, NV Anderson, Lea & Febiger, 1992

IM: *Large Animal Internal Medicine- 2nd*, BP Smith, Mosby, 1996

L: *Lameness in Cattle*, PR Greenough, JB Lippincott Co, 1972

Mk: *The Merck Veterinary Manual*, 7th edition, 1991

N-L: *Large Animal Neurology, A Handbook,* IF Mayhew, Lea & Febiger, 1989

Pa: *Thompson's Special Veterinary Pathology - 2nd,* WW Carlton, MD McGavin, Mosby, 1995

Pic: *Color Atlas of Dizs & Disorders of Cattle,* RW Blowey, AD Weaver, Iowa State Univ Press/Ames, 1991

PP/USA/C: *Poisonous Plants of the United States & Canada,* JM Kingsbury, Prentis Hall, 1964

PP/Mt, PP/O, PP/A *Poisonous Plants/Montana, Oklahoma or Alabama,* printed by Extension Service of each state

R-M: Current Therapy in Theriogenology 2, DA Marrow, WB Saunders, 1986

S-O: *Textbook of Large Animal Surgery,* F Oehme, Williams & Wilkins, 1988

S-J: *The Practice of Large Animal Surgery,* PB Jennings, WB Saunders, 1984

S-T: *Techniques in Large Animal Surgery,* AS Turner, CW McIlwraith, Lea & Febiger, 1989

S-N: *Food Animal Surgery,* 2nd, J L Nordsy, Vet Med Publ, Lenexa, Kansas, 1989

S-UG: *Bovine & Equine Urogenital Surgery,* DF Walkens, JT Vaug, Lea & Febiger, 1980

Tox: *Clinical and Diagnostic Veterinary Toxicology,* Osweiler, Kendal/Hunt Publ Co, 1985

VC/T: *Vet Clinics of N Amer (VCNA), Food Animal Practice, Female Bovine Infertility,* SF Braun, 9(2) 1993

VC/S: *VCNA, Surgery of the Bovine Digestive Tract,* DG Bristol, WB Saunders, 6(2) 1990

VC/F: VCNA, *Metabolic Dizs,* TH Herdt, WB Saunders, 4(2) 1988

VC/L: *VCNA, Bovine Lameness and Orthopedics,* JG Ferguson, WB Saunders, 1(1) 1985

VC/M: *VCNA, Update on Bovine Mastitis,* KL Anderson, 9(3) 1993

VC/N: *VCNA, Bovine Neurologic Diseases,* JC Backer, 3(1) 1987

Introduction - 3rd & 4th Editions

Like all infants, this book has grown into a more complete and usable clinical reference. Most of the changes made to the 3rd and 4th editions were of the "editing" kind. New references were added and updated, along with a few conditions not included in the second edition. "Student's" was dropped from the original title as practitioners have found it a useful addition to their clinic; those initially using it now practicing what they learned. It is hoped that it will be useful to all who endeavor to do just that, practice.

Susan Pasquini

Introduction - 2nd Edition

This second edition is the result of pretending to be a senior vet student and using the first edition. Obvious holes became evident and the other students preferred the more completeness of the "Equine Guide". New Additions:

Over 360 conditions have been added to the first edition
A toxicology chapter and a differential diagnosis chapter have been added
New references have been added under each new condition
A new summary box in the lower left corner has been added to important conditions, for a qui
Stars have been added under the references to indicate prevalence of each condition
*** = seen once a month
** = seen once a year
* = maybe once a lifetime. This will vary depending on region of the country
Chapter index on first page of each chapter

Dr. John Kirkpatrick and I read through the whole text. He added his practical knowledge and the "stars" for prevalence of each condition. Dr. Gregor Morgan read the reproduction section.

The mass of information is overwhelming and this is only one of the many species you are expected to know. Who's kidding who? Veterinary schools are trying, but coming far short of helping the student get a handle on all this material. Traditionally the first 3 years are spent in classrooms cramming information. It is said that these years are to teach students how to look up information; you learn when you get out in practice. The student would be better served by exposure to the clinics at least part time all four years. If your school doesn't do this formally, take it upon yourselves. This guide will hopefully help you do this. Spend time in the clinics so that the different conditions have a "face". You need to see the conditions, not just copy down a list of symptoms to learn. Blowey & Weaver's *Color Atlas of Diseases & Disorders of Cattle* is a way to put pictures to the conditions. Hopefully this guide will open up the clinics for the lower classmen without trying to read an incomprehensible 200

Condition

References: See inside front cover

Facts/Cause: Important information (Cause, Pathophysiology, Hx (history), Incubation period (IP), Transmission, etc.)

Presentation/CS: clinical signs that can be visualized from a distance, or that owner might report

Diagnosis: CS (clinical signs) found by palpation, auscultation, lab tests, postmortem [PM], etc.)

Treatment

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Tetanus, Lockjaw Mk 330; IM 1023; C3T 567; BR 677; Br 567; VC/N 89; Pic 205 ** 	• ***Clostridium tetani*** - **Toxin** producing, **Spore** in soil/feces - World wide distribution - All species susceptible • Gen. individ. cattle, not herd outbreak • IP 10-14 d (wk - wks) • Transm.: Contamination of uterus - Deep puncture wounds • **Toxin** ascends nerves to spinal cord, causing ascending paralysis, - **Reduce inhibition to motor nerves, causing hypertonia & spasms**	• **Initially muscle spasms** - Masseter, neck, hindlimb • General stiffness • **Tonic spasms** & hyperesthesia • **Sound & tactile stimuli** • **Muscular rigidity** - **"Lockjaw"** (masseter) - Prolapse of 3rd eyelid - **Erect ears** - Retracted eyelids - **"Pump handle" tail** - **Sawhorse stance** • **Bloat** • Excess salivation • Regurgitation of feed & water • Convulsion - recumbency 	• **Usually presumptive Dx**: Hx & CS • No reliable clinical test for Dx 	1. **Remove source** 2. **High levels of penicillin** 3. **Antitoxin** if early 4. **Muscle relaxation** 5. **Support** - **Quiet, dark stall** - **Good footing** - **Good nutrition**   Px: Good, if can make stand, better than horses; If survive 7 ds - fair to good; Long recovery, 3-4 wks  **Prevention: No immunity on recovery** • Generally don't vaccinate (because more resistant than horses & small ruminants) 

Toxin - ↓Inhib. on motor nerves
CS: Muscular rigidity - "Sawhorse"
Tx: Penicillin, Muscle relaxants, Quiet
Px: Good if standing; Long recovery

DDx:
- Polioencephalomalacia
- Enterotoxemia
- Lead toxicity
- Salt poisoning
- Bact. & viral encephalitis

Prevalence:
*** = See once a month
** = See once a year
* = Maybe once a lifetime

Summary Box: Key words

DDx: Differential diagnosis

Prognosis (Px):
- Good
- Guarded
- Poor
- Grave

page chart. Examine an animal in the clinic at your level of knowledge. Pretend you are the veterinarian in charge. Find in the animal's chart the physical exam finding and the differential diagnosis. Think about these. Check the diagnosis and look up the condition in this guide. Then see if you can detect any of the clinical signs. Hold the medicine being used and imagine yourself administering it. Guess if the animal will survive. Check on its progress over time, refreshing your memory with the guide and other texts if you have the time, over and over. Later in lectures, when a condition comes up, you will have a specific animal that relates to it. Then read about each condition over and over again, even if you just scan the texts.

Introduction - 1st Edition

Student's Guide to Bovine Clinics is a quick reference guide for veterinary students. It should be especially helpful during the senior year in clinics.

The idea for this guide comes directly from Heidi Tschauner's ***Senior Veterinary Student's Guide to Small Animal Clinics***. Dr. Tschauner compiled her guide as a senior veterinary student to help her assess cases quickly until a more thorough reference could be located. These pocket-sized guides are compiled by many senior students to provide quick references for pertinent veterinary facts. Heidi's idea was for seniors to help revise her book to help other veterinary students. Once Heidi put all the information in the computer, Susan Pasquini (my wife) and I arranged it into charts and Sudz Publishing published it. Its instant success has been exciting.

For the last two semesters Susan has been in her junior year of veterinary school. She brought her portable computer to class and typed the large animal medicine and surgery lectures. I then tightened them using the *Merck Manual*, Smith's *Large Animal Internal Medicine* and a number of surgery texts, and put them into chart form. Susan would proof read and correct the charts. Then before her tests we would study from them, correcting and clarifying as we did so. This coming year I am going to pretend to be a senior again (most fun year in veterinary school!) and wander around the clinics with Susan to judge and revise the guides.

This deviates from Heidi's idea of seniors making life easier for other seniors. Our rationalization is, having been out of veterinary school for thirteen years making anatomy books, I've forgotten most of this information, thus the guide will give a quick and complete review.

The ***Student's Guide to Bovine Clinics*** also goes into more detail than Heidi's, which was a concern, changing something that works. To compensate, different sized type and bolding important information was used. The key words in the shaded box provide a handle on each condition. Bold type allows skimming facts/causes, clinical signs, diagnosis and treatment. More in-depth information is given in light type and small type. Other texts keyed under the condition allow for quick references. John Roberts did many of the cartoons. Those done by me tried to follow his style. The cartoons add life and help page recognition.

In Veterinary school I had trouble with many of the methods and attitudes of some of my professors. Many seemed to expect me to remember everything I had ever been told in classes semesters earlier. I usually didn't! If as a child I had been lectured on the ABCs, tested two weeks later and expected to remember forever, I probably wouldn't be able to use a keyboard today. The key to learning all this information is seeing as many patients as possible and reading as many texts on each condition over and over to supplement veterinary classes. Then go back to the guide and try to organize all the facts in your mind over and over again. Differential diagnoses, the key to diagnosis, are highlighted in a shaded box.

In the senior year many teachers embarrass students with how little they remember. When in a panic, slide around the corner and quickly read through a condition in the guide. Short term memory may allow an intelligent answer to the teacher in front of your peers.

During under class years, this may be the book to keep the forest in focus while dealing with all the trees. Classes such as pathology, clinical pathology, parasitology, virology, bacteriology, neurology, etc. deal with conditions not fully discussed until later in medicine and surgery classes. Read about them in this guide to get an overview of facts, clinical signs, diagnosis and treatment. This should make these conditions less disconnected, thus more meaningful, and easier to learn.

This Guide is incomplete, but with continued work and the help from other seniors and faculty members it may turn into the key to Bovine Clinics. Please send any ideas, criticisms, praise, corrections or charts to:

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(940) 686-9208

Most of all, as you go through veterinary school remember the feeling on finding out that you had been accepted to veterinary school and that you would one day be a veterinarian. Veterinary school seems to kill this excitement, don't let it!

Chris Pasquini

Disclaimer: the authors do not assume any responsibility for any results obtained from the procedures, treatment, drugs, and dosages used; nor shall the author be held liable for any misinformation or errors that may have been obtained by any persons or organization using this book.

Acknowledgments: Susan Pasquini's work makes up the heart of this book, her revisions and corrections make up its complexion. John Robert's illustrations give it personality. Tory Yaphé gave it its index. I would like to thank Lynn Lankes, DaLee Caryl, Jason Steinle and other Oklahoma State University students of the class of '95 for editing. Thanks to Anne Cougar and Nancy Cathey, librarians at OSU. Thanks goes to Dr. Kerstin Thorén-Tolling for the Clinical Pathology Chart. And lastly the Students of Ross University who made my three years in paradise just that.

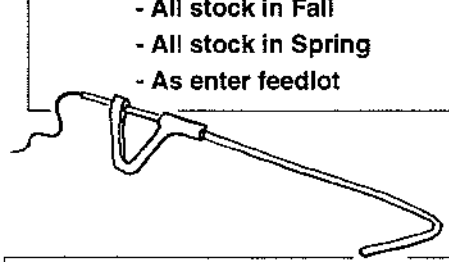
Table of Contents

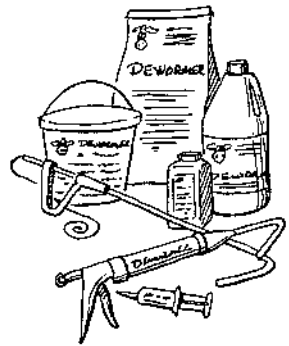
Internal Parasite Control

IM 1701; Br B15

Deworm (Spring calving)

- **Cow: After calving; Before pasture**
- **All stock in Fall**
- **All stock in Spring**
- **As enter feedlot**



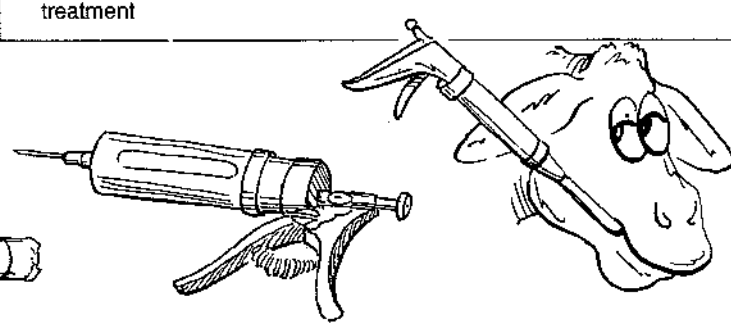


Anthelmintics

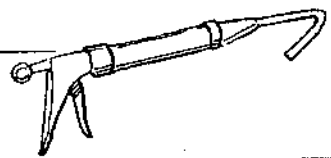
- **Beef cows**
  - Ivermectin, Valbazen® (albendazole), Synanthic® (oxybendazole) or high-dose Panacur® (fenbendazole) will get inhibited Ostertagia larvae
  - TBZ® (thiabendazole), Panacur® (fenbendazole) or Levamisole will get all important GI worms, except inhibited Ostertagia larvae
- **Dairy cows**
  - **Rumatel®** (morantel tartrate) or **Baymix®** (coumaphos) at any time (dry or lactating) because they have no milk withdrawal time, TBZ has 96 hr withdrawal & the rest are not recommended for dairy cows of breeding age
- **Fluke area**
  - Clorsulon or albendazole
- **Miscellaneous:** many anthelmintics used in past are infrequently used or not at all
  - Phenothiazine & hygromycin
  - Piperazine: Lungworm Tx, replaced by others because requires 3 day treatment

Deworming program (no single program fits all area & climate conditions, below is a starting point to greatly reduce Ostertagia problems, including inhibited larvae)

- Spring calving
  - Deworm cows at end of calving season, right before turnout to summer pasture
  - Deworm spring calves by midsummer (ideal [supplement blocks, top dressing])
  - Deworm all stock in late fall (at weaning in beef calves)
    . Move to clean pasture that day
- Fall calving
  - Deworm cows before overwintering
  - Deworm all stock in Spring, before Summer pasture
- Yearling Spring calves & Fall calves
  - Deworm in late Spring
  - Deworm in Summer if intensively grazed on Summer pasture
- Beef entering feedlot
  - Deworm
- All adult
  - Spring & Fall minimum, coincide w/ management practice



Anthelmintic	Dose mg/kg	Gut Adult	Gut Larvae	Lung	Tape	Flukes Adult	Flukes Immature	Comments	Withdrawal time Milk	Withdrawal time Meat
Benzimidazoles								**Benzimidazoles:** Mech: starve worms, Carbamate anthelmintic, Low toxicity		
Thiabendazole (TBZ®)	66	+	-	-	-	-	-	• Thiabendazole (Rx 861) - Preparations: 43% oral paste, 2 or 15 g boluses, 3.3% cubes & suspension - 110 mg/kg recommended for severe infections, Tx may be repeated in 2-3 wks	3d	96 hrs
Fenbendazole (Panacur®)	5	+	±	+	+	-	-	• Fenbendazole (Rx 662) - 2X dose for hypobiotic larvae (very safe 100 X dose) - Preparations: suspension, paste, supplemental block, Premix for 1 days (crumbles, pellets & cubes), Free choice mineral mix over 3-6 ds	3-13d	-
Albendazole (Valbendazole®)	7.5	+	±	+	+	±	-	• Albendazole - Kills adult flukes & all nematodes, including hypobiotic larvae (Ostertagia) - Oral drench (11%), Not 1st 45 ds of gestation	27d	-
Oxyfenbendazole (Synathic®)								• Oxyfenbendazole (Rx 851) - Preparation: rumen injection, drench suspension, not for breeding age dairy cows	7d	-
Imidazothiazoles										
Levamisole (Tramisol®, Levamisol®)	8	+	-	+	-	-	-	• Levamisole (Rx 543) - Non teratogenic, can use in pregnant cattle; Mech: paralyze worms (cholinergic agonist) - Preparation: SQ injection, oral gel, oral boluses, soluble powder drench, pour-on - Less effective against inhibited larva, Not for dairy cows of breeding age - Narrow margin of safety, toxic signs, injection site reaction so not near slaughter	7d	-
Tetrahydropyrimidines										
Morantel tartrate (Rumatel®)	9.7	+		-	-	-	-	• Morantel tartrate (Rx 792) - Nontoxic, safe in young & pregnant animals, can be feed to lactating dairy cows - Preparation: Oral bolus, medicated premix, Mech: paralysis of worms	14 d	0d
Avermectin										
Ivermectin (Ivomec®)	0.2	+	+	+	-	-	-	• Ivermectin (Rx 516) - Hi activity against nematodes & some ectoparasites (warbles, lice, mange mites & ticks), Hi safety - Preparations: **SQ injection not IV or IM** (1% solution - 1 ml /100 lbs), Pour-ons, or drench - Mech: flaccid paralysis of parasite (Stimulate GABA [inhibitory transmitter]), not for dairy cows - NO effect on trematodes (flukes), cestodes (tapeworms), or protozoa (coccidia) bec. they don't have GABA - Persists in tissue for 2 wks (don't need to move to clean pasture right away & reduces frequency of Tx)	35d	-
Sulphonamide										
Clorsulon (Curatrem®)	7					+	±	• Coumaphos (Rx 178) - Preparation: Premix (mix so 2 mg/kg for consecutive days) repeat at 30 d intervals - Mech: cholinesterase inhibitor, Atropine & 2-PAM antidote	89	**0d**
Anticholinesterase								• Clorsulon (Rx 316) - Only flukacide cleared in USA, effective against flukes 8 wks or older - Preparation: oral drench (1-qt containers), can be used w/ other anthelmintics	2d	**0d**
Caumophos (Baymix®)										



Vaccinations

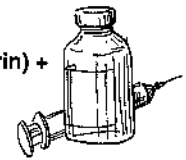
All Cattle

Highly recommended

- **IBR** (pg 252)
- **BVD** (pg 253)
- **Leptospira bacterin** (5 serotypes) (pg 257)

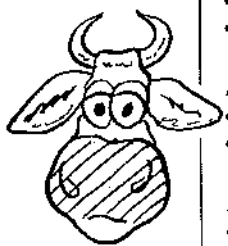
8 wk-old Calves

- **Above (IBR, BVD, Lepto bacterin) +**
- **PI3 (Parainfluenza)** (pg 65)
- **Clostridial bacterin** (pg 250)



6 mo-old Calves

- **Above (IBR, BVD [MLV], Lepto bacterin) +**
- **Bov. resp. syncytial virus** (pg 64)
- **PI3 (Parainfluenza)** (pg 65)
- **Brucellosis** (heifer replacements only) (pg 122)
- **Clostridial bacterin** (pg 250)

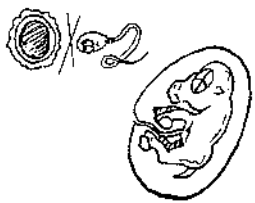


Adult Beef Cattle (bulls, cows & replacement heifers)

- **Above (IBR, BVD [MLV], Lepto bacterin) +**
- **Campylobacteriosis bacterin** (pg 119)

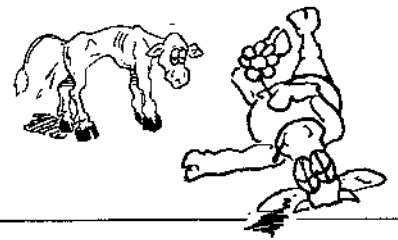
Adult Dairy Cows

- **Above (IBR, BVD [MLV], Lepto bacterin) +**
- No Campylobacteriosis if artificial insemination (AI)



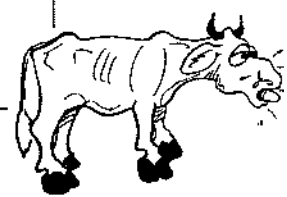
On Entering Feedlot & Stocker Cattle

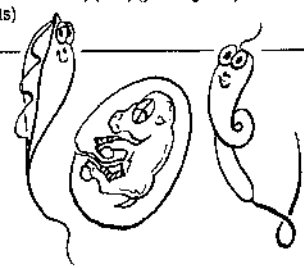
- **Above (IBR, BVD [MLV], Lepto bacterin) +**
- **Bov. resp. syncytial virus** (pg 64)
- **PI3 (Parainfluenza)** (pg 65)
- **Pasteurella vaccines** (pg 255)



Specific herds &/or in specific geographic areas

- *Trichomonas fetus*
- Anaplasmosis (inactivated)
- *Clostridium hemolyticum* bacterins
- Anthrax vaccines
- *Clostridium novyi* bacterins
- Rotavirus-coronavirus (inactivated)
- *E. coli* bacterins
- *Leptospirosis hardjo* bacterins
- *Staphylococcus aureus* bacterin-toxoid
- *Moraxella bovis* bacterins (more common in young)
- Campylobacteriosis bacterin
- Malignant edema (Cl. septicum)
- *Hemophilus somnus* bacterin (calves)
- Pasteurella bacterins (not in adults)
- ***Moraxella bovis* bacterins** (yearling dairy heifer replacements)
- ***Hemophilus somnus* bacterin** (yearling dairy heifer replacements)
- **Blackleg (*Cl. chauvoei*) (196)** (yearling dairy heifer replacements)

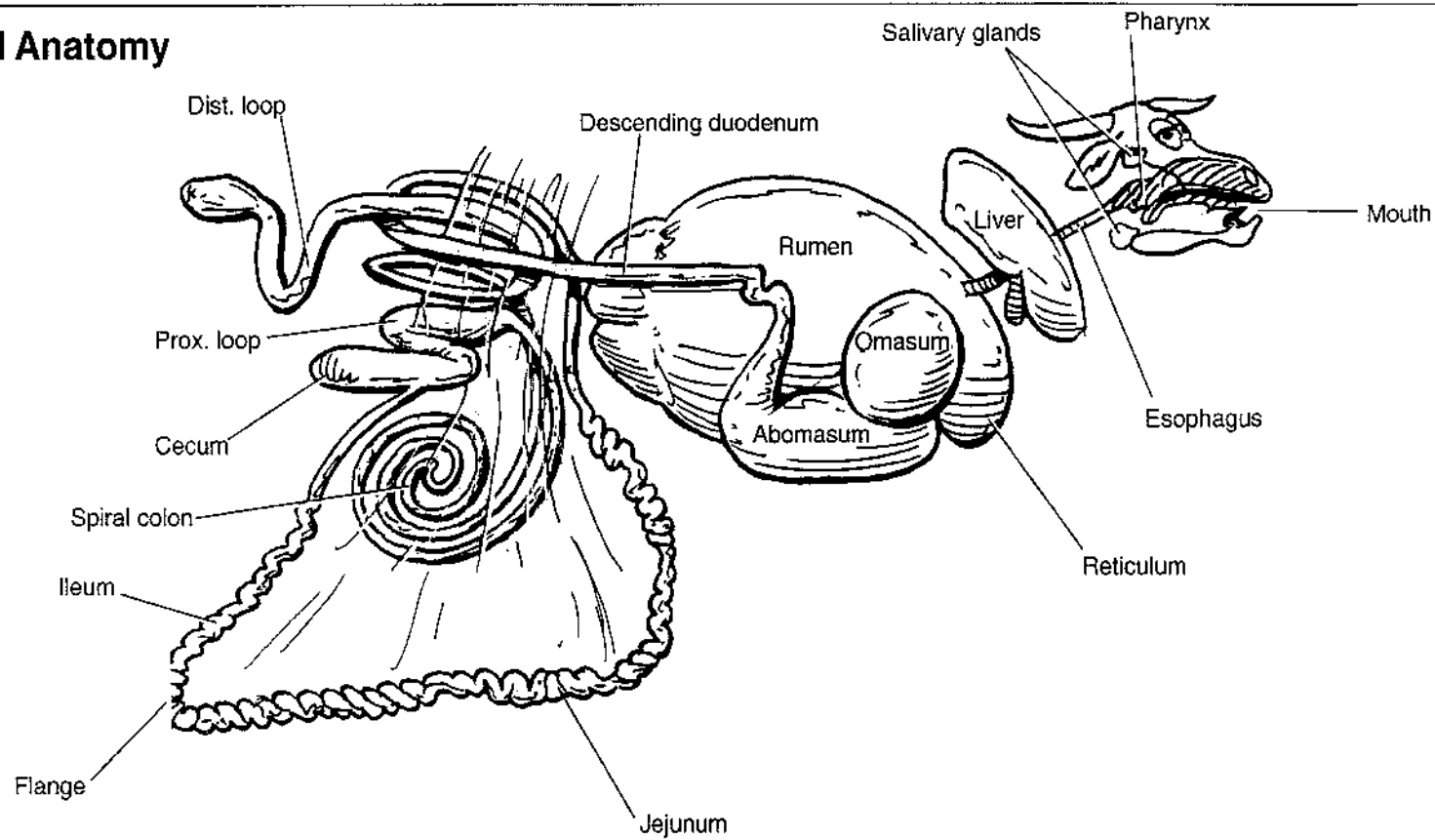


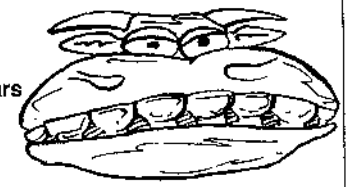
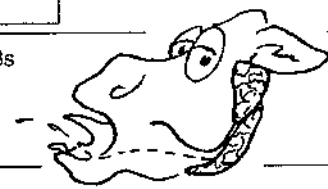


GASTROINTESTINAL TRACT- I

GI Anatomy - Mouth

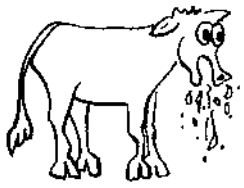
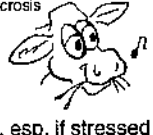
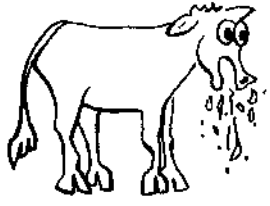
GI Anatomy



Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Dental disorders Mk 115; C2T 713; IM 789; BR-hb 64, 67; BR 174; BM&S 658; Br 629; S-J 498; S-O 399; S-N 63; Pic 55; GI 705 ***	• **Teeth problems: horses >> cattle** • **Dental caries**: older animals, black pigment, usually doesn't cause interference w/ eating, m/ lead to periodontal diz • **Premature dental attrition**: > 5 yrs old, due to grazing sparse vegetation on sandy soil, or mineral imbalances (Ca or Ca:P ratio); CS: unthriftiness & weight loss • Tx: balanced rations & don't overgraze • **Fractured teeth**: usually cheek teeth • CS: most asymptomatic • Tx: remove w/ molar forceps if painful • **Osteodystrophy fibrosa**: goats > sheep & cow; resorption of Ca from bone & replacement w/ fibrous tissue • **Periodontal diz** (periodontitis, broken mouth, alveolar periostitis): Sheep > cattle; chronic bact. infec. of periodontal membrane which holds tooth in alveoli • CS: loss of teeth, mastication problems, weight loss • Tx: Broad spectrum ABs (oxytetracycline), extraction of abscessed tooth			**Rough aging by incisors** • **Eruption** of incisors I1 - 2 yrs I2 - 3 yrs I3 - 4 yrs I4 - 5 yrs • **Neck appears** I1 - 6 yrs I2 - 7 yrs I3 - 8 yrs I4 - 9 yrs 
Jaw Fx Pic 56	• Symphyseal fxs: isolate & bring cut food to animal, heals in 3 wks; Other fxs: more difficult, but if no displacement, Tx the same or wire together; If displacement slaughter			
Cleft palate, Palatoschisis Mk 109, IM 1725t; BR-hb 89; BR 231; Br 146; S-O 422; GI 705 **	• Palate closes from rostr. to caud., - Defect always at back • Inherited in Charolais cattle • Commonly occurs w/ other defects such as arthrogryposis	• Nurses, then stops • Milk comes out nose when head is down • Dies of starvation if gross defect	• Oral exam - M/b difficult if just in soft palate	• Euthanasia if gross defect 
Emesis or vomiting ** C1T 869; BR-hb 65; Br 111, 630; DC 122	• See DDx pg 280 • Regurgitation (reverse peristalsis) is normal (chewing cud) in ruminants • Vomition: uncommon sign in ruminants	**Causes** • Toxicities (most common, e.g., azalea • Choke • Rumen overload • Abomasal impaction • Papillomas of esophageal groove • Megaesophagus • Actinobacillosis of esophageal groove • Painful teeth eruptions • Terminal stages of milk fever • Other causes reported (bloat)		
Salivary glands IM 793; BM&S 656; BR-hb 68, 89; BR 175, 231; S-O 425 ***	• **Sialadenitis** (inflam. of salivary gland) • Tx: reduce swelling, drain abscesses & broad spec. ABs • Wounds & infections of glands usually heal well by 2° intention • Wounds or blockage of salivary ducts m/ cause fistulae or mucoceles (salivary cysts) or **ranula**: cystic dilatation in mouth			
Salivary tumors	• **Rare**: pleomorphic carcinomas & squamous cell carcinoma *			
Ptyalism Br 110 ***	• Excessive salivation • Cause: 2° to choke; pain in mouth (stomatitis), pharynx or esophagus, calf diphtheria, FB, abomasal impaction, ruminal disorders, spoiled silage; heavy metals, rabies & pseudorabies, slaframine, swallowing problems (choke, CNS)			

Mouth

DIGESTIVE SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Stomatitis Mk 128; BR-hb 66; BR 171; BM&S 650; Br 626; Pa 5 *** 	• **Inflam. of oral cavity** - Gingivitis (gums) - Glossitis (tongue) - Palatitis (palate) • 1° condition - Trauma . Plant awns . Foreign bodies . Malocclusion of teeth . Chemical (see box) • **2° to several diseases** (see DDx)	 • **Excessive salivation** • Altered chewing • **If severe, ↓ appetite** • Local or general areas of acute inflam. • + Bacteria - necrosis, **halitosis** • Swelling of local lymph nodes • Swelling of face in assoc. w/ cellulitis **Chemical** - creosol on fences, plants of crowsfoot family containing ranunculin (cowslip, crocus, buttercup, pasque flower), prolonged Tx w/ mercurials, arsenicals & iodides	• History (Hx), CS  **DDx & Causes** • **Severe uremia** • **Infectious causes:** - Bovine papular stomatitis (p 8) - Wooden tongue (p 13) - Foot-&-mouth disease (p 11) - Malignant catarrhal fever (p 10) - Bovine viral diarrhea (p 9) - Bluetongue (p 10) - Necrotic stomatitis (p 12)	• **Most recover rapidly & uneventfully** once cause is removed • Severe cases - treat - Broad spectrum ABs - Mouth wash - mild antiseptics (0.5% hydrogen peroxide, 5% sodium bicarbonate, 1-3% potassium chlorate) 
Bovine papular stomatitis (BPS) Mk 372, C3T 426; C2T 479; IM 805; BR-hb 391; BR 1009; Br 216; BM&S 654; DC 183, 230; Derm 102; GI 707; Pa 6; Pic 52 *** 	• Calves (2 wks - 1 yr) • Parapoxvirus - related to pseudocowpox • Transmission - direct contact • **10-100% infected** (young calves in close contact) • Not seen in small ruminants 	• **Mild** in cattle w/o systemic signs • **Reddish, raised papules** (0.5-1 cm) - Active for a week, then regresses - On muzzle, lips, oral mucosa, esp. hard palate, inside nostrils, esophagus - Increase in size, then central necrosis • **Salivation** • Loss of appetite (pain) • Nasal & oral secretions • **Self-limiting,** short lived • Recurrence in few cases, esp. if stressed • **Teats not affected**   **DDx:** • Vesicular stomatitis (p 11) • FMD/MD (p 11) • Rinderpest (p 9) • BVD (p 9)	• **Significance: confusion w/ DDx of other forms of stomatitis** • **Calves 100% infection rate** • **Papules:** characteristic lesions • **Virus isolation** 	• **Self limiting** • Palliative - Soft food (mash) - Nasogastric tube feeding, if severe - Mild astringent rinse, removes necrotic debris - Antibiotics (ABs) for 2° infections **Prognosis: Good**  **Prevention** • NO vaccine • Reduce stress 

Calves, 100% Infected, Virus
CS: Mild, Papules
Dx: DDx from serious stomatitis
Tx: Self limiting

PH Humans: painful proliferative lesions of the hands

Rinderpest, RP

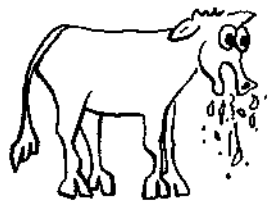
"Cattle plague"

Mk 404, C3T 444, 899; C2T 497; IM 820; BM&S 142; Br 543; BR-hb 384; BR 980; Derm 113; Pa 5; Pic 191

USA FREE

- **Never occurred in N. Amer.**
- Rinderpest virus (Paramyxovirus)
- **Most severe** infec. diz of cattle
- **Highly contagious** (morbidity 99%)
- **Fatal** (mortality 25-90%)
- Cattle & water buffalo >> sheep & goats
- 1 of 4 distinct cattle plagues
- Reportable

- Epidemics (plagues)
- **Fever**, depression, anorexia
- Dry nose
- **Oral erosions** (similar to VS, FMD)
- Purulent lacrimation
- **Severe diarrhea**
- Dehydration & emaciation



- CS, report
- **Lab confirmation**

DDx:
- Bluetongue (p 10)
- VS (p 11)
- BVD (p 9)
- MCF (p 10)
- Arsenic (p 202)
- Coccidiosis (p 260)
- IBR (p 252)
- GI - diarrhea (p 16)

- Tx unrewarding

- **Quarantine**
- **Slaughter** affected animals & exposed ruminants & swine
- Disinfect area

Prognosis (Px):
- **Grave: Death 25-90%**

USA FREE

Not in USA; Severe; Contagious (99%)
CS: Fever, GI (Necrotic Stomatitis)
Tx: Has never occurred in N. America
Px: Grave - 25-90% Die

Mucosal disease, Chronic BVD, BVD/MD

Bovine viral diarrhea/ Mucosal disease

Mk 166; IM 806; GI 707; DC 230; L 115; Pa 5

***

- See GEN pg 253
- **Togavirus**
  - Cytopathic & noncytopathic biotypes
  - Immunosuppressive
  - **Mucosal diz requires both biotypes to develop**
- Transmission:
  - Direct or indirect
  - Transplacentally
- Incubation: 5-10 day
- **8-24 mo, all ages**

1. Inapparent infections
2. Classical BVD: Diarrhea, Oral erosions
3. Respiratory diz
4. **MUCOSAL DIZ (chronic BVD)**
   - **Total anorexia - cachexic**
   - Enophthalmos (from loss of fat, not dehydration)
   - **Oral erosion**, nares, teats & vulva
     - Ulcers develop whitish-gray to yellow diphtheritic membrane
   - Erosive coronary band & interdigital space
     - **Lameness**
   - **Die w/in 2 months**
   - **Dermatitis** (from hyperkeratosis to erosive lesions)

- **Presumptive - physical exam & necropsy**
- **Definitive Dx requires 2-3 weeks virus isolation**
- Severe leukopenia
- **DDx Rinderpest & FMD**

DDx:
- **Rinderpest** (p 9)
- **FMD** (p 11)

- **BVD/MD - cull**
- **Persistently infected cows** - sold to slaughter

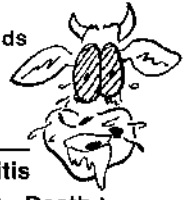
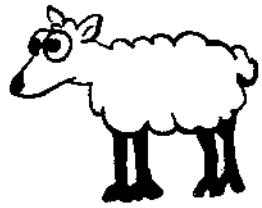
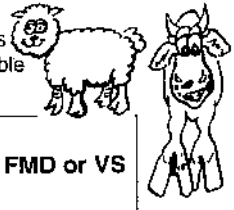
Prognosis (Px): Grave
- **Virtually 100% die,** low morbidity

May require both non- & cytopathic biotypes
CS: Oral lesions, Cachexia, Lameness, Death
DDx: Rinderpest & FMD
Tx: Cull

BVD/MD

Oral Cavity

DIGESTIVE SYSTEM

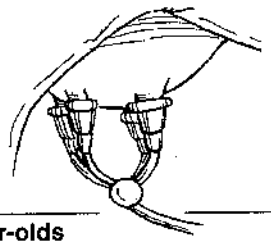
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Malignant catarrhal fever (MCF), **Malignant head catarrh, Snotsiekte, Catarrhal fever, Gangrenous coryza** Mk 397; C3T 421; C2T 473; IM 638, 814; Br 765; BR-hb 387; BR 989; Derm 108; DC 215, 230; GI 780; N-L 81; VC/N 51 ******	• **Herpes virus** - 2 strains - In Africa & in zoos assoc. w/ Wildebeest - **"Sheep assoc. agent"** (doesn't cause diz in sheep) - **Vasculitis (endothelium) & disruption of epithelium** • Sporadic, low morbidity (usually see in 1 animal) • **General, Skin, GI or CNS forms** • > 1 yr. old (all ages of cattle) • IP 3-10 wk • **Course 3-7 ds**  **Assoc. w/ Sheep, Fatal vasculitis** **CS: Head & Eye, Skin, GI, CNS - Death** **Dx: Epith. bleeding & ulcers** **Tx/Px: 100% Die**	• **Peracute generalized diz** - **Fever**, depression, anorexia - **Sudden death** - **Enlarged lymph nodes** • **GI/Resp - catarrh** (inflammation of mucous membranes w/ discharge) - **Severe diarrhea & dysentery** - **Dyspnea**, Enlarged lymph nodes • **Head & eye** (most common) - Profuse, mucopurulent nasal & conjunctival discharge - **Oral & upper resp. ulcers** (buccal papillae) - Ophthalmia & corneal opacity, hypopyon (pus in ante riorchamber of eye) - Encrustation of muzzle - Salivation • **Skin thickened, fissured** - **Lameness** (hoof & horn shedding m/b - vasculitis) • **CNS** (general nervous system) - **Behavioral changes** (aggression or docility) - Weakness, Tremors, nystagmus, convulsion, paralysis	• History (sheep), CS • Serology not very reliable • **Postmortem:** - **Epithelium hemorrhagic &/or ulcerative** - Upper & lower GI, urinary bladder - Lymph tissue & liver enlarged - Histo. - damage to epithelium & blood vessels  Dorland's Dict: says catarrh has been practically eliminated from the scientific vocabulary!	• **Unsuccessful** **Prognosis (Px): Grave** - **100% w/ CS die** **Prevention:** • **Do NOT graze w/ sheep** • **No vaccine** **DDx** • Rinderpest (p 9) • FMD (p 11) • BVD/MD (p 9) • Vesicular stomatitis (p 11) • Blue tongue (p 10) • Arsenic toxicity (p 202) • C napthalene toxicity • Encephalitis (p 154)
Bluetongue Mk 390; C3T 435; C2T 488; IM 799; BM&S 176; Br 527; BR-hb 397; BR 1028; Derm 113; DC 190, 230; S-O 407 *******	• **Mainly a sheep** diz > cattle • **Culicoides**, Arthropods - Biting midge • Orbivirus • Reportable  **Sheep > Cattle** **CS: indistinguishable from FMD or VS** **Tx: Reportable**	• **Cattle** - **Generally mild or inapparent** - **Oral lesions, ulcerative coronitis** - **Difficult to distinguish from FMD or VS** **Sheep** - fever, edema of head, salivation, nasal discharge, oral ulcers, pulmonary edema, 2° bronchopneum., lameness, diarrhea, death - **Cyanotic tongue** (hence name) - Teratogenic effects ("dummy lamb")	• History, CS • Virus isolation • ELIZA, neutralization	• **REPORT** to Feds - cattle • ABs for 2° infection Prevention - control vector **DDx:** Vesicular stomatitis (identical) (p 11) B papular somatitis (p 8) Rinderpest (p 9) Malignant catar. fever (p 10) IBR (p 252) Enzootic hemorrhagic diz Teat lesions - Bov. herpes mammillitis (p 187) - Pox virus (p 186)

Vesicular stomatitis, VS

Mk 372; C3T 447; IM 817; BR-hb 382; BR 976; Br 546; DC 189, 277; Derm 113; GI 707; Pa 5; Pic 52

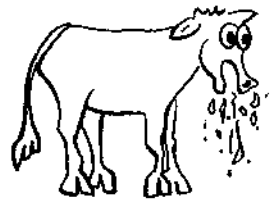
*

- **Equine, pigs & cattle**
- Rhabdovirus, can't penetrate intact mucous membranes
- Abrasions in mouth
- Spread by poor milking hygiene (machine or by hand)
- Cyclic/sporadic every yr & m/b epidemic
- Short incubation
- **6-8 yr**-old retired dairy cattle
- **Reportable disease** due to similarity to FMD



Identical to FMD
- **Epidemic**
- **Ulcerations of mouth, teats & interdigital areas** (macules to papules to vesicles to ulcerations)
- Temp 106° F, then decreases
- **Excess salivation**
- Dysphagia, reluctance to eat, Lose weight
- Decr. milk production
- **Lame if on feet**
- Recover 2-21 d

- **Sequelae**
  - M/not regain milk production
  - M/ block teat canal - mastitis



- CS, Hx (6-8 yrs-old)
- Viral isolation from lesions
- Serology - serum neutralization test - rapid titer formation

DDx:
- **FMD** (p 11)
- BVD (single animal) (p 9)
- Rinderpest (single animal) (p 9)
- BPS (single animal) (p 8)
- Bristle grass (p 240)
- IBR (p 252)

- **REPORT to Feds**
- Supportive therapy & isolation
  - Soft feeds & fresh water & shade
- ABs in severely debilitated - 2° infection
- Teat lesions
  - Milk infected cows last
  - Ointments to protect from flies, etc.

Px: Good, Death uncommon (high morbidity, low mortality)
- Recovery 2-21 ds
- M/ not regain milk production

Identical to FMD, 6-8 yr-olds
CS: Identical to FMD: Ulcers - Mouth, Teats, Digits
Dx: Viral isolation, Serology
Tx: Reportable

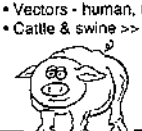
Prevention & Control
- Notify Federal agents, they take over
  - Disinfect the environment - 10% formalin or iodides
- Two vaccines, rarely used, except where recurring epidemics on same farm yearly Adm. under fed. agent supervision. Vaccine interferes w/ serological testing

Foot-&-Mouth disease (FMD), Aphthous fever

Mk 338; C3T 437; C2T 490; IM 819; BM&S 153; Br 537; BR-hb 378; BR 965; Derm 111; GI 707; L 113; Pa 5; Pic 189

USA Free

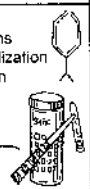
- **USA FMD free - Reportable**
- **Economically devastating**
- Picornavirus
  - Attaches to epithelium of GI tract
- Transm. - aerosol, Highly communicable
- Vectors - human, milk, carcass
- Cattle & swine >> sheep & goats



USA - FMD free, Economically devastating
CS: Like VS, Wt. loss, Abortions, Mastitis
Dx & Tx: Report, Quarantine, Slaughter

- **Identical to vesicular stomatitis** (see above)
  - Blisters & vesicles on mouth, teats & feet
  - Ulcers, reluctance to move
- Rapid spread
- Mastitis
- Weight loss
- ↓ milk production
- Freq. abortions

- **Reportable**
- Viral isolation from lesions
- Serology - serum neutralization test - rapid titer formation
- ELISA, CF, FA



DDx:
- Vesicular stomatitis (p 11)
- BVD (single animal) (p 9)
- Rinderpest (single animal) (p 9)
- BPS (single animal) (p 8)
- Bristle grass (p 240)
- IBR (p 252)

USA FREE

- **REPORT to Feds-USA**
- **Quarantine**
- **Slaughter all affected & exposed herds**

Prevention
- Vaccines used in countries where enzootic, not USA

Upper GI Diseases

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Necrotic stomatitis, Oral necrobacillosis Mk 719, IM 627; BR-hb 346; BR 878; BM&S 652, 200; Br 626; BA 214; Pa 7 ***	• *Fusobacterium necrophorum* invades broken skin & laryngeal cartilage • **Necrotizing endotoxin** • Normal inhabitant of oral cavity • Predisposing factor - Trauma to oral mucosa (erupting teeth, coarse feed, or other infections) • **Necrotic stomatitis** - Calves < 3 mo (2 wks - 6 mos)	• **Necrotic STOMATITIS** - **Deep, necrotic ulcers, oral & pharyngeal cavity** - Trouble nursing, depressed, anorectic, 104° F - Fetid odor to breath - Salivation, drooling, puffy-cheeked appearance • **Sequela:** - **Necrotizing pneumonia** . **Acute** (sequela due to aspiration of infected tissue) . **Death**	• **History (trauma), CS** • **Necrotic ulcers**	• **Isolate** from healthy calves • Debride ulcers • Topical diluted iodine sol. to swab ulcerated areas • Flush mouth with K^+ permanganate • Force feed • Starts to resolve in 3-5 days, deep ulcers fill in & granulate • Rumenotomy to feed m/b **Control:** • Clean & disinfect feeding & drinking areas • Daily PE all calves to find new cases
Calf diphtheria, Laryngeal necrobacillosis, Necrotic laryngitis Mk 719, IM 627; BR-hb 346; BR 879; Br 214, 626, 835; BM&S 652, 200; DC 69; Pa 132 ***	• *Fusobacterium necrophorum* invades broken skin & laryngeal cartilage - **Necrotizing endotoxin** - Normal inhabitant of oral cavity • **Necrotic laryngitis** - Older calves, 6-18 months - **Necrotic ulcers of larynx** (directly behind vocal cords on vocal process of arytenoid) - Diphtheritic membrane - Scar on healing - permanent stricture of airway	• **Necrotic LARYNGITIS** - **Moist, painful cough** - **1° loud inspiratory dyspnea** . Obstruction of airway - **Fetid breath** - **Salivation** - Nasal discharge, often mucopurulent - No stomatic lesions - Dysphagia, 106° F., tachypnea • Untreated some die in 2-7 days due to toxemia & upper airway obstruction • **Sequela:** - **Necrotizing pneumonia** . **Acute** (due to aspiration of infected tissue) . **Death**	• **History** • **CS** (inspiratory dyspnea, Smell) • Laryngoscope - **Diphtheritic material** on arytenoid cartilages **DDx:** • Laryngeal trauma • Pharyngeal trauma (p 14) • Viral laryngitis (IBR) (p 152) • Actinobacillosis (p 13) • Laryngeal edema/Abscesses (p 60) • Trauma • Paralysis • Tumors	• **Treat early & aggressively** - **ABs** (Micotil®, Naxcel®, Tetracycline, Penicillin) - **Isolate** from healthy calves - **Supportive** - Tracheostomy if airway obstruction (last resort) - NSAIDs, incl. aspirin, Banamine® (flunixin meglamine), "bute" **Control:** • Clean & disinfect feeding & drinking areas • Daily PE all calves to find new cases

Bact. *Fusobacterium necrophorum*
CS: Necrotic ulcers
Tx: Debride, topical Iodine

Bact. *Fusobacterium necrophorum*
CS: Necrotic ulcers
Dx: Scope - Diphtheritic membrane
Tx: Isolate, Sulfonamides

Actinobacillosis "Wooden Tongue"

Mk 317; C3T 534; C2T 606; IM 794; BR-hb 334; BR 852; Br 627; BM&S 257; DC 184; GI 706; N-L 177; Pa 8; Pic 57

***

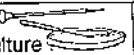
- ***Actinobacillus lignieresi***
  - Gram neg. saprophyte
  - Inhabitant of mouth
- Enters through **abrasions**
  - Coarse feed, straw or fibrous feed
- Cattle, occasionally sheep
- Normally sporadic, m/b herd problem - coarse feed

Abrasions/Coarse feeds
CS: Soft tissue diz
Dx: Sulfur granules, Gr - rod
Tx: IV Na iodine, Px: Good

- **Soft tissue diz**
- **Stomatitis**
- **Hard & swollen tongue** (m/ protrude from the mouth)
- Painful
- **Dropping food,** prehension problems, m/not be able to move to back of pharynx
- **Granuloma formation** on other parts of body by licking broken skin
- Stridor or noise (respiratory)
- Lymphadinitis of head & neck
- Dehydration, weight loss
- Chronically see tongue scarred, smaller & less motile

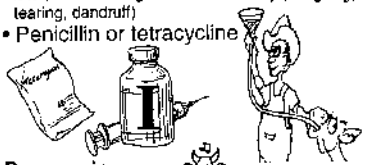
Combiotic® (penicillin/streptomycin combo) commonly misused in past; now outlawed

- Hx, CS
- Biopsy & culture
- Direct smear of exudate
  - **Gram negative rods**
  - **Sulphur granules**
- **Granulomas**
- **Soft tissue, not bone**



DDx:
- Dental diz (p 7)
- Oral foreign bodies
- Pharyngeal trauma (p 17)
- Dizs causing oral pain, vesicular dizs (p 8-12)
- Granulomas
- Tumors
- Polyps
- Cysts

- **Tx during acute phase - successful**
- Bland diet, soft
- **IV sodium iodide,** repeat in 1 wk, then 3 wks later, watch for signs of iodide toxicity (coughing, tearing, dandruff)
- Penicillin or tetracycline



Prognosis:
- Good
- Once chronic - Poor

Prevention: avoid traumatic feed (stems, grass awns)

Actinomycosis, "Lumpy jaw"

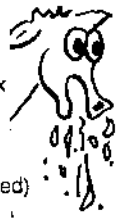
Mk 318; C3T 536; C2T 607; IM 796; BR-hb 339; BR 851; BM&S 255; Br 629; DC 186; Derm 148; GI 706; Pa 8; Pic 58

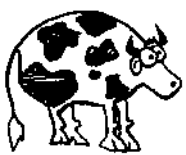
***

- ***Actinomyces bovis*** **(bacteria)**
  - Gram +, branching filamentous
  - Normal inhabitant of mouth
- Chronic bacterial diz of cattle > sheep & goats
- Invades abrasions into bone
  - Teeth eruptions, coarse feed
- **Osteomyelitis of jaw**
  - Mandible > maxilla
- Non-painful swelling
  - Can rupture & drain fetid fluid
  - Contaminates environment

Osteomyelitis of jaw
CS: Bone & soft tissue diz
Dx: Culture, Gr + filament, Rads
Tx: Cull

- **Hard, immovable, bony mass of mandible**
- **Later fistulous tracts**
- Lymphadinitis
- Swelling of the pharynx
  - Bloat
- **Excess salivation**
- Dysphagia
- **Quidding** (dropping feed)
- Early fever, resolves
- Occasional granulomas in other tissues





- History (trauma)
- Palpation
- Culturing the exudate
- Rads
  - Check for pathological fractures or tooth involvement
  - Mandible & maxilla, radiolucent areas, abnormal remodelling

DDx:
- Mimics stomatitis (p 8)
- Always think RABIES (p 144)
- Tooth root abscesses (p 7)
- Tumors
- Osteomyelitis (other org.)
- Fractures (p 7)

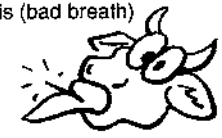
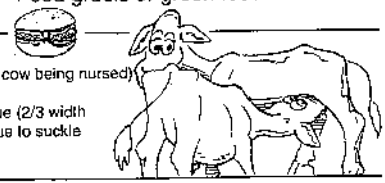
- **Cull** (normally)
- **Iodides**
- Penicillin & streptomycin
- Curette out bone, remove affected teeth (careful of fracture)

Prognosis (Px):
- **Poor**
- Generally animals **do not recover**

Prevention: avoid traumatic feed (stems, grass awns)

Iodides do not cause abortions, but questioned by some

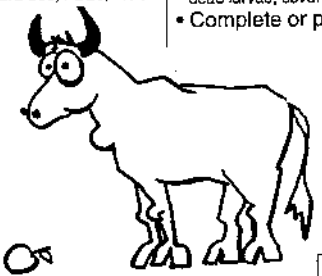
Upper GI Diseases

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Tongue trauma Mk 123; S-J 501; S-O 423 *** Transverse groove Avoid amputation	• **Cattle eat wires, nails,** etc. • **Torus lingua** (dors. swelling at base of tongue) • **Transverse groove** in front of torus lingua - Common site for FB (foreign body) • **Tongue prehensile organ** in cattle	• **Anorexia** • Reluctance to protrude tongue • **Salivation** • Halitosis (bad breath) 	• **Think rabies** (salivation) • **Oral exam** (good restraint, nose tongs, speculum, gags) - Pull tongue out one side **DDx:** • **Rabies** (p 144) 	• **Remove foreign body** • Clean & antiseptics • ABs (antibiotics) • Laceration of tongue - Suture under general anesthesia - **Avoid amputation** of cattle tongues because of prehensile function • Feed gruels or green feed 
Anomalous milk suckling, Galactophagia Mk 924; S-J 501 ***	• **Vice - suckling as adult** • Weaned too early or orphaned • Nuisance • Predisposes to mastitis • Others mimic (epidemic of suckling)	**Tx: Sell for slaughter** - they are nothing but trouble • **Bull ring** or bull ring w/ spikes to face or nose region of the suckler (to cause pain to cow being nursed) • Electrical device to head of suckler which shocks it when it suckles another • **Sx - Remove an elliptical piece of mucosa** from the underside of the apex of tongue (2/3 width of tongue, just in front of the frenulum. This results in scarring, so unable to roll tongue to suckle		
Pharyngeal trauma/ abscesses IM 625, 798; C3T 713; C2T 714; BR-hb 69; BR 176; 880; Br 628; DC 191; GI 706; S-J 502; S-O 426; Pic 60,61 ***	• **Trauma - freq.** (near esophagus) - **Iatrogenic (balling gun**, long dose syringe, paste dewormer gun, rigid stomach tube - causing trauma) • **Retropharyngeal abscesses** • **Cellulitis** • Accidental adm. &/or ingestion of irritants - pharyngitis • Infections (see DDx) • **Mayaffect vagus nerve** (swallowing & eructation)  **Balling gun trauma, Head restraint** **CS: Salivation, Aspiration** **Dx: Endoscope, Palpation** **Tx: Antibiotics, Drain** 	• **Coughing** • **Painful swallowing** (dysphagia) • Anorexia • **Salivation** - mimics other diz (stomatitis) • Feed out nose • Rumen stasis & mild bloat • Pharyngeal obstruction • Swelling of retropharyngeal lnn. • **Sequela:** - **Aspiration pneumonia** 	• History, CS • Endoscope • Pharyngeal palpation (think rabies)   **DDx:** • **Rabies** (p 144) • Infectious agent - *F. necrophorum* - *A. ligniersi* (p 13) - Bovine rhinotracheitis (p 252) • Lymphoid hyperplasia • Pharyngeal obstruction - Foreign bodies - Swollen lymph nodes - Retropharyngeal abscess - Lymphosarcoma	• **Broad spectrum ABs 7-14 days** - Tetracyclines, sulfas, ampicillin, trimethoprim sulfa or pen.+ aminoglycosides • NSAIDs - analgesia & reduce inflam. • **Access to water** (if not drinking gently stomach tube several times 8-13 gal/d water+ electrolytes, esp. 60-100 g of KCl/d) • Soft green grass or feed mash 2 week (when drinking w/o coughing or nasal reflux) • Gradually onto green leafy alfalfa hay • Temporary tracheostomy if dyspnic • **Surgery:** - **Drain into pharynx** through original laceration (push finger in) or - Go through neck (needle into abscess & cut along needle) **Prevention when using balling gun** • **Head restraint**, go only over torus lingua (base of tongue)

Esophageal obstruction, Choke

Mk 173; C3T 712; C2T 714; IM 822; BR-hb 71; BR 180; BM&S 659; Br 631; GI 707; S-J 504; S-O 430; VC/S 360; Pa 20; Pic 61

***



- **Greedy eating**
  - History - eating **beets, apples,** other large, solid objects
- Dry ingesta - poor quality roughage; if not enough water, dry ingesta forms into a ball
- **Treated *Hypoderma lineatum***, dead larvae, severe reaction
- Complete or partial obstruction

- **Acute**
- **Bloat**, possibly rapidly fatal
- **Difficult swallowing** (retching)
- **Salivation**
- **Feed stuff in both nostrils**
- Acute coughs
- Rapid, shallow breathing (head & neck extended, may swing from side to side)
- Cellulitis around obstruction (painful, hot swelling)
- Chewing movements
- Protrusion of tongue
- Anxious, go off feed

Complications:
- Aspiration pneumonia
- Esophageal rupture
- Esophageal stricture

- History (beets), CS
- **Inability to pass gastric tube**
- Palpate cervical esophagus
- Endoscope - see if sharp object
- **THINK RABIES!** - animal that can't swallow

DDx
- **Rabies** (can't swallow) (p 144)
- Botulism (p 145)
- Tetanus (p 145)

- **Relieve bloat first** (acute) - trocar rumen
- Pass tube gently to localize choke
- **Remove obstruction** (see box)
- Mild, careful tranquillization (w/ swallow when spasm relieved), low dose Xylazine
- ABs (antibiotics)
- NSAIDs
- Soft food (beet pulp)

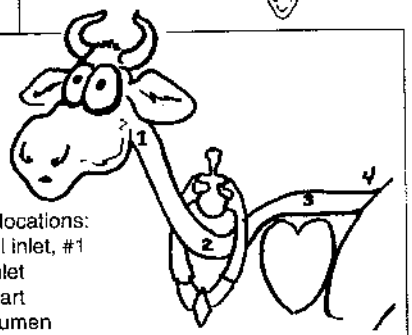
Prognosis: Good if no damage or stricture

Apples & turnips
CS: Acute bloat
Dx: Can't pass tube
Tx: Relieve bloat

Remove object
- Pharyngeal inlet - massage out mouth, or #9 wire loop through mouth speculum, past object, pull out mouth - may use tranquillizer or muscle relaxer (succinyl choline)
- Thoracic - push into rumen w/ stomach tube (be sure its not sharp)
- Near diaphragm - rumenotomy, then pass a tube retrograde

Feed ball: lavage gently with water to break it up

Esophagostomy last resort, problem w/ stricture & poor healing, give ABs, let heal by 2° intention, 2nd incision distally to feed by stomach tube



Four primary locations:
1) Pharyngeal inlet, #1
2) Thoracic inlet
3) Base of heart
4) Cardia of rumen

Esophageal disorders

C2T 714S; IM 823; Br 630; BR-hb 71; BR 179; BM&S 661; GI 707; S-J 503; S-O 428; S-N 65; VC/S 268; Pa 18; Pic 61

**

Esophageal trauma/rupture: Uncommon • Cause: choke, stomach tube or probang. If suspect rupture - immediate slaughter

Esophageal stenosis • Causes: healed trauma, persistent rt. aortic arch, swollen mediastinal lymph nodes, tuberculosis, lymphosarcoma, pneumonia • CS: bloat

Dead cattle grubs *(H. lineatum)* from OPs, see Skin pg 182

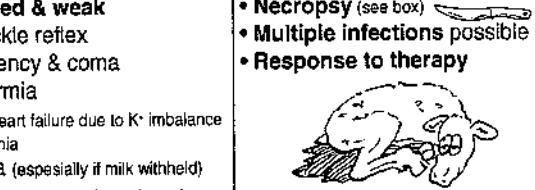
Esophageal dilation (megaesophagus) & hiatal hernia: Rare, assoc. w/ pharyngeal trauma, inflam. of vagus nerve & hiatal hernia (diaphragmatic hernia) & persistent right aortic arch • **CS:** regurgitation or vomiting after eating, bloat
- **Dx:** pass stomach tube to R/O choke, contrast radiographs • Sx: exploration • Rabies must always be R/O in esophageal dysfunction
- **Tx:** fluid by stomach tube 1-2 wks m/b, Sx - hiatal hernia in valuable animal

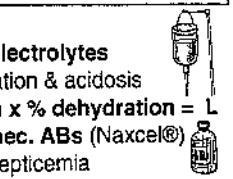
Esophageal diverticula: rare outpocketing

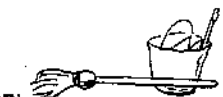
Neonatal Diarrhea

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Neonatal diarrhea, Calf Scours Mk 181; C3T 103; C1T 116; C2T 105; IM 118, 396; BR-hb 296, 86; BR 160, 217, 227, 703; Br 154, 656; GI 755; Pic 21 ***	• **See DDx pg 279** • **Economic loss** $50-120 mil/yr USA • **#1 killer of neonatal cattle** • Cause: - **↑ Secretion** . Enterotoxins (*E. coli*, Salm., Campylobacter) . Inflammation (Salmonella & Clostridia) - **↓ Absorption** . Destruction of absorptive villus epithelial cells (protozoa & enteric viruses) .. Secretions continue & absorption decr., + osmotic effect of unabsorbed substances - Inflammation (Salmonella & Clostridial diz) incr. secretions & decr. absorption - **Fluid & electrolyte losses** leading to **dehydration & acidosis** - **Diarrhea contaminates environ.** • **Predisposition** - **FPT** (failure of passive transfer) - Filthy environment, Overcrowding	• **Diarrhea** • **Dehydration** - cardiovascular collapse • **Acidosis** - impair cardiac function • **Depressed & weak** • Lose suckle reflex • Recumbency & coma • Hypothermia • Death - heart failure due to K^+ imbalance & hypothermia • Cachexia (espesially if milk withheld) • Death - malnutrition or hypoglycemia **Public Health** PH • Salmonellosis • Cryptosporidiosis	• **Etiological Dx** impossible on CS alone • **Lab: feces or tissue** • **Necropsy** (see box) • **Multiple infections** possible • **Response to therapy** **Causes (see p 279):** • *E. coli* (p 18) • Rotavirus (p 18) • Coronavirus (p 19) • Coccidia (p 21) • Cryptosporidia (p 19) • Salmonella (p 20) • BVD (p 22) • Milk replacer	• **Isolate** • **Fluid & electrolytes** - Dehydration & acidosis - **BW (kg) x % dehydration = L** • **Broad spec. ABs** (Naxcel®) prevent septicemia • Check for FPT (failure of passive trans.) - Plasma or blood transfusion **Prevention:** • Environmental hygiene - Disinfection • Dairy - calf hutches • No nose to nose contact • Handle sick animals last, wear gloves, disinfect boots, have feed buckets disinfected • Bacterin vac. cows prepartum (4 - 2 weeks) • **Colostrum very important** (see box)

Necropsy for Neonatal Diarrhea: identify agent assoc. w/ damage to intestine + CS caused by agent
- Examine several calves, early in diz, euthanatize just before necropsy
- Lay a square of gut, mucosal side down, on paper & drop in fixative, or
- Tie off a segment of gut, inject w/ fixative & then drop in fixative
- Tissue examined w/ light or electron microscope for bact. adhering to mucosa or cryptosporidiosis assoc. w/ brush border
- FA for K99 *E. coli* or viruses, *Clostridium perfringens*







COLOSTRUM:
- **Colostrum w/in first 2 hours of life** (from dam) **- 10% of BW w/in 12 hours**
- Local (enteric) immunity: important
- Colostrum deprivation in 25-50% of dairy calves (due to colostrum deprivation, poor mother, early separation from dam) - Beef calves less common
- Assist suckling or hand feed
- Adequate nutrition during late pregnancy in beef cattle important
- High quality colostrum; IgG 1500 mg/dl
- Colostrometer, a tubular device, measures specific gravity & thus immunoglobulins in milk

↑ Secretion (toxin), ↓ Absorption (villi); FPT
CS: Diarrhea, Dehydration, Acidosis
Dx: Hx, CS, Response to Tx
Tx: Isolate, ABs, Fluids, Colostrum

Vaccination
- Bacterin w/ K99 + *E. coli*: effective
- Virus vaccines - checkered past, new

Treatment of neonatal diarrhea

Correct dehydration& acidosis (common causes of death)
- **Depressed calves that don't suckle** (no milk)
  - IV fluids (saline based) + bicarbonate (see below)
  - Hypoglycemia - add 5% glucose to IV fluids
  - Should be up & suckling after 24 hours of Tx
- **Nursing calves & mildly affected calves** (milk in diet)
  - High energy oral electrolytes, or tube feeding
  - Milk + nonbicarbonate electrolytes
  - Multiple feedings 4-6/d better than 2 x/d - better absorption
- **Colostrum/failure of passive transfer** (see box)
  - Give colostrum if less than **18 hours** of age
  - > 36 hours can't use colostrum, must give plasma

Fluids & maintenance 50-100 ml/d & anticipate fluid loss (up to 4 L/day)
- Fluid needed - degree of dehydration (gauged by degree eyeball is sunken & skin tents)
  BW (kg) x % dehydration = amt. given (liters)
  (e.g., 50 kg x 10% = 5 L needed to rehydrate, given over 4-6 hours)
- Isotonic fluids (Lactated Ringer's)

BW x % dehydration = liters

Acidosis - Bicarbonate requirement
- Alert, suckling calves do not need bicarbonate
- Comatose calves require more than depressed calves
- Dehydration has no correlation w/ acidosis
- Ideally give over a 24 hour period, but 4 to 8 hours OK
- Not necessary to completely correct acidosis, get close to normal
- After 24 hrs. calf should be up suckling; if still depressed sign of incorrect metabolic problems or toxemia

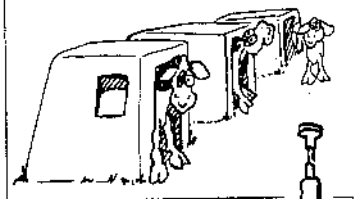
- Add bicarbonate in isotonic solutions (156 mmol/L)
  - Homemade: 13 gm Na bicarbonate (baking soda) in 1 L of water
- **How much bicarb. w/ no lab test available**
  1. Give bicarbonate empirically; or
  2. Rehydrate 1st & if not suckling in 12 hrs, consider giving bicarb
  3. **Empirical starting point**
     - Young calves (< 8 ds) 3 L of 1.3% saline + 1 L of 1.3% Na bicarb
     - Older calves (> 8 ds) 2 L of saline + 2 to 3 L of 1.3% Na bicarb
- **Blood gas measurement**
  - mmol Bicarbonate = Body wt (kg) x Base deficit (mmol/L) x 0.5

Hypoglycemia - most don't have, add "IF" in poor body condition
- Add glucose to IV fluids, 5% concentration (1-2% dextrose/liter) to Lactated Ringer's (4 mEq/l of K)

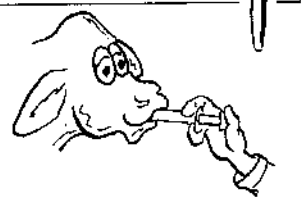
Antimicrobial - frequently used
- *E. coli* & Salmonella only org. that respond
  - Cult./sens. important (resistance high in both; improper ABs select for resistant strains)
- Viral & protozoa not affected directly, but **2° infection,** so ABs
- Prolonged oral ABs m/ cause diarrhea, so don't use on calves older than 5 d, unless evidence of Salmonella or giardiasis
- Oral ABs effective for *E. coli*, 3 days usually sufficient

Milk withdrawal? (take off all milk?) - can reduce severity of diarrhea & depression (milk osmotically pulls water into GI)
- ± 1-3 day w/drawal in depressed calves that don't suckle
- >3 d no benefit even if diarrhea persists, so reintroduce to milk
- Do not withdraw from alert calves that suckle
- Lactase is lost during w/drawal so reintroduce milk slowly
- **Reintroduce milk when diarrhea is resolved**
  - To restart induction of lactase (inducing enzyme)
    Day 1-2 - 2.5 parts milk + 2.5 parts electrolytes (QID)
    Day 3-4 (cut in half elec.) 2.5 parts milk, 1.25 parts electrolytes
    Day 5-6 (cut in half elec.) so 2.5 parts milk, 0.625 parts electrolytes
    Need 10% of body weight in kg per day

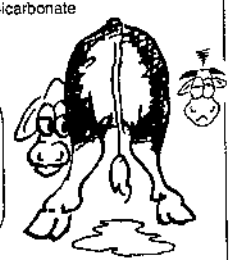
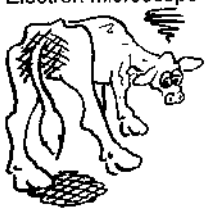
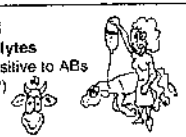
Energy in chronically scouring suckling calf (50 kg/calf requires 2000 kcal & 3500 kcal for weight gain of 0.5 kg/d)
- 3-6 L of whole cow's milk/day
- If no milk being ingested give:
  . High energy oral electrolyte (Lifeguard HE®, Biolyte 50% energy needed if BID 4 L total, 75% if TID 6 L) (Lifeguard HE® only 25%)



Catheterization of calf's jugular vein
- Clip & prepare skin
- Nick skin w/ #15 scalpel blade (skin thick in dehydrated calves)
- If can't find jugular, suspend calf upside-down so blood will pool
- Lay animal flat after catheter placed
- Warm fluids, especially in hypothermic calves



Neonatal Diarrhea

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
E. coli **Colibacillosis, Enteric *E. coli*, Enterotoxigenic colibacillosis** Mk 181, C3T 105, C1T 118; C2T 105; IM 396; BR-hb 298; BR 707; Br 167; DC 155; GI 755; Pa 56; Pic 22 ★★★ 	• **See Gen pg 258** All systems, esp GI • ***Escherichia coli*** **- Enterotoxigenic K99** - Normal GI flora, in GI soon after birth - Adhere & colonize gut wall (pili -K99, F5) • **Enterotoxins/septicemia** - hypersecretions of electrolytes, fluids, bicarbonate, water (dehydration, electrolyte disturbances & hypoglycemia) - May enter through umbilicus, or orally • **< 4 day-old** (occasionally older) • **FPT (failure** of passive transfer) • **Septicemia** - bacteria & their toxins in blood stream, fever not consistent feature of septicemia in neonates	• **Found dead w/ no diarrhea** • **Profuse watery diarrhea**, white to yellow • **Dehydration** • **Acidosis** • **Weakness** • **Death in 6-12 hours (1-4 days)** • Milder forms can't be differentiated from other causes • **Sequelae** - Iritis, hypopyon - Pneumonia - Joints/arthritis - Meningitis - neck rigidity	• **History (< 4 days), CS** • **Culture** feces, looking for K99 pili by indirect immunofluorescence of smears - In huge outbreak, sacrifice calf to Dx - 1° place - ileum & jejunum • More than 1 organism m/b causing diarrhea • **Lab**: - Total volume K^+ deficient - Metabolic acidosis . Low bicarbonate **DDx:** • Rotavirus (p 18) • Coronavirus (p 19) • Cryptosporidia (p 19) • Salmonella (p 20) • BVD (p 22) 	• Aggressive Tx - Isolate **- Fluid & electrolytes** to restore hydration & vigor **- Broad spectrum ABs (Naxcel®)**   **Prognosis**: Once in blood stream - Poor **Prevention:** • **Hygiene** • **Colostrum** (see above) • **Bacterin (K99 + *E. coli*)** 6 & 3 weeks before calving to be effective
Devastating losses in 1-2 d-old calves **CS: Diarrhea/Dehyd, Septicemia, Death < 4 d** **Dx: Hx, CS, Culture** **Tx: Aggressive: Fluids, ABs**				
Parvo virus (C3T 431)	Isolated from calves w/ enteritis			
Rotavirus Mk 181; IM 399; C3T 104; BR-hb 394; BR 1016; Br 160; DC 165; GI 761; Pa 52; Pic 21, 22 ★★★   **Common** **In combo w/ others** **Malab./villus**	• **25% of diarrhea cases**, usu. in combo w/ others (*E. coli*, corona, etc.) • **5 ds to 2 wks** (commonly) • Transmission: ingestion • **Malabsorptive diarrhea** (unlike *E. coli*) - Attacks villus of small intestine, **large intestine spared** - Epithelial cells destroyed, can't absorb - **Self limiting** when runs out of epith. cells, takes time to regenerate	• **Diarrhea** • Anorexic • Depressed, occasional fever • Aged animals can shed virus w/out CS **DDx:** • *See E. coli* **Vaccines** • New vaccines m/ help control rota & corona infections • Checkered past	• **Difficult** - FA - ELISA - Electron microscope 	• **Self limiting** **- Fluid & electrolytes** - Not directly sensitive to ABs - ABs m/ help (2°)  **Control:** • **Hygiene** - disinfect environment • Isolation of shedders • Virus survives for months in cool environment • Vaccine questionable • **Colostrum** for longer than normal - Local immunity 

Corona virus

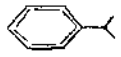
Mk 161; C3T 106; IM 399; Br 164; DC 167; GI 783; Pa 53

***

Worse than rota
Malabsorption
Villus & crypts

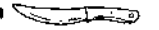
- Transm.- Fecal/oral route & air
- **4-30 days,** IP longer than rotavirus
- Attacks small & **large** intestine
- **Malabsorptive**, maldigestive diarrhea
  - Milk in large intestine = diarrhea
- **More virulent than rota,** bacteria attacks both tips & crypts of villi

- **Diarrhea**
- Nonspecific, similar to rotavirus
- ± Mucus present in diarrhea (due to large intestinal involvement)
- ± Pneumonia



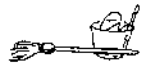
- **Difficult**
- FA
- ELISA
- Elect. microscope
- **Postmortem**
  - No gross findings, except fluid-filled intestine
  - Histo. - more severe villus blunting & fusion than rota

DDx:
- See *E. coli*



- **Same as rotavirus**
- Fluid & electrolytes
- Not directly sensitive to ABs, m/ help (2°)

Control:
- Same as rotavirus



- **"Calf-Guard®" vaccine** for coronavirus, doesn't provide good antibodies

Enterotoxemia, *Clostridium perfringens,* Hemorrhagic enteritis

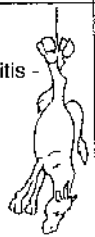
***

Healthiest calves
CS: Fatal hemorrhagic enteritis
Dx: PM • Tx: Serum, fluids, ABs
Prevention: Vaccinate dam

- **See Gen pg 250**
- Acute noncontagious diz
- Effects the healthiest, fastest growing calves
- Easily & cheaply prevented
- 2 wk-olds
- ***Clostridium perfringens*** type C

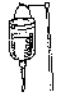
- **Fatal hemorrhagic enteritis**
- **Sudden death**
- Weakness
- Prostration
- ± Colic
- ± Nervous derangement
- ± Terminal diarrhea

- **History, CS**
- **Postmortem:**
  - Hemorrhagic enteritis - small intestine
  - Mouse inoculation



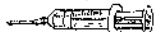
DDx:
- See *E. coli*

- **Tx usually ineffective if CS**
- Hyperimmune serum
- ABs PO & systemic (Extralabel dosage of penicillin or tetracycline)
- Outbreaks from unvaccinated dam
  - Antiserum immediately after birth
- Isolate
- **Fluids** to restore hydration & vigor

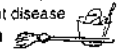


Prognosis: Guarded

Prevention:



- **Vaccination** of dam 2x before parturition & annual booster helps prevent disease
- Hygiene & Colostrum



Cryptosporidia

Mk 108, 181, C3T 107; IM 400; BR-hb 458; BR 1194; Br 170; DC 168, 183; GI 765; Pa 45; Pic 21

***

Small protozoa
Sucrose flotation

- ***Crytosporidium* spp, Protozoa**
- **1-4 weeks**
- Individual calf problem
- Fecal/oral route
  - Oocytes immediately infective
- **Malabsorptive**
  - Lower small & large intestine
  - Villus atrophy & fusion
- Auto infect. - relapses & protracted infect.
- Low mortality
- Winter more prevalent
- Affects multiple species
  - mice, man, lambs & pigs

- **Diarrhea,** soft foamy to watery, m/ contain milk, blood, mucus & bile
- Tenesmus
- Dehydration
- ± **Mhronic diarrhea & cachexia** (auto infection)

DDx:
- See *E. coli*

PH
Public health: man

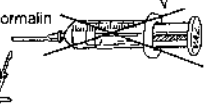
- **Pathological oocysts** in feces (m/ require multiple samples)
- Fecal flotation w/ Sheather's sol. (sucrose)
  - Stain w/ Ziehl-Neilsen (turns organism red)
  - **Small & easily missed**
- **PM: emaciation**

Giardia: newly recognized; nonresponsive, chronic, pasty diarrhea, wt. loss.
- Dx: Lugol's stained smear
- Tx: Dimetridazole (50 mg/kg S d)

- **Supportive Tx**
  - Protracted fluids, elec., acid base
  - Milk - to fight emaciation

Prognosis: Guarded

Control:
- **Sanitation**
  - Bleach, 15% formalin
- No vaccine



Diarrhea

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

Neonatal salmonellosis

Mk 181; C3T 108; C2T 578; IM 894, 396; Br 183; BR-hb 302; BR 370; BM&S 223; DC 169; GI 769; L 123; Pa 72; Pic 23

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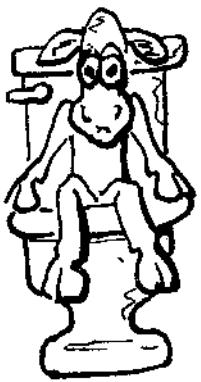


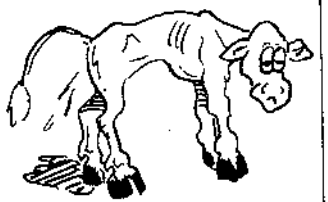
- **See GEN pg 259**
- **#2 economic GI bact** (> $50 mil/yr)
- > 2000 serotypes
- ***S. dublin***, host specific to cattle, therefore long carriers, Western USA
- ***S. typhimurium***, *S. montividio, S. newport, & S. anatum*) Eastern USA
- Invasive organism
  - Attach to mucous membranes
  - Destroy cells & pass through GI wall
  - Move to regional lnn (**Peyer's patches & mesenteric lnn**)
  - Live in cells, protected from ABs & disseminate throughout body
- **Endotoxins** through damaged mucous membr.
- **Acute protein losing enteropathy**
- **Calves 1-2 months** (range 1 wk-6 months, peak 6 weeks) (bacteremia)
- Transmission via fecal/oral route
  - Contaminated animal by-product, feeds, milk
  - Birds, rodents & cats
  - Stress m/ cause recrudescence & shedding in feces & milk
  - IP: 1-4 ds or recrudescence from carrier state
- Predisposition:
  - Crowded conditions/stress/hygiene
  - High protein diet
  - **FPT** (failure of passive transfer)
  - Newly purchased calves

Incr. in prevalence, Endotoxins
CS: 1 • Enteric 2 • Septicemic
Dx: CS, Hx, Fecal cultures
Tx: Isolate, ABs, Hygiene

- **Enteric**
  - **Initial fever**
  - **Intractable diarrhea**, brownish, watery to mucoid w/ fibrin & blood, "septic tank odor" (protein)
  - Extreme weakness
  - Dehydration
  - Terminal septicemia

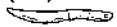
- **Enterotoxemia/septicemia**
  - Fever, anorexia, depression
  - Meningitis
  - Endotoxic shock
  - Polyarthritis
  - Pneumonia (dyspnea)
- **Sudden death** (12 - 24 hours circulatory collapse) w/ or w/o diarrhea

PH
PH: Infects man



- **Difficult**

- **PM culture** of organism from feces, blood or tissue: **Definitive Dx**
- Lab m/ or m/not be able to isolate
- **Culture** - need lots of feces
  - Not easy to grow
  - Rule: 5 neative cultures, not economically feasible in cattle
- **Postmortem(PM)**:

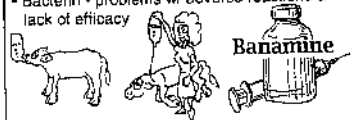


  - Emaciated
  - Pseudodiphtheritic membrane lining dist. small bowel & large bowel
  - Isolation from mesenteric lymph node, lung & colon

DDx from others
- Higher death rate if not treated
- Dehydrated more quickly
- Feces more fetid due to protein loss
- Fibrinous casts: blood &/ or mucous shreds
- Abomasum to colon m/b infected

DDx (see p 279):
- Colibacillosis
- Rotavirus
- Coronavirus

- **Isolate sick** (noncontact pens)
- ntibiotics controversial
  - Clinically ill calves (oral & systemic)
  - Culture & sensitivity (resistance to many)
  - Oral ABs rapidly become ineffective against enteric diz
  - Systemic ABs prolong recovery & carrier state
  - Trimethoprim/sulfate inexpensive
  - Resistant to pen, strep, erythromycin & tylosin
- Valuable septicemic animals
  - IV Banamine®
  - Intensive IV & oral fluids
  - Freq. feedings of milk (emaciation)
- Bacterin - problems w/ adverse reactions & lack of efficacy



Prognosis: Poor, deaths m/ approach 100% in calves

Control:
- **Difficult bec. of carriers**
- **#1 adequate colostrum intake**
- Environmental hygiene, constantly clean & disinfect betw. calving (carriers shedding) One-Stroke®, Environ (difficult to eliminate)
- **Culture animal by-product feeds** (40% contaminated in USA)

Controlling *S. dublin* (chronic carriers)
- ID carriers & calves (multiple fecal & milk cultures)
- Cull all positive animals

Coccidiosis

(Eimeria)

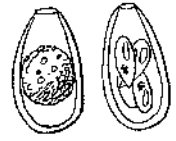
***

- See GEN pg 260
- **All ages**
  - **Calves > 21 days (life cycle)**
  - Young & stressed animals
  - Transient partial immunity
- ***Eimeria bovis, E. zuernii***
- **5th most important diz of cattle**
- Life cycle (see Gen)
- Pathogenesis
  - Destruction of intestinal epithelium

***Eimeria* - #5 - Intest. epith. destruction**
CS: Hemorrhagic diarrhea
Tx: Difficult, Amprolium, Support
Prevention: Hygiene, Monensin

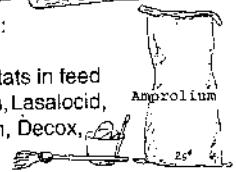
- Mild cases
  - Diarrhea
  - Listless & anorexic for a few days
- **Severe**
  - **Hemorrhagic diarrhea** (mucus & sloughed intestine)
  - Fresh, unclotted blood from anus
  - Rough hair coat
  - **Tenesmus** m/b protrusion of anus
  - Myiasis (on soiled hindquarters)
  - Emaciation, dehydration & weak
  - Die or slow recovery
- Nervous coccidiosis
  (See Nerv pg 150)

- **Demonstrate parasite in clinically sick animals**
  - Just coccidia not diagnostic (some apathogenic)
  - Oocysts m/ not be in feces in some clinical infections
- Smears of hemorrhagic stool
- Flotation (Sheather's sugar sol.)
- Sporulate in potassium dichromate solution for 1-14 days
- Postmortem: micro exam of scrapings or sections of intestine



- **Anticoccidial drugs**
  - **Amprolium** (TOC)
  - Sulfonamides only partially effective
  - Nitrofurazone (not approved in USA)
- Supportive (Fluids, Isolate)
- Treat exposed nonclinical calves

Prevention:
- Hygiene
- Coccidiostats in feed (Monensin, Lasalocid, Amprolium, Decox, Sulfas)



Ostertagiasis, Parasitism - diarrhea

***

- See GI pg 55; ***Ostertagia ostertagi*** • **#1 nematode of cattle, Type I & Type II ostertagiasis**-, type II overwinters (hypobiosis) in abomasal gastric glands
- **CS: Type I** - Anorexia, Poor growth, **Diarrhea** • **Type II ostertagiasis** (emergence of arrested larvae) Hypoproteinemia, **Diarrhea**, Anemia, Fever
- **Dx:** Hx, CS, Egg counts misleading • PM: **"Moroccan leather"** - pathognomonic
- **Tx: Anthelmintics: Adult ostertagia, Give before hypobiosis, Ivermectin,** Hi dose of fenbendazole, albendazole
- **Px:** Type I - good • Type II - damaged mucosa, unlikely to recover

Salmonellosis, adult

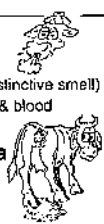
Mk 184; C3T 108, 562; C2T 576; IM 894; Br 183, 657; BR-hb 302; BR 370; JDC 193; Pa 72; Pic 23

***

S. typhimurium
#1 diarrhea
Hi protein feed
Trimeth/Sulfa

- Most common cause of adult diarrhea (see **GEN pg 259**)
- ***Salmonella typhimurium*** (see DDx p 279)
- *S. dublin* (host specific to cattle - longer carrier)
  - Occurs throughout USA, IP: 1-4 ds
- **Stress** (intensive management, crowding), parturition
- Transmission:
  - **Fecal/oral**
  - **Contaminated high protein diets** (fish meal, feather meal)
  - Milk
- Penetrates gut wall to mesenteric lymph nodes

- **Acute**
  - **Fever**
  - **Severe diarrhea** (distinctive smell)
    - Mucoid - watery w/ fibrin & blood
- **Chronic**
  - **Persistent diarrhea**
  - **Unthriftiness**
- **Endotoxins** cause
  - Anorexia, depression
  - Shock
- **Abortion**
- **Feedlot (anytime)**, most common soon after calves arrive



- Fever & diarrhea
- Defin. Dx: PM cultures of organisms from feces, blood or tissue
- Lab: No consistent values
  - Leukopenia often
  - Metabolic acidosis

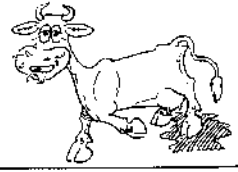
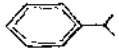
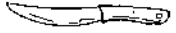
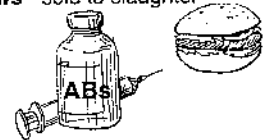
DDx (See pg 279):
- BVD
- Johne's diz (p 23)
- Coccidiosis (p 260)
- Parasitism (p 54)
- Poisons (e.g., arsenic)
- Winter dysentery (p 23)
- Feed indigestion (p 25)

- **ABs- C&S (Naxcel®)**
- IV fluids & electrolytes
- Isolate
- Cull chronic carriers

Px: Guarded, most become chronic carriers
- 75% die w/o Tx

Prevent (or minimize)
- Isolation
- Cull carriers
- Group culture, then ID individuals, cull
- Control bird & rodent pop. & their access to feed
- By-product feeds - scanned for Salmonella, sealed containers
- Proper disposal of carcasses

Adult Diarrhea

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Bovine viral diarrhea (BVD) /Mucosal disease Mk 166; C3T 432; C2T 485; IM 636; BM&S 122; Br 660; BR 993; DC 197; GI 765, 774, 789; Pa 54; Pic 485 *** 	• **See GEN pg 253** • **Togavirus** (pestivirus) - Cytopathic & noncytopathic biotypes - **Immunosuppressive** - m/ predispose to other dizs • Transmission: - Direct contact w/ sick or carriers - Indirect from contaminated matter (feces, saliva, semen, uterine discharge, aborted fetuses, placentas) - Transplacentally • Incubation period: 5-10 days • Worldwide • 1° yearlings, up to 2-3 years **Young most common, 8-24 months; all ages susceptible** 	1 • **Unobserved - Majority** - systemic infect. 2 • **Classical BVD** **- Gastroenteritis** **- Diarrhea** - explosive, watery, m/b blood & mucus - Dull, depressed, anorexic w/ fever, ↑ HR, RR  - Rumen stasis, m/b mild bloat - Rt. flank splashing sounds (intestinal dilatation & fluid) - Rapid dehydration - elect. & acid base abnormal **- Oral erosions** - 75%, m/not develop for 10 days - Necrotic tongue - blunting of oral papillae & hyperemic **- Most recover in 10 days** **- If profuse diarrhea m/ die w/in 48 hours** 3 • Respiratory signs 4 • Abortion, "Weak calf" syndrome  5 • Cerebellar hypoplasia 6 • **Mucosal diz (chronic BVD, BVD/MD)** **- 100% fatal,** but low morbidity **- Oral erosion,** also nares, teats & vulva **- Total anorexia - cachexia** - Diarrhea - if persistent & severe, die acutely **- Lameness:** erosive coronary band & interdigital space **- Majority die w/in 2 mos** 7 • **Persistent infections** 	• **Presumptive - PE & PM** • **Defin. Dx requires 2-3 weeks** - Serum neutralization test . Persistently infected - m/b sero-negative, so viral isolation - Viral isolation blood buffy coat  • Leukopenia • Dx important to DDx from similar sign in Rinderpest & FMD in countries other than USA  • **Postmortem:** - Degenerative epith. cells (GI) **- Erosion from mouth through intestine** - Necrosis of lymphoid tissue - Peyer's patches (dark red necrotic foci in ileum) **BVD/MD**	• **Fluids** (for dehydration) • **Prophylactic ABs** (immunosuppression of BVD) • Good husbandry (fresh water, feed & salt available)  • **BVD/MD - cull** • **Persistently infected cows** - sold to slaughter  **Prognosis:** • **BVD - guarded to fair**  • Cow that aborts, breeding back - good to excellent • **Mucosal diz - grave,** euthanasia - 100% fatal  • Persistent infection - sold for slaughter  **Prevention & Control** • **Vaccination schedule:** - 1° immunization - 2 weeks - booster - Annual revaccination • **Eliminate persistent infection** & clean up a herd, see Gen pg 253

Togavirus - Non- & cytotoxic biotypes
CS: Multisystem viral disease
Dx: PE, Hx, CS, PM, Isolation
Tx: Fluids, ABs; BVD/MD: cull
Px: BVD: guarded to fair; BVD/MD: Grave
Vaccination: 2 injections w/ annual booster

DDx (See pg 279):

Infect. diz w/ oral lesions, diarrhea, fever
- Salmonellosis (p 259)
- Blue tongue (p 10)
- Malig. catarrhal fever (p 10)
- Rinderpest (p 9)
- Winter dysentery (p 23)
- Papular stomatitis (p 8)
- Vesicular stomatitis (p 11)
- IBR in neonates
- Parasitic diseases (p 54)
  - Trichostrongyles (p 56)
  - Sarcocystis (p 261)
  - Coccidia (p 260)
- Toxicity
  - Chlorinated naphthalene
  - Heavy metals (p 202)
  - Nitrates (p 231)
  - Caustic substances

Pneumonia (p 62)

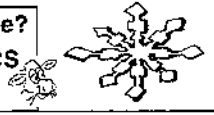
Winter dysentery, Winter scours

Mk 226; IM 892; BM&S 679; Br 659; BR-hb 396; BR 1026; DC 213; GI 778; Pa 69; Pic 53

***

- **Acute infection, endemic diz of stabled cattle**
- **All ages** (calves & yearlings least susceptible)
- **Winter months**
- **Herd outbreaks**
- **Unknown agent** probably infect. agent bec. of spreading, m/b coronavirus
- Incubation period 3-5 days
- Sudden onset (1 w/ diarrhea, then rest of herd)

- **Explosive watery diarrhea w/ clotted blood** (dark feces)
  - Acute outbreak & spread. Resolves in short time (2 ds)
  - Some prolonged (unknown cause)
- Anorexic, dull
- Milk decr. (1st sign often noticed)
- **Cough** - 30 to 50%
- **Severe cases**
  - Colic (lay down, get up, appear restless, anxious, kick at belly, tread w/ hindlimbs, stand w/ elbows abducted)
  - Dehydrated (short duration so usually not a problem)



- **Hx: short herd outbreak**

DDx (See pg 279):
- Bovine viral diarrhea
- Salmonellosis (p 259)
- Johne's disease
- Dietary gastroenteritis (Hx of moldy feed)
- Coccidiosis (oocysts in feces)
- Toxic agents

- **None, self limiting**
- Palliative: feed, water & salt
- ABs not needed, immune for life or at least less severe diz
- No vaccine

Px: Good: low mortality
- **Immune for life**

Prevention:

- Watch animals as come into barn for winter
- Isolate new cows for 2 weeks
- Acute diarrhea cases - separated from herd until recover, IP short so likely rest exposed
- Hygiene of handlers

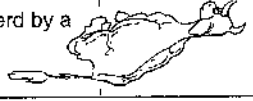
Herd outbreaks, Stabled cattle - Winter, Cause?
CS: Short herd outbreak, Diarrhea • Dx: Hx, CS
Tx: Self limiting

Johne's disease, Paratuberculosis

Mk 399; C3T 533; C2T 601; IM 899; BR-hb 330; BR 841; Br 664; DC 208; GI 783, 816; Pa 62; Pic 53

***

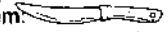
- ***Mycobacterium paratuberculosis***
  - Acid fast bact. Survives in soil for one year
- **Adult** onset 2-5 years
- Subclinical carriers
- **Granulomatous enteritis** (multiplies in cells of ileum, cecum & associated lymph nodes)
  - **Malabsorption - protein**
  - **Protein losing enteropathy**
- **Transmission:**
  - Fecal/oral route (so dairy >> beef, due to concentration of animals)
  - Intrauterine
  - Milk
  - Usually introduced into herd by a subclinical carrier



- **Most carriers w/ no CS**
  - ± Poor fertility, mastitis, ↓ milk or other 2° dizs)
- **Chronic/intermittent diarrhea** (homogenous w/o blood, fibrin or bad odor)
  - **Weight loss**
  - **Muscle wasting**
  - **Unthrifty** (rough hair coat, alopecia & dry skin)
- Advanced stages
  - Dehydration
  - Anorexia (cachexia & emaciation)
  - **Debilitated & die**
  - **Course of wks to 6 mos**

- **History, CS**
- No reliable diagnostic test for preclinical cases

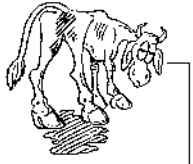
- Definitive Dx:
  - Isolate org. from feces or PM
  - Fecal culture takes up to 12 wk
- Lab: **Hypoproteinemia**
- **Postmortem:**



  - **Granulomatous enteritis** (whole GI, most commonly dist ileum)

- **None, death if CS**
- Subclinical cases often culled for 2° problems: poor fertility, mastitis, ↓ milk production or other 2° dizs
- Reportable? depending on state

Prognosis:
- **Grave - die if CS**



DDx:

Chronic diarrhea
- Parasitism (p 54)
- Chronic BVD (p 9)
- Salmonellosis (p 259)
- Renal amyloidosis (p 95)
- CHF (p 76)
- Intest. neoplasia (p 51)
- Fat necrosis (p 50)
- Chronic peritonitis (p 53)

Weight loss
- Malnutrition
- Starvation (p 189)
- Cobalt or Cu defc (p 87)

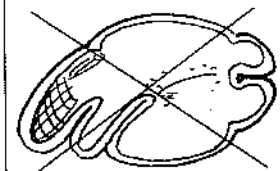
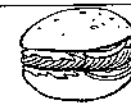
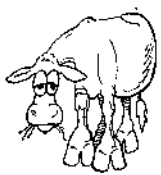
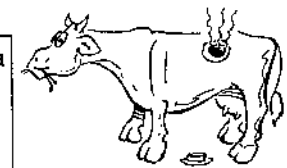
CONTROL & PREVENTION

Stop introduction into free herd
- Replacements from certified free herds
- Semen from Johne's-free bulls

Infected herds - test & cull
- Adults w/ chronic diarrhea, isolate, test & cull if positive
- Fecal culture all adults at 6 mo intervals, cull positives
- Calves of infected cows, cull
- Separate calves at birth from cows & feces
- Colostrum from negative cows or pasteurized
- Vaccinations of value, but interfere w/ TB tests, need state authorization
  - Vaccinate animals that are sold, need a health certificate saying from a Johne's infected herd

***M. paratuberculosis*, Adults, Chronic malabs./hypoprot.**
CS: Asymptomatic, Chronic wasting & diarrhea, Fatal
Dx: Isolate org. (12 wks) • PM: granulomatous enteritis
Tx: None - Die if CS; Certify free, Test & Cull

Grain Overload

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Amyloidosis *	• See pg 94, Rare, Urinary system; Twisted sheets of protein that accumulate due to chronic inflam., Deposited in glomeruli & GI (malabsorption) • **CS:** Intractable diarrhea, ventral edema, Weight loss, oral lesions • **Dx:** CS, Hx, Hypoproteinemia, PM: kidney • **Tx:** Salvage • **Px:** Grave			
Parakeratosis, Chronic rumen acidosis, Rumenitis Mk 178; C3T 716; C2T 718; IM 830; BR-hb 101; BR 269; Br 637; S-O 682 ***	• **Feedlot cattle** • **Hi-concentrated ration** during finishing w/ inadequate roughage (100% concentrate feed) - Heat treated alfalfa pellets - Incidence in group as high as 40% - Lowers pH & ↑ VFA (volatile fatty acids) • Also 2° to acute lactic acidosis • Hardening & enlargement of the papillae of the rumen (rumenitis) - Bact. through wall to liver = liver abscesses	• **Not clinically ill** usually (good weight gain & food consumption OK) • Advanced rumenitis or liver abscesses - Anorexia & ↓ weight gain - Gaunt abdomen (↓ rumenal fill) • **Condemnation of rumen** so can't be used for tripe • Sequela: - Liver abscesses - Chronic laminitis	• Diet & off feed suggests • Condemnation of rumen (tripe) & liver at necropsy - Edema & clumping of papilla - Matting & necrosis of papillae - Diffuse ulceration, abscesses & thickening of rumen - Liver abscesses 	• Nothing individually • Send to slaughter  **Prevention:** • Add roughage ration, at least 10% dry matter **Prognosis:** • Good: not life threatening, tripe condemned 
Prolonged Hi-conc. feeds (finishing), Little roughage **CS: Not clinically ill, Economic loss (No wt. gain)** **Tx: Nothing • Prevention: Roughage 10% of dry matter** 				
Rumen impaction C3T 710; BR 259 ** 	• **Microfloral inactivity** (due to microbial nutrition defc or disruption) • **Causes:** - **Poor quality roughage diet** (defc in protein, CHOs) (late hay, lignified hay or straw) - ABs or plant poisons foul up microbes - **Prolonged anorexia** (#1 cause) . Simple indigestion • Results in rumen break down & impaction of rumen w/ feedstuff	• **Rumen distention** • ↓ Feces (dry, undigested feedstuff) • ↓ Growth • Ketosis • Emaciation • Poor hair coat 	• History, CS • **Palpate hard rumen** - Decreased ruminal motility • Dry feces w/ undigested feedstuff	• **Restore rumen environment** - Feeding: correct feeding error, fresh green grass - Transfaunation • Oral fluids (to distend & stimulate rumen) 
Inactive microflora, Poor hay, Prolonged anorexia **CS: Distention, Emaciation, Poor hair coat** **Dx: Hard, Atonic rumen** **Tx: Transfaunation, Oral fluids**				

Grain overload, Lactic acidosis,

Rumen impaction, CHO engorgement, Acid indigestion, Toxic indigestion, Grain engorgement, D-lactic acidosis

Mk 175; C3T 714; C2T 716; IM 837; VC/S 276; BR-hb 100; BR 262; Br 634; DC 107; GI 719; Pa 24; Pic 62

★★★

- **Dramatic acute diz**, m/b lethal 24 hrs
- Cause:
  - **Engorge on fermentable CHO** (carbohydrates)
    - . Feedlots: introduction to grain
    - . Accidental access to grain
    - . Cereal grains w/o sufficient roughage, also fruits & root crops (beats, sugar beets, potatoes), silage
    - .. Roughage incr. buffering saliva
  - Fermentation of CHO to lactic acid (rumen pH ≤ 5)
    - . Disrupts flora: kills lactate-utilizing org. (protozoa & bacteria) & ↑ lactate acid producing organisms (gram positive bacteria [*Strep. bovis* & Lactobacilli])
  - Systemic acidosis
  - Dehydration: osmotic pressure rises & pulls fluid into rumen from circulation
  - Diarrhea: osmotic press. rise in intestine
  - . ↓ Liver, cardiac & renal function
- Severity: depends on adaptation to grain, 20 lb m/ cause death if unaccustomed to grain
- Groups > single (competitive gluttony!)

- CS in 12-36 hours
- **Simple indigestion**
  - Full rumen
  - Bloat (rumen atony)
  - Colic (kicking belly)
  - Anorexia, BAR
  - Diarrhea common
  - Reduced rumenal movements
  - Returns to eating 3-4 days
- **Fatal toxemic acidosis**
  - Complete anorexia, depression
  - Recumbency w/ head to flank
  - Temp. below normal 98-101° F
  - Resp. shallow & rapid 60-90/min (acidosis)
  - Elevated HR
  - Profuse, wet diarrhea (sweet odor)
  - **Dehydration**
  - **CNS**: ataxia, stagger
  - ± Anuria due to dehydration
  - ± Die in 24-72 hours
- **Sequela to recovery**
  - Chronic poor doers (rumenitis, liver abscesses)
  - Laminitis (histamine release?)
  - Metabolic alkalosis
  - Fungal rumenitis, abscesses
  - Hepatic abscesses, peritonitis
  - Abortion (days - weeks later)

- History, CS
- Ruminal atony w/ gurgling sounds
- Dehydration, ↑ PCV
- Lab:
  - **Low ruminal pH < 5** (severe acidosis)
  - Ruminal flora (no protozoa)
  - Gram stain change from Gr neg to Gr + bact
  - ± Urine pH 5
  - Blood pH < 7.2

DDx:
- Parturient paresis (no diarrhea/ dehydration) (p 148)
- Coliform mastitis (p 195)
- Peritonitis (p 53)
- Urolithiasis (p 96)
- Polioencephalomalacia (p 140)

- **Mild to moderate**
  - Restrict grain & water
  - Provide hay & exercise
  - Activated charcoal (1 lb/1000 lb) + mineral oil (1 gal/ 1000 lb)
  - ± Magnesium hydroxide (500 g/1000 lb) into rumen antacid) early
- **Toxic - emergency**
  - Consider slaughter if serious CS
  - Restrict water 18-24 hours
  - Empty rumen
    - . Large stomach tube (add water & gravity drain) 15-20 times
    - . Rumenotomy & siphon
  - Transfaunation
  - Fluid therapy
  - Good quality hay during recovery
  - Thiabendazole (anthelmintic) helpful to control 2° mycotic infection

Prevention:
- Avoid sudden changes in diet
- Adequate roughage
- Bring onto full feed gradually

Prognosis (Px):
- Poor: peracute recumbency
- Good: less acute standing cases
- Good: if pH > 5, HR 70-85, ruminal contractions, & willingness to eat w/in 3 ds
- Poor: HR 120/140 poor
- Grave: Mycotic infection w/ relapse

↑ Lactic acid, Rumenal flora
CS: Indigestion; Toxemia
Dx: CS, Hx, Rumen atony, Lab: pH < 5
Tx: Empty rumen, Fluids

Rumen alkalosis

IM 839; C3T 714; BR 74; Br 635

★★

- Uncommon, Rumen pH 7-7.5
- **1° in poor digestible roughage**
- Soya bean or high protein engorgement
- Fermentation reduced & saliva continues
  - Prolonged anorexia
  - Poorly digestible roughage
  - Simple indigestion
  - Excess ammonia NPN (nonprotein nitrogen)

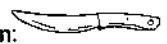
- **Poor doing animal**
- Excitement & hyperesthesia
- Muscle tremors, Convulsions
- Slow, shallow breathing
- Dyspnea & hyperpnea in later stages

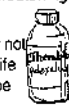
- History, CS (poor doer)
- **Rumen pH alkaline**
  - Rumen content dark grey w/ putrid odor

- **Electrolyte** w/ excess chloride (Ringer's) 30-50 L over 24 hours
- **Concentrate feeds**
- **Good quality hay**
- **Transfaunation**

Bloat

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Bloat **Tympanitis, Tympany, Hoven, Meteorism** Mk 163; C3T 717; C2T 721; IM 828, 842, 384; BR-hb 101; BR 270; Br 118,637,198; DDx 133; DC 110; GI 707, 731; VC/S 279, 292, 383; S-J 512; S-N 111; S-O 439; Pa 22, 23; Pic 53 ★★★	• **Excessive accumulation of gas in rumen & reticulum** • **CS of underlying disorder** - **Not a diagnosis** • **Common in cattle**, all ruminants • **Cause** - **1° - Frothy bloat** (legume pastures or high concentrate diet - most important) . **Stable foam** traps normal gas of fermentation in small bubbles which don't coalesce, so can't eructate . Commonly see bloat on 3rd day of new pasture w/in 1 hr - **2° - Free gas bloat** - physical interference of eructation . Dx: Passing stomach tube releases gas & distention - **Chronic free bloat** . Calves w/ pneumonia, disruption of vagal trunks . Vagal indigestion of any kind	• **Distension of left side** of abdomen, esecially paralumbar fossa • **Mild distention**, clinically insignificant • **Severe:** - Labored breathing - Excessive salivation - Anorexia, m/ cease eructation - Colic - Cyanotic mucous membranes - Staggering - ± Vomit - Collapse, death **1° FROTHY BLOAT** • Found dead - unobserved animal (feedlot, dry dairy, pasture beef); observed lactating dairy cows, noted before death • Herd: few affected clinically, others mild **FREE GAS BLOAT** • Gas cap **CHRONIC BLOAT** • Repeated bloating	**FROTHY BLOAT** • CS & Hx - bloat, new pasture • **Stomach tube doesn't relieve** **FREE GAS BLOAT** • Determine underlying cause of failure to eructate • **Stomach tube relieves** **Postmortem:** • **"Bloat line"** of esophagus, cervical portion congested, thoracic portion pale • Frothy bloat: uniform consistency to rumenal contents, less frothy than before death	**TX - FREE GAS BLOAT** • **Emergency** if life threatening - severe compromise to resp.; **remove gas** - **Try endogastric tube** - **Trocarize** - (nick in skin 1st, relieves immediate problem, peritonitis sequela) • Exploratory - to understand cause • Mineral oil to relieve gas, Carmalax® • ABs if 1° infection or if emergency trocarization • Naxcel® (ceftiofur) • NSAIDs - aspirin - for underlying cause such as fever, pneumonia, abscesses, endotoxemia • Disruption of rumenal flora - **Transfaunation** - repeated until establish normal situation, or - Probiotics (poor 2nd choice to transfaunation) **TX - FROTHY BLOAT** • **Relieve bloat, Emergency** if life threatening - **Rumenotomy** (uneventful recovery) . Large bore trocar & cannula (1") (regular not big enough to relieve quickly) or large knife . Stomach tube - if doesn't relieve, use tube for defoaming agent • **Proloxalene** (**Therabloat®**) - defoaming agent/nonionic surfactants - most effective, m/b several times, use early - **Box of "Tide"** detergent • Empty rumen completely m/b, transfaunation + Bicarbonate to alkaline the pH (pH in low 5s) • Consider diet **TX - CHRONIC BLOAT** - **Temporary/permanent rumenal fistula** (see box)





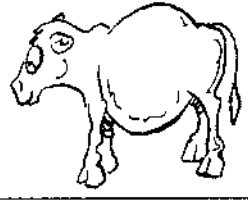
Bloat: Dx, Not condition: M/b life threatening

- **Frothy bloat** - Stable foam - "Tide"
  - Pasture: Legumes
  - Feedlot: Concentrates - Slime
- **Free gas bloat** - Eructation failure

Dx: Stomach tube

Tx: Relieve bloat: Stomach tube/Trocar/Rumenotomy/Fistula

- **Pasture frothy bloat**
  - Predisposed in some animals
  - Feedstuff - protein content & rate of digestion
  - **Legumes** (high prot. & ground quickly to fine particles)
  - Lush pastures w/ high % of rapid growth
- **Feedlot frothy bloat**
  - Uncertain, m/b species of bacteria producing insoluble **slime** (traps bubbles)
  - Finely ground feed - promotes stable foam
- **2° Free gas bloat**
  - **Related to failure to eructate**
  - Rarely due to excessive gas production, but 2° to problem with eructation



Causes of free bloat

- **Cardia constriction or obstruction:**
  - Recumbency
  - Overconsumption of fluid (drinks too much)
  - Lymphadenopathy of caud. mediastinal lnn.
  - Abscesses in lungs
  - Choke (foreign body)
  - Tetanus
  - Abscesses in esophagus
- **Rumen atony**
  - Grain overload
  - Anaphylaxis
  - Hypocalcemia (milk fever)
  - Endotoxemia
  - Vagal nerve damage
- **Tension receptors in cardia nonresponding**
  - Rumenitis
  - Esophagitis

Diagnostic approaches to bloat

- History is very important
  - Sternal or lateral recumbency?
  - Acute vs chronic
  - Diet: sudden changes?
  - Other diz problems? toxic mastitis? endotoxemia?
  - Pressure on esophagus due to enlarged lnn.?
- Vital signs
- Evidence of colic or abd. pain?
- Rumenal contractions, strength & how often
- **Acute severe bloat is an emergency!**
- Frothy bloat puts pressure on resp. tract. Also an **emergency!**
- **Rumen intubation** - treats & identifies problem
  - If can't open **mouth, think tetanus**
  - **Stomach tube**
    - . If doesn't pass = esophageal obstruction
    - . If passes easy, but doesn't relieve gas = frothy bloat
    - . If passes, resistance, then sudden release of gas = blocked cardia &/or pressure on esophagus
    - . If passes easily & releases gas - rumenal stasis where gas can't get to cardia
- **Palpation & ballottement** - consistency of rumen
  - Frothy bloat is one consistency throughout
  - Free gas bloat is like punching a balloon

Prevent FREE GAS BLOAT

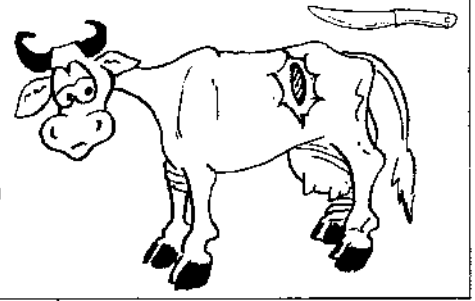
- **1° underlying diz**
- Get in sternal recumbency if on side
- Fast animal prior to any surgery to reduce substrate

Prevent FROTHY BLOAT

- **Proloxaline blocks (Bloat guard®, Therabloat®)**
- **Proloxaline feed mix** (must be given daily)
- **Added prevention for pasture frothy bloat**
  - Difficult - management
  - **Hay before pasture**
  - Restrict grazing to 20 min. 1st few days
  - Strip grazing
  - Pre-bloom pastures most dangerous
  - Antifoaming agents - oils, fats & nonionic surfactants (automatic dosing syringe, in water or feed, painted on flank)
- **Added prevention for feedlot frothy bloat**
  - **10-15% chopped roughage**
  - Rolled or cracked grain, not finely ground

Rumen fistula

- **Rumenostomy**, in left flank, high so in dorsal sac (not at fluid line)
  - 2" skin incision
  - Grid muscle layers & incise peritoneum
  - Grasp rumen w/ towel clamps
  - Incise rumen & suture edge to skin edges w/ simple continuous suture
  - Opening should be able to accept a quarter
  - Gridded muscles act as valve, opening when distended, closing when relaxed
  - Can lose large amounts of heat in cold climate through fistula
  - Fistula routinely heals if cause of bloat is corrected
- **Ranchers often use a large knife to relieve bloat**
  - The vet then later sees the animal



Ruminant Indigestion

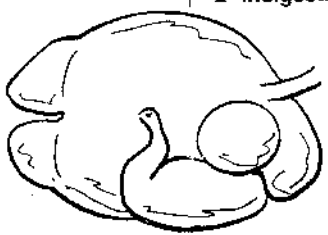
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment - Prognosis

Ruminant indigestion

Mk 178; C3T 710; C2T 715; IM 824, 835; BR-hb 99; BR 259; BM&S 662; Br 633; DC 106; S-J 514

★★★

- **Common group of dizs of dysfunction of the reticulorumen**
- **Commonly caused by feed change**
- **Nongrazing cattle**, intermittently fed
- Pathogenesis
  - Altered ruminal microbial population 2° to rapid change in intraruminal environment
  - Population in constant flux due to feeding frequency, diet, water intake
- Cause
  - #1 Feed change - herd affected
- **1° Indigestion**
  - Motor function diz
  - Microbial/biochemical fermentation dysfunction
- **2° indigestion**



- **Inappetence**
- ↓ Reticulorumenal motility usually, rumination ceases
- **↓ Milk production**
- **Abnormal feces**, malodorous loose stool 12-24 hours after CS
- No systemic illness

DDx if single animal

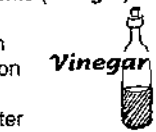
1° Indigestion
- Vagal indigestion (p 29)
- **Hardware diz** (p 38)
- Frothy bloat (p 26)
- Free gas bloat (p 26)
- Reticulitis/rumenitis (p 29)
- Obstruction of cardia
- Diaphragmatic hernia (p 48)

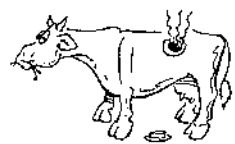
1° Fermentative disorders
- Rumen impaction (p 25)
- Simple indigestion (p 28)
- Lactic acidosis (p 25)
- Rumen alkalosis (p 25)
- Putrefaction of rumen ingesta

2° Indigestion
- 2° Reticulorumenal motor activity
- 2° Reticulorumenal microflora inactivity
- Abomasal reflux

- Easy if herd & recent feed change
- Difficult if single animal affected
  - History, CS
  - Abn. forestomach motility
  - Abnormal rumen contents
  - R/O all other diz affecting GI
  - **Rumen fluid analysis**
  - **Exploratory for cause**

- **Feed change - herd**
  - **Transfaunation**
  - **Oral alkalizing** (Mg hydroxide) or acidifying agents (**vinegar**)
- **Single animal**
  - Correct problem
  - Relieve distention
  - Transfaunation
  - Limit feed & water
- **Rumen fistula if chronic bloat**





Reticuloruminal dysfunction; #1 Feed change (herd)
CS: Inappetence, Loose stool, ↓ Milk, Rumen atony
Dx: Herd (feed change); Individual (Hx, CS, Rumen fluid, Exploratory)
Tx: Transfaunation

Motor Activity - Reticulorumen

- 1° cycle (biphasic reticular contraction w/ rumen contraction in between)
  - Reticulum contracts & wave passes caudally across dorsal sac of rumen, then cranially over ventr. sac (mixes ingesta & saliva)
  - Reticulum contracts again, reticulo-omasal orifice relaxes & reticular ingesta passes into omasum
- 2° cycle follows two 1° cycles
  - Caud. dors. blind sac contracts & wave moves across the dorsal sac of rumen (pushes gas to cardia for eructation)

Nervous control of motor activity

- Sensory: tension sensory receptors in rt. medial wall of reticulum, buccal receptors & acid receptors in abomasum
- Gastric motor centers in medulla, integrate sensory input & generate motor impulses
- Motor:
  - Parasympathetic: **vagus n.** causes contractions of reticulorumen
  - Sympathetic: **splanchnic nn. & adrenal gland**, inhibit reticulorumenal contractions, do not initiate them (gastric dilatation or surgical manipulation of gut can cause splanchnic inhibition of reticulorumen)

Vagal indigestion

Hoflund's syndrome, Abomasal reflux

Mk 179; C3T 730; IM 830, 834; VC/S 382, 412; BR-hb 105, 108; BR 284, 292; Br 640, DC 116; GI 725; S-J 527; Pic 65

***

- **Group of dizs** impeding passage of ingesta from reticulorumen &/ or abomasum
- **Mimics transection of vagus n.** innervation to forestomachs & abomasum
- Paralysis of rumenal stomach
- Delayed passage of ingesta, two 1° syndromes (some divide into four)
- Adults, rarely in cattle < 2 yrs old

CS Both types
- **Anorexia/indigestion**
- **Dehydration**
- **Papple bloat** (filling, not gas)
- **Loss of weight**
  - Starvation, missed bec. of abd. distention
- **Little feces**
- ↑ Rumenal motility or atony
- Rumen contents homogenous, not stratified

- **CS**
- **Exploratory lap.**
- **Rumenotomy**
- **Lab:**
  - Omasal block
    - Electrolytes normal
  - Pyloric block
    - Hypochloremic metabolic alkalosis

- **Slaughter; or**
- **Slow response to Tx**, depends on status of animal & if rumenal motility
- **Exploratory laparotomy for cause** (most cases)
- **Correct underlying problem**
- **Relieve distention, critical**
  - Large bore stomach tube
  - Sx remove rumenal fluid
- **IV fluids (40 L m/b necessary)**
- **Transfaunation**
- **Limit feed & water** (palatable, hi-fiber)
- Poor doers if from hardware diz or persists after calving
- Large fetus causing obstruction
  - Remove fetus, resolves
  - C-section
  - Dexamethasone to induce labor

Type 1 • Omasal transport failure
- Paralysis of reticulo-omasal orifice
- Accumulation of ingesta in reticulum & rumen
- **Omasum/abomasum empty** (relatively)
- Mimics cutting the ventr. & dors. vagal n. trunks
- Rt. med. wall of reticulum tension sensory receptors (vagus n.) damaged

CS Omasal transport failure:
- Adult cows > 2 years
- Indigestion
- ↓ Milk production
- Will drink water
- Mild to moderate dehydration
- Electrolytes normal, serum & rumen

Causes of Type 1
- **1° hardware disease**
  - Adhesions in omasum
  - Abscesses
- Liver abscesses (p 36)
- Diffuse peritonitis (p 53)
- Reticulitis
- Obstruction of reticulo-omasal orifice (neoplasia, FB, papilloma, ingested placenta, Actinomyces granuloma)
- Leakage from abd. viscera
- Adhesion on rt. med. wall
- Reticular herniation thru diaphragm

Px: guarded to poor
- Favorable signs - normal 1° & 2° contractions, incr. appetite, no bloat, weight gain, incr. fecal production
- Unfavorable CS: repeated bloat, scant feces, poor rumen motility, recurrent bloat - grave

1 • "Omasal block" Normal electrolytes
2 • "Pyloric block" Hypochloremic metabolic alkalosis
CS: "Papple", Starvation
Dx: CS, Laparotomy, Rumenotomy, Lab
Tx: Slaughter or Relieve bloat, Fluids, Transfaunation
Px: Guarded to poor

Type 2 • Pyloric outflow failure
- **Paralysis of pylorus** (outflow of abomasum, not stenosis, but mimics)
- **Ingesta accumulates in abomasum, omasum & reticulorumen**
- **Internal vomiting** into reticulorumen (distention)
  - **↑ Cl** in rumen (peripheral Cl decr.)
- Cause: disruption of vagus to pylorus?

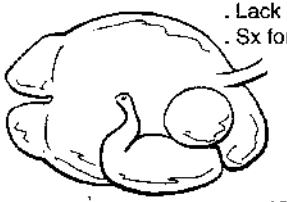
CS pyloric outflow failure:
- **Marked dehydration**
- **Hypochloremic metabolic alkalosis**
- **↑ Cl in rumen**

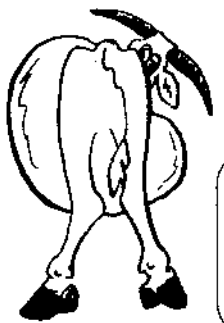
Causes of Type 2
- **Volvulus of abomasum** (p 40) (most common)
- Displaced abomasum (p 40)
- Sx correction of above, abomasum atonia
- Abomasal ulceration - leakage into peritoneum w/ adhesion or abscess formation (p 31)
- 2° to advanced pregnancy, large fetus compressing pylorus

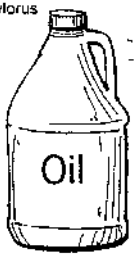
"Papple" - distention
- Apple shape to lt. side of abd. (rumen, ventral & dorsal sac) &
- Pear shape to rt. side (ventral sac)

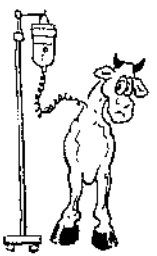
Abomasum

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Abomasal impaction/ obstruction Mk 158; C3T 732; IM 878; BR-hb 111; BR 301; Br 550; DC 137; VC/S 285, 441 ***	• Accumulation in abomasum w/ failure to transport • **Winter, pregnant beef cattle, & calves** • Causes - **#1 poor quality roughage as sole feed + dehydration** - Common - overwintering beef cows - Severely cold weather - Mechanical obstruction of pylorus . Calves eating bedding . Calves - hair balls . Lymphosarcoma . Lodging of ingested placenta - **Vagal nerve damage** or stretching of musculature . Lack of motility of abomasum . Sx for abomasal volvulus	• "**Papple**"**-shaped abdomen** (gradual abomasal & ruminal enlargement) • **Thin** (neg. energy balance), but bloated • Reduced feed intake • ↓ & firmer feces • Severe: recumbent & groaning	• **Palpation** of firm mass of abomasum following costal arch • Rectal: - Distended rumen (± ventral sac to right wall) • Calf's abomasum m/ fill abd. • **Exploratory laparotomy** • Lab: - **Metabolic alkalosis (hypochloremic)** m/ not be present if fluid can get through impaction. If it can't, get sequestration of HCl in abomasum) - ± Terminally acidosis from starvation	• **Salvage by slaughter** (usually bec. presented in advanced stages & Tx unrewarding) - If Tx doesn't work, death usually follows a few days after onset of CS • **Early presentation** - Aggressive fluids & electrolytes - Easily digested foods - Laxatives - Terminate pregnancy (PGF) - Metoclopramide SQ m/ ↑ passage through pylorus • **SURGERY**, difficult to exteriorize abomasum - Rumenotomy on left side - Pass nasogastric tube into reticulum, push into abomasum & leave it indwelling to flush - Laxatives & emulsifiers through tube (mineral oil, dioctyl Na sulfosuccinate [DSS], Mg OH, Mg sulfate) - **Not commonly done**









Winter, Pregnant beef, Dry roughage
CS: "Papple", Thin
Dx: CS, Hx, "Papple", Metabolic alkalosis
Tx: Salvage
Px: Poor

DDx:
- Hydrops (allantois) (p 113)
- Chronic peritonitis (p 53)
- Vagal indigestion (forestomach outflow problems) - no impaction (p 29)
- Intestinal obstruction (palpable loops) (p 44)
- Volvulus of abomasum (p 40)

Abomasal ulcer diz

Mk 156; C2T 740; C3T 735; IM 874, 385; VC/S 284, 295, 415; BR-hb 112; BR 304; BM&S 667; Br 199, 649; DC 132; GI 721; S-J 528; Pa 25; Pic 24, 66

***

- **1° adult dairy cows & calves** (rare in small ruminants)
- **Specific cause unknown**
  - **Assoc. w/ stress**
    - Intensive management & **high grain** (starch) diets
    - Dairy cows - parturition, onset of lactation & grain fed
    - Calves (dairy, veal & feedlot) pushed for weight gain, sudden dietary changes (milk to solid diet)
      - *Clostridium perfringens*
      - Copper deficiency
      - Hair balls (trichobezoars) commonly present in calves
  - **Lymphosarcoma assoc.**
  - Viral erosion of mucosa (BVD, Rinderpest)
- **Ulcer - full thickness erosion of mucosa**

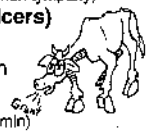
Type I - nonperforating
Type II - non-perf., but significant bleeding
Type III - perf. ulcers w/ localized peritonitis
Type IV - perf. ulcers w/ diffuse peritonitis

#1 GI bleeding, Adult & calves, Stress
CS: Melena, Peritonitis - Perforation
Dx: Occult blood, Exploratory
Tx: Salvage, Diet, Stress, ABs, Fluids

Varies, dep. if complicated by hemorrhage or perforation - mild indigestion to death

ADULT DAIRY COWS

- **Type I** (nonperforating or bleeding)
  - **Mild abd. pain** (shown by anorexia, decr. rumenal motility & mild rumen tympany)
- **Type II (Bleeding ulcers)**
  - Acute anorexia
  - Mild abdominal pain
  - Rumen stasis
  - Tachycardia (90-100 min)
  - **↓ Milk production**
  - **Melena** (scant, dark, tarry, bloody stool)
  - ± Anemia, hemorrhage, shock, **death in < 24 hours** or **subacute bleeding** to hemorrhagic anemia, w/o melena (more common)

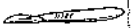


- **Types III & IV (Perforating)**
  - **Local peritonitis** - similar to Hardware diz
    - Fever, anorexia, ↓ milk production
    - Intermittent diarrhea
    - Pain in right cranial quadrant
    - Abates in 2 days (like hardware diz)
  - **Diffuse peritonitis** (rupture)
    - **Shock & death in a few hours**

CALVES (no categories)

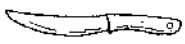
- Acute abdominal tympani
- Colic, general peritonitis w/ assoc. CS
- **Often die**

- **CS, History**
- **Fecal occult blood test** (inexpensive & done during PE)
- Grunt test - palpation behind xiphoid on right



- **W/o melena difficult**
- **Exploratory laparotomy**
- **Lab:**
  - **Fecal occult blood test**
    - Several samples
  - Adult - hemorrhagic anemia
  - **Bovine leukemia virus titers, if positive - cull**

- **Postmortem**
  - **Single or multiple ulcers** in fundic part of greater curvature



DDx:

- Distended abomasum
- Rt. displaced abomasum (p 40)

Melena

- Duodenal ulcers (identical) (p 31)
- Hematomesis
- Abomasal torsion (p 40)
- Intestinal obstruction (p 44)
- Intussusception (p 45)
- Blood sucking parasites (p 56)

Perforation

- Peritonitis (p 53)
  - Chronic Hardware diz (p 38)
  - Uterine rupture (p 113)
  - Cecal rupture

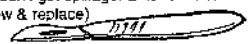
Calves

- Chronic abomasitis (identical)

- **Salvage for slaughter** (since most occur 1st month post calving, most common Tx because don't come back into lactation until next year)
- **Correct dietary problems**
  - Calves - feed small amounts freq. instead of BID
  - Adults, trade starch w/ good quality hay & confinement

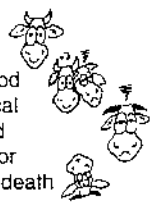
- **Alleviate stress**
- **Tx ulcer problems**
  - Whole blood transfusions - PCV < 14% (4 L once usually enough, Sx unrewarding for bleeding ulcers)
  - **ABs** - broad spectrum for peritonitis

  - Antacids (magnesium oxide following copper sulfate sol. to close gastric groove into abomasum)
  - **IV fluids** in animals not eating & drinking (careful in diffuse peritonitis because of pulmonary edema due to hypoproteinemia)
- **Bovine leukemia virus titers + ulcers = cull**
- **Surgery for perforation** (carefully break adhesions so don't get spillage. Exteriorize to resect, oversew & replace)



Prognosis:

- Nonbleeding/ nonperforating - good
- Stop bleeding & local peritonitis - guarded
- Chronic ulcers - poor
- Diffuse peritonitis - death

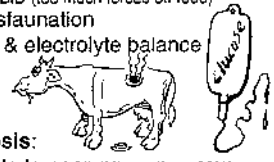


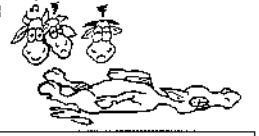
Control:

- Change dietary management
  - Avoid sudden changes in diet
  - Include adequate roughage
- Minimize stress

Ketosis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Fat cow syndrome, Fatty liver syndrome Mk 444, C3T 315; C2T 742, 324; C3T 315; IM 937; BR-hb 521; BR 1354; VC/F 436, 269; BM&S 689; Br 598; GI 824, 829; Pa 88 ★★★	• Similar to pregnancy toxemia but different cause • Hi-production dairy cows postparturient - Common in loose housing where all cattle fed same diet - Adults > heifers - **1st 2 wks of lactation** (up to 1 month) • Pathophysiology: - High producing dairy cows - Overfeeding (lactation diet) in late pregnancy/dry period . Obese cow at calving - Anorexia of calving (neg. energy balance) - Sudden energy demand of lactation - Mobilizes fat deposits of body . Rapid weight. loss . Fat deposited in liver & other organs .. Liver dysfunction - **hypoglycemia** .. Lipids into Kreb's cycle w/ no acetyl-CoA = ketone bodies .. Spill ketones into urine & ketosis	• **Herd** - **Obese cows in dry period** • Subclinical • Clinical cases - Anorexia, depression - **Rapid weight/condition loss** - ↓ Milk production - Weakness, recumbency - Terminal tachycardia & coma - **Death in 7-10 days** - **CNS problems** (ketosis) • Sequelae &/or cause - Milk fever - Mastitis - Salmonellosis - Retained placenta - Metritis - Indigestion	• History (fat cows in dry period) • Palpate enlarged liver on rt. (paralumbar) • Lab: m/ or m/not be changed - **Ketonuria** - Decr. potassium, Ca, Mg, WBCs, Glucose, Cholesterol - Incr. Bilirubin, AST, GGT • Liver biopsy for subclinical cases - If > 35% fat (will float) bad sign • Postmortem: - Fat, enlarged liver that floats	• **Return to positive energy balance** - Force feed hi quality, palatable roughage - IV glucose initially until begins to eat - Oral propylene glycol working up to 6-8 oz BID (too much forces off feed) - Transfaunation - Fluid & electrolyte balance **Prognosis:** • Variable to poor, if floats (fat > 35%) poor - 25% fatal





DDx Fatty liver from Ketosis

Fatty liver
- Fat cows
- 1st weeks postcalving
- Poor response to Tx

Ketosis
- Fat or thin
- At peak lactation 3 weeks (usually)
- Good response to Tx

Prevention
- **Prevent obesity precalving & maximize energy intake post-calving**
  - Dry out cows on pasture & maintain, but do not incr. body condition
  - Good quality forage freely available
  - Concentrates can be used to maintain body condition
- Minimize calving intervals so they don't have a prolonged dry period (not over 2 mo)
- Generally dry at 300 d of gestation

Overfed in dry period, Just calved, Anorexia/Neg. energy balance
CS: Rapid weight loss, CNS, Death
Dx: Hx, CS, Ketones, Floating fatty liver (> 35%)
Tx: Energy (IV Glucose, Propylene glycol)

Pregnancy toxemia/ Ketosis in beef
Mk 456, IM 939, C3T 314; C1T 348; Br 593; BR 1354
★

- **Rare/Sporadic** in fat beef cows (more common in sheep), Heavily fed in early pregnancy, Nutritional stress 2 mnths before calving (i.e., run out of pasture), Predisposing: Twins, Cold weather
- **CS:** Fat, pregnant beef cow, Anorectic, Transitory restlessness & incoordination, Sternal recumbency, Clear nasal discharge, Dry, cracked muzzle, Rapid respiration & grunting, 7-10 days comatose & death
- **Dx:** Hx, CS, Lab: Ketonemia, ketonuria, hypoglycemia & proteinuria, Elev. liver enzyme GOT, PM. Enlarged fatty liver
- **DDx:** Johne's diz (pg 23), Lymphosarcoma (pg 268), Parasitism, Chronic pulmonary diz, Other deficiencies, Debilitating dizs, Fat cow syndrome (above), Lead poisoning (pg 152), Pyelonephritis (pg 98), Emphemeral fever, Traumatic reticulitis (pg 38)
- **Tx:** Generally ineffective, esp. if recumbent, Anabolic steroids (Vebonol®, Finajet®), glucose, fluids, propylene glycol, Induce parturition (corticosteroids or X-section) m/ save cow, Supplement rest of herd w/ good quality hay • **Px:** Grave: most die

Beef cows before calving

Ketosis, Acetonemia, Ketonemia

Nervous ketosis

Mk 446; C3T 309; C2T 317; IM 1455; BR-hb 519; BR 1343; VC/F 253, 385, 436; BM&S 539; Br 590; DC 419, 497; GI 828; N-L 262

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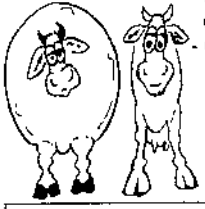
- **Metabolic diz of lactating cows**
  - Ds to few wks postcalving (w/in 6 wks)
  - Economic loss - decr. milk production & return to full prod.
- Fat or thin, housed dairy cows (pasture cows in Southern hemisphere)
- Cause
  - **1° ketosis**: predisposing factors
    - . Excessive silage (butyric acid)
    - . Inadequate exercise
    - . Obesity at parturition (fat cow syndrome)
    - . Inadequate fiber intake (digestive upsets)
    - . Lush pastures (low nutrients hi water)
    - . Mineral defics: P, Na, Mg, Cobalt + reduced feed
  - **2° ketosis**: anything causing anorexia in early lactation
    - . Metritis, mastitis, displaced abomasum, Hardware diz, peritonitis, etc.
- Cause
  - Acetic, propionic, butyric acids (VFA) made by rumen microbes
    - . Propionic major glucose precursor
    - . Butyric acid (ketogenic)
  - Lactation overwhelms glucose stores of liver, raids fat & promotes ketosis
  - Glucose demand (CNS needs)



- **Subclinical**
  - **Anorexia** (don't eat conc. but continue to eat roughage)
  - **Weight/condition loss**
  - **Drop in milk production**
  - Constipation
  - Mucus-covered feces
  - "Glazed" eyes
  - Humpback m/b (colic)
  - **CNS CS**: circling, staggering, licking, bellowing, hyperesthesia, head pressing, apparently blind, trembling
  - **Acetone breath**
- **Subclinical**: no CS, but excrete ketones
- **CS of other dizs**
- Self limiting

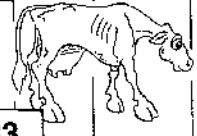
DDx:
- Fat cow syndrome (p 32)
- Listeriosis (CNS not transient) (p 143)
- Rabies (always fatal) (p 144)
- Tetanus (p 145)

- History, CS
- CS or other dizs
- Smell breath (acetone)
- Lab
  - Hypoglycemia (< 25 mg/dl, norm - 40-50)
  - Ketonemia (> 30 mg/dl, norm < 10) ketonuria not definitive
  - Acetest®, Ketostix® urine or milk to rule out ketosis if neg.
- **Response to Tx**

- **Glucose** IV (500 ml 40% sol) alleviate, lasts 2 hrs
- **Glucocorticoids** IV (prednisolone 100 mg, dexamethasone 10 mg)
- **Propylene glycol PO** (glucose precursor bid)
  - Add cobalt salt in deficient areas
- Rapid return to full nutrition (hay & whole oats)
- Other treatments
  - Chloral hydrate if nervous form (PO bid 3-5 d)

Prognosis:
- **Rarely fatal**, self limiting, once lactation stops, glucose demand stops
- Return to milk production important

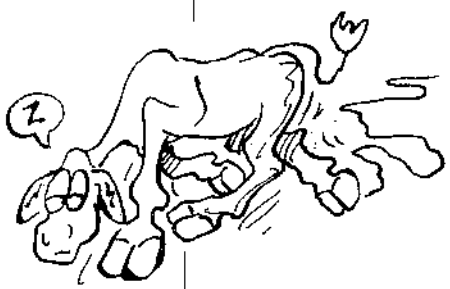
Prevention
- No overly fat or thin cows
- ↑ Plane of nutrition started 2 weeks before calving (reduced lactation diet) to allow microflora to adjust to lactation diet)
- Increase energy after parturition
  - Maximum glucose precursors
  - Minimize hay crops or silage hi in butyric acid precursors
  - Good quality roughage minimum of 1/3rd of ration
    - . Alfalfa hay, 3 kg/100 kg body weight
  - If concentrates used - readily digested carbohydrates
  - Adequate vitamins & minerals
  - If high concentrate diets, divide into 4 feedings/day
- Daily exercise
- Problem herds: monitor ketone levels in milk & urine
  - Supplement susceptible cows w/ oral propylene glycol

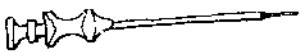


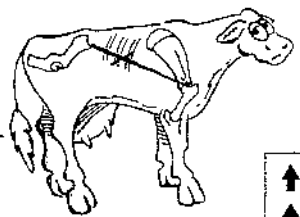
Fat or thin - Lactation peaks before intake = Mobilizes fat (Ketosis)
CS: Weight/Condition loss & CNS
Dx: Hx, CS, Acetone breath, Ketones & Hypoglycemia, Tx response
Tx: Glucose + Steroids + Propylene glycol + Feed

Liver Disease

Condition	Facts/Cause	Presentation/SC	Diagnosis	Treatment
Liver disease, Hepatitis Mk 138; C2T 741; IM 913, 915; BR-hb 117; Br 120, BM&S 683; GI 820; Pa 82, 95 **	• Liver m/b diseased long before it fails to function • CS not seen in early stages • **Loss of 80%** of liver before regeneration & recovery impossible • **Remarkable ability to regenerate**	• **No pathognomonic CS for liver diz** • **No CS of liver diz consistently present** • **Most signs related to failure of liver function** (except pain) • **Icterus** uncommon unless biliary obstruction - Hemolysis can also cause incr. bilirubin - Failure of uptake, conjugation or excretion of bilirubin • **Wt. loss** common, but not specific in chronic diz • **Diarrhea** possible in chronic liver diz • **Dermatitis** (hepatic photosensitization) due to phylloerythrin accumulating in skin • Ascites common in calves w/ liver cirrhosis • Lighter colored feces in calves (decr. bilirubin) • Hemorrhage terminally (decr. clotting factors) • **2° Hepatoencephalopathy** - **Behavioral changes** . Docile animal becomes aggressive, aggressive becomes docile - **Depression, incoordination, aimless walking, head pressing, vocalization** - Multiple causes: low blood glucose levels, incr. ammonia	• Hx, CS • **Lab:** - Slightly ↓ blood glucose - **Ammonia** (4x) - **BUN ↓** (urease needed) - Terminally ↓ serum albumin - **Enzymes** . **↑ GGT** in biliary infections . ± ↑ ALP in chronic - also in bone, intestine, placenta & macrophages . **SDH, LDH & GDH** - **↑ in acute diz, normal or ↓ in chronic** . **SDH**: active hepatocellular necrosis - **Excretion tests:** . **Bilirubin**: elevation indicates liver diz, bile blockage, hemolysis . **Bile acids** (BA) • Liver biopsy - safe & simple, but expensive & avoid if liver abscesses if suspected - Useful in generalized not localized problems	• **Slaughter** if severe fibrosis & failure • Acute liver failure - 1st sedate (xylazine) - 10% glucose IV • Correct any acidosis slowly • Slow 5-10% dextrose drip • Low protein diets - Vit. B1, folic acid & Vit. K1 weekly • Fresh plasma transfusions • Corticosteroids: if not infectious • Protect from sun when grazing • Colchicine • Antibiotics - Avoid those metabolized by liver such as tetracycline & chloramphenicol **Poor Prognosis indicators** • Prothrombin time > 30% of normal • Greatly ↑ GGT & ALP w/ normal or ↓ SDH or LDH • Marked fibrosis • Grave w/ pyrrolizidine alkaloid toxicosis







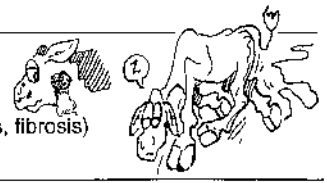
No pathognomonic CS of liver diz
CS: Wt. loss; Diarrhea; CNS; Sunburn
Dx: GGT, ALP, SDH; BA
Tx: Sedate, Glucose; Protect from sun

Liver biopsy site
• Rt. 11th ICS (intercostal space) on line from tuber coxae to shoulder joint

↑ GGT - Biliary
↑ SDH - Acute

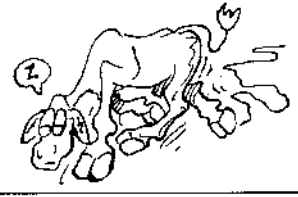
Mycotoxins-Hepatotoxin **

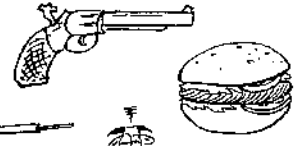
- See TOX pg 232; **Aflatoxin & Rubratoxin, Toxic metabolites of molds, Grow on feed** (grains, corn, cottonseed), Calves > adults cattle > sheep
- **CS: Liver failure**, Acute liver insufficiency
- **Dx: Analysis of feeds for mycotoxin conc., Liver biopsy** (central lobular fat infiltration & hepatic, necrosis, fibrosis)
- **Tx not usually successful, Activated charcoal slurry orally & oxytetracycline IM**

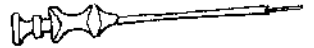


Ragwort poisoning, Pyrrolizidine alkaloid toxicity ***

- See TOX pg 233, **P. plants**: tansy ragwort & others, **alkaloids, cumulative & progressive**, chronic disorder; **Fibrosis, West USA**
- **CS:** Liver failure, Wt. loss, Hepatoencephalopathy (abnormal behavior, ataxia, wandering), Icterus (uncommon in cattle), Photosensitization
- **Dx: Difficult w/o Hx of eating, Geographic area**, Feed analysis, **Liver biopsy** (Triad: Megalocytosis, **Fibrosis**, Bile duct proliferation)
- **Tx: Euthanasia:** if severe fibrosis, Remove plant source, If appetite & little fibrosis treat for liver failure
- **Px: Poor to grave** due to tremendous amount of fibrosis



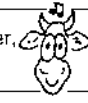




Hepatic neoplasia (IM 945; GI 835; Pa 105) ★ **Rare in cattle** < 0.01%, Metastasis of lymphosarcoma (2°) • **Tx:** None

Waste oil **ingestion** (spread to control dust), tetrachlordibenzodioxin. • Tx: supportive, additionally show acute signs after being exposed fairly recently. Use of intestinal protectants and/or cathartic is indicated
**

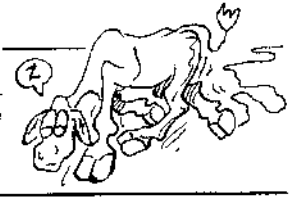
Telangiectasia (IM 945; Pa 88) • "Sawdust livers", focal degeneration in liver lobular circulation (red-brown foci 1-5 mm in diameter) found at slaughter, Cause unknown, Results in condemnation of 2% of livers of slaughtered cattle
**



Cholangitis (Mk 138; IM 948; CT 263; BR-hb 121; BR 324; GI 837; S-O 470) • Inflammation of bile system; Result of fascioliasis
**

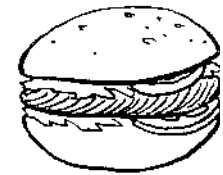
- CS: anorexia, pain, ruminal stasis, icterus

Neoplasms of gall bladder (IM 946) ★ Rare (most adenomas or adenocarcinomas, 1 case reported of bovine leukosis)

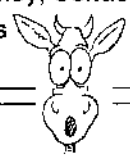


Bile stones, Cholelithiasis (Mk 138; IM 947; GI 793; Pa 108) • **Calculi (bile stones) in bile duct, Choledocholithiasis:** presence of calculi in bile duct, Cause debatable, Postmortem finding in cattle: Icterus; Decr. milk production, Hypophagia reported before slaughter
• Dx: Findings postmortem
*

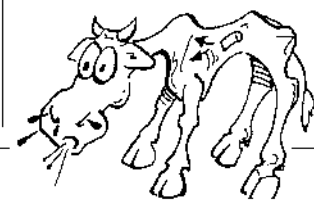
Liver

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Liver abscesses **Necrobacillosis of liver** Mk 221; C3T 716, 103; C2T 741; IM 935; BR-hb 341, 120; SR 323; Br 120, 675; GI 820, 824; S-J 542; Pic 73 ★★★	• **Beef/Feedlot** up to 95% of fattened cows - Beef > dairy bec. usually associated w/ rumenitis caused by lactic acidosis - Condemnation of liver at slaughter • ***Fusobacterium necrophorum*** #1 gr. neg., obligate anaerobic, normal flora • *Corynebacterium pyogenes*, Strep. spp, Staph. spp, & Bacteroides • **Causes** - **Rumenitis** (caused by high level carbohydrates [fattening diets] or grain overload or lactic acidosis) - **Ulceration** in cran. sac of rumen, populated by *F. necrophorum* & other bact. - **Bacterial emboli** -portal v. to liver - **Navel infection** in young (uncommon) - **Hardware diz** - commonly puncture liver to right of reticulum	• **Usually subclinical** - **Still economic loss** . ↓ **Weight gain** (reduced efficiency of feed utilization) - ± Pain (on moving or pressure over caud. right rib cage) - Most regress into a scar • **SEQUELAE** to ruptured abscess: - **Diffuse peritonitis**, rupture into abd. - **CVCT** (caud. vena caval thrombosis) - Septic or anaphylactic shock - Epistaxis & anemia - **Severe dyspnea**	• **Hx, CS, Decr. weight gain** • Postmortem - **Liver abscesses** in 10% of cattle slaughtered in USA • Not cultured usually • No liver biopsy bec. of focal lesions • ± Ultrasound  **DDx:** • Hardware diz (p 38) • Parasitism (p 54) • Malnutrition • Johne's diz (p 23) • Lymphosarcoma (p 268)	• **Salvage** • SS Long term antibiotic therapy (oxytetracycli or penicillin)   **Control:** • Reduce the conc. to roughage rat • Slow transfer from roughage to con • Multiple feedings, not TID • Chlortetracycline in diet during fatteni period (70 mg/ head/d)

Beef; Rumenitis, Ulcers, Navel ill, Hardware diz
CS: Subclinical = $ loss (↓ feed efficiency, Condemned livers)
Dx: Decr. wt. gain • PM: liver abscesses
Tx: Salvage




Liver neoplasia
BR-hb 120, BR 324
★ Rare



• **Diffuse peritonitis**: Abscess rupture into abdomen

• **Anaphylactic shock & death**: due to release of purulent material from abscess into the caud. vena cava • CS: collapse & death w/in minutes or acute resp. distress & live for several days • Px: grave

• **CVCT** (caud. vena caval thrombosis): • CS: Weight loss, emaciation, mild ascites, chronic diarrhea (like Johne's diz), Distention of Mammary veins, but not jugular veins

• **Epistaxis**: abscess in lungs from liver abscess embolus in caud. vena cava, abscess erodes pulmonary artery • CS: intermittent epistaxis, weight loss, decr. milk • Px: slaughtered after poor Tx response

• **Severe dyspnea:** thrombosis into caud. vena cava to lungs, anaphylaxis

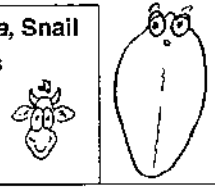
Liver flukes, Fascioliasis, Hepatic fascioliasis

Mk 215, C3T 755; C2T 757; IM 933; BR-hb 470; BR 1230; BM&S 69 3; Br 238, 815; DC 182; GI 533; Pa 99; Pic 71

★★★

- ***Fasciola hepatica***
  - **Common liver fluke** (leaf-shaped)
  - West & gulf coasts & Rocky Mt. region (endemic)
  - **Cattle**: subclinical, develop resistance to repeated infec.
  - **Sheep**: acute cases, no resistance to repeated infec.
- ***Fascioloides magna*** (giant liver fluke)
  - Cattle encapsulate to stop migration
  - Sheep - not encapsulated, so migrate, can kill lambs
- Migratory larvae damaging liver
  - Fibrosis/finally sclerosis of bile ducts
- Summer & early fall (liver fluke season)

Sheep >> cattle, *Fasciola*, Snail
Liver migration/Necrosis
CS: Emaciation, Anemia
Dx: Capped egg
Tx: Anthelmintic



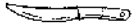
- **Liver diz CS**

1 • **Chronic** - often fatal in sheep, rarely in cattle
- All seasons
- Emaciation, Unthrifty, Rough hair coat/Brittle wool
- **Anemia**
- Edema & ascites
- ↓ Milk production
- Mayhave no CS in cattle
- Heavy infection in sheep - Fatal

2 • **Subacute/acute** - 1° sheep & often fatal
- Seasonal
- Distended, painful abdomen
- Anemia
- Sudden death (w/in 6 wks - acute; 7-10 weeks - subacute) in sheep

- **In conjunction w/ "Black diz"**
  - Mainly sheep (fatal)

- No pathognomonic CS
- **Operculated, oval eggs in feces** (repeated fecals, ± negative for 16 weeks after infection)
- ELISA & DOT-ELISA
- Rapid card test (ELISA) for antibodies for field work

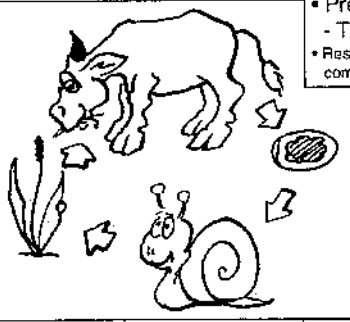


- Postmortem:
  - Migratory tracts & flukes in bile ducts; immature in parenchyma

- **Anthelmintics** reduce in host animals
  - Adult & immature: nitroxynil, tricloabendazole, diamphenetide, closantel
  - Adults: Clorsulon, Alfendazole, rafoxinide, netobimin - to eliminate flukes
    - 2nd dose in 8 weeks

Prognosis: Good cattle, Poor sheep

Control
- **Reduce snail pop.** (drain land, fence, management & molluskacides)
- Preventative herd health program
  - Tx for flukes
- Reservoir infect. in horses, deer & rabbits complicate control



Life cycle
- Eggs pass in feces
- Hatch in water
- Infect lymnaid snails
- Encyst on vegetation
- Eaten by host
- Penetrate intestine to peritoneal cavity, then liver capsule
- Migrate through liver tissue
- Enter bile duct, mature & lay eggs
- Live in bile ducts

Infectious necrotic hepatitis, Black diz

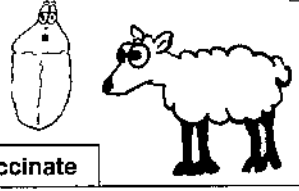
Mk 327; C2T 570; C3T 572; IM 921; BR-hb 289; BR 689; Br 564; Pa 99; Pic 72

★★

- **Sheep** (1-4 yrs-old) & sometimes cattle
- ***Clostridium novyi*** infection
  - Type B, soil-born & intestines & skin surface
  - Transm: feces from carrier animals
  - Multiplies in liver necrosis (migrating liver flukes)
  - Powerful necrotizing toxin
- Worldwide distribution

Sheep >> Cattle, *Cl. novyi* + Liver flukes; Vaccinate

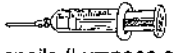
- **Sudden death usually**
  - Sternal recumbency, die w/in a few hrs



- Postmortem: necrotic liver fluke tracts

- **No effective Tx** (ABs in cattle)

Control

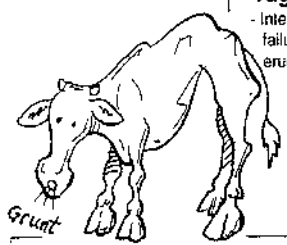


- Reduce snails (Lymnaea spp) intermediate host of fluke
- **Vaccinate** w/ *C novyi* toxoid more effective than snail removal

Bacillary hemoglobinuria - red water disease: See Cardio pg 90, *Cl. hemolyticum* (also called ***Cl. novyi* type D), Anaerobic conditions: Fluke infection; Hemolyzing exotoxin** • CS: Jaundice & anemia, **Port-wine-colored urine**
IM 846
•Tx: IV fluid support, High doses of penicillin, Vaccinate
Cl. hemolyticum bacterin • **Px:** Poor

Hardware Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Hardware diz, **Traumatic reticuloperitonitis,** **Traumatic reticulitis,** **Traumatic gastritis** Mk 224; C3T 719; C2T 719; IM 829, 858, 865; BR-hb 107; BR 289; BM&S 668; Br 120, 643; DC 113; GI 715; S-J 513, S-N 77; S-O 526; Pa 28; Pic 64 ***	• **Mature dairy** >> beef • **Indiscriminate eaters** (cows eat wire & nails); FB falls into reticulum • **Contractions force FB thru reticular wall** - nail, wire - **Right medial wall of reticulum** (most common site of penetration) - **Commonly into liver** - Abscesses in right med. wall - Rarely into pericardium . Pericarditis & pleuritis - through diaphragm • **Local or diffuse peritonitis** - Leakage into abd. cavity - Fibrous adhesions (m/ disrupt gastric motility) **CHRONIC** • **Vagal indigestion** - Interference w/ vagal n. (omasal block) failure of transport from rumen; not eructation failure so no gas buildup	**ACUTE** • **Sudden onset** • **Anorexia** • **Sharp fall in milk production** • **Pain** - anxious expression, careful gait, reluctance to move, shallow fast resp., pulse rate elev. - **"Grunts"** when defecates, urinates or moves - **Elbows abducted**, back arched **CHRONIC** • **Vagal indigestion** • Fever • Shock • **"Papple bloated"** • No fecal passage • Generalized ileus (no GI movement) • **CS often abate in couple of ds,** Dx then difficult • **Less severe cases** - **Subtle confusing signs** - Weight loss, rough hair coat, ± diarrhea	**ACUTE** • **Pinch withers** (grunt w/ no movement) • **"Skooch" test:** pressure on xyphoid - **"grunt"** • **Compass** to see if magnet present • **Exploratory lap.** - most commonly done; lt. flank just behind last rib • Standing rads. of cran. ventr. abdomen - Foreign body if radiopaque - in or outside reticulum - Gas associated w/ an abscess (gram negative organism) • Ultrasound - only works w/ abscess adjacent to body wall • **Lab** • **Abdominocentesis** (see box) - Neg. findings doesn't rule out - Normally small volume - Frank pus, Ingesta **CHRONIC reticuloperitonitis** • Rectal - Filling of ventral sac of rumen to right abdominal wall • **Chronic bloat - serum & rumen electrolytes normal**	**Conservative medical Tx 1st** • **Forestomach magnet** • **ABs** IV or IM to control peritonitis - broad spec - Naxcel®, tetracyclines, Penicillin - If Px grave, inform owner before ABs . Withdrawal times • **Supportive care** • Analgesia (watch for ulcers in abomasum, aspirin cheapest, phenylbutazone, Banamine) • Many recover by 3 days; if not - Surgery **Rumenotomy** (see box) • Remove object; do not break down adhesions (because localizes any peritonitis) • Diffuse peritonitis (see box Tx peritonitis) **Prognosis:** • Good w/ Sx • Diffuse peritonitis - poor • If don't respond, re-evaluate economically



Wire through reticulum, Abscesses, Peritonitis
CS: Acute (Pain), Chronic (Vagal indigestion, "Papple")
Dx: CS, "Grunts", "Skooch test", Abdominocentesis, Sx
Tx: Magnet, ABs, Rumenotomy • Px: Diffuse - Poor

DDx for all GI diz bec. of similar signs

Control:
• **Bar magnet** all cattle (at 1st breeding (usually AI), or pregnancy dx (i.e., when handling)
• Clean FBs from area - avoid bailing wire
• Compass check for magnet

DDx:

Pain

- Liver abscesses
- Abomasal ulcers
- Lymphosarcoma
- Laminitis (forelimbs)
- Pyelonephritis
- Rupture of abscesses (liver, rumenal, umbilical, renal, pelvic)
- Uterine rupture/torsion
- Septic abd. Sx
- Ruptured bladder
- Intraperitoneal injections
- Ruptured rectum
- Hernias
- Fat necrosis

Loss of milk abruptly & anorexia, etc.

- Ketosis or indigestion
- Acute systemic mastitis
- Metritis
- Enteritis
- Intussusceptions
- Cecal & abomasal volvulus
- Abomasal displacement

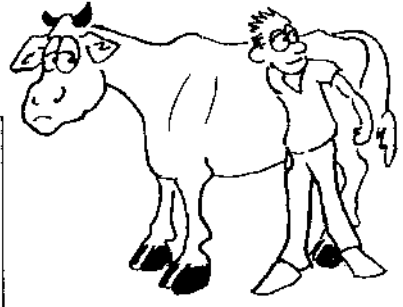
Respiratory

- Pneumonia

Cattle localize peritonitis well

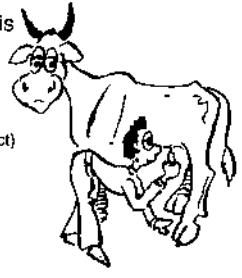
Rumenotomy

- Incision in left flank, just behind rib (not too close or m/ cause osteomyelitis)
- Feel adhesions in front of reticulum (break down adhesions; they will reform)
- Suture dorsal sac of rumen to skin outside incision, make water tight (w/ Connel & Lambert patterns, bites about 45°; outer edge of incision buried & not exposed to contamination from rumen)
- Incise into dorsal sac of rumen
- Pass hand inside along dorsal rumen into reticulum
- **Feel every mucosal square for** FB (foreign bodies) (if present, immediately remove or will not find it again)
- **Palpate for abscess on med. wall** (slimy feel)
  - Penetration point (large circular mass [omasum] also to left of right wall)
  - IV tubing, 16 gauge syringe & stick in, trying to get pus back
  - Draining back into reticulum, but must be sure of good adhesion (walled off peritonitis)



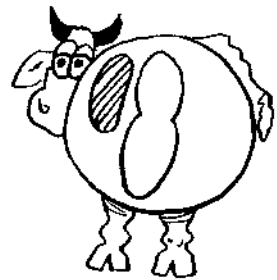
Abdominocentesis

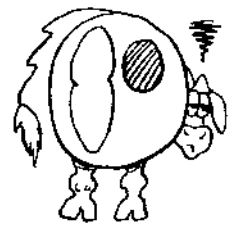
- Negativew findings doesn't rule out walled off peritonitis
- Peritoneal fluid normally clots in cattle
  - EDTA tube so doesn't clot (inhibits bact. growth)
  - "Clot" tube for culture
  - Smear if can't do analysis immediately & refrigerate rest (don't freeze)
- Volume: small in normal nonpregnant animal (m/b impossible to collect)
  - Large volume suggests abd. effusion or advanced pregnancy
- Color, norm. straw-colored, odorless, m/b slightly cloudy
- Frank pus, fibrin clumps or turbidity suggests peritonitis
- Ingesta - ruptured bowel or entering bowel w/ needle
- TP (refractometer) - of little benefit bec. of wide range (1-5 g/dl)
- Fibrin- of little benefit bec. of overlap of norm. (100-400 mg/dl) & peritonitis (100-800 mg/dl) levels
  - > 500 mg/dl peritonitis
- WBC count - difficult to interpret (norm. 1-20,000 cells/mm^3)
- Peritonitis, PMN > 40% Neutrophilia (Lymphocyte-neutrophil reversal)



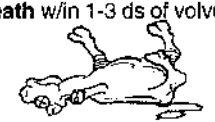
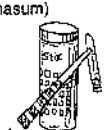
Abomasal Displacement

Abomasal displacement & volvulus (DC 124)

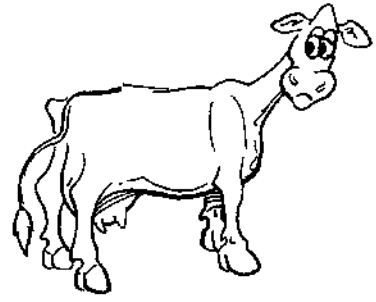




- **Common**
- **Man made diz** - metritis, mastitis, incr. conc. diets
- Gas accumulation in abomasum causes displacement to the lt. or rt.
  - **Atony** of abomasum due to **hi VFA** (volatile fatty acids) + continued fermentation = gas & distention
  - **Abomasum floats up wall on lt. or rt.** side (no ligg. holding abomasum down)
- LDA (left displacement) more common
- Adult dairy cows >>>> others
- Early postpartum period commonly

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
RDA, Rt. displaced abomasum - Abomasal volvulus, RTA, Rt. torsion of abomasum Mk 153; C3T 725; C2T 726; IM 870; BM&S 675; BR-hb 110; BR 296; Br 648; DC 129; GI 738; Pa 23; S-J 526, 538; S-N 125; S-O 436, 457 VC/S 409 *** 	• **RDA ≤15% the frequency of LDA** • RDA, pathophys., clin. path. & epidemiology same as LDA • **RTA** (Right torsion of abomasum) - **Surgical emergency** • **Cause uncertain** - Stress, adverse weather - Hi conc. diet - Concurrent diz • **Epidemiology** - **Early lactation** - greatest risk for RDA, but not for RTA, postpartum • RDA probably leads to abomasal volvulus (RTA) • Sequela - Vagal type 2 indigestion 	• **RDA similar to LDA** - **"Ain't doing right" - vague** - **CS** not total obstruction - Moderate to total anorexia - ↓ Feces (variable) - ↓ Frequency of ruminal contractions - ↓ Milk (hypogalactia) • **RTA** - **More severe** than RDA or LDA - **Dehydration** (sunken eyes) - **HR > 100 beats/min** - **Marked bilateral distention** - Colic rare (even w/ distention) - Feces absent or scant/watery - **Death** w/in 1-3 ds of volvulus 	• **Auscultation & percussion**  - **RDA "Ping"** under last 5 ribs in dors. abd. (uniform pitch) - **RTA** also into paralumbar fossa . Ventral border horizontal line because of **fluid** in abomasum - RTA - borborygmi absent • RTA - Ballottement (succussion) sloshing in abomasum  • Rectal - RDA m/b palpated - **RTA always palpable** • **Lab** - RDA - normal electrolytes - **RTA** (similar, but more severe than LDA due to sequestration of HCl in abomasum) - **Metabolic alkalosis** - **Hypochloremia** - **Hypokalemia** & paradoxical aciduria  - **Terminal acidosis** (due to ↓ perfusion of peripheral tissues)	• **RDA or RTA** - **Immediate surgery** to correct both RTA & RDA (difficult to DDx RTA & RDA) - **Rolling contraindicated** (can change RDA into RTA) • **RTA**  - **Fluids & electrolytes** . IV 20-80 L of 0.9% NaCl w/ 25-100 mEq/L of KCl (careful w/ KCl, not more than 1 mEq/kg/hr - cardiotoxicity) • **Broad spectrum ABs** • **Corticosteroids & NSAIDs** for shock  **Prognosis:** • RTA directly related to time - Depends on mucosal integrity - Higher heart rate, poorer Px - Abomasal distension m/ result in vagal indigestion syndrome, then must salvage later

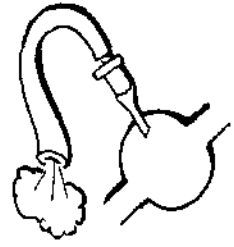
Surgical Emergency - RDA & RTA
CS: RDA -"Ain't doing right" • RTA - More severe
Dx: "Ping" on right, Rectal
Tx: Emerg. Sx, Fluids, ABs, Steroids & NSAIDs

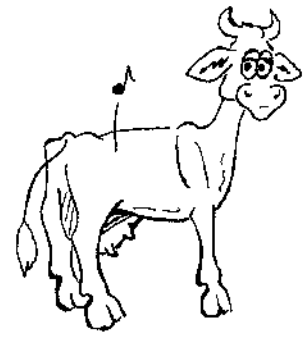


Surgery - Correction of RDA & RTA

(NEVER leave Rt-sided displacement. Sx immediately)

- Right paralumbar approach
- **RDA**
  - Make sure no volvulus
  - Rt. flank omentopexy, or Right paramedian abomasopexy
- **VOLVULUS (RTA)**
  - Think twice about laying down (very sick)
  - **Untwist**, very enlarged, most twisted counterclockwise
  - **Alternatively decompress gas w/ needle & untwist**
    - Place purse string suture bec. fluid also in abomasum
    - Cut through serosal layer, not mucosa
    - Needle w/ small tubing through mucosa
    - Tighten purse string around tubing (under a lot of pressure)
    - Once decompressed easy to untwist
  - **Stabilize w/ omentopexy**
  - Must warn owners that cow may go down due to impaction & vagus n. damage



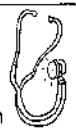


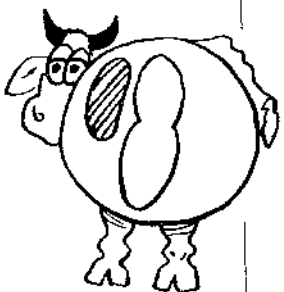
DDx:

- **Right-sided "pings"**
  - Cecal distention, or volvulus (linear pings below transverse processes to tuber coxae) (p 49)
  - Gas in spiral colon (variable pings, palpate rectally)
  - Pneumorectum following rectal exam (pings like cecal distention)
  - Pneumoperitoneum (heard on both sides)
  - Gas in uterus/physometra (rectal palpation)
  - Abomasal volvulus (most difficult to DDx) (p 40)
- **Intestinal obstruction**
  - Torsion around root of mesentery (rectal: distended loops) (p 45)
  - Cecal volvulus (p 49)
  - Intestinal obstruction (p 44)

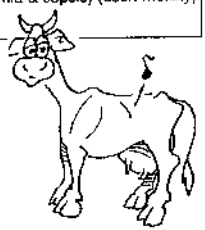
Abomasal Displacement

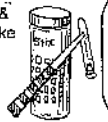
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
LDA, Left displaced abomasum Mk 153; C3T 723; C2T 724; IM 868; Br 645; BR-hb 109; BR 292; BM&S 671; DC 124; GI 734; Pa 23; VC/S 406; S-J 523, 529; S-N 119; Pic 67 ***	• **More common than RDA** • **Cause uncertain** (see box) - Stress, adverse weather - **Hi concentrate diet** - **Concurrent diz** • **Early lactation** - greatest risk, **postpartum** • **"Swingers"**, repeatedly displaces & then slips back, empties & lot of diarrhea, not uncommon, so keep checking	• **"Ain't doing right" - vague CS**, not total obstruction • Moderate to total anorexia • ↓ Feces (variable) • ↓ Frequency of rumenal contraction • ↓ Milk (hypogalactia) • Don't chew cud (ruminate) • **Last 1 or 2 left ribs sprung**, sunken left paralumbar fossa • ± Retraction of eyeballs • Mild pain (treading) • Pulse 85-90 beats/min (norm. 60 -70) • **Acetone breath** (ketotic)	• **Auscultation** - Gurgling or tinkling in lt. paralumbar fossa (normally scratching sounds) • Auscultation & percussion - **"Ping" over LDA** - on line betw. tuber coxae to elbow • Palpation of rumen (lt. flank) indistinct bec. separated from wall • Rectal exam - **Rumen displaced medially** away from lt. wall - M/ feel abomasum betw. lt. wall & rumen • **Aspiration** of fluid or gas - **pH < 4.5** (wide-range pH paper) - Odor of abomasal gas (slightly acid or burnt almonds) • **Lab:** - **Metabolic alkalosis** (sequestration of HCl in abomasum) - Elev. blood pH & bicarbonate (HCO_3) - ↓ Blood Cl (**hypochloremic**) - **Hypoglycemic w/ ketonuria** on farm (transport often changes to hyperglycemia due to stress & cortisol secretion) - Dehydration m/ elevate other electrolytes - **Paradoxical aciduria** despite alkalosis (due to hypokalemia & dehydration causing renal retention & hydrogen secretion) - Hypokalemia (from alkalosis & decr. intake of K)	• **NOT an emergency** • **Return abomasum to correct anatomical position** • Fluids & electrolytes: occasionally Tx electrolyte & acid-base abnormalities (usually not required if correct position, normal flow corrects itself) • **Treat concurrent diz** **Prevention:** • Slow introduction to concentrated feeds after calving • Prepartum introduction of ensiled & concentrate feeds • Incr. particle size of forage • Prevent hypocalcemia • Prevent inflammatory diz (metritis & mastitis)





Cause uncertain
- **Stress, adverse weather**
- **Hi conc. diets**
  - Sm. size feed particle not mech. stimulating rumination
  - Need large particle roughage
- **Concurrent diz**
  - Assoc. w/ endotoxemia or febrile (retained placenta, metritis & severe mastitis), decr. gastric motility
  - Hypocalcemia (milk fever, endotoxemia & sepsis) (decr. motility)
  - Ketonemia (mechanism unclear)





Common, Hi conc. diet, Concurrent diz
CS: "Ain't doing right"
Dx: "Ping" on lt. side
Tx: No emergency; Reposition abomasum

DDx "pings" on left side
- Rumen tympani (assistant blows on stomach tube while "pinging") (p 26)
- Air in uterus/physometra (rectal exam)
- Distended lt. displaced cecum (rectal exam) (p 49)

Repositioning the abomasum

• Nonsurgical

- Cast cow in right lateral recumbency
- Roll into dorsal recumbency & shake legs back & forth (jiggle gas filled abomasum up to a ventral position)
- Roll cow over to eft lateral recumbency & allows to stand
  . Complication rare (torsion of intest. mass)
- **Recurrence** of LDA in a few days usually

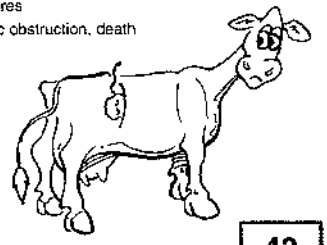
• Surgical (outcome usually satisfactory)

1. Blind-stitch abomasopexy

- Advantage: no celiotomy (opening abdomen), cheap
- Must have displaced abomasum w/ air & "ping"
- Cow cast in rt. lat. & then rolled to dorsal recumbency to move abomasum back to ventrum (see nonsurgical above)
- Use stethoscope to make sure "ping" in correct position, clip area
- Push special 8 cm needle through body wall & hopefully abomasum, through mucosa, maybe 2 stitches
- Hope for adhesion
  - Special toggle pin fixation (bar suture) - toggle connected to sutures
  - Complications - abscess, hemiation, suturing rumen, pyloric obstruction, death

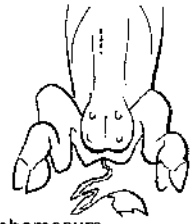
2. Right flank omentopexy (done standing)

- Open right flank (be careful of descending duodenum)
- Bring abomasum under rumen to right side (if trouble, decompress w/ needle & extension tubing)
- Pull pylorus up to incision to identify (char. appearance)
- Let pylorus move 4" down, 4" forward of incision
- **Suture omentum into incision** w/ peritoneum & transversus muscle



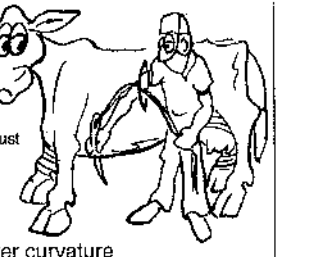
3. Rt. paramedian abomasopexy
(Most permanent fixation)

- Dorsal recumbency, no anesthetic used, front & hind legs extended. Clip ventr. abd.
- Incision hands width behind sternum & hands width to right of midline through rectus abdominis muscle
- Relocate abomasum & ID greater curvature (greater omentum attached)
- Locate reticuloabomasal lig. to locate cran. abomasum
- Suture 6" caudal to ligament, include abomasum in full length of closure w/ peritoneum & deep rectus sheath
  - **DO NOT go full thickness, but must include submucosa** or it will tear away (pinch between finger & thumb & will feel mucosa slip away)
  - Suture material PDS (absorbable, but lasts some time [Maxon®])
- Close muscle layer, then **superficial (external) rectus sheath**, 2-0 Vicryl®, wide bites, simple interrupted
- Close SQ & skin



4. Left flank abomasopexy (done standing)

- Incision in left flank close to ribs (abomasum must be displaced at time of surgery)
- ID greater curvature of abomasum (greater omentum attached to it & most dors. part in LDA)
- Pexy as far forward as possible
  - Suture (6 feet long), 4-5 bites into cran. greater curvature
- Push needle through ventral abdomenal wall from inside
  - 1 hands width from sternum, 1 hands width to right
- Repeat with other end of suture
- Assistant takes sutures & ties as you push abomasum into proper position
- Leave for 3 weeks (good adhesion); cut exposed part of sutures
  - Advantage: stronger hold on abomasum & standing position
  - Disadvantage: hard to get sutures far enough forward to be in correct place



Obstruction

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Obstructive intestinal diz Mk 161; C3T 733-5; C2T 734-6; IM 880; Br-hb 114; BR 309; BM&S 677; Br 651; GI 747, 751; Pa 34; S-J 545	• **Obstruction of flow through the GI tract** **Causes** • Congenital malformation (atresia or constriction of a portion) • Mechanical - Intussusception (p 45) - Volvulus (p 44) - Tumors (p 51) - Hernias (p 46) - Fat necrosis (p 50) • Functional obstruction - Ileus (p 48) - Dilatation	• **Anorexia** • **Drop in milk production** • ↓ **Feces** or failure to pass feces • **Abdomenal distension** (progressive) • **Tympanic resonance in right abdomen** • ± **Colic** • Severe pain m/ cause atony of forestomach • **Mechanical obstruction** - Circulatory shock & collapse due to dehydration	• **Dehydration** • **Pulse rate indicates severity** - Normal 60-80 beats/min - Severe if >100 beats/min • Electrolyte abnormalities - Obstruction: duodenum or pylorus (sequestration of abomasal secretions [HCl]) . **Hypochloremia** . **Hypokalemia** . **Metabolic alkalosis** - Obstruction of cecum, colon, or rectum - M/b dehydration w/o alkalosis - **Necrosis or rupture** . **Acidosis** (due to circulatory collapse from peritonitis & absorption of toxins) • **Shape of abd. from behind** - Ruminal - lt. dors. distension - Fluid distension("pappel" - 10-4:00 o'clock) of abomasum or rumen - Small intestinal distention - pear-shaped, then finally completely round • **Auscultation** - know normal sounds - Ruminal contractions 2/min - Right side, just gurgling of intestine	• **Treat cause** • **"Pinging" auscultating while percussing** (Flick hard & listen) - Heard when gas distended • **Succussion** (ballottement) - fist into abd. & rock &/or pulling it out fast to get fluid shaking. Do both sides • **Rectal palpation** - Feel rumen, degree of distension - Cecum (esp. if distended) - Abomasum normally too far forward - Distended loops of bowel • **Feces**, if not passing, look at what is in rectum • **Stomach tubing** - Through mouth, using Frick speculum - Kingman tube used to get fluid off (1.5" diameter) • **Abdominocentesis** -Teat cannula or 18 gauge needle - Incr. in no. & % of PMNs, cows hi # of eosinophils (normally ↓ w/ ↑ in PMNs) TP in normal < 2.5, ↑ w/ inflammation
Volvulus Mk 161; IM 881; Br 652; GI 748; Pa 36; VC/S 652 ★	• **Rare** • **Twisting** • **Long mesentery** of spiral colon, dist. jejunum & prox. ileum predisposes to volvulus - **#1 Segmental volvulus of "flange"** (dist. jejunum & prox. ileum) • Distention prox. to obstruction, emptying distally • Strangulation common in calves & kids • Strangulation uncommon in adults bec. of so much fat in mesentery	• Similar, but slower onset to complete volvulus around root of mesentery • Acutely - colic (continuous) • Moderate abd. distention on Rt. side • ↑ HR & RR • Anorexia • If don't Tx die in 2-3 days • **Doesn't usually strangulate**	• **Multiple resonant "pings"** • Rectal exam - Scant feces, mucus or blood - Gas-filled loops • Lab: - Hypochloremia - Metab. alkalosis • Exploratory	• Correct acid-base imbalance • Surgical ight flank - **Untwist inside abdomen** (if exteriorize hard to replace bec of distention) if gets tighter, twist other way • Rarely strangulates so don't need resection DDx • Intussusception (p 45)

Long standing obstruction
• **Hypochloremic metabolic alkalosis**

Strangulation
• **Metabolic acidosis**

#1 "flange"
Rarely strangulate

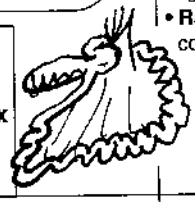
Volvulus around root of mesentery

Mk 161; C3T 734; C2T 735; IM 881; Br 652; GI 748; VC/S 456; S-J 546 **

- Volvulus of large & sm. intest. around the mesenteric root
- **Preruminant neonates** most common (any age susceptible)

DDx: Grain overload (p 25)

Preruminant neonate
CS: Colic, Abd. enlargement, Shock
Dx: Hx, CS, Palpation, Exploratory Sx
Tx: Emergency Sx
Px: Grave - Good if acute Sx

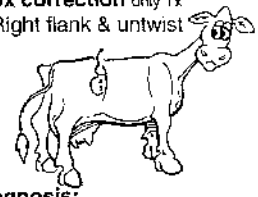


- **Painful colic** (violent kicking & vocalization)
- **Recumbency & dehydration**
- **Rapid abdom. enlargement**
- Circulatory shock early (incr. HR & RR 120/min)
  - Cold extremities
- **Rapid strangulation** - clinical course short **- Sx quick**

- **History, CS**
- **Percussion & auscultation**
  - Calves - resonant sound, bilat.
  - Adults - tympany on rt. side (rumen on other side)
- Succussion - fluid splashing
- Rectal palpation
  - Distended loops & tense abd.

- **Exploratory laparotomy**
- Lab:
  - Metabolic alkalosis early, then
  - **Metabolic acidosis** (strangulation)

- **Surgical emergency**
  - **Sx correction** only Tx
  - Right flank & untwist



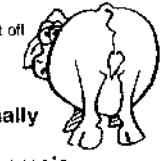
Prognosis:
- Dep. on amount of devitalization & venous thrombosis
- Grave, not many saved
- Earlier Sx the better

Intussusception

Mk 161; C3T 733; C2T 734; IM 881; BR 309; BM&S 678; Br 654; GI 746; Pa 35; S-J 545; S-N 130; Pic 69

**

- **Telescoping** of a piece of bowel into an adjacent segment
- **Infrequent** cause of obstruction in cattle
- **Jejunum of adults**
  - **Assoc w/ polyps** or intraluminal masses propelled into intussuscipiens
- **Calves associated w/ enteritis**
- Pathophysiology
  - Venous return stopped, swells as arterial still pumps
  - Arterial supply then shut off
  - Ischemia & necrosis
  - If rupture, peritonitis
- **Obstruction**
  - **Distends proximally**
  - **Empties distally**
- **Strangulation - necrosis**



- **Colic** (kicking)
  - Acutely, tension on the mesentery, then subsides in 24 hours
  - Chronically: distention of prox. gut (treading & repeated lying down & standing)

- Depression, anorexia, milk drop
- Gradually shocky & dehydrated
- **Abdomenal distends, pear-shaped, then rounded**
  - Rumen distends (continued digestion = fine particles & reflux from abomasum)
  - Sm. intestinal distention - rt. side
- **Absence of feces w/in hours**
  - **"Strawberry jam" feces** if bowel necrotic

- Auscultation & percussion
  - **Resonance on rt. side**

- Rectal exam:
  - **Distended loops**
  - M/ palpate intussusception (firm mass)
  - **"Strawberry jam"** (very dark red feces + mucous)

- Abdominocentesis
  - Incr. RBCs, WBCs & protein
  - Bacteria if rupture

- CBC
  - Neutropenia & elev. fibrinogen
- Exploratory (if done standing, lay down for resection)

Neonates
- Abdomenal palpation w/ both hands m/ find intussusception
- **Neutrophilia**
- **Hyperfibrinogenemia**

Intussusceptum (orad gut) propelled by peristalsis into **intussuscipiens** (enveloping portion)

- **Surgical resection** (never reducible)
  - Incision hi in caud. rt. flank
- **Fluid & electrolytes**
- When stabilized after surgery - oral electrolytes & fluids

Prognosis:
- **Good** if Sx early & peritonitis controlled

DDx:
- Abomasal ulcers (p 31)
- Neoplasia (p 269)

Obstruction - Distends prox., Empties dist.
CS: Colic distention, "Strawberry jam" feces
Dx: "Pings" on rt., loops, "Strawberry jam", Alkalosis
Tx: Surgical resection

Umbilical Hernia

Condition	Facts/Cause	Presentation	Diagnosis	Treatment
Intestinal incarceration, Internal hernia IM 759; S-O 390; VC/S 417 ★	• **Rare** • Obstruction due to entrapment of loops (usually jejunum) - Embryonic structures (urachus, omphalo-mesenteric duct, umbilical vein, [round lig. of liver in falciform lig.]) - Acquired defects in mesentery - Intestinal adhesions	• **Obstructive CS** - Colic - Depression - Anorexia - Absence of feces	• CS, History • Rectal palpation **Rare** **CS: Obstructive** **Dx: CS, Hx, Rectal** **Tx: Sx**	• Surgical correction
Hernia Mk 111; C3T 102; IM 759; VC/S 499; S-J 551; S-N 83 ★★★	• **Classification of hernia** - **Location** (umbilical, ventral, scrotal, inguinal, diaphragmatic, perineal) - **Contents** (enterocoel [intest.], omentocele [omentum]) - **Condition** - reducible, irreducible - incarcerated, strangulated . **Small reducible hernias** m/ disappear in time . **Incarceration of bowel** (m/b obstructed & not strangulating) . **Adhesions between sac & contents** . **Strangulation** (more serious, compromises blood supply) - **Cause:** Inherited, traumatic, incisional . **Inherited:** if hernia at birth or develop shortly after animal should not be bred . Traumatic or incisional (ventral hernias usually) **Parts of external hernia** **1. Hernial sac** - inner lining of peritoneum & outer layer of skin & subcutaneous tissue **2. Hernial contents**: omentum, intestines or freq. other viscera **3. Hernial ring** opening in abd. wall natural or acquired			
• **Diaphragmatic hernias** ★ C3T 868; IM 834; BR-hb 167, 106; BR 421; Br 152, 288, 655; VC/S 490; S-J 523 **Resp. distress**	• Congenital - Peritoneal/pericardial hernias usually • Traumatic hernia	• Weakness • Resp. distress • Slight coughing • Odontoprisis • Recurrent bloat • Capricious appetite	• History, CS • Auscultation: abnormal lung sounds, muffled heart sounds	• Congenital: no reported successful Tx • Traumatic: - Surgical repair - ventral approach, if calf old enough to ruminate, empty the rumen via rumenotomy 1st, mesh implants m/b used for large defects

• **Abdominal hernias** (S-J 551) • Sequela to trauma in late pregnancy • Usually salvaged because surgery not economical

• Umbilical hernia

Mk 111; IM 331; BR-hb 649; BR 1653; Br 151; S-J 551; VC/S 499; S-O 47, 391; S-N 84; S-UG 53; Pic 17, 19

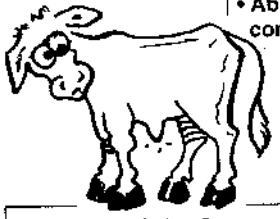
***

- **Common in calves**
- 1° DDx for lumps on bellies of calves
  - Can palpate complete ring in linea alba, no thickening, just sac
  - Lined w/ peritoneum
  - Great variation in size of hernial sac &/or hernial ring
- Congenital (at birth)
  - Occasionally umbilical hernias develop after infec. & are not consider inherited
- **Abscesses of umbilicus common cause of hernia**

- **Uncomplicated hernia** (most common) no adhesions or strangulation
  - **Reducible through hernial ring**
- Incarceration: bowel, pyloric part of abomasum or greater omentum
- **Strangulation very rare**
- Abscesses m/b present w/ hernia, or just abscess & no hernia
  - Urachal abscess
  - Umbilical abscess

- History, CS
- Palpate
- Physical exam
- Needle aspiration

- **Uncomplicated hernia**
  - **Small reducible hernias m/ disappear in time**
  - **Young calf - pressure bandage around body a few weeks**
  - **Older calves: Surgical** correction (see box)
- **Abscess & hernia**
  - Open & drain abscess, flush w/ Betadyne®
  - Repair hernia later - hernia m/ heal after abscess drained
- **Urachal abscess** (urachus extend from umbilicus to apex of bladder)
  - Must resect urachus & tip of bladder
  - 2 inverting nonperforating layers in apex of bladder (must be water tight)
- **Umbilical vein abscess** in patent vessel
  - **Liver abscess**
    . More difficult to handle

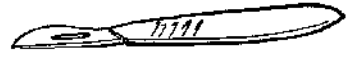


Umbilical vein passes in free edge of falciform lig. to liver, continued as the ductus venosus through liver in the fetus, Umbilical v. becomes round lig. of liver.

CS: Reducible, Strangulation rare
Dx: Palpation, Sx
Tx: Sx reduction, "Vest-over-pants"

Sx always check for infection (open abd.)
- Fusiform skin incision, open to abdomen to break down adhesions, check for abscess & viability of intestine, cut out hernial ring & close abdomen
  - Marlex® mesh or Proxplast® rarely required to fill wall defect, can't place if infection

Umbilical hernia in male, just in front of prepuce
- 2 elliptical incisions from front of hernia back past prepuce
- Inverted U-shaped incision around cran. end of prepuce
- Suture so inverted Y-shaped suture line
  . Legs of "Y" on either side of prepuce



• Inguinal/scrotal hernia

C3T 734; C2T 735; VC/S 458;S-J 552; S-N 87

*

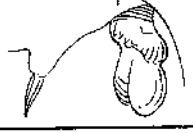
- **Mature bulls**
- Loop of gut into int. inguinal ring
- Predisposition: congenital enlargement of int. inguinal ring
- Almost always left inguinal ring
- Problems when gut becomes strangulated, if large ring then m/ slide in and out w/o problems for years

- None if not obstructed or strangulated
- **Strangulation**
  - Acute abdomenal pain
  - Tympany
  - Abdominal distention
  - ↓ Fecal output
- Enlargement at neck of scrotum sometimes

- History, CS
- **Rectal palpation of int. inguinal ring**
  - Always check in intestinal obstruction

- **Emergency surgery**
  - Left of right paralumbar laparotomy on standing bull, or ventr. approach over inguinal canal at neck of scrotum
  - Postsurgical hydrotherapy if swelling
  - Check fertility before surgery

Mature bulls - Left inguinal ring
CS: Strangulation/Obstruction
Dx: Rectal palpation of inguinal rings
Tx: Surgery

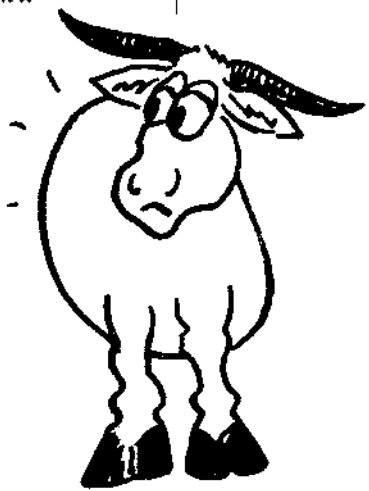


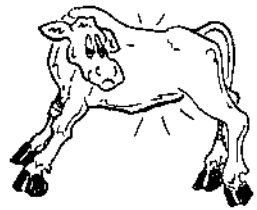
DDx:
- Intussusception (p 45)
- Torsion around root of the mesentery (p 45)

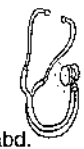
Prevention: m/b hereditary, owner can decide to breed or not

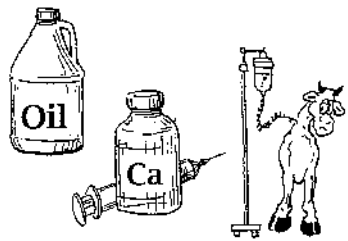
Obstruction

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Ileus, Pseudo-obstruction Mk 161; IM 884; Pa 34 **	• **Adult, lactating dairy cows** • **Adynamic ileus** (inhibition of bowel motility) mimics obstruction • **Cause unknown** • **Often spontaneously resolves**	• **Cow in early lactation** (usually) • Anorexia (presenting CS) • Colic (presenting CS) • Rt. abdominal distention • No feces	• **Normal temp, HR & RR** • ↓ Amplitude, but normal frequency of rumen motility • Auscultation - **No borborygmi**, quiet abd. on right side (± fluid "tinkling" sounds) • Auscultation & percussion - Areas of high pitched resonance • Succussion - "sloshing" sounds • Rectal exam - **Distended loops** (spiral colon, cecum or sm. intest) - M/b difficult to do rectal because of distention - No feces passed, but sticky mucus & feces on examiner's arm • **Lab - no abnormalities**	• **Often spontaneously resolves** • **Not life threatening** - Symptomatic Tx & observe for a few days if suspect ileus - SubQ calcium - Oral laxative - antacids - Mg $(OH)_2$ - Balanced electrolytes (LR or 0.9% NaCl) • **Surgical decompression & drainage (rare)** - Incision in rt. paralumbar fossa - Laborious procedure (multiple punctures of distended bowel) **Prognosis:** • **Good**: spontaneous recovery • Sx - many cows pass feces soon - Manipulation of gut alone seems to benefit

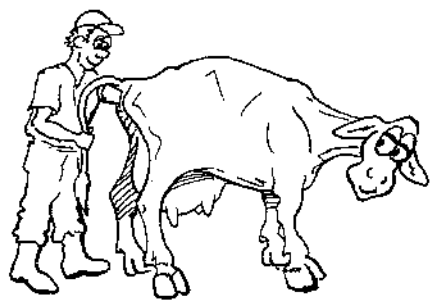








DDx:
- Intussusception (p 45)
- Intest. obstruction (p 44)
- Intest. incarceration (p 46)
- Cecal dilation (p 49)



Lactating, Mimics obstruction, Cause?
CS: Obstructive CS mimic
Dx: Quiet abd., Rectal • Lab: Normal
Tx: Not life threatening, Spontaneous recovery

Cecal dilation & volvulus

Mk 161; C3T 739; C2T 734; IM 882; BR-hb 114; BR 308; BM&S 679; Br 653; DC 142; GI 743; S-J 547; S-O 465; Pic 68

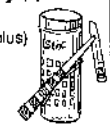
***

- **Associated w/ parturition (postpartum)**
- Changes to concentrate diets from roughage
  - Cecal flora metab. CHOs into VFA (volatile fatty acids)
  - VFA reduce motility of cecum + gas = distention
- Distention m/ lead to volvulus
- **Volvulus**: twisting of cecum & proximal loop of ascending colon

DDx
- **LDA**
- **RDA**

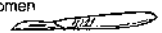
- **Dilation** (not total obstruction)
  - **Vague signs, gradual onset**
  - ↓ Feed intake
  - ↓ Dmilk production
  - Mild abdominal pain
  - Distended rt. paralumbar fossa
  - Still passes feces
- **Volvulus** (total obstruction)
  - **Abrupt CS**
  - **Right paralumbar distention**
  - Anorexia
  - Agalactia
  - Marked abd. pain
  - Tachycardia
  - Forestomach stasis
  - Manure scant or absent

- **DILATION**
  - Auscultation - resonance cranial to tuber coxae
  - Rectal exam
    - **Distended apex** in or near pelvic cavity
- **VOLVULUS**
  - Large area of resonance
  - Ballottement - fluid in cecum
  - Rectal - exam
    - **Distended cecal body** (apex cranial)
- **BOTH** (more extreme in volvulus)
  - Metabolic alkalosis
  - Hypochloremia
  - Hypokalemia



- **DILATION:**
  - **Medical** if not tightly distended
    - Antacid/laxatives - $Mg(OH)_2$
    - IV or oral fluids
    - Coarse, high fiber diet (take off conc.)
    - IV or SQ Ca in lactating cows
  - **Sx** if recurrent distention or no response to medical
    - Typhlectomy (see box)
- **VOLVULUS:**
  - **Sx** necessary
    - Incision cranial right flank
    - Untwist & decompress, see if need typhlectomy (see box)
  - Fluid management (K, Cl & alkalosis)

Surgery on cecum
- Incision caud. rt. paralumbar fossa, pull omental "curtain" cranially to see cecum
- Incise apex of cecum, remove fluid, double inverting closure
  - If contracts down & peristalsis when pinched, close abdomen
  - If discolored or remains distended, remove cecum



Typhlectomy (remove cecum) leave only ileocecocolic junction
- Double layer closure, inverting (Parker-Kerr)
  - If volvulus involves prox. loop m/ not be able to save ileocecocolic junction
  - Need to anastomose ileum to viable colon
- Cecal a. in ileocecal ligament on anti-mesenteric side needs to be preserved

Prognosis:
- **Depends on degree of ischemia**

Dilation (partial obstruction) • Volvulus (total)
CS: Dil: vague • Volv: abrupt CS
Dx: Resonance, Rectal, Alkalosis
Tx: Dil: Medical or Sx • Volv: Sx required

Colonic obstruction

C3T 740; DC 145

**

- Partial or complete
- Cause:
  - Intraluminal obstruction (adult dairy cattle)
    - **Enteroliths** in spiral colon (small diameter)
  - Extraluminal compression
    - Fat necrosis, lymphosarcoma, adhesions from peritonitis

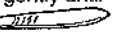
- Identical to cecal torsion, or cecocolic volvulus
- Partial
  - Gradual & progressive
    - Mild dehydration

- History, CS
- Electrolyte & acid-base abnormal in complete, not in partial

- Tympanic resonance in right paralumbar fossa
- **Rectal:**
  - Scant feces
  - Distended loops of bowel (small & large intestine)

- **Surgical exploration**

- **Exploratory celiotomy to Dx**
  - **Enterolith**: massage gently until broken down



    - If firm inject DSS (dioctyl Na sulfo-succinate) into to soften
    - Incise& remove (usually not necessary)
  - Extraluminal compression
    - Sx identification
    - Attempt to free colon
    - If can't be freed: side-to side colo-colic or ileocolic anastomoses

Obstruction

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Mesenteric fat necrosis IM 807; BR-hb 93, 115, 613l; BR 240; Br 655; DC 141; GI 790; Pic 73 ★	• **Channel Island dairy breeds** (Guernseys, Jerseys) • **Mature cattle** • Cause: **- Dietary fattening** . Long-chained saturated FA form clumps or crystals of FA in cells that resist removal - Clumps or crystals of FA serve as foci for inflammation **- Leads to obstruction** **- Tall fescue** (see pg 264)	• **Progressive obstruction** **- Weight loss** - Anorexia - Diarrhea - Bloody stool **- Abdominal enlargement** **- Rt. sided "pings"** - Colic signs (incr. HR, tenesmus, teeth grinding) • M/ have no signs & Dx by rectal exam • Sequela: **- Dystocia** (necrotic fat mass in pelvic cavity)	• CS, History • Right sided "pings" • Lab - ↓ cholesterol - ↑ FFA (free fatty acids) • Rectal exam: m/b impossible due to fat constricting pelvic cavity	• **None if no obstruction** • Fungicide isoprothiolane m/b Tx of future • Salvage recommended • Sx: removal if obstructing intestines **Prognosis:** • Good if no obstruction • Guarded if obstruction
Proctitis C3T 743; C2T 739 ★★	• Inflammation of rectum • Iatrogenic - **rectal exam** • Sadism	• **Tenesmus** (straining) • Sequela: **- Peritonitis**	• CS • Palpation	• Surgical repair Prevention: • Rectal palpation: lubrication, xylazine
Rectal tear/ stricture C3T 743; C2T 739; BR-hb 89, 92; BR 230, 238; Br 665; DC 148 ★★	• Rectal constriction • Caused by proctitis: Traumatic injury & scarring; Nonexpanding circumferential lesion (lymphosarcoma, peripelvic abscess, fat necrosis) - Inherited defect: rectal & vaginal stricture (Jersey cows) • Tx: None affective			

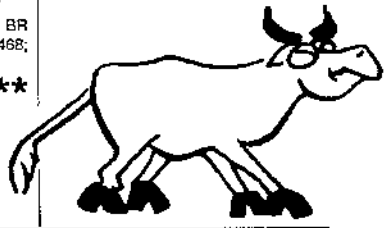
Fattening diet, FFA, Obstruction
CS: Obstruction
Dx: CS, Hx, Rt. "Pings", Rectal
Tx: None

Rectal prolapse

C3T 741; C2T 740; BR 229; Br 665; VC/S 468; S-N 137; Pic 74

***

- Common
- Highest incidence in Herefords



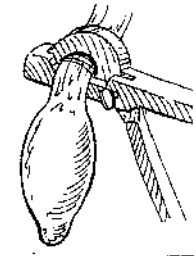
- Prolapse of rectum

Caused by tenesmus
- Diarrhea
- Frequent coughing
- Obesity
- Vaginal prolapse/irritation
- Coccidiosis
- Bull calf mounting cows
- Pyrralizadine alkaloids

- Obvious

- Tx often frustrating
- Salvage for slaughter
- Replace rectum
  - Epidural anesthesia
  - Purse string suture
- Submucosal resection in long standing cases

Prevention
- Castrate bull calves



Common, Tenesmus
CS, Dx: Prolapsed rectum
Tx: Slaughter, Replacement frustrating

Intestinal tumors

IM 883

*

- **VERY RARE** in cattle
- Relatively high in sheep in some areas of world

- Protracted weight loss to death
- Rarely signs of obstruction

- Rectal palpation of intraluminal mass or annular constriction of jejunum or ilium

- **Sx unsuccessful** (due to undetected metastases)

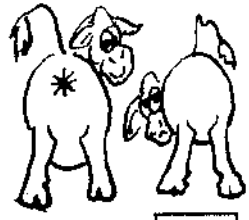
Intestinal atresia or stenosis

IM 880; C3T 742; C2T 738; BR-hb 89; BR 230, DC146; GI750; S-J551; S-N 468

**

- **Uncommon**
- Congenital in calves & lambs
- Stenosis or atresia of GI tract
- **Most hereditary** (anal & rectal atresia)
  - **Atresia ani** - usually lethal gene
    - **Rectovaginal fistulas**, feces out vagina
  - **Colonic atresia** - palpation of amnionic vesicle at 42 ds
    - Commonly spiral colon doesn't join rest of ascending colon

- **CS w/in a few ds of birth**
- Depression
- Not suckling
- Cardiovascular collapse
- Tympani



- **Atresia ani**
  - No anus - obvious!
- **Atresia of GI**
  - Digital palpation of rectum
    - Absence of feces, m/b mucus
  - Contrast radiographs (cautiously)

- **Surgical repair for salvage, not for breeding**

Prognosis:
- **Poor** w/ surgery - stasis & peritonitis common
- Death w/o Sx

Sx of intestinal atresia

- Rt. flank incision
- Find 2 ends, open proximal & squeeze out meconium
  - Side-to-side or end-to-side anastomoses to descending colon (bec. blind end small usually)
- If registered should tell breed registry (w/o telling owner? Ethical?)

Atresia ani - must close any rectovaginal fistulas if surgically correct atresia ani

Uncommon, Hereditary
CS: w/in few ds of birth
Tx: Salvage or Sx

Peritonitis

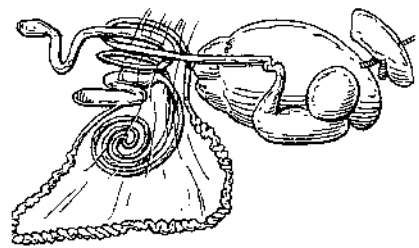
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

Pancreatitis (GI 917) ✱ Rare in cattle & seldom manifested clinically unless there is insulin deficiency

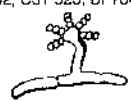
Diabetes mellitus
C1T 917: BR-hb 122; BR 325
✱
- Rare, but reported in cattle • Cause: not acute pancreatitis as in dog; neoplasia, absence of beta cells& chronic pancreatitis, foot & mouth diz
- CS: Hyperglycemia, glycosuria, polydipsias, polyuria, weight loss
- Tx: Protamine zinc insulin SQ BID m/b helpful
- Px: poor

Pancreolithiasis
C1T 917
✱
- Rare; concretions in pancreatic excretory ducts; usually incidental finding on necropsy (82% of animals over 4 yrs)
- CS: rarely associated w/ clinical signs

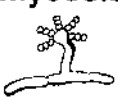
Atrial fibrillation
✱
- **See Cardio pg 81**; Assoc. w/ gastrointestinal diz 75-95% of time, Common in adult cattle, Not assoc. w/ heart diz
- **CS:** GI DZ, Anorexia, decr. milk prod., Rapid & disorganized heart sound (review S1, S2) described as irregularly regular heart beat
- **Dx:** Dx underlying GI diz, CS, ECG - **P waves replaced w/ undulating F waves**, Irregular P-R interval, QRS complexes irregularly spaced
- **Tx:** Tx underlying GI dz CS should resolve, If continue after 5 ds: Quinidine + IV fluids, If HR > 120/min -Digoxin then quinidine, but rare
- Px: Good if not underlying heart diz or chronic GI dz



Candidiasis
Mk 342; C3T 525; Br 764
✱
- Mucocutaneous diz, Worldwide, yeastlike fungus, *Candida albicans*, Common inhabitant of oral mucosa & GI Implicated in bovine oral, GI, & vaginal infections, abortion & mastitis
- **CS:** GI: calves w/ forestomach • Candidiasis - water diarrhea, anorexia & dehydration progressing to prostration & death Resp: Pneumonia, dyspnea, mod. fever
- **Dx:** Scraping or biopsy from mucocutaneous lesions, Ovoid budding yeast cells
- **Tx:** Nystatin ointment or amphotericin B, iodine for oral or cutaneous infec.



Muromycosis
Mk 348
✱
- Fungi of order Mucorales (Mucor, Absidia, Rhizopus, Mortierella, Rhizomucor), inhabitant of soil, manure & rotting vegetation Often 2° to metabolic disorders or immunosuppression, Granulomatous lesions in several organs: skin, GI, lymph nodes; Placentitis & abortion in Bovid
- **CS:** Nonspecific reflecting organ involved, Pneumonia m/b, Anorexia, pyrexia, persistent diarrhea, Neurological disturbances
- **Dx:** Antemortem Dx uncommon • PM: fungal ID, microscopically, FA, cultures
- **Tx:** No completely satisfactory Tx, Surgical excision of supf. lesions, amphotericin B



Peritonitis

Mk 146; IM 861; C3T 719; BR-hb 90; BR 233; Br 655; DC 151

***

- **Peritonitis**: inflam. of mesothelia lining the abd. cavity & covering the viscera
- **Common**
- Local or general
  - **Cattle wall off** infections better than other species
- Acute or chronic
- Hematogenous spread
- **Septic component inflammatory response**
- Stimulates pain receptors
- Fluid into peritoneal space (circ. hypovolemia)

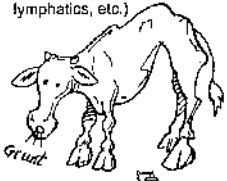
Causes:

- **#1 hardware diz** in cattle
- Abomasal ulcers
- Lymphosarcoma
- Pyelonephritis
- Rupture of abscesses (liver, ruminal, abomasal, umbilical, renal, pelvic)
- Uterine rupture/torsion
- Septic abd. surgery
- Ruptured bladder
- Intraperitoneal injections
- Ruptured rectum (iatrog.)
- Hernias
- Fat necrosis
- Acute systemic mastitis
- Metritis
- Enteritis
- Intussusceptions
- Cecal & abomasal volvulus

- **Variable**: related to extent of lesion, generalized or local, host response, infecting organism & age of animal
  - Rumination ceases
  - ↓ Milk production
  - Anorexia & depression

- **CS - localized** peritonitis:
  - ↑ Heart rate, temperature
  - **Abdominal pain**, tends to resolve in 24-48 hours
  - **Kyphosis** (arching back, pain)

- **CS - generalized**
  - **Very shocky, septic shock**
  - ↑ HR, RR & temp.
  - Mucous membr. injected
  - Slowed refill capillary time
  - Ileus
  - **Abdominal pain**
  - **Ascites** (pressure put on liver, lymphatics, etc.)



- **History & CS**
- "Skooch" test - abd. pain
  - Percussion & palpation
- **Abdominal laparotomy**
- Stasis of GI tract
- Rectal:
  - Adhesions & distended intestines
- **Paracentesis**
  - Fluid w/ degen. lt. shift
  - Culture & cytology
- **Alkalosis** (Chloride sequestration w/ adynamic ileus)

DDx:

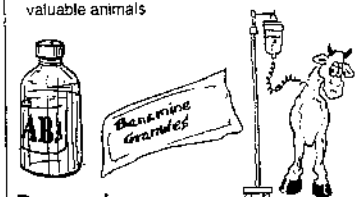
Abdominal pain

- GI distention (p 25)
- Urinary tract obstruction (p 96)
- Reproductive tract pain
- Pleuritis (p 72)
- Myositis
- Multiple limb lameness

Septic processes

- Rumenitis (p 24)
- Toxic enteritis (p 250)
- Mastitis (p 192)
- Pneumonia (p 62)

- **Tx cause**
- **Fluid** - place an IV catheter
  - 20-40 L isotonic solution - adult
    - Monitor hydration w/ serial PCV & TSP
  - **Lactating cows** - 500 ml of 23% calcium gluconate to 1st 3 L of saline
- **ABs** Cult/sensitivity abdominocentesis
  - Broad spectrum: Naxcel®, Penicillin (gr +) + sulfonamides, Tetracycline & sulfonomides
- **Corticosteroids**, for endotoxic shock & to stabilize membranes
- **NSAIDs** for septic shock (Banamine® IV or IM, Phenylbutazone)
- Abdominal lavage ? $
- **Nursing care**, analgesics for sleep, sternal recumbency, fly control, bedding changes
- **Nutrition**, force feeding, parenteral for valuable animals



Prognosis:

- **Localized Hd/dz - fair**
- **Diffuse - grave**

Control:

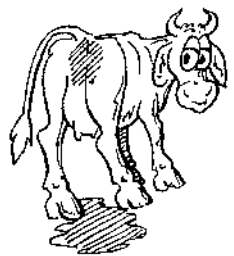
- Prevent causes (Sx aseptic, Limit IP injections, magnet)

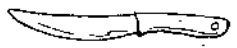
Common, Causes: Hardware diz, Ulcers, etc.
CS: Localized (Pain) • Generalized (Septic shock)
Dx: Hx, CS, "Skooch test", Rectal, Paracentesis, Sx
Tx: Tx cause, Fluids, ABs, Steroids, NSAIDs, TLC

- **Fluid** - place an IV catheter
  - **Dehydration** in adult bovid - 20-40 L isotonic sol., daily maintenance
    - Monitor hydration w/ serial PCV & TP
  - **Alkalosis** (most common acid base abn., from Chloride sequestration w/ adynamic ileus)
    - IV saline, 40-100 mEq/L of potassium m/b to correct hypokalemia
  - **Lactating cows** - 500 ml of 23% calcium gluconate to 1st 3 L of saline

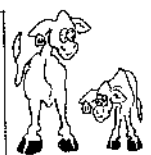
GI Parasites

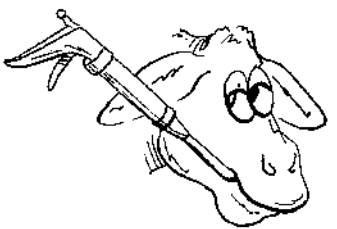
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Gastrointestinal parasites, Parasitic gastroenteritis Mk 205; IM 1701; C3T 47; C1T 919; Br 231, 754, 815; GI 781, 808 ***	• **Ostertagia** most pathogenic & control of it controls other GI parasites - Larval stage does much damage • All ages can become infected • Clinical diz mainly in herds less than 18 months old • Mixed infections the rule • Preconditions to infection 1. Large #'s of infective stages - Intensely grazed pastures - Warm, wet weather - Insect vectors for some 2. Susceptible cattle - Decreased resistance: poorly fed, dietary defc. (cobalt, copper, P or protein) - Resistance after exposure variable . Dictyocaulus (lungworm) & nematodirus . Rapid resistance . Ostertagia require prolonged exposure • Pathogenesis - Necrosis, mechanical pressure, edema - Anemia directly (blood sucking hookworms & large stomach worm) or indirectly - Anorexia & incr. passage of nutrients & fluid through GI tract	• Clinical helminthosis indicates proportionate subclinical cases - Gastroenteritis - Subclinical . Stunting . Unthriftiness • Clinical **- Diarrhea** **- Anemia** m/b **- Death**	• Presumptive: CS, Hx of grazing & season of year - Mixed infection the rule - Ostertagia especially hard to Dx • Fecal egg counts, neg. counts don't R/O - Negative or low counts possible in heavy infestation, CS before eggs in feces possible - Specific ID of eggs impractical, except in specialized labs - EPG (eggs/gram) not always accurate if immature worms - Little correlation betw. # & severity of diz - Broad spectrum anthelmintic have eliminated need to specifically ID • Fecal cultures - 3rd stage larvae • Diagnostic deworming, measuring weight gain after treatment • Necropsy recommended for herds if deaths - Haemonchus, Bunostomum, Oesophagostomum, Trichuris & Cabertia adults easy to see - Ostertagia, Trichostrongyles, Cooperia & Nematodirus difficult to see so small (movement in ingesta)	• **Treating Ostertagiasis controls other GI parasites** **Prevention:** • No single program universally effective (different areas & climates) • Assume every animal infected, esp. at pasture • Good nutrition • Pasture management • Barn management (avoid overcrowding, fecal removal, plenty of bedding, feed off ground, nutrition) • Anthelmintic Tx (specifics controversial) - Strategic strategies - 2-4 Tx/yr - Tactical Tx: when periods of abnormally heavy rainfall & mild temperatures or poor nutrition, or when moving from low to high parasite area - Ivermectin, albendazole or 2x fenbendazole or febentel, oxyfenbendazole - Move to clean pasture that day





DDx:
- Shipping fever (p 63)
- Nutritional GI disorders
- Salmonellosis (p 20)
- Paratuberculosis (p 23)
- Viral diarrhea (p 22)
- Mineral defc
- Fascioliasis (p 37)
- Lungworm (p 69)





#1 Ostertagia; Large #s, Susceptible (young)
CS: Gastroenteritis; Subclinical (stunting)
Dx: All infected, Egg count, Culture, Diagnostic deworming • PM
Tx: Tx Ostertagia (anthelmintics)
Prevention: Nutrition, Management, Anthelmintics

Ostertagiasis, Parasitism - diarrhea

Mk 205; IM 1701; Br 231; DC 180; GI 781, 808; Pa 31

***

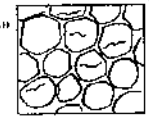
- *Ostertagia ostertagi*
  - Medium or brown stomach worm
  - **#1 nematode of cattle**
    - Most pathogenic & cause of most economic loss
    - Control also controls other nematodes (see box)
  - Life cycle (see box)
- **Type I ostertagiasis** - reaction of larvae in gastric glands
  - **Albumin lost** into lumen
  - ↓ HCl production
  - Alkalinity to abomasum
- **Type II ostertagiasis** - caused by exit of larvae from gastric glands (hypobiosis)
  - Hyperplasia & loss of cell differentiation (**"moroccan leather"**)
  - M/b sloughing of mucosa
- Young beef & grazing dairy replacement cattle
- **Rarely in older cattle** after 1st year on pasture

Type I ostertagiasis
- **< 2 yrs old**, On pasture
- Anorexia, Poor growth
- **Diarrhea**
- Death

Type II ostertagiasis
(emergence of arrested larvae, hypobiosis)
- **2-4 years** (m/b adults)
- Anorexia
- Unthrifty
- Hypoproteinemia
  - Submandibular edema

- **Diarrhea**
- Anemia
- Fever
- ± Death

- Hx, CS
- Egg counts misleading because not specific or sensitive
- Postmortem
  - **"Moroccan leather"** pathognomonic

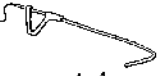


Peak pasture infec./Outbreaks
In the North:
- Summer - Type I
- Spring - Type II

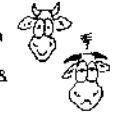
In the South:
- Fall - Type I
- Spring - Type II

Anthelmintics
- **Adult ostertagia**
  - **Give before hypobiosis**
    - **North - July**
    - **South - Sept.**
- **Hypobiotic larvae** (treatment & prevention of type II)
  - **Ivermectin**

  - High dose of fenbendazole, albendazole
  - Repeated doses of ivermectin m/b necessary to kill all
- Drug withdrawal times



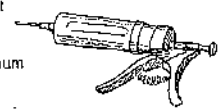
Prognosis (Px):
- Type I - good
- Type II - damaged mucosa unlikely to recover
  - Profound hypoproteinemia & dehydration has worse Px



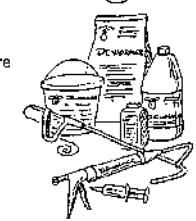
Life cycle - Direct
- Ingested 3rd-stage larvae into gastric glands of abomasum
- Complete development in glands 4th stage
  - Can reenter lumen in 18 days
  - **Hypobiosis**: Arrested development, remain in glands for mos. (range 3 weeks - 4 months)
    - Type II ostertagiasis occurs when they emerge months later

Deworming program (no single program fits all area & climate conditions, below is a starting point to greatly reduce Ostertagia problem including inhibited larvae)
- Spring calving
  - Deworm cows after calving season just before turning out to summer pasture
    - Ivermectin, albendazole or hi-dose fenbendazole
  - Deworm spring calves by midsummer (ideal)
  - Deworm all stock in late fall (at weaning in beef calves)
    - Move to clean pasture that day

- Fall calving
  - Deworm cows before overwintering
  - Deworm all stock in spring, before summer pasture
- Yearling spring calves & fall calves
  - Deworm in late spring
  - Deworm in summer if intensively grazed on summer pasture
- Beef entering feedlot
  - Deworm
- All adults
  - Spring & fall minimum



Ideal
- Ivermectin at 5 wk interval or others at 3 week



#1 parasite, Controlling Ostertagia controls others
Type 1 infec. < 2 yrs
Type 2 infec. 2-4 yrs, Hypobiosis ("hibernating")
Dx: Hx, CS, Egg count, "Moroccan leather"
Tx: Ivermectin

GI Parasites

GASTROINTESTINAL

Toxocara infection, Ascarid (Mk 208; BR-hb 473; BR 1239; DC 180; Pa 47; Par 199)

- *Toxacara vitulorum*, Ascarid, stout whitish 1-1 1/4" long • Transm.: Ingestion of eggs, pass in milk, Calves < 6 mo old, older calves resistant
- CS: diarrhea, reduced wt. gain, anemia & steatorrhea; no CS in older animals
- Dx: Eggs: Thick pitted shell
- Tx: Ostertagia Tx controls, piperazine at 2 wks of age to expel worms before mature

Oesophagostomum, Nodular worm, Pimply gut (Mk 208; DC 180; Par 163)

- *Oesophagostomum radiatum* (nodular worm), 1/2" long & head bent dorsally; Direct life cycle, Loc.: dist sm. intest, cecum & colon, M/ encyst in wall in subsequent infections (nodules)
- CS: Young (anorexia, weight loss, severe constant, dark fetid diarrhea); Older resistant animals (nodules, decr. motility of intestines, stenosis or intussusception occasionally)
- Dx: Nodules palpated per rectum
- Tx: control Ostertagia

Chabertiasis, Largemouth bowel worm (Mk 208; BR-hb 487; BR 1273; DC 180; Par 162, 288)

- *Chabertia ovina*, 1/2"long & ventrally bent at anterior end • Direct life cycle enter sm. intest. mucosa & then emerge & pass to large colon • CS: Rarely see clinical chabertiasis in cattle, Mucus-coated feces • Tx ostertagia controls

Trichuris (Mk 208; BR-hb 487; BR 1237; DC 180; Par 209)

- Common in calves & yearlings, Eggs resistant & persist in environment
- CS: Clinical signs unlikely (dark feces, anemia, anorexia)
- Tx: treatment of Ostertagia controls

Moneizia, Tapeworm (Mk 208; BR-hb 472; BR 1237; DC 183; Par 132, 138)

- *Moniezia expansa*, *M. benedeni*, Lack rostellum & hooks, segments wider than long, Eggs triangular or rectangular • Life cycle: intermediate host orbatid mite, ingestion of mite, Young cattle
- CS: Non-pathogenic in calves, except in young; m/ cause failure to thrive, intestinal stasis has been reported
- Tx: treatment of Ostertagia controls tapeworms

Nematodirus (Mk 207; Par 153)

- *Nematodirus helvetianus* most common, 1/2-1" long, Eggs highly resistant, m/ last til next season, Transm.: ingestion of larvae, Loc.: 1st 20" of sm. intestine, Dairy calves after 6 wks old
- CS: Diarrhea & anorexia
- Dx: Eggs in feces after CS
- Tx: control ostertagia

Trichostrongyles (Mk 209, BR-hb 481; BR 1259; DC 180; Pa 49)

- Sheep, *T. colubriformis*, *T. vitrinus*, *T. rugatus*, Direct life cycle, Larvae burrow into crypts of intestine, Villous atrophy - impaired digestion & malabsorption, Protein loss across mucosa
- CS: Anorexia, Persistent diarrhea, Weight loss • Dx: Fecal
- Tx: control Ostertagia

Haemonchosis, Barber pole worm (Br-hb 483; BR 1265; Br 247; DC 180; Pa 30; Par 152)

- *Haemonchus placei* (barber's pole worm, large stomach worm, wire worm), Large worm - 1" long, Abomasum, Immature cattle (immunity after 3 yrs), Warm weather, Suck blood from abomasum
- CS: Acute - Hemorrhagic anemia, ± Diarrhea, ± Constipation; Chronic - Weakness, lethargy, Weight loss, Submandibular edema (bottle jaw), Anasarca (generalized massive edema)
- Dx: Presumptive, SC, Hx, Fecal egg count, CS often before eggs in feces, not present w/ CS, Direct centrifuge flotation, Fecal smears not recommended • PM: Edema of abomasal mucosa, minute hemorrhages • Tx: Treat Ostertagia, flukicides, Move to unaffected pasture

Cooperia Mk 206; BR-hb 481; BR 1259; DC 120)

- Small intestine, Red, coiled adults - 1/3" long, males have a large bursa, Don't appear to suck blood
- CS: Heavy infestation - Profuse diarrhea, Anorexia, Emaciation, No anemia
- Dx: Eggs - parallel sides, larval culture for definitive Dx
- Tx: control Ostertagia

Bunostomum, Hookworm (Mk 207; C1T 921; Br 247; BR 1257; DC 180; Pa 47)

- *Bunostomum phlebotomum* - 1" long, Hookworm, Warmer climates (tropics or subtropics), Direct life cycle, Ingestion or skin penetration, found in small intestines; Prepatent period 2 mo, Small numbers (2000) cause severe diz & death
- CS: Larval penetration of legs (uneasiness & stamping), Rapid weight loss, Blood sucking (anemia), Diarrhea & constipation m/ alternate, Edema (Hypoproteinemia), bottle jaw rarely seen as in Haemonchosis • Tx: treating Ostertagia controls

Strongyloides infection (Mk 207; DC 180; Par 48); *Strongyloides papillosus*,

Only female in parasitic cycle, 1/4" small, prepatent period 10 d, Pass in feces & infect, or become free living adults & cycle to become infective, Young calves, esp. dairy

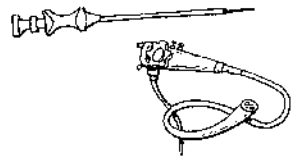
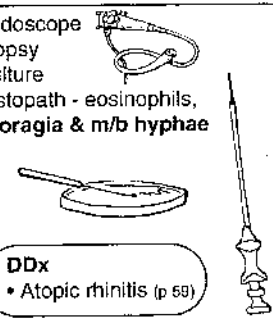
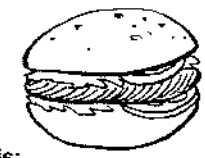
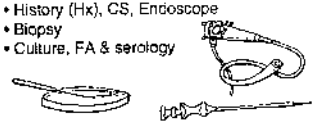
- CS: Rare (m/b diarrhea, anorexia & wt loss)
- Tx: Tx Ostertagia controls

Rumen flukes (BR-hb 471; BR 1236; Br 241)

- *Paraphistomidae*, commonly found in rumen, Conical shape, < 1/2" long (3-11mm)
- No CS of rumen infestation, immature flukes burrow into mucosa of small intestine to get to rumen, m/ cause weakness, anemia & diarrhea
- Tx: carbon tetrachloride effective

RESPIRATORY SYSTEM - II

Nasal Cavity

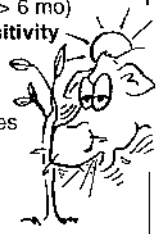
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Rhinitis C2T 654; BR-hb 169; BR 425; Pa 124 ***  **CS of other diz** **Discharge, Sneezing, Dyspnea**	• **Usually CS of other dizs** - Inflammation of nose • Can obstruct airway - ↓ Airflow 	• **Discharge** - mucoid, serous, mucopurulent, etc. • **Sneezing** • **Stridor**, on inspir. &/or expir., hear by standing beside • Congestion of mucus membr. of nose (penlight) • ± Cyanosis rare in lage animals • **Dyspnea:** - Opened mouth breathing w/ head extended 	• Inflam. of nostrils, assoc. w/ other CS • Biopsy - Rhinosporidia Dx (fungal) • Endoscope if far back • Serology for infec. • Nasal obstruction CS more severe than infec. 	• Tx 1° cause **Causes:** • IBR ("rednose") (p 252) • BVD (along with other signs) (p 64) • Bovine Malignant Catarrh (p 10) • *Pasteurella hemophilus* (p 63), *H. somnus* - mucopurulent (p 71) • Rhinosporidiosis (p 58) • Allergic rhinitis (p 59) • Foreign bodies (p 59) • Tumor of ethmoids - adenocarcinoma • Hypersensitivity reaction involving lungs
Mycotic nasal granuloma, Mycetoma, ** **Rhinosporidiosis** **Fungal granuloma** Mk 351; IM 620; BR-hb 170; BR 426; Br 763; Pa 125; DC 67 **Fungus, Allergy** **CS: Dyspnea, Polyps, Debilitating** **Tx: Salvage**	• **Uncommon** • Fungus (mold) in Western U.S. - *Rhinosporidia* spp., *Helminthosporium* spp., *Aspergillus* • Spores in nose • **Type IV** delayed hypersensitivity • No seasonal predilection • Warm, wet climates 	• Respiratory noise - stridor • **Dyspnea** • Creamy to yellow nasal discharge, m/b epistaxis • **Polyps** (granuloma) yllw, yllw/grn or red, single or multiple, anywhere, uni - or bilateral • Inflammation, ulceration due to irritation • **Chronically debilitating**, rarely fatal 	• Endoscope • Biopsy • Culture • Histopath - eosinophils, **sporagia & m/b hyphae**  **DDx** • Atopic rhinitis (p 59)	• **Salvage** - debilitating • Difficult to treat • Sx - remove polyp • **Na Iodide** (NaI) (long term)  **Prognosis:** • Poor; when granuloma, Tx usually not effective
Nasal tumor IM 622 * 	• **Rare, 6-9 yr-olds**, unilateral • Ethmoid adenocarcinoma (m/b viral cause) • SCC (squamous cell carcinoma) • Neuroblastoma • Osteoma (sinuses) • Osteosarcoma (sinuses)	• Facial swelling • Nasal discharge • Epistaxis • Dyspnea • M/b invasive, m/b metastatic to lungs & local lymph nodes 	• History (Hx), CS, Endoscope • Biopsy • Culture, FA & serology 	• **Salvage** 

Allergic rhinitis, Summer snuffles, Atopic rhinitis,

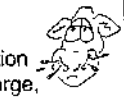
Nasal Granuloma (pg 58)
Mk 426; IM 621; BR-hb 170, 625; BR 426, 1622; Pa 126, 129
**

Granuloma, Allergy
CS: Pruritus, Polyps
Tx: Steroids

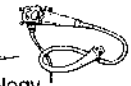
- **Granuloma** (see pg 58)
  - **Nasal obstruction**
- Jerseys & Guernseys (Channel Island breeds) & Holsteins
- > 2 yrs generally (> 6 mo)
- **Type I hypersensitivity**
  - Severe rhinitis & conjunctivitis
- **Allergens**
  - **Mold** (fungal) spores
  - Plant pollens
- Summer & Fall
- Moist, warm conditions



- **Acute:**
  - **Dyspnea**
  - Stertorous inspiration
  - Thick nasal discharge, ylw to orange, bilat.
  - Swelling & inflam.- obstruction
  - **Intense pruritus**, sneezing, rubbing nose on ground
- **Chronic:**
  - **Polyps** - granulomas in nose, lobular appearance (see pg 58)



- **If change environment CS abate or improve**
- Endoscope
- Biopsy
- Culture, FA & serology
- **DDx from fungal granuloma because of different treatments**



DDx:
- **Fungal granulomas** (p 58)
- Foreign body (p 59)
- Resp. viruses (p 252)
- Nasal actinomycosis or actinobacillosis
- Irritant gases (p 210)

- **Remove allergen**
- **Block hypersensitivity**
  - **Corticosteroids** (anti-inflam dose)
    - Dexamethasone IM/IV
    - Prednisolone IM/IV
- Antihistamines - less effective
- Meclofenamic acid

Prognosis:
- Poor response once polyps formed

Epistaxis

Mk 706; C3T 683; C2T 655; BR-hb 155, 170; BR 427
***

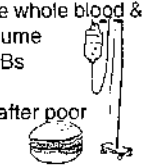
- **Epistaxis**: bleeding from nose
  - Hemoptysis: blood originating from lungs
- 1° Trauma
- 2° to disease processes
  - Abscess in lungs from liver abscess embolus in caud. vena cave
    - Abscess erodes pulmonary artery
  - Bleeding dz in Simmental cattle

- **Bleeding from nose**
- **Lung abscess** from liver abscess
  - Intermittent blood from nostrils
  - Weight loss
  - ↓ Milk production

- **Bleeding from nose**

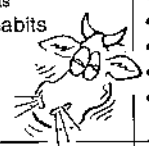
Causes:
- **1° Trauma**
- **Lung abscess** (p 71)
- **Foreign body** (p 59)
- Polyps
- Neoplasms (p 58)
- Granulomas (p 58)
- Thrombocytopenia (p 85)
- Clotting abnormalities (p 84)
- Bracken fern toxicity (p 84)
- Moldy sweet clover (p 86)
- Dicoumerol (p 86)

- **Treat 1° diz**
- For trauma give whole blood & expand the volume
- Prophylactic ABs
- Lung abscess
  - Slaughtered after poor Tx response



Nasal foreign bodies (FB)

IM 621; C2T 655; BR 155; DC 65
**



- Cattle >> small ruminants
- Aggressive eating habits

- **Head shaking**, Stridor
- **Sneezing**, Snorting
- Frequent nose licking
- Epistaxis m/b
- Nasal discharge

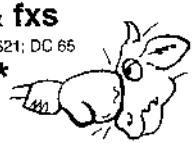
- History, CS
- PE
  - Visualization
  - **Endoscope**

DDx:
- Snake bite (p 215)
- Allergic rhinitis (p 59)
- Nasal actinomycosis or actinobacillosis (p 13)

- **Remove**

Nasal trauma & fxs

IM 621; DC 65
**



- Causes:
  - Fighting
  - Improper restraint
  - Human sadism
  - Large nasogastric tube
  - Foreign body (FB)

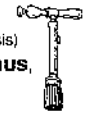
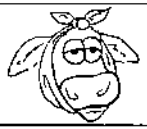
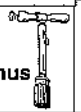
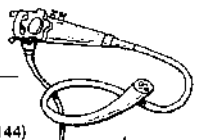
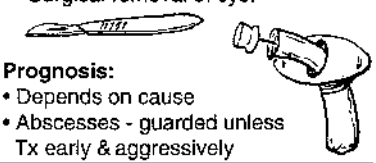
- **Facial swelling**
- SQ emphysema
- Obstruction
- Stertor
- **Epistaxis**
- 2° Bact. mucopurulent discharge

- **History** (Hx), **CS**
- **Radiographs**

DDx:
External swelling
- Snake bite (p 215)
- Phlegmon
- Nasal actinomycosis or actinobacillosis (p 13)

- Surgery generally not required, unless obstruction, severe depression fxs or sequestra
- **Prophylactic ABs**
  - Penicillin 22,000 IU/kg IM or SQ

Sinuses - Larynx

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Sinusitis, Paranasal sinusitis Mk 115; C3T 639; C2T 655; IM 623; DC 68, 69; Pa 124; S-N 59; S-O 356 ★★★	**1• Dehorning** - Frontal sinus extends into "horn" (cornual) process > 6 mo - Opens frontal sinus 	• **Dehorning** - **Acute:** . **Drainage from sinus opening** - **Chronic:** . Crusting at dehorning site, no drainage . Uni- or bilateral (sinuses separated) . Nasal discharge w/ foul odor . Neurologic signs, if drainage to brain (See strabismus, exophthalmus) . M/ lead to systemic disease	• **Hx of dehorning** m/b mos before • **CS, drainage, etc.** • **Trephine** (sinus centesis) • **Percuss frontal sinus**, if purulent - dull (normally high pitched) • Chronic - osteolysis or fractures - Soft tissue swelling • C&S (culture/sensitivity) - trephine hole 	• **Trephine & flush** w/ sterile saline & ABs - Bone flaps over sinus, replace bone in dairy (cosmetic) or leave open (beef) to drain - Problem - postorbital diverticulum • **ABs** (broad spectrum, parenteral & local) • **Aspirin** to decrease inflammation & pain  **Prognosis:** • Acute - good • Chronic - poor/salvage, nonresponding, even w/ aggressive therapy or w/ systemic CS of diz
Open frontal sinus **CS: Drainage from opening & nose** **Tx: Trephine & Flush, ABs**			**Prevention:** • Early (< 6 mo) dehorning w/ dehorning iron • Cosmetic dehorning using aseptic technique • Not in fly season or dusty conditions	
	**2 • Infected tooth** • Maxillary sinus involved • Infected teeth • *Actinomyces bovis*	• Nasal discharge foul odor - Unilateral 	• **CS, drainage, etc.** • **Trephine** (sinus centesis) • **Percuss maxillary sinus** 	• ***A. bovis* - salvage** • **Repel tooth** • **Maxillary sinusitis** & no tooth problem - Trephine just dors/caud. to facial tuberosity 
Laryngeal obstruction IM 628; C2T 656; BR-hb 173; BR 432 ★★★	• **Laryngeal abscesses** - *Actinomyces pyogenes*, Calves & sheep - Arytenoid cartilages • **Laryngeal papillomatosis** • **Acutely - laryngeal edema** - Rare - smoke, noxious gas inhalation • **Trauma**: balling gun injuries, passing a tube into rumen • **Retropharyngeal lymph nodes swelling**, pressing on the larynx • **Necrobacillosis** • **Foreign bodies** • **Subepiglottic cyst**	• **Trauma = severe resp. signs** - **Inspiratory dyspnea** - open mouth breathing, stridor or stertor - Paroxysmal breathing (lifting ribs, flanks sink in) - **Salivate excessively** - Bloat commonly seen (esophageal encroachment) - Nasal discharge variable - Difficulty in swallowing 	• **CS - resp. problems** • Physical exam w/ speculum • **Palpate larynx** (very carefully, feel obstruction & swelling) • **Endoscope** to visualize larynx  **DDx:** • **Rabies** (p 144) • Necrotic laryngitis (p 61) • Severe viral laryngitis • Actinobacillosis (p 13) • Tumors	• **Remove foreign body** • **ABs** (broad spectrum) Naxcel®, Pen. IM/SQ • NSAIDs (PBZ, Banamine®, aspirin) - ↓ inflam., pain & swelling - ↓ long term stricture formation • **Surgery:** - **Tracheostomy** - severe cases - Debride area to ↓ necrotic tissue - Surgical removal of cyst  **Prognosis:** • Depends on cause • Abscesses - guarded unless Tx early & aggressively
Rabies!?! CS: Salivation, Dyspnea **Tx: ABs, NSAIDs, Tracheostomy**				

Calf diphtheria,

Laryngeal necrobacillosis, Necrotic laryngitis

***

- See GI (pg 12)
- *Fusobacterium necrophorum*
  - Necrotizing endotoxin
  - Invades broken skin & laryngeal cartilage
- Necrotic stomatitis
  - Calves < 3 months (2 wks - 6 mos)
- Necrotic laryngitis
  - Older calves, 6-18 months
  - Untreated some die 2-7 days from toxemia & upper airway obstruction
- Necrotizing pneumonia

Fusobacterium necrophorum

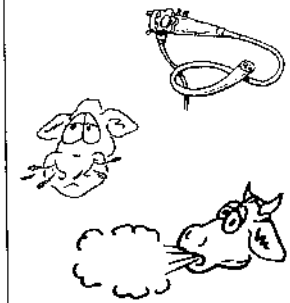
CS: Dyspnea, Salivation, Nasal discharge

Dx: Laryngoscope

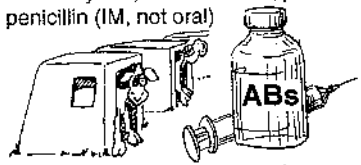
Tx: Isolate, ABs

- Necrotic stomatitis (see GI pg 12)
- Necrotic laryngitis
  - Moist, painful cough
  - Necrotic ulcers of vocal process of arytenoid, not in mouth
  - 1° loud dyspnea - obstruction
  - Nasal discharge, fetid odor
  - Salivation
- Necrotizing pneumonia
  - Acute (aspiration of infected tissue)
  - Death

- History, CS, necrotic ulcers
- Laryngoscope
- Diphtheritic material



- Isolate from healthy calves
- ABs - Mycotil, Sulfonamides, procaine penicillin (IM, not oral)



Laryngeal obstruction

- Tracheostomy if airway obstruction
- NSAIDs, incl. aspirin, Banamine®

Control

- Clean & disinfect feeding & drinking areas
- Daily PE all calves to find new cases

"Honkers", Tracheal edema

Mk 732; IM 621; Pa 131

***

- Feedlot cattle
- 2 forms
  - Acute dyspnea
  - Chronic cough
- Cause unknown

Cause? 2 Forms

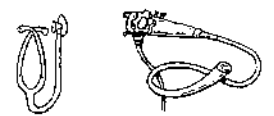
CS: Acute - Dyspnea; Chronic - Cough

Dx: Auscultate, Endoscope

Tx: Salvage

- Loud guttural inspiration (lower trachea)
- Acute form, Heavy feedlot cattle (> 900 #), Southern plains - Summer
  - Dyspnea, open-mouth breathing
  - Cyanosis
  - Recumbency & death (asphyxiation)
- Chronic form, Lighter cattle (300 - 900 lb), Western plains
  - Continuous, deep, nonproductive cough

- History (Hx) (feedlot), CS
- Auscultate lower trachea
- Endoscope:
  - Edematous thickening of tracheal & bifurcational lining
  - Cobblestone appearance
  - ±Fingerlike projections or polyps



- Salvage
- No Tx for chronic form
- Acute form
  - Broad spectrum ABs
  - Steroids (Dexamethasone, Prednisolone IV/IM daily
  - Avoid stress, provide shade

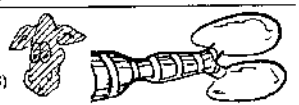
Prognosis:

- Recovering patients tend to relapse so salvage

Tracheal collapse, stenosis *

IM 629; BR-hb 172; BR 431

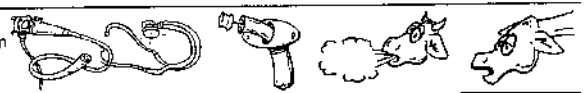
- Rare: Cause: unknown (blunt trauma, tracheostomies, congenital?); Calves - majority thoracic trachea (congenital)
- CS: Dyspnea (exacerbated by excitement), stertorous resp., "honking" cough, fever, cyanosis, ↑ HR & RR, BAR
- Dx: Hx, CS, auscultate trachea, palpate cervical trachea
- DDx: Tracheal FB, Tracheal actinobacillosis, Neoplasms, Bronchopneumonia, Necrotic laryngitis, extern. compression (abscesses, hematomas, TB)
- Tx: Mild cases - confinement & fattening. Prostheses have been used



Tracheal foreign body (FB) *

IM 630

- Rare
- CS: chronic cough, inspiratory dyspnea, strider, extension of head & neck, open-mouth breathing, salivation
- Dx: Auscultation, Endoscope, Rads
- Tx: Remove object (endoscope snare); Tracheostomy



Respiratory Disease

RESPIRATORY SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
IBR **"Rednose"** **Infectious bovine rhinotracheitis** IM 635; DC 80 ★★★	• **Multisystem see Gen pg 252** • **Herpesvirus 1 (BHV 1)** - **Older carriers** 1° reservoir • **Contagious** - aerosol of viral particles • > 6 months (passive immunity worn off) • **Stress** • **Corticosteroids** can cause recrudescence & shedding	**Large outbreak** 1) **Upper resp. tract** • **Rhinitis & tracheitis** • **Conjunctivitis** (m/b only CS in mild cases), ascends up lacrimal duct • **"Red nose"** - hyperemia of muzzle • **Ulcers & plaques** - muc. membr. • Initially temp 106-107° F. • **Salivation** & anorexia • **Recover in 10-14 ds,** most w/o Tx • Rarely corneal edema 2) 2° bronchopneumonia 3) Enteric form - diarrhea 4) IPV - Infec. pustular vulvovaginitis 5) Abortion storms ($)(see repro.) 6) Encephalitic - 100% mortality	• **History, CS** • Antibody • Viral isolation (nasal fluids early in diz) • **Serum Neutraliz. Test - TOC** • Auscultation of lungs, normal w/ just IBR **DDx:** • Laryngitis (p 61) • Tracheitis • Bovine keratoconjunctivitis (pink eye) (p 178) **Prevention: IBR vaccinate all cattle**	• **Nonspecific** (palliative) **- Most recover in 2 weeks** • Reduce stress, quality feed, water • **ABs in feed & water** - 2° diz in feed lots (oxytetracycline, sulfas, etc.) • Ideally isolated, difficult in feedlot & intensive dairy situation • 1° isolate young calves • **Herd outbreak** - Separate large group, to decr. exposure • Corticosteroids contraindicated **Px: Good**, most recover in 2 wks • Recovery = long term immunity
Contagious, Carriers, Stress, 2° bact. **CS: Upper respiratory** **Dx: CS, Hx, Serum neutralization** **Tx: ABs, Isolation • Px: Good**				
Pneumonia IM 581; C3T 640; C1T 823; BR-hb 162; BR 410; Br 671 ★★★	• **Most infectious** (see box) • Etiology - Serous then fibrinous exudate - Consolidation - M/involve bronchi, bronchioles & pleura - Tissue damage & emphysema - Fibrous organization • Transmission - Bronchogenic (most common) . Apical (cran.) & "middle" lobes most affected . Right > lt. lung bec. of tracheal bronchus - Hematogenous: Lobular	• **Mild to rapidly fatal** • **Bilateral nasal discharge** • **Cough** • **Fever - acute** • **Dyspnea** • Pain indicates pleural involvement • **Chronic** - Dyspnea, depressed - Some coughing - Normal temp. usually	• **Decide if 1° lung or 2° to systemic diz** • **Upper or lower** resp. (auscultation) • **Emphysema** (expiratory dyspnea) or **pneumonia** (insp. & expir. dyspnea) • Auscultation - Normal lungs - vesicular sounds - Abnormal . Harsh vesicular sounds in functional areas . Absence of sounds (consolidation) . Moist rales (movable exudate ["crackles"]) - acute . Dry rales (whistles from occlusion) - chronic - Pleural friction rubs (squeaking leather) • Nasal & tracheal swabs (culture) • Transtracheal wash (better) • Nasal scrapings • Thoracocentesis • WBCs - bacteria = upper normal w/ lt. shift; Virus - leukopenia • Radiology in calves • PM: Consolidation of cranioventr. areas	• **ABs minimum of 3-4 days** • **Bronchodilators** (isoproterenol, theophylline) • Steroids controversial **Prevention** • **Vaccines** (IBR, BVD, PI 3) • Reduce stress
Most infectious **CS: Discharge, Cough, Fever, Dyspnea** **Dx: 1° or 2°, Upper or lower** **Tx: ABs ≥ 3 wks, Bronchodilators**		Agents/types • *Pasteurella multocida* • *Pasteurella hemolytica* • Parainfluenza-3 virus • Farmer's lung (mold) (p 68) • Fog fever (pasture) (p 67) • *Haemophilus somnus* • IBR • BVD • *C. pyogenes* • BRVS • DN-599 virus • Misc. viruses		

IBR + Pasteurella = Bronchopneumonia (Shipping fever) (See below)

• **2° complication of rednose** • Virus destroys mucous membrane of trachea, allowing bacteria to colonize; 10% more severe CS than upper resp. tract infection of IBR

Broncho-pneumonia, Shipping fever, Pasteurellosis, Bovine pneumonic pasteurellosis, Transit Fever, Fibrinous pneumonia

Mk 723; C2T 670; IM 632, 639; BR-hb 309; BR 758; Br253; DC 71

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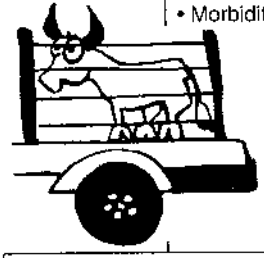
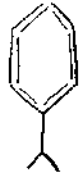


- **Multifactors**
  - #1 ***Pasteurella hemolytica***, *P. multocida* & other bacteria also possible
  - Pasteurella normal in upper resp. tract, but not in lung
  - CS due to bacterial lesions of lungs
- **+ Stress** - immunosuppression causes bacteria to proliferate & move to lungs
- **+ Virus** (IBR, PI-3, BRSV, BVD) or mycoplasma, like stress, increases susceptibility to 2° bact.
- **= Bronchopneumonia**
- **Contributing factors to stress:**
  - Transport
  - Co-mingling of new animals
  - Change in diet from roughage to conc.
  - Underlying viral diz (e.g., IBR) causes immunosuppression
- Morbidity up to 50%



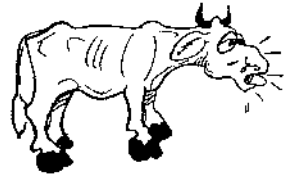
- **Respiratory problems**
  - **7-21 d after arrival at feedlot**
- Found ill, hanging back from feed & water or **dead**
- **Depression**, anorexia
- **Nasal & ocular discharge**, mucopurulent (bacteria)

- **Fever**
- **Dyspnea**
- **Cough - productive**
- **Rapidly fatal**, esp. in young
- Septicemia (USA free?)

- Sequela:
  - Survivors m/b chronic poor doers

- **History (Hx) (shipping) & CS**
- Abnormal lung sounds
  - Expiratory grunt
  - Initially wheezes, moist rales & crackles
  - Friction sounds
  - W/further consolidation sounds m/ decr.

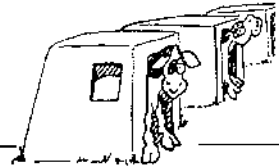
- **Postmortem:**
  - Cranioventr. lungs dark red, swollen & hard, often covered w/ **fibrin**



DDx:
- Pleuritis (p 72)
- Pleural effusion, e.g., due to hardware diz (1 animal) (p 38)
- Acute pulmonary emphysema (p 67)
- Fog fever (p 67)
- Pulmonary edema (p 67)
- Laryngitis (p 61)
- Tracheitis
- Lungworms (p 69)

- **Early Tx for best results**
- **Difficult due to $**
- **ABs** (critical) - Mycotil®, Naxel®, long acting tetracycline, based on transtracheal wash & culture
- Separate sick animals
- ↓ Stress, liberal water & hay
- NSAIDs (aspirin, Banamine®)

Prognosis: Good - 1-10% mortality



Prevention:
- Precondition 3 weeks before shipping (weaned & conc. diets, castrated, dehorned, resp. vac., Tx parasites)
- Reduce stress (↓ transit time, ↓ crowding & mixing, ↓ dust, proper ventilation & feed)
- Tx high risk calves w/ Mycotil® or oxytetracyclines IM + oral bolus of sulfamethoxine
- **Vaccination**

Stress + Virus + Bact. = Bronchopneumonia, 1-2 wks after shipping
CS: Resp. (fever, dyspnea, cough), Rapidly fatal
Dx: Hx, CS, Fibrin
Tx: ABs, Isolation • Px: Good

Respiratory Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Bovine resp. syncytial virus, BRSV Mk 722; IM 637; C3T 447; BR-hb 408; BR 1051; DC 82 ***	• **Paramyxovirus** - Forms **multinucleated cells** (syncytial cells) (pneumocytes coalesce) - Destroys resp. epithelium • 0-20% mortality • **Winter/Beef** breeds due to husbandry • No maternal ABs - Calves affected more severely • **Two phases: 1st respiratory, 2nd hypersensitivity** • Adults serve as reservoir	**Two phases** **1st phase** • 104-108° F. • Anorexia, depression • Salivation • Nasal discharge • **Dyspnea** • **Remission or progression** - **2° bact. pneumonia** common, M/b complicated by mycoplasma **2nd phase:** • **Hypersensitivity reaction** (m/b) • **Severe pneumonia** - **Dyspnic, lying down** - SQ emphysema - Submandibular edema (migrated along mediastinum) - **Calves spontaneously cough** • **Time between 2 phases 1 - 2 wks**	• **Difficult, due to other viruses causing similar CS** • **Development of 2nd phase** - severe pneumonia • Cough, easily elicited by tracheal palpation • Difficult to culture in vitro • Postmortem - Intracytoplasmic inclusion bodies - **Syncytial cells: multinucleated pneumocytes** (coalesce) • **Need to differentiate from other viruses because of different Tx** • Also part of shipping complex, causing resp. diz & adding to shipping fever • Both upper & lower resp. tract diz (different from PI-3 & IBR) • Predisposing factor for 2° infec.	• **ABs - preventive** (broad spectrum: oxytetracycline, sulfas, Naxcel®, etc.) • **2nd phase** • **Corticosteroids** - Dexamethasone, once - Then prednisone - Usu. get dramatic response - Contraindicated in other viral dizs - Steroid treatment? Need to know if BSVD or some other virus; difficult so treat empirically (from experience) • Banamine® ↓ inflam. response (NSAIDs) • Antihistamine **Prognosis:** • **Good 1st phase** • **Grave 2nd phase** **Prevention:** • Minimize other stresses • Vaccinate against other viral diz
Paramyxovirus, Winter/Beef, 2 Phases **CS: 1st phase Resp., 2nd Hypersensitivity** **Dx: Hx, CS, Syncytial cells** **Tx: ABs, Steroids**				
BVD/MD **Bovine viral diarrhea** ***	• See Gen pg 253 • **Togavirus** - **Immunosuppressive**, may predispose to other dizs • Transmission: - Direct & indirect contact - Transplacentally • IP (incubation period) 5-10 days • 1° yearlings up to 2-3 years • M/b part of shipping fever complex	• Classical BVD - Diarrhea (see GI) • **Resp.** CS w/ intermittent fever - ↑ RR - **Recover in 10 d if no 2° bact.** • Abortion ("weak calf syndrome") • **Mucosal diz** (chronic BVD) - 100% fatal (die w/in 2 mo) - Diarrhea - **Mucopurulent nasal & ocular discharge** - Cachexia **BVD/MD**	• **Presumptive - PE & necropsy** • **Definitive Dx requires 2-3 weeks** - Serum neutralization test or viral isolation • Leukopenia • **DDx from Rinderpest & FMD** • **Postmortem:** - Degenerative epithelial cells of GI - Erosion from mouth to intestine **Prevention: BVD vaccinate all**	• Palliative - Fluids (for dehydration) • Prophylactic ABs (immunosuppression) • Good husbandry • **BVD/MD - cull** • **Persistently infec. - salvage** **Prognosis** • BVD: Guarded to fair • Mucosal diz: Grave - Euthanasia

Other Viruses Isolated in Resp. Diz (IM 638; DC 86)

Parainfluenza - 3 virus (PI-3)

Mk722; IM637; C3T443; C1T 546; BR 1051; DC 85

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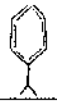
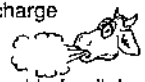


- **Paramyxovirus**
- All ages affected, 1° weanling calves
- Predisposes to lower resp. tract diz, shipping fever, but in itself little problem
- Majority of cattle have antibody levels to PI-3 (ubiquitous)
- Linked to bovine respiratory diz (BRD)
- Can cause diz alone, but probably 1° infection followed by Pasteurella as a 2° invader

- **Most mild** w/o 2° bacteria
- Fever, anorexia
- Serous nasal discharge
- Lacrimation
- Coughing



- CS develop after get to feedlot
  - Predisposes to 2° bact
- **+ Pasteurella = pneumonia**
  - **Incr. severity of CS, Death**

Malignant catarrhal fever virus: sporadic occurrence

Other herpes viruses: Serologically distinct from IBR, MCF & herpes mammillitis virus, Herpesvirus type 4, Several isolated from cattle w/ respiratory diz (DN-599, Movar 33/36, FTC-2); importance poorly defined, not thought to be important enough to warrant vaccine development

Adenovirus (BAV): Bovine adenovirus, DNA virus; infection often not apparent, assoc. w/ other viruses & bacteria; Assoc. w/ a wide spectrum of dizs (pneumonia, enteritis, pneumoenteritis, conjunctivitis, keratoconjunctivitis, weak calf syndrome & abortion

- CS of both upper & lower respiratory tract diz

Rhinovirus: RNA virus (picornavirus), infection appears widespread

- CS: inapparent to fever, anorexia, depression, ↑ RR, lacrimation, conjunctivitis, salivation, coughing & nasal discharge

Reovirus: RNA virus; subclinical infection usually; importance unclear

Enterovirus: RNA virus (picornavirus); not considered pathogenic

Coronavirus: Established cause of diarrhea in young calves, role in respiratory diz ?

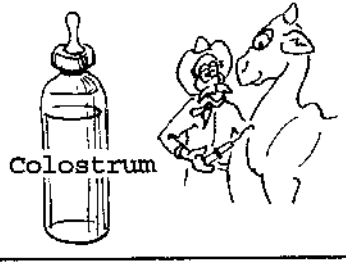
Calicivirus: Isolated in calves w/ persistent respiratory diz

Dx of Viral Respiratory Diz

- History, CS, Physical exam

- Specific viral Dx difficult w/o lab
  - Labs look for virus that has a vaccine
  - CBC & chem. rarely of value
  - Serum immunoglobulins useful for FPT (failure of passive transfer)
- Virus isolation: time consuming & expensive
  - Performed in cell cultures
  - Nasopharyngeal swabs, conjunctival swabs, tracheal lavage fluids, PM tissues

  - Place in virus transport medium & refrigerate (24 hrs) or freeze
  - Sample in acute phase of diz & asymptomatic contact animals (m/b incubating)
  - BRSV very difficult to isolate
  - Virus identification: neutralization of specific antiserum, fluorescent antibody staining, immunoperoxidase staining, electron microscopy, immunoelectron microscopy
  - Viral antigen detection: immunofluorescence (rapid) immunoperoxidase
  - Serological diagnosis: retrospective Dx, paired serum from individual animals 2-4 weeks apart. Detect antibodies, microliter serum-virus neutralization test, hemagglutination/ inhibition test (PI-3), ELISA

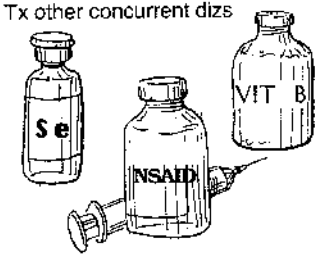


Tx of Viral Respiratory Diz

- **ABs to prevent 2° bact. infec.,** be aggressive & continue several days after recovery (Naxcel®, oxytetracycline, Tylosin, etc.)

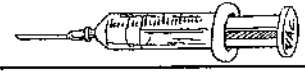
- **NSAIDs** found to be helpful
- Corticosteroids reported helpful in BRSV infections. Dexamethasone (immunosuppressive) m/ cause recrudescence of IBR infec.
- NO antiviral drugs available in vet med.
- **Supportive care:**
  - **Fluids**
  - **Vit. B-complex** for anorectic animals
  - **Selenium or copper** supplementation if deficient

- Tx other concurrent dizs



Prevention:

- Management important
- **Vaccinations**
  - Not totally effective for a number of reasons (diverse etiology, few vaccines)
  - Vaccinate IBR, PI-3, BVD
  - BRSV vaccine requires 2 doses



Respiratory Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Enzootic calf pneumonia, Cuffing pneumonia Mk 727; IM 646, 325, 632; Br202; BR-hb 407; BR 1051 ***	• **Multifactoral** - **Virus** (IBR, PI-3, BRSV) - **Mycoplasma** (*M. viscan*) or chlamydia • **2° bact. - *P. hemolytica***, *P. multocida* or *Actinomyces pyogenes* • Transmission: aerosolization • 2-5 mo-olds (waning of maternal antibodies) • Depress host defences + incr. pathogen challenge • **Housed calves:** - **Crowding, poor ventilation, stress** - Intensely managed calves, multiple sources of animals, new pathogens	• **Occurrence & severity vary** - Initial viral or mycoplasm diz usually mild or subclinical • **Acute outbreaks - pneumonia** - **Fever** 103-107° F - **↑ Respiratory rate** - **Coughing** - Weight loss - Recovery gradual unless 2° bact. • **Toxemic w/ Pasteurella** - Cold extremities, toxic lines in oral cavity, etc.	• **Coughing in housed calves** • Lab detection difficult - Viral or mycoplasm . Nasopharyngeal swabs - viral isolation & mycoplasm, cultures FA if early - Transtracheal wash for bact. cult/sens • Auscultation - Consolidation, high pitched airway sound (cranioventrally) - Percussion - dull resonance - Friction rubs • **Postmortem** - Cranioventr. lungs - fawn colored or greyish-purple - **Fibrin, adhesions**	• **Eliminate environ. problems** • **Treated early** • **ABs** (transtracheal washes) assume others have similar pathogens - Naxcel®, Micotil, oxytetracycline - Repeat Tx since relapses are common • **Acute course 10-14 days w/ Tx** **Prognosis: Guarded** • Hi morbidity, but w/ therapy, low mortality • Recover, but some poor doers

Housed calves; Stress + Virus/Mycoplasm + 2° Bact.
CS: Outbreaks - Pneumonia (Coughing)
Dx: Hx, CS, Lab
Tx: Stop stress, ABs • Px: Guarded

Control:
• **COLOSTRUM at birth**
• **Eliminate environmental causes**
- Individual calf hutches placed outside (1st 4-6 wks)
- Bedded & protected from wind
- If not space for individual hutches, then certain specifications, temp 55-70°F, humidity 70%, etc.
• **Vaccines**
• Isolate incoming calves at least 2 wks
• Buy calves with adequate colostrum intake

Mycoplasma pneumonia: Common in goats, not in cattle

Mycotic pneumonias
IM 671; Br 764; DC 96
*

Coccidiomycosis (Mk 344; IM 671) **Dust-born, noncontagious infection; fungus - *Coccidioides immitis*, SW USA (arid), Public health even though difficult to transmit** • CS: subclinical infec. in lungs & inn usu., m/b a chronic cough & wt. loss • Dx: Rads (masses), Histo. (spherules), Culture, intradermal & complement fixation tests • Tx: None; Control dust

Aspergillosis (IM 672): Rare, housed, immunosuppressed/chronically ill calves (Chronic ABs/steroid Tx) • CS: Fibrinous pneumonia (fever, dyspnea, tachypnea, cough, nasal discharge, groaning, acute death) or chronic form (anorexia, weight loss, mild resp. signs) • Dx: Rads, TTW, Histo (branching septate hyphae), culture • Tx: Freq. ineffective, nystatin, amphotericin B, ketoconazole

Histoplasmosis (IM 672): Rare, Multiple system diz • CS: Chronic weight loss, dyspnea, diarrhea, anasarca • Dx: Intradermal test, culture, histo. (yeastlike) • PM (ascites, hepatomegaly, pulmonary emphysema, edema & abscesses • Tx: None

Pulmonary candidiasis (IM 672): Rare (a report in one feedlot), chronic pneumonia • Dx: Budding yeastlike smears & cultures • Tx: not investigated

Zygomycosis, phycomycosis, mucormycosis (IM 672): Very rare, Systemic infec. (lungs, stomach, liver, brain, lymph) • CS: Pneumonia • Dx: Histo. (brd. aseptate hyphae) • Tx: not investigated

Acute Respiratory Distress Syndrome (ARDS)

IM 656, 363; Br 764; DC 91, 100; Tox 395

- Any resp. condition or sudden onset of dyspnea (usually severe), characterized by: Congestion & edema, Hyaline membranes, Alveolar epith. hyperplasia & Interstitial emphysema
- Examples: Fog fever (ABPE), Moldy sweet potato toxicity & Perilla ketone toxicity, Toxic gases

Atypical interstitial pneumonia, Fog fever

Acute bovine pulmonary edema & emphysema (ABPE), Acute respiratory distress syndrome (ARDS)

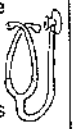
Mk 724; C2T 661; IM 656, 1888; BR-hb 163, 664; BR 408, 1685; Br 674

***

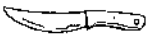
- **M/b ARDS**
- **Moving adults** from dry sparse forage **to lush green pasture**
- **L-tryptophane** in lush forages converted by microorganisms into 3-methylindole
  - **Pneumotoxic compound (3-methylindole)**
  - **Damages resp. epithelial cells,** resulting in pulmonary edema, alveolar epith. hyperplasia, hyaline membranes
  - = emphysema w/ severe dyspnea
- Pasture type unimportant, esp. lushness
- Fall, Western US, moving to lush pastures
- Morbidity up to 50%
- **Mortality up to 30%**
- Nursing calves & yearlings don't eat enough to get diz

- **Acute severe respiratory CS**
  - Dyspnea, loud resp. grunt
  - Frothing at mouth
  - Mouth breathing
  - Tachypnea (35-75 breaths/min)
- **Distressed** not depressed: stand w/ neck extended, head elev., dilated nostrils
- **No coughing** (DDx from infec. resp.)
- **Death, brought on by mild exercise or handling**
- 30% die w/in 2 days of onset
- **Survivors** improve after 3 days w/o moving off pasture
- SQ emphysema

- **Adult herd/New pasture**
  - **Severe resp. distress**
  - **Absence of coughing**
- **Auscultation**
  - Surprisingly soft sounds (emphysema), soft crackles
  - Harsh breath sounds, w/ crackle & wheezes in caud. lung lobes



- **Postmortem:**
  - Congested, edema & **hyaline membranes**
  - Histo.: **multinucleated giant cells**



- **None** may be best bec.:
  - Handling may kill
  - Removing doesn't prevent new cases
- Most deaths 1st two days
- Survivors recover - 10 days
  - Some may develop emphysema
  - Poor doers

Prognosis:

- **Guarded:** 30% die, some on recovery are poor doers

"Fog" pastures: British term for lush regrowth after hay cut

Adult + Lush pastures (L-tryptophan) = ARDS (lung damage & edema & emphysema)

CS: Acute dyspnea, Death, No coughing

Dx: Hx (Pasture), CS, Hyaline membranes

Tx: None - Don't stress • Px: 30% die

DDx:

- Acute respiratory distress syndrome (ARDS)
- Moldy sweet potato poisoning & perilla mint (pneumotoxins) (ID source) (p 67)
- Parasitic bronchitis (coughing) (p 69)
- Anaphylaxis (only 1 animal affected) (p 251)

Prevention:

- **Slowly introduce to lush pasture** - gradually decr. hay in feed lot and incr. pasture - over a period of 10-12 days
- Delay lush pasture until after first frost
- Thoroughly graze lush pasture w/ young stock or sheep before older cattle
- **Prophylactic** - decr. conversion of tryptophane to 3-MI
  - Monensin for 5-6 ds prior to putting on pasture

Moldy sweet potato toxicity, 4-ipomeanol toxicity & Perilla mint toxicity (See Tox pg 225)

**

- See PP pg 225 • Both produce ARDS; Sweet potato + fungus = pneumotoxin, Perilla plant (weed in SW) = pneumotoxin
  - Damages cells - edema, hemorrhage, cellular necrosis, hyaline membrane formation - 2° emphysema
- CS, same as Fog fever • Dx: exposure to damaged sweet potatoes to DDx from fog fever • Tx: suggested same as fog fever

Toxic gases: See Tox p 210, can cause ARDS, Nitrogen dioxide, Zinc oxide, Chlorine, Manure gas, Smoke inhalation

Lung Worm

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Hypersensitivity pneumonia "Farmer's lung" Mk 725; IM 662; BR-hb 666; BR 1689; Br 668; DC 102 **	• Inhaling organic dust • **Moldy hay** - spores of ***Thermophilic actinomycetes*** (*Micropolyspora* & *Thermoactinomyces*) • Wet summers (moldy hay) & cold winters (housed cattle) > 30% moisture content to hay - heats when bailed - thermophilic molds proliferate • Spores - hypersensitivity - destroys alveoli - Confined adult cattle (dairy)	• Animals in diff. stages • **Acute resp signs:** - **Coughing** - **Dyspnea**, tachypnea - Dullness, ↓ appetite, hypogalactia, moderate transient fever • **Chronic:** - Insidious onset - Fibrosis - **Weight loss & coughing** over several winters - CS similar to acute	• History (Hx) & CS • Auscultation: cranioventr. crackles • Postmortem: - Grossly normal lungs, small gray spots of lymphocytes **DDx** • Toxic gases (p 210) • ARDS (p 67) • Fibrosing alveolitis • Resp. dizs of housed adult cattle in winter • Viral & bact. pneumonia (fever & consolidation)	• **Remove moldy hay ($)** • Corticosteroids (Dexamethasone IV) **Prevention** • Silage instead of hay • Dry hay, feed outside • Cull chronic cases **Prognosis (Px):** • Good if Tx before fibrosis

Moldy hay - Hypersensitivity - Damages alveoli
CS: Acute (Coughing, Dyspnea); Chronic (Wt. loss & Coughing)
Dx: Hx, CS
Tx: Remove moldy hay, Corticosteroids • Px: Good if no fibrosis

Contagious bovine pleuropneumonia (Mk 726; IM 651; B-A 672) • USA free since 1892, highly contagious pneumonia generally accompanied by pleurisy (Africa, Iberian peninsula, India & China; Mycoplasm mycoides mycoides • Reportable diz
*

USA Free

Chlamydia psittaci IM 671; BR 437 **	• Contributes to some outbreaks of enzootic pneumonia in housed calves • Pneumonia in range calves	• Fever, depression • Nasal discharge • Dry hacking cough • Dyspnea • Diarrhea	• Isolation from nasal discharges, trachea • Inclusion bodies in affected tissue, FA, Complement fixation • Postmortem: plum-colored lung lobes (like enzootic pneumonia)	• Tetracyclines, large doses (11 mg/kg or more) 3 days Tetracycline
Pulmonary listeriosis IM 671 *	• *Listeria monocytogenes*; Pneumonia resembling atypical pneumonia in feedlots, Stocker & feeder calves, Clinically indistinguishable from other bacterial pneumonias. Also causes encephalitis, abortions, septicemia, conjunctivitis & mastitis • Tx: Oxytetracycline & penicillin at high doses			

Coccidiomycosis (MK 344) • Dust-born, noncontagious infec.; fungus/*Coccidioides immitis*, SW USA (arid) • Ruminants rr/ have subclinical infection in lungs & lymph nodes of thorax

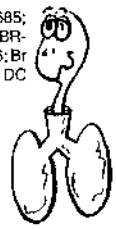
Mycoplasma pneumonia: in goats, not cattle
***Pneumocystis carinii* pneumonia**: also in goats, not cattle

Pulmonary adenomatosis, Jaagsiekte, Pulmonary carcinoma in sheep:
• Not in cattle

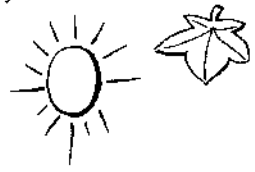
Lung worm, Verminous bronchitis, Verminous pneumonia, "Husk"

Mk 714; C2T 685; IM 664, 1705; BR-hb 476; BR 1246; Br 810, 819, 236; DC 89; Pic 80

★★★



- ***Dictycaulus viviparous***
- Yearling cattle >> adult
- Infected pastures
- Herd problem at pasture
- **Late Summer & Fall**
- High rainfall or irrigation
- Larvae in alveoli - block small airways

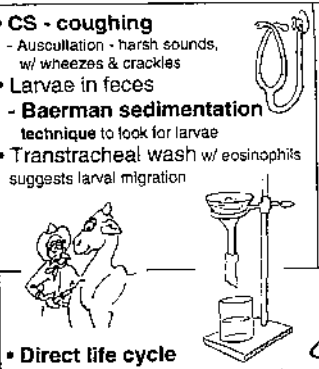


- **Coughing** (gradual onset)
- ↑ Respiratory rate
- Severity depends on # of larvae
- Can cause death

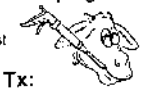
Parasitic Pneumonia (aspiration of eggs & larvae) + tracheitis & bronchitis (adults)

- Consolidation of caud. lung lobe
- **Marked coughing**
- Dyspnic, off feed, temp. elev., wt. loss
- SQ emphysema due to dyspnea
- May die if untreated
- **Self limiting** (slow recovery as eliminates adult worms)

- **CS - coughing**
  - Auscultation - harsh sounds, w/ wheezes & crackles
- Larvae in feces
  - **Baerman sedimentation technique** to look for larvae
- Transtracheal wash w/ eosinophils suggests larval migration



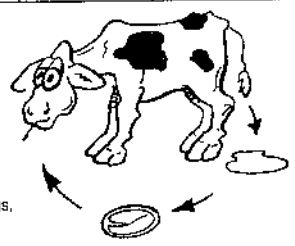
- **Ivermectin** (Broad spec. 3, 8, & 13 weeks after start on pasture)
  - Repeat for developing larval stages
- Levamisole in past



Prognosis w/ Tx:

- Just cough & dyspnea - Good
- More severe, dyspnic
  - Guarded, some die, some chronically unthrifty

- **Direct life cycle**
  - Adults lay eggs in trachea & bronchi
  - Eggs hatch & larvae are coughed up
  - Swallowed & passed in feces
  - Larvae re-ingested
  - Penetrate inteslines
  - Move by blood & lymph to caudal lungs, then to alveoli & bronchi
  - Larvae in alveoli block small bronchi
  - Adults cause inflammation in large airways
  - Aspirated eggs & larvae cause consolidation of ventral part of caudal lobes



Dictyocaulus, Summer/Fall
CS: Coughing, Self limiting
Dx: Baerman sedimentation
Tx: Ivermectin

DDx

- Fog fever (less coughing) (p 67)
- Farmer's lung (p 68)
- Bronchopneumonia (p 63)

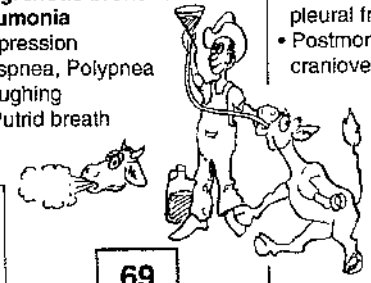
Aspiration pneumonia, Gangrenous/Foreign body/Medication/Lipid inhalation pneumonia

IM 650; BR-hb 164; BR 416; Br 668; C3T 59; DC 94

★★★

- Inhalation of foreign material
- Cause:
  - **#1 careless drenching/ stomach tube** milk or liquid medication
  - Pail-fed calves, pharyngeal paresis, necrobacillary laryngitis, anesthetized animals, parturient paresis, crude oil ingestion

- **Sudden death** (if "lots" inhaled)
- **Gangrenous broncho-pneumonia**
  - Depression
  - Dyspnea, Polypnea
  - Coughing
  - ± Putrid breath

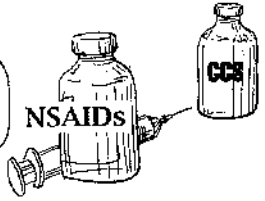


- **History (Hx)**, CS
- Auscultation: crackles, wheezes, pleural friction rubs
- Postmortem: Consolidation of cranioventral lungs, necrosis

DDx:

- Bronchopneumonia (p 63)
- Septicemia (p 258)

- **Emergency**
- ABs - long term
- NSAIDs + corticosteroids IV

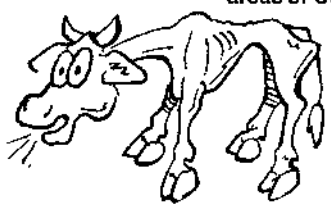


Prognosis: Guarded, but some can be saved

Inhalation of FB - Careless drenching
CS: Gangrenous bronchopneumonia, Sudden death
Tx: Emergency - ABs, NSAIDs, Steroids • Px: Guarded

Tuberculosis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Tuberculosis Mk 267, 369; IM 872; BR-hb 165, 327; BR 418, 830; Br 669; DC 474, 97; Derm 156; L 118 *	• **Mycobacterium**: acid fast bacilli • Pathogenesis - **1° focus in lungs** in man & cattle - Drains to adjacent lymph nodes - Seldom heals, progresses slowly or rapidly - Localizes into tubercles (tumorlike granulomatous masses that tend to mineralize) • Transm.: inhalation, ingestion of contaminated feces, milk - M/ spread to udder - **Public health** • Main reservoirs: humans & cattle • **Few infected herds in diverse areas of USA**	• **Chronic debilitating diz** - Enlarged supf. lymph nodes m/b - Weakness, anorexia - **Dyspnea** - **Chronic wasting & Emaciation** - Low grade fluctuating fever - Intermittent hacking cough • Acute rapid diz occasionally	• Dx only when advanced • **Tuberculin skin test** - Inject tuberculin intradermally (PPD - purified-protein-derivative) - Inflam. & swelling positive (delayed hypersensitivity reaction) - **c-c test** (comparative-cervical) *M. avium* & *M. bovis* PPD tuberculin injected in separate sites on neck & compared . *M. paratuberculosis* m/ gives false positives • Culture organism to confirm 4-8 weeks	• **Notify authorities** - **Test & slaughter** **Prognosis: Grave**



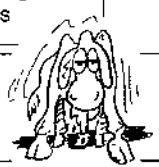
PH Reportable

Mycobacterium, 1° lungs, Seldom heals, Public health
CS: Chronic debilitating diz; Dyspnea, Wasting, Fever, Cough
Dx: Tuberculin skin test
Control: Test & Slaughter

Types of Mycobacterium: can affect other species
- *M. tuberculosis*: human & nonhuman primates, dogs & parrots
- *M. bovis*: most warm blooded species, including man
- *M. avium*: birds, cattle, sheep & other species

Buss diz, Sporadic bovine encephalomyelitis *

- See Neuro pg 151
- Rare, endemic on some farms, Chlamydia (psittacosis), Cattle & buffalo only; Transm. unknown; Vasculitis
- CS: Multisystem diz; **Resp**: nasal discharge, dyspnea, cough, Grunt - Pleuritis - pain like hardware diz; **GI** (initial diarrhea); **CNS** (encephalitis)
- Dx: Elementary bodies in pleural & peritoneal effusions highly suggestive. Culture chlamydia
- Tx: **Tetracyclines** effective early



Vena caval thrombosis, Metastatic pneumonia, Pulmonary thromboembolism, Embolic pulmonary aneurysm, Lung abscess

C2T 556; IM 654, BR-hb 164; BR 416; Br 416; DC 91, 52; GI 790; Pa 138

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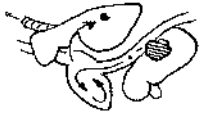
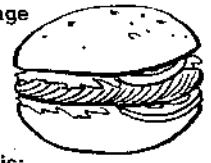


- Common > 1% of necropsies (feedlots)
- Multifocal abscessation in lungs
  - Thromboembolism
  - Septic emboli arise from septic thrombi of caud. vena cava > cran. vena cava
- Cause of septic thrombi
  - **#1 liver abscesses 2° to rumenitis**
  - Mastitis, foot rot, jugular phlebitis
- **Bact:** *Fusobacterium necrophorum*, *Actinomyces pyogenes*, staph., strep, *E. coli*
- **Feedlot cattle**, most common (assoc. w/ rumenitis), Hi CHO diets - lactic acidosis, bact. penetrate rumen & pass to liver through portal vein - Abscess, m/infiltrate caud. vena cava - thrombus
- **Traumatic reticuloperitonitis**
- < 1 year old
- 100% fatal

- **Respiratory distress** (tachypnea [RR > 30/min], expiratory dyspnea, hyperpnea, coughing, frothy muzzle, SQ emphysema)
  - Widespread wheezes
  - **Epistaxis**
  - Hemoptysis (spitting blood), melena
- **Anemia** (hemic murmurs, pale "gums")
- **Weight loss**
- **Thoracic pain**
- Nonspecific (fever, depression, anorexia, rumen stasis, scant feces, ↓ milk production)
- Acute to chronic
- **Chronic sequelae**
  - Rt heart failure due to cor pulmonale
    - . Jugular pulse
    - . Brisket edema
  - Hepatomegaly
    - . Ascites
  - Chronic diarrhea

- **CS: Resp., anemia, wheezing & hemoptysis - pathognomonic**
- Lab:
  - Anemia
  - Neutrophilic leukocytosis
  - Hyperglobulinemia (freq.)
  - Liver: ↑ bilirubin & liver enzymes
- Rads: ↑ density to lungs, small densities
- Postmortem:
  - -Abscess in caudal venal cava & adjacent liver, large, uncollapsed lungs, blood clots in airways, abscesses

Tx: Salvage



Prognosis: 100% fatal

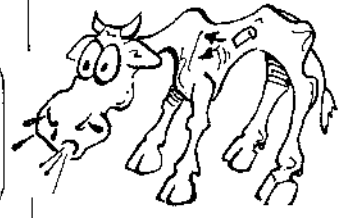
Prevention:

- Prevent rumenitis, slow adaptation to hi-energy food, ABs in feed to reduce liver abscesses

Rumenitis - Liver abscess - Caud. venal caval thrombus - Lung emboli
CS: Resp., Anemia, Widespread wheezes, Hemoptysis
Dx: CS pathognomonic, PM
Tx: Salvage • Px: 100% fatal

DDx before hemoptysis

- Anaphylaxis (p 251)
- Acute resp. distress syndrome (p 67)
- Hypersensitivity pneumonia (p 68)
- Lungworms (p 69)
- Shipping fever (p 63)



Haemophilus somnus

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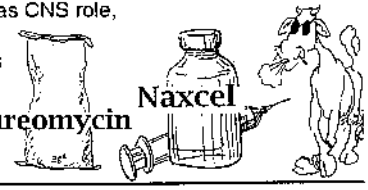
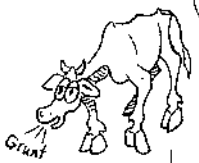
- **See pg Gen 254**; Septicemic diz, ↑ frequency in pneumonia, Role in pneumonia not as well defined as CNS role, **Calves** - 4 weeks after entering feedlot
- **CS:** Resp. diz by itself or w/ CNS (cough, dyspnea, fever, pleuritis); TEME: CNS CS; Joint - lameness
- **Dx: Calves w/ CNS, resp., & joint disease, Just respiratory signs difficult to Dx**
- **Tx:** IV ABs (Naxcel®, Micotil®, oxytetracycline)
- Prevention: Bacterin of questionable value, Add aureomycin to feed



Pleuritis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Pleuritis w/ pleural effusion Mk 707; IM 674, C3T 664; BR-hb 168; BR 422; Br 116; DC 97 ***	• **Acute 1° pleuritis rare in ruminants** **2° condition** almost always • Bronchopneumonia (p 63) • Hardware disease (p 38) • Liver abscesses (p 36) • Trauma (gunshot, broken ribs, perforation) • Contagious bovine pleuropneumonia (CBPP) (p 68) • Systemic conditions • Lung abscesses (p 71) • Uroperitoneum (p 96) • Rt. heart failure (p 76) • Hypoproteinemia (p 302) • Ruptured thoracic duct • Hemothorax (p 73) • SBE (sporadic bov. encephalomye.) (p 151) • Lymphosarcoma, uncommon (p 268)	**Depend on & m/b overshadowed by 1° cause** • **Acutely pleuritis** • **Pain:** - Stance: head & neck extended, elbows abducted, tachypnea - Grunts on respiratory, abdominal or shallow respiration - Guarded cough due to pain • **Progressive dyspnea** • Anorexia, fever, weight loss, ↓ Milk production, ↑ Temperature & HR • **Ventral edema**: submandibular, ventral thorax & abdomen	• **Physical exam (PE) - presumptive** • **Then determine cause** • **History** (may be helpful) • **Auscultation:** - **Pleural friction rubs** ("leather rubbing") - **Horizontal fluid line** - percussion, ventral dull resonance, dorsal normal . Chronically cattle wall off => areas of dull resonance, not straight line • **CBC** - differentiate infection from noninfection - Acute (significant lt. shift) - Chronic (mature neutrophilia, hyperglobulinemia & nonregenerative anemia) • Chemistry & urinalysis - **Hypoproteinemia** - Azotemia • Thoracocentesis (see box) • Transtracheal wash (TTW) - for pneumonia - m/not be economically feasible • **Ultrasound** - transducer in ICS - Fibrous adhesions floating in fluid	**Tx** animals of economic value • Treat 1° prblm • **Cull/salvage** **1) Drainage of fluid** - making animal more comfortable, drain as much as possible - Fibrous adhesions develop - Indwelling chest tubes **2) ABs** - Based on cult/sens. ideally - Empirical before getting cult. & sens. back (many cases broad spectrum ABs - IV, but expensive) . Mycotil®, Naxcel®, tetracyclines - Gram stain **3) Analgesics**, minimize pain (aspirin) **4) Supportive therapy** - palatable feed, good bedding, easy access to feed and water **Prognosis:** • Pleuritis - grave to poor, depending on 1° cause & duration - Worse if w/ multiple or gram negative anaerobic organisms



Thoracocentesis - therapeutic chest drainage
- **Establish cause & response to Tx**
- **Assess volume drained for baseline**
  - If redrain know if making more fluid
- **Correlation between survival & amount of fluid**
- **Evaluate grossly & record**
  - Normal - yellow clear fluid (m/ still be abnormal)
  - Yellowish white - infection
  - Cloudy - ↑ in WBCs
  - Odor fetid - anaerobics (gram positive)
  . Nonseptic transudate (neoplasia, CHF, hypoproteinemia, uremia)
  . Effusion: Acellular & high protein- sporadic bovine encephalomyelitis
  . Septic exudates, hi cells & protein (pneumonia, hardware diz, peritonitis, abscesses, penetrating trauma & septicemia)
- **Cytologic evaluation**
  - Cytology & culture - bact., mycoplasm & chlamydia
  - Cult/sens for therapeutic plan (or transtracheal wash)
- **TP** (normal < 2 gram/dl)
  - > 2 suggests leakage - damaged capillary or obstruction to drainage or oncotic pressure change
- Cell count < 10,000 /ml normal (no correlation to cell count & survival rate)

Inflam. & Fluid in chest, CS, Not diz
CS: Pain, Dyspnea, Edema
Dx: CS, Hx, Auscul., Centesis, US, TTW
Tx: Drain, ABs, Analgesics, Support
Px: Grave - Poor

Pulmonary dysmaturity, Neonatal Resp. Stress Syndrome, Hyaline membrane diz

IM 370

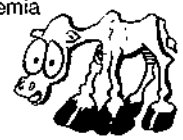
**

- **Parturition before lungs mature**, insufficient **surfactant** produced
- Causes:
  - Spontaneous abortion
  - Induced parturition
  - Early cesarean section

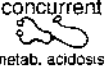
- Pathophysiology: Surfactant appears in last trimester. Deficiency, resulting in incr. surface tension, fluid lining alveoli causes collapse, inability to expand lungs
  - Results in vicious cycle of hypoxia, pulmonary edema, atelectasis & lung damage w/ production of hyaline membrane

CS: Dyspnea, Immaturity
Dx: Hx, CS, Auscultation, Rads
Tx: Stim. surfactant, ABs, O_2, Nursing

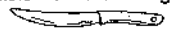
- M/b normal at birth then respiratory distress
- **Dyspnea**, inspiratory component
- Intercostal retraction
- ↑ HR & RR, cyanosis, gasping, open-mouthed breathing, depression, recumbency, hypothermia, unresponsiveness
- Sequela:
  - Septicemia



- **History** (physical signs of dysmaturity) (see box)
- Auscultation: harsh sounds, crackles
  - Machinery murmur from concurrent patent ductus arteriosus



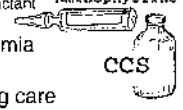
- Lab: initial alkalosis followed by metab. acidosis (hypoxic anaerobic metab. = lactic acidosis)
- Rads: atelectasis - air bronchograms
- Postmortem:



  - Lung atelectasis, sunken, firm, dark red & sinks in water
  - Histo: Alveolar collapse & necrosis, hyaline membrane, edema, hemorrhage, low # of type II cells

Physical signs of prematurity
- Short, silky hair coat, low birth weight, short ears & tail

- **Emergency** - initiate before CS if suspect
- Stimulate surfactant formation
  - **Glucocorticoids or ACTH**
  - Thyroxine (T4) IM BID or TRH
  - Prolactin, pilocarpine
- **Aminophylline**: bronchodilation & stimulate surfactant (IV TID)
- Isoxaprine, lessen hypertension & bronchospasm, stimulates surfactant



- Diuretics controversial
- ABs for 2° septicemia
- Oxygen therapy
- Supportive nursing care
  - Whole milk by nasogastric tube, stim oral cavity w/ 5% Na bicarbonate 1st to close gastric tube
- Couppage, posture drainage & airway suction

Prevention: Premature parturition anticipated: give TRH, ACTH or steroids to dam

Failure of passive transfer

- **See Gen pg 246: FPT**: **Born w/out immunoglobulins**; **Colostrum**, **#1 cause of death in 1st wk**, Absorption 1st **12-18 hours** of life
- **CS:** Bacteremia, **Dyspnea**, **Diarrhea**, Anorexia, Depression, Weakness; Survivors: septic arthritis, meningitis, panophthalmitis
- **Dx: Can't be determined by PE** • **Lab:** Zn turbidity field test, **Refractometer - If failure, give colostrum**
- **Tx: Tx clinical diz, If less than 24 hours, feed colostrum. Over 24 hours - plasma or serum transfusion** IV
- **Prevention**: Feed colostrum automatically w/o test, **Make sure suckle in first 6 hours of life**, 2 L colostrum in 1st 4 hours after birth

Hydrothorax & Hemothorax

BR-hb 166; BR 419; IM 371

**

- Accumulation of edematous transudate or whole blood in pleural cavity • Cause: hydrothorax congestive heart failure, BLV, ruptured thoracic duct (Chylothorax rare), Hemothorax due to trauma, Hemangiosarcoma; all causing compression atelectasis of ventr. lungs
- **CS: Dyspnea, NO fever, no pain or toxemia** • **Dx:** dullness on percussion, absence of breath signs, Thoracocentesis (sterile)
- **Tx:** Tx primary cause, If severe dyspnea - aspirate fluid (reaccumulates quickly), Fluid replacement in hemorrhage

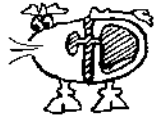
Pneumothorax

IM 675; BR-hb 167; BR 420; DC 99

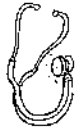
**

- Uncommon in cattle
  - Associated w/ pleural effusion
- Causes:
  - Thoracocentesis - small
  - Trauma: flail chest
  - Ruptured lung
- **Bovid - complete mediastinum - 1 side only**

- ± Dyspnea
- Abnormal respiratory effort
- **SQ emphysema**



- Seeing open chest
- Auscultation - absence of lung sounds dorsally
- Abnormal respiratory effort & SQ emphysema



Uncommon, Complete mediastinum
CS: SQ emphysema

- **Cull/Salvage**
- Close chest wound, Sx
  - Recreate negative pressure
- ABs (broad spectrum)

Prognosis: Guarded

Anaphylaxis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Anaphylaxis Mk 423; IM 1263; BR-hb 35; BR 99	• Anaphylactic reactions - Type 1 immediate hypersensitivity - Alterates vascular permeability & smooth muscle contractions • Causes: - **Biological product injection** #1 - Repeated blood transfusions - same donor - Repeated vaccines (Brucella abortus) - Repeated penicillin injections - Milk allergy at drying off - *Hypoderma* spp. larvae killed SQ • Target organ: lungs in cow	• **Acute, transient,** w/in 20 min of injection • Anxiety, distress • Tachycardia • **Dyspnea,** open mouth breathing, abducted elbows, flaring of nostrils, stertor • Shivering • ± Bloat, cough, nasal froth • Piloerection, urticaria, angioedema • Nystagmus, cyanosis • Recumbency, convulsion & death	• History (injection), CS • Crackles on auscultation • Radiology for pulmonary edema • Postmortem (PM): - Vascular engorgement - **Pulmonary edema** - ± Emphysema - Laminitis DDx: • Peracute pneumonia	• **Emergency: life threatening** - **Epinephrine IV,** 1:10,000 5 ml slowly . Epi IM or SQ 1:1000 if less acute cases . **Repeat at 15 min** intervals if necessary - Steroids (Methylprednisolone Na succinate or Dexamethasone - Antihistamine (Diphenhydramine) IV or IM - IV fluids - ± Tracheostomy **Prognosis:** • **Guarded,** depending on speed of vet.
Lung tumors IM 677; DC 97; BR 419	• Uncommon in large animals, (pulmonary alveolar carcinomas, papillary adenomas, adenocarcinomas, metastatic tumors [lymphosarcoma]) Most incidental finding at slaughter			

Contagious bovine pleuropneumonia: eradicated in USA in 1892, Mycoplasma

Chronic interstitial pneumonia IM 663, DC 103, Br 673	• Fibrosing alveolitis (FA) diffuse inflammation beyond terminal bronchiol • CS: BAR, weight loss, coughing, tachypnea, dyspnea; terminal cor pulmonale & heart failure; may represent chronic farmer's lung • Tx: none; lesions are irreversible • Bronchiolitis obliterans: chronic respiratory condition of yearlings or young adults • CS: deep, infrequent cough, tachypnea, hyperpnea, exaggerated respiratory effort, no fever; lung don't collapse at necropsy

Hydrogen sulfide (H_2S) *	• **See Tox pg 210; "Rotten egg", Manure pits, PH** • CS: Pulmonary edema, dyspnea, **Asphyxia,** CNS • Remove animals & humans before agitating manure pit; Ventilate
Smog (Sulfur oxides) *	• See Tox pg 212; air pollution, urban areas • CS: Eye irritation & salivation, Emphysema, Respiratory distress • Dx: History, CS • Tx: No specific Tx
ANTU *	• **See Tox 209; Rare,** exclusive rodenticide, Bait • **CS:** Pulmonary edema "drowns in own fluid" • **Tx:** None specific; Emetics early before edema
Smoke inhalants *	• See Tox pg 212; Barn fires: Smoke toxicity, CO toxicity (carbon monoxide poisoning) • CS: Oral burns, Conjunctivitis, Laryngospasms, Cough, Strider, Tachypnea • Dx: History (fire), CS • Tx: Patent airway, O2 therapy, IV fluids, ABs, Bronchodilators
"Silo gas", NO_2 *	• See Tox pg 211; Heavier than air, nitric acid - Lung damage • Salivation, dyspnea, cough, fever, SQ emphysema, pneumonia • Dx: History, CS, Postmortem • Tx: O2, Sedation, Diuretic, ABs for 2° infection

CARDIOVASCULAR - III

Heart

CARDIOVASCULAR SYSTEM

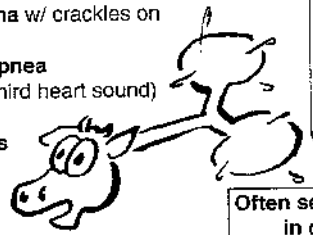
Congestive heart failure, CHF

Mk 11; BM&S 751; BR-hb 123; BR 329; Br 759; Pic 85

Fluid Backup:
Right side - into body
Left side - into lungs

Rt. sided CHF, fluid backs out to the **periphery** (caud. & cran. vena cava)
- Edema: brisket, submandibular, limbs
- **Jugular pulsation, jugular distension** (pulse should only go 1/3rd of the way up the neck)
- **Ascites** (abd. fluid)
- Splitting of 2nd heart sound, pulmonic & aortic valves not closing synchronously due to dilation of rt. ventricle

Lt. sided CHF: fluid backs up into **lungs**
- Poor peripheral perfusions
- **Pulmonary edema** w/ crackles on auscultation
- **Respiratory dyspnea**
  - Prominent S3 (third heart sound)
  - Tachycardia
- **Pleural effusions**



DDx:
- Rt. heart failure
- Bacterial endocarditis (p 81)
- Rt. AV insufficiency
- Cardiomyopathies (p 77)
- Pericarditis (p 76)
- Lt. heart failure
- Pleuritis or pleural effusions (p 72)
- Pulmonic valve stenosis
- Cardiac neoplasm (p 79)

Often see bilateral heart failure in cattle & horses

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Traumatic reticulo-pericarditis **"Hardware diz"** Mk 225, C3T 687; IM 532; Br 566,126, 759; BM&S 752; G 508; BR-hb 137; BR 360 DC 44 ***	• Uncommon - cattle, rare - sm. rumin. • **Indiscriminate eaters** • **FB** (foreign bodies - wire, nail) through reticular wall & diaphragm into pericardial sac - **Fluid into sac** (pericardial) • Pleuritis • **Heart failure due to compression**, sudden death due to acute hemorrhage or dysrhythmia	• Fever, ↑ HR, RR • **Pain**, abducted elbows - **Respiratory grunt** • Constriction of Rt. side - **Jugular pulse** - **Extended jugular veins** - **Ascites**, submandibular edema • **Dehydration** • Toxemic, arrhythmias, off feed • GI stasis • ↓ Milk prod. • **CHF** (congestive heart failure)	• **CS** • **Grunt test** (press up on ventrum) • Auscultation (Pleural effusion) - **Muffled heart sounds** - Pericardial friction rubs - **"Washing machine murmur"** gas & fluid splashing sounds • **Pericardiocentesis** (lt. 5th ICS at costochondral junction) - Fluid is odiferous - ↑ Protein & WBCs - Record volume drained off • **Ultrasound** confirms pericardial effusion, note changes of heart movement, thickened myocardium (chronic)	• **Cull/slaughter** - **Tx unrewarding** • $ If pregnant, or embryo transfer, 48 hrs to induce calving or to superovulate - Pericardial drainage to incr. myocardial action - Nc furosemide - Broad spectrum ABs (antibiotics) - IV fluids, based on lab abnormalities **Control** • Remove FB from eating area • Bar magnets **Prognosis (Px)**: Grave, salvage only alternative, don't use ABs (antibiotics)

Other causes of CHF
- Pleuritis w/ pleural effusion (has distinctive signs)
- Hematogenous spread (rare)

"Wire" –> Compression = Heart failure
CS: Jugular pulse, Pain, Dehydration
Dx: Grunt test, "Washing machine" murmur
Tx: Send to slaughter

Cardiomyopathy, Dilatative cardiomyopathy

IM 527; C3T 352; BM&S 751; BR-hb 632;BR 1633; Br 145; DC 42; GI 790; Plc 85

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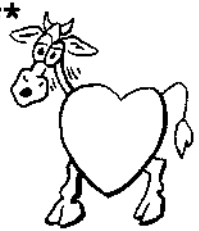
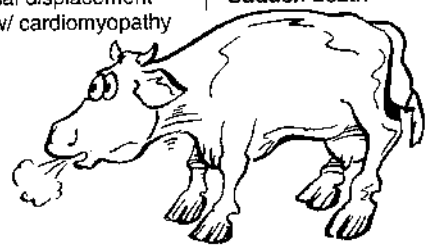
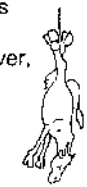


- **Dilatative** - only significant cardiomyopathy in **large animals**
- **Causes**:
  - Vit. E/Se deficiency
  - Ingestion of Lasalocid, Gossypol, *Cassia occidentalis, Phalaris* spp., monensin
  - Copper deficiency
  - Excessive molybdenum/sulfates (2° Cu defc)
  - Lympho- or fibrosarcoma
  - Abomasal displacement assoc. w/ cardiomyopathy

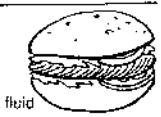
- **Cardiac failure**
  - **Peripheral edema** (rt.)
  - **Jugular venous pulse** or distention (rt.)
  - **Resp. distress** (lt. heart)
    . Tachypnea
    . **Dyspnea** (pleural effusion)
    . Bloody froth in nostrils
- Nonspecific signs
  - Diarrhea, Anorexia, Syncope
  - Exercise intolerance
  - ↓ Milk production
- **Sudden death**



- **CS**
- Auscultation abnormal
  - Tachycardia
  - Gallop rhythm
  - **Muffled heart sounds**
  - Cardiac dysrhythmia, murmurs 2° to dilatation
- **Postmortem (PM):**
  - Grossly enlarged heart
  - Heart failure signs
    . Gen. edema
    . Congestion of liver, lungs & spleen
    . Pleural effusion



- **Salvage**
  - $ Digoxin (inotropic agent)
  - Diuretics (Furosemide)
  - Rest
  - Removal of pleural or abd. fluid



Prognosis (Px): Poor

Prevention: see prevention to causative agents on following page

DDx:
CALF:
- Congenital heart defects (p 79)
- Cor pulmonale
- Nutritional: myodegen. (p 78)

ADULT:
- Bacterial endocarditis (p 81)
- Thoracic abscesses (p 71)
- Cardiac neoplasia (p 79)
- Pericarditis (p 76)
- Pleuritis (p 72)
- Diaphragmatic hernia (p 460

Lg. Animals = Dilatative
CS: Cardiac failure
Dx: Auscultation, PM
Tx: salvage • Px: Poor

Congenital cardiomyopathy:
- Polled Hereford - Curly hair coat - Rare

Haemophilus *somnus* (See Gen pg 254) • Calves, Feedlot, Septicemic diz: TEME, Lungs, Joint, Repro & Heart abscesses, Infertility, Conjunctivitis,

• CS: **CNS, Resp, Joint,** Myocardial abscesses, Fever & Resp. distress & depression from left heart failure; or Found dead

Myocarditis

IM 527; C3T 546; G 506; BR-hb 124; BR 332, 350; DC 40

**

Uncommon

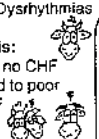
- **Uncommon**
- **Inflammation of myocardial wall**
  - Bacteria (Staph., Strep., Clostridium, Mycobacterium)
  - Virus (foot & mouth disease)
  - Parasite (toxoplasmosis, sarcocystis, cysticercosis)
- Thromboembolic diz (rare in cattle)
- 2° - bacteremia, septicemia, pericarditis, endocarditis

- **Variable or unnoticed**
- 1° diz may mask vague heart signs (e.g., mastitis)
- Tachycardia
- Febrile
- CHF (peripheral edema)
- Sudden death
- M/ lead to idiopathic dilatated cardiomyopathy

- **Rarely diagnosed**; mild, vague signs of heart involvement
- 1° cause masks heart signs
- **Postmortem:**
  - M/b no gross lesions

- **Treat 1° agent**
- Control complications: CHF, Shock, Dysrhythmias

Prognosis:
- Good, if no CHF
- Guarded to poor with CHF



Prevention
- Vaccination
- Parasite control

DDx:
Masked heart signs
- Septicemia
- Resp. diz

Heart signs
- Endocarditis (p 81)
- Cardiac neoplasia (p 79)
- CHF (p 760
- Cardiomyopathy (p 77)

Myocardial Diz

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Vit. E - Selenium Deficiency, White muscle diz, Enzootic muscular dystrophy, Nutritional myopathy of lambs & calves Mk 547, 1198, IM 1513; C3T 689; Br 266; BM&S 431; G 343; BR-hb 537; BR 1414,1408; DC 38, 403; Pic 213 ***	• Mechanism not understood • **Selenium (Se) or Vit. E defc** (antioxidants, protect from free radicals) • PUFA (polyunsaturated fatty acids) in diet (produce free radicals) - lead to Vit. E deficiency • **Calves 2 wks to 6 mos** - Most rapidly growing • Congenital - death 2-3 ds old • Delayed type (2 wk- 6 mo) • **Cardiac & skeletal muscle** • Degeneration of myocardium - To necrosis • US & Canada Se defc soils	• **Sudden death**, handling/exercise brings on signs or death • **Dyspnea,** due to myocardial diz., pleural, pericardial & peritoneal effusions & pulmonary **edema** • **Weakness** • **Recumbent** • **Stiffness in gait** • **BAR** (bright, alert, responsive)	• CS, History (Hx) • **Vit. E, Se not supplemented** • **Postmortem** - **Pale muscles**, linear pale areas in skeletal mm., symmetrical - Myocardium, **subendocardial plaques**, lt. ventricle in calves, both ventricles in lambs • **Lab: Elev CPK** in 1000s IU/L	• **Vit. E/Se to asymptomatic** • **Vit E/Se to affected,** every 2 wk., not to exceed 4 doses - **Selenium toxicity** - follow manufacturer's suggestion **Prognosis (Px):** • Cardiac form - Grave • Skeletal mm. form - better **Prevention:** • Se orally or SQ to cows 4 wks before parturition • Se to calves & lambs at 2-4 wk of age, twice more at monthly intervals (Bo-Se® & Mu-Se®) in defc areas • Supplements in feed in defc areas (sodium selinite): **Caution: toxicity** • No PUFA, no continuous supplementation w/ cod liver oil Some myopathies respond only to Se or Vit E, some to both

Myodegeneration, 1-2 wks - 6 mos old
CS: Sudden death, Dyspnea, Weak, BAR
Dx: Defc diet • PM: Pale muscles, Elev CPK
Tx: Vit E/Se • Px: Cardiac - Grave, Muscle - Better
Prevention: Supplement in defc areas

DDx
- **Sudden death**
  - Enterotoxemia, pneumonia, toxemia
- **Cardiotoxic plants** (p 78)
  - Lasalocid, gossypol, *Cassia occidentalis*, *Phalaris* spp
- **Stiffness in gait, BAR**
  - Spinal cord compression, cerebellar diz, meningitis, polyarthritis, neurotoxins (OPs), tetanus, trauma, Clostridial myositis

Monensin/ Lasalocid toxicity **

- **See Tox pg 203**; Feed additive: Coccidostat (AB), Improves feed efficiency, Feed mixing errors, Cattle << horses
- **CS:** Dilatated cardiomyopathies (peripheral edema, jugular pulse, dyspnea, sudden death)
- **DDx:** Se/Vit E defc, Gossypol toxicity, Any diz causing hemoglobinuria
- **Dx:** Hx, CS, Lab: Hemoglobinuria
- **Tx:** Remove from source • **Px:** Poor • **Prevention:** Clean silo, Monensin will settle from bag to bag

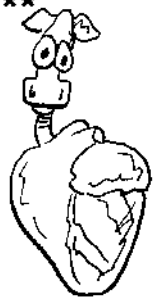
Gossypol, Cottonseed toxicity **

- **See Tox pg 227**; Cottonseed - cheap feed, contains gossypol (cardiotoxic); calves on starter rations of cottonseed meals
- **CS:** Calves - Sudden death, Dyspnea, Depression, Anorexia, Hemoglobinuria; Adults - Repro: Sterility in bulls, ↓ conception rate in cows
- **DDx:** Monensin, Lasalocid, Vit E/Se defc, Cassia poisoning
- **Dx:** Hx, CS, Feed & tissue analysis
- **Tx:** No response to any treatment • **Px:** Poor, survivors m/b chronic poor doers • **Control:** Do not feed calves < 4 mos cottonseed meal

Congenital heart defects

Mk 34, C3T 95; IM 512, 1554; BR-hb 138, 89, 633; BR 381,1634; Br 144; Pic 15

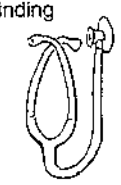
***



- **#1 - Ventricular Septal Defects (VSD)**
  - Holosystolic murmur, blood from left to right; murmur in area of AV valves. More blood in rt. ventricle so more through pulmonary trunk, resulting in a relative stenosis & systolic stenotic murmur
- **PDA (patent ductus arteriosus)**: continuous "machinery murmur" (left 3-4th ICS, shoulder level)
- **Tetralogy of Fallot** (overriding aorta, ventricular septal defect, pulmonic stenosis & hypertrophy of rt. ventricle); loud holosystolic murmur w/ palpable thrill (left 4-6th ICS)
- **Atrial septal defects (ASD)**: most commonly patent foramen ovale, common in calves, usu. asymptomatic bec. different pressures in atria cause functional closure even though its not an anatomical closure
- **Ventricular hypoplasia**: m/b present w/ other defects & usually assoc. w/ early death
- **Persistent rt. aortic arch**: forms a ring around the esophagus with the pulmonary trunk, ligamentum arteriosum & base of heart • Sequela: megaesophagus
- **Ectopic cordis cervicalis**: relatively common in cattle, heart usually in neck region, some in pectoral region or abdomen; assoc. w/ other defects • Px: Poor for productive life, but m/ live up to 1 yr
- **Eisenmenger's complex**: VSD, overriding aorta, dilated pulmonary trunk; gallop rhythm

CS:
- Poor appetite
- Reduced growth rate
- Dyspnea
- Tachycardia
- Cyanosis

Dx:
On initial exam
- Listen on both sides of animal, not just left
- M/b incidental finding
  - No CS



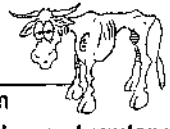
Tx:
- Slaughter if doing poorly

Lymphosarcoma cardiomyopathy, Enzootic lymphosarcoma

Mk 391; C3T 609; BM&S 638; IM 536, Br 530; BR 365; DC 40; Pic 208

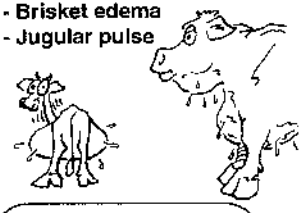
**

- **See Gen, pg 269**
- Myocardial damage (rt. atrium) also uterus, lymph nodes & abomasum
- BLV (bovine leukemia virus)
- Adult cattle
- AV valves, then whole heart
- Rt. AV (tricuspid) insufficiency



BLV - Virus, Right atrium
CS: Cardiomyopathy, Edema, Jugular pulse
Dx: Difficult
Tx: None; Cull all BLV + • **Px: Grave**

- **Dilated cardiomyopathies**
  - **Brisket edema**
  - **Jugular pulse**



DDx:
- Reticulopericarditis (p 76)
- Bact. endocarditis (p 81)
- Cu deficiency (p 89)

- **Dx difficult**
- Ultrasound
- Lymphosarcoma elsewhere
- Cardiac arrhythmias
- Leukemia in only 1/3rd of clinical cases
- Biopsy/necropsy definitive Dx
- BLV titers not diagnostic, indicate exposure
  - Negative titer rules out

- **No treatment**

Prognosis (Px:) Grave

Eradication of BLV infection is feasible
- Id & remove all BLV-positive animals

Cardiac tumors: Rare in large animals, 1° or 2° to tumors of lungs, pleura, lymph nodes or diaphragm, BLV - lymphosarcoma, thymic lymphosarcoma; No Tx, test for BLV positive animals; death expected in 6 months

Heart

CARDIOVASCULAR SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
High mountain disease, Brisket edema, High altitude diz, Pulmonary hypertensive heart disease Mk 832, IM 525; BR-hb 134, 533; BR 353, 1457; BM&S 764; DC 46, 54 ***	• **Chronic hypoxia of high altitude** - **Pulmonary vasoconstriction & hypertension** - Right ventricle overworked, chronic pressure overload - Enlarged heart, either hypertrophy or dilatation - Leads to **CHF** (congestive heart failure) • Stress initiates (cold weather) • **Moved > 6000 feet** • Calves >> adults • Genetic disposition, inline assoc. (mother to daughter), variable from animal to animal • **Locoweed** (*Oxytropis* & *Astragalus* spp) ingestion worsens diz	• **Slow onset** • **Stress** precipitates CS • 1st depressed & isolated • Right CHF - **Edema: brisket,** submandibular, ventr. abdomen & less commonly limbs, Ascites - **Jugular pulse** • Diarrhea • **Dyspnea** • Cyanotic m/b • Reluctant to move, progressive diz • **Exertion - collapse & death**	• **History (Hx), CS** • Auscultation - ↑HR, gallop rhythm - Splitting of 2nd heart sound - Rt. AV murmur (2° dilation) • **Postmortem:** - **Nutmeg liver** (congestion) - Myocardial damage	• **Reversible** if caught early & moved to low altitude • ABs - 2° pneumonia • $ Congestive heart failure, Digoxin, Diuretics $ O2 therapy - **not done** **Prognosis (Px):** • **Good, mortality < 2%** • Poor once signs of heart failure **Prevention:** • Outbreed, don't breed those that have had diz • Move to low altitude **Control:** • Keep at low altitudes

High altitudes + Stress
CS: Rt. CHF - Jugular pulse, Edema
Dx: Hx, CS, Auscultation, PM: Nutmeg liver
Tx: Move lower • Px: Good

Cor pulmonale:
• Pulmonary hypertension leading to right heart hypertrophy, dilation &/or failure

DDx:
- 1° Pulmonary diz
- Parasitic bronchitis (p 69)
- Bacterial endocarditis (p 81)
- Tricuspid insufficiency
- Cardiomyopathy (p 77)
- Lymphosarcoma (p 79)
- Traumatic pericarditis (p 76)
- Pulmonary stenosis
- Chronic pneumonia (p 62)
- 1° myocardial lesions
- Pleuritis (p 72)
- Left heart failure (p 76)

Vascular diz,

Aneurysms
Thrombosis
Embolism

IM 483; BR-hb 140; BR 365; DC 49
**

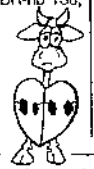
- **Aneurysm:** vascular dilation (weakening of medial coat of the vessel), pseudoaneurism (weakening of all coats), uncommon
- **Thrombosis:** clot formation in vessel that obstructs flow; **#1 Cause: Catheterization,** Trauma, venous stasis • Tx: Remove catheter & rest vessel, DMSO
- **Thrombophlebitis:** inflam. of vein assoc. w/ a thrombus
- **Embolism:** foreign material carried in bloodstream, Freq. arise from thrombus
  - **Caudal vena caval thrombosis (CVCT) & embolic pneumonia: #1 cause of bilat. epistaxis w/ hemoptysis**
- **Arteriosclerosis:** thickening of arterial wall • Cause: excessive Vit D3 from ingestion of cardiogenic plants (Solanum, Cestrum, Trisetum)

Bacterial endocarditis

Vegetative endocarditis, Endocardial Disease

Mk 49, C3T 687; IM 520; BM&S 756; Br 581, 126; BR-hb 136; BR 357; DC 42

**



- **Bacteria** - *Corynebacterium pyogenes*, Strep., Erysipelothrix, Actinomyces, *E. coli*.
  - Subclinical bacteremia
  - **Septic thrombus** - 2° to pyemia, mastitis or prostatitis
  - Iatrogenic jugular sticks
- **Vegetation on valves**, layers of fibrin, blood cells, bacteria & necrotic tissue, most commonly affect endocardium of valves
- Determine if during systole (AV valves) or diastole (semilunar valves)

- Weight loss, hypophagia
- ↓ Milk production
- **CHF signs**
  - **Edema**, ascites, milk vein distention
  - **Systolic jugular pulse**
- Intermittent fever
- 2° organ systems
  - Pyelonephritis
  - Pneumonia (adventitial sounds, ↓ bronchial tones)

- History, CS
- **Systolic murmur - Rt. AV**
- **Ultrasound**
- Positive blood culture
- Lab:
  - Leukocytosis
  - Positive blood culture
- Postmortem:
  - **Vegetation on valves**

DDx:
- Endocarditis of other causes
- Degeneration of valves
- Viral
- Inflammation
- Trauma
- Rupture of rt. chordae tendinae
- Brisket edema (p 80)
- Cardiomyopathies (p 77)

- **Salvage**
- $ Expensive pregnant cows
  - AB (antibiotic) empirical* (penicillin)
  - Long term treatment - mos. ($)
  - Fibrous tissue of vegetation m/ protect bacteria from ABs
  - Chronic poor doers
  - Drug residue in body & milk

Prognosis:
- **Grave**

* Empirical: from your vast experience

Vegetation on valves, stops the valves from completely closing, blood backs up through the valves - murmur of insufficiency [leaky]. **Cattle: right AV valve** most common, blood backs into rt. atrium; Other species: aortic or lt. AV (bicuspid) valve

Septic thrombus, Iatrogenic
CS: CHF - Edema, Jugular pulse
Dx: CS, Murmur, US, Culture, Vegetation
Tx: Salvage • Px: Grave

Atrial fibrillation

Mk 45, C3T 689; IM 541; BM&S 759; BR-hb 129; BR 347; DC 47

*

- **Assoc. w/ GI diz** 75 - 95% of the time
  - Also foot rot & pneumonia
- **Usually no underlying heart diz** (If underlying heart diz - Px worse)
- Atriocardial diz
- Autonomic imbalance
- Rapid, uncoordinated atrial contractions, resulting in insufficient filling of ventricles

- **GI diz**
- Anorexia
- ↓ Milk production

Quinidine sulfate IV (not oral, diluted in saline or LR) until conversion
- IV fluids in other jugular vein simultaneously
- Side effects during administration
  - Diarrhea & depression, continue treatment
- Monitored with ECG while admin.
- If do not convert, grave Px

- **Underlying GI diz**
- **Auscultation:**
  - Rapid & disorganized heart sounds
- **ECG:**
  - **F (fibrillation) waves replace** P waves
  - Irregular P-R interval
  - QRS irregularly spaced
- Underlying electrolyte abnormalities
  - Metabolic alkalosis, hypochloride, etc.

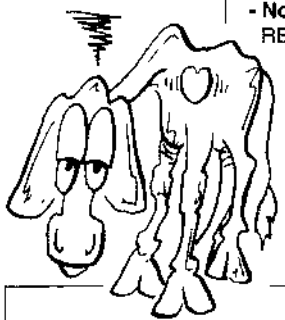
- **Tx underlying GI diz**
  - **Correct electrolyte imbalance**
  - **Tachycardia should resolve**
- If fibrillations continue after 5 days:
  - **Quinidine sulfate IV** (see box)
- If high heart rates (>120 per min, rare)
  - **Digoxin** to lower heart rate
  - Then quinidine

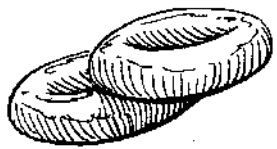
Prognosis:
- **Good** if not underlying heart diz or chronic GI diz
- Grave if no conversion

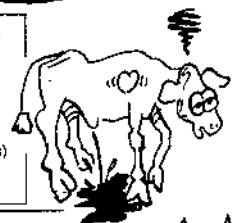
Assoc. w/ GI diz, Heart OK
CS: GI diz, Anorexia, ↓ Milk production
Dx: GI diz, Rapid HR, F waves, No P waves
Tx: Tx GI - Resolves

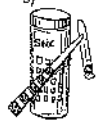
Anemia

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Anemia IM 423; 372; C3T 693; C2T 699; BR-hb 148; BR 384; DC 54; S-O 679 ★★★	• ↓ **O_2-carrying capacity of blood** • Pathophysiology of causes **1. Blood loss** **2. Hemolysis** (incr. RBC destruction) **3. Inadequate erythrocyte** production (bone marrow) • Types - **Regenerative anemias** . Blood loss or hemolysis - bone marrow responds by incr. erythropoiesis - **Nonregenerative** - inadequate RBC prod., bone marrow problem	**CS due to inadequate O_2 to body tissue** • ↑ HR (tachycardia) • ↑ RR (tachypnea) • **Exercise intolerance** (tiring) • Depression • Pale mucous membranes	• **History** (Hx): **diet** & access to pasture - Other herd members affected or systemically ill - Immune status & exposure • **PE** (physical exam): - Color of mucous membr. (icterus is rare in cattle, except in assoc. w/ hemolysis) - Fever: m/b sign of hemolysis or systemic diz - Hemoglobinuria caused by most hemolytic anemias, except anaplasmosis - Onion breath • **CBC:** - **PCV reduced < 24%** - **Regenerative signs: blood loss or hemolysis** w/ normal bone marrow . Basophilic stippling, anisocytosis, polychromasia, Howell-Jolly bodies, nucleated RBCs - **Nonregenerative signs: abnormal bone marrow**, acute blood loss or acute hemolysis < 4 days - **↑ Hb, MCH &/or MCHC w/ low PCV: intravascular hemolysis** - **Basophilic stippling w/o other regen. signs: lead poisoning** - **Heinz bodies**: onions or Brassica plants, postparturient hemoglobinuria - **Agglutination** suggests immune-mediated anemia . **Coombs' test**, dilution test, RBC fragility test • **Plasma protein changes:** - Hypoproteinemia + anemia => blood loss - Hyperproteinemia, hyperglobulinemia &/or hyperfibrinogen = chronic inflam. diz • **Urine analysis (dipstick) for occult blood:** - If positive do sedimentation exam to rule out hematuria - Hemoglobin assoc w/ pink plasma + occult blood w/o urinary sedimentary abnormalities - Myoglobinuria (myopathy) assoc w/ clear plasma + RBCs • **Occult blood in feces:** - Melena: GI blood loss (gastric ulcers) • **Bone marrow analysis:** necessary if no peripheral signs of regeneration	Treat underlying cause









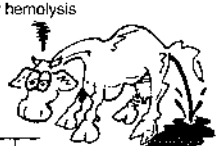
• MCV (mean corpuscular volume): reflects the size of RBCs

$$MCV\ (fl) = \frac{PCV \times 10}{RBC\ count\ (millions/\mu l)}$$

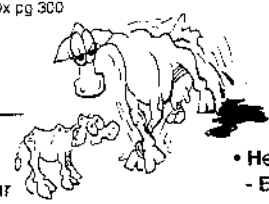
- ↑ MCV indicates regen. anemia (immature RBCs larger than mature RBCs)
- ↓ MCV (microcytosis) indicates iron deficiency

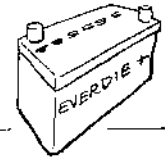
Anemia - PCV < 24%

- **Nonregenerative**
  - Chronic diz
  - Acute blood loss or hemolysis
  - Abnormal bone marrow
- **Regenerative**
  - Basophilic stippling, nRBCs
  - Normal blood marrow
  - **Blood loss**
    - ↓ Protein
    - Normal bilirubin
  - **Hemolysis**
    - Protein norm. or incr.
    - ↑ Bilirubin/icterus
    - **Intrav. hemolysis**
      - Hemoglobinuria
      - Hemoglobinemia
    - **Extrav. hemolysis**
      - Normal urine



DDx - Anemia (IM 477; CST 695, 696) • See DDx pg 300



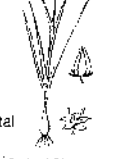


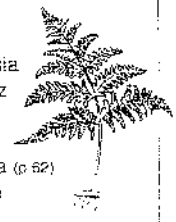
REGENERATIVE ANEMIA

- **Blood loss**
  - Trauma/Sx
  - Parasites (p 55)
    - . Intestinal (p 55)
    - . External - ticks & lice (p 180)
  - Abomasal ulcers (p 31)
  - DIC (p 85)
  - Moldy sweet clover toxicity (p 229)
  - Severe pyelonephritis
  - Pulmonary abscess
  - Hematuria
  - Vascular neoplasia

- **Hemolysis**
  - **Intravascular**
    - . Bacteria
      - .. Leptospirosis
      - .. *Clostridium hemolyticum*
      - .. *Clostridium perfringens* type A
    - . Bacillary hemoglobinuria (p 90)
    - . Babesiosis (RBC parasite)
    - . Onion toxicosis (p 89)
    - . Chronic copper toxicosis (p 88)
    - . Plants
      - .. Brassica/Cruciferous (p 89)
      - .. Rye grass
      - .. Castor bean
      - .. Onion (p 89)
    - . Intrinsic RBC defects (congenital erythropoietic porphyria)
    - . Postparturient hemoglobinuria (p 88)

- **Hemolysis**
  - **Extravascular**
    - . Anaplasmosis (p 92)
    - . Immune-mediated
      - .. Drug-induced
      - .. Autoimmune hemolytic anemia (p 92)
- Plants can cause intra- & extravascular hemolysis
- Intrinsic RBC defects

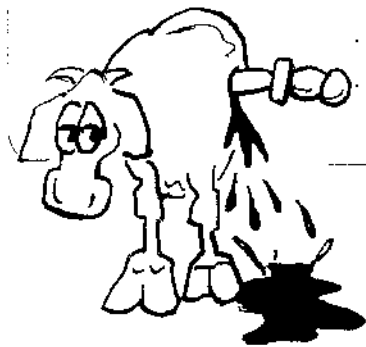


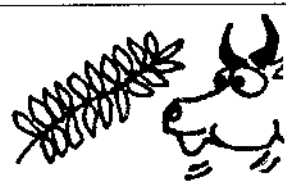


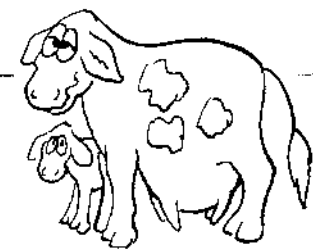
NONREGENERATIVE ANEMIA

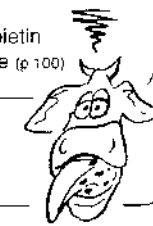
(Inadequate RBC production)

- Nuclear maturation arrests
  - . Vit B12 defc/Cobalt defc/Folic acid defc
- Hemoglobin synthesis disorders
  - . Iron defc
  - . Copper defc (p 89)
  - . Molybdenum toxicity (p 89)
  - . Lead toxicity (p 202)
  - . Pyridoxine defc
- RBC hypoplasia/aplasia
  - . Anemia of chronic diz
    - .. Liver abscess (p 36)
    - .. Johne's diz (p 23)
    - .. Chronic pneumonia (p 62)
    - .. Chronic BVD (p 253)
    - .. Chronic abscess
  - . Lymphosarcoma
  - . Bone marrow damage
    - .. Bracken fern toxicity (p 228)
    - .. Radiation toxicosis
  - . Inadequate erythropoietin
    - .. Chronic renal failure (p 100)









Blood Loss Anemia

CARDIOVASCULAR SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Hemorrhage IM 1198, C3T 638; C2T 701; Br 125; BR-hb 144; BR 374; DC 54 ***	• **Trauma** - Laceration - Splenic vessel rupture - Coronary vessel rupture - Reticulopericarditis • **Surgery** - Castration - Dehorning **Trauma or Surgery** **CS: Hypovolemic shock** **Dx: Anemia/No icterus** **Tx: Fluids**	• Sudden death • External hemorrhage • Occult w/ internal bleeding • Acute massive loss = **hypovolemic shock** - ↑ HR & RR - Cold extremities - Muscle weakness - Cardiovascular collapse • No icterus **DDx:** • Anthrax (p 247) • Peracute salmonellosis (p 256) • Acute babesiosis (p 91) • Acute bracken fern tox. (p 228, 86)	• CS of hemorrhage • **Anemia & hypoproteinemia** • Abd. & thoracic taps (for internal) • Bone marrow responds in 5 days • Lab - Acutely PCV & TP normal (declines in 24 hr due to mobilization of extracellular fluid to maintain volume) - Regenerative anemia (polychromasia, basophilic stippling, Howell-Jolly bodies)	• **Stop hemorrhage** - Ext.: suture or pressure bandages - Internal: rn/ not attempt if poor surgical risk (cause often not found) • **Tx hypovolemic shock** ($) - Fluids IV 40-80 ml/kg Na containing crystalloid sol. (even though dilutes PCV) - Give more than blood loss bec. distributes to intracellular space - PCV < 12% consider whole blood transfusions (only temporary, See Gen) - Hypertonic saline + dexamethasone
Enzootic hematuria, **Bracken fern poisoning** Mk 1641; IM 989; BR-hb 596; BR 1561; Br 620, 127; C3T 350; BM&S 839; DC 55, 363 **Cause: ? Bracken fern > 4 yrs old** **CS: Hematuria/Anemia** **Dx: Rectal, Cauliflower bladder tumors** **Tx: Salvage • Px: Poor**	• Cause: unknown - **Bracken fern areas** • > 4 yrs of age • Hemangiomatous tumors in the **bladder wall** (cauliflower-like)	• **Acute:** - **Blood clots in urine** - Hemorrhagic anemia, weak, pale muscles - Die from blood loss 1-2 wks • **Subacute or chronic:** - Anemia late in dz (bone marrow) - **Bladder tumors** (wartlike) - ²2 cystitis	• History (Hx) (Bracken fern area); CS • Rectal - Bladder thickening • **Intermittent hematuria** - Hemoglobinuria • **Postmortem** - **Acute:** . Hemorrhagic bladder mucosa - **Chronic:** . **Tumors** pedunculated into lumen . Bladder wall fibrotic & thickened **DDx:** • Cystitis (p 95) • Pyelonephritis (p 98) • Urolithiasis (p 96)	• **Salvage early** **Prognosis:** **Poor - Salvage** **Prevention:** • Clear bracken fern ($), dz disappears

Bleeding disorder of Simmental cattle: Rare; Prolonged episodes of bleeding, Spontaneous epistaxis, Superficial hematomas

Disorders of hemostasis (IM 1202; C3T 698; BR 370)

- Acquired: hepatic failure, rodenticides (dicoumerol), moldy sweet clover poisoning, DIC • Dx: ↑ PTT & PT times
- Congenital: hereditary defc - coagulation factor VIII (Hereford cattle), factor XI (Holstein cattle) • Dx: ↑ PTT time

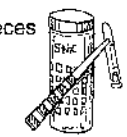
DIC,
Disseminated intravascular coagulation,
Consumptive coagulopathy,
intravascular coagulation fibrinolysis
Mk 24; C3T 698; IM 1207; BR-hb 144; BR 372; Br 563; DC 60
***

- **Never a 1° disease entity**
  - **Dizs causing vasculitis activate platelets & clotting mechanism**
  - Septic processes (salmonellosis, metritis)
  - Neoplasia
  - **Acute GI disorders** (strangulation, acute enteritis, protein losing enteropathy, emboli)
  - **Hemolytic uremic syndrome**
  - Hemolytic anemia
- Spectrum from diffuse thrombosis to ischemic organ failure to severe hemorrhagic diathesis
  - RBCs are damaged passing through damaged arterioles & removed by endoreticular system
  - Peracute diz in Gr. Britain: *Pasteurella multocida*, CS: Septicemia & high mortality
  - USA probably free

- Variable - dep. on 1° diz
- **Rarely overt hemorrhage**
- **Thrombosis & ischemic organ failure**
- **CNS - microvascular thrombosis**
  - Delirium, convulsions, coma
- **Petechial or ecchymotic hemorrhages** (depletion of clotting factors)
  - Life threatening hemorrhage very rare

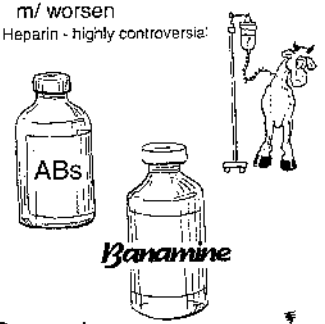
- Sequelae:
  - **Renal failure** - common
  - Oliguria, azotemia (excess urea or other nitrogenous bodies in blood, BUN)
  - Depression & ileus

- Systemic CS
- Lab:
  - **No test for definitive Dx,** Findings often NOT helpful
  - Strongly suggestive
    - **Thrombocytopenia**
    - **< 100,000/ml platelets suspect DIC**
  - Mild to moderate prolongation of PT &/ or APTT time
  - Occult blood in feces



DDx:
- **Septicemia**
- Warfarin toxicosis (pg 214)
- Moldy sweet clover toxicosis (pg 229)
- Inherited coagulation abnormalities

- **Treat 1° disorder**
- **Supportive Tx to combat shock & maintain tissue perfusion**
  - IV fluids
  - ABs for septic conditions
  - Banamine® (flunixin meglumine) (IV, q8h) for endotoxins
  - Corticosteroids not indicated, m/ worsen
- Heparin - highly controversial



Prognosis
- Poor if doesn't coagulate
- Depends on underlying diz

2° Entity; Activated platelets & Clotting
CS: Thrombosis/Organ failure - CNS
Dx: Difficult, Platelets < 100,000
Tx: Tx 1° cause, Supportive

Thrombocytopenia
Mk 56, 428; C3T 698; IM 1204; BR-hb 150; BR 372

- **Platelet count < 100,000**
  - **Premature cell destruction or**
  - **Impaired production**
    - Causes
      - Sepsis due to DIC
      - Immune-mediated drug reaction
      - Neoplasia
      - Isoimmunization of newborn calves
      - Bracken fern poisoning

CS: Bleeding
Dx: Platelets < 100,000
Tx: Steroids

- Vary w/ underling diz process
- **Hemorrhagic diathesis**
  - Petechial hemorrhages
  - Oral, ocular, nasal mucosa
  - Epistaxis
  - Prolonged bleeding from wounds or injection sites
  - Hematoma formation w/ trauma (< 40,000 µl)

- History, CS - Rule out DIC
- Lab
  - **Thrombocytopenia** (< 100,000 platelets)
  - **Prolonged bleeding time & abnormal clot retraction**
  - **No effect on clotting time or plasma fibrinogen**
- Response to Tx supports Dx

- **Unexplained case**
  - **Stop all drugs**, if Rx necessary replace w/ most dissimilar Rx
  - **Steroids: Dexamethasone,** Prednisolone
- Blood transfusion

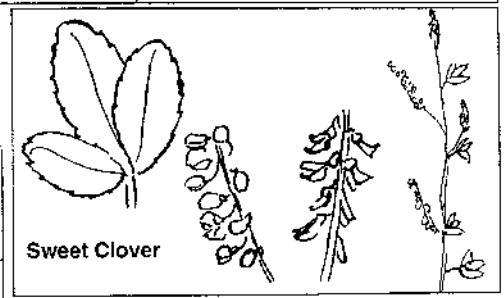
< 100,000 platelets

Hemorrhage — CARDIOVASCULAR SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment - Prognosis

Moldy sweet clover & Anticoagulants (Warfarin, coumarins)

- **See Tox pg 229, 214**
- **CS:** Hemorrhagic diathesis
- **Dx:** Hx (exposure), Hemorrhages, Prolonged PT, Anemia, Hypoproteinemia
- **Tx: Remove source**, Remove plants, **Vit. K1**, Fresh plasma, Whole blood transfusion



Abdominal ulcers ***

- **See GI pg 31**; Stress, Feed, Lymphosarcoma
- CS: Variable (Abdomenal pain, Melena, Peritonitis)
- Dx: Fecal occult blood, Anemia, Exploratory
- Tx: Salvage, Tx ulcers (Fluids, ABs, Antacids, Sx)

NONREGENERATIVE ANEMIAS

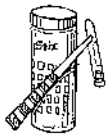
Bracken Fern toxicosis

- **See Tox, pg 228**
- *Pteridium*
- **Not very common**
- Western USA
- **Chronic ingestion of plant** (must ingest large amounts for 2-3 weeks or longer, cumulative)
- Bone marrow aplasia
  - **Pancytopenia** (complete bone marrow depression, all precursors destroyed)
  - **Clotting abnormality**

Bone marrow damage, Pancytopenia
CS: Bleeding
Dx: "No platelets" < 40,000
Tx: None, Batyl alcohol • Px: Grave - Die

- **Hemorrhagic syndrome** due to **platelet loss**
  - Bleeding from body orifices & into body cavities
  - Melena (lost of blood in feces)
  - Epistaxis
  - Mucosal petecchiation
  - Hematuria
  - Hyphema (blood in anterior eye)
  - Blood from med. canthus
- Temperature elevation
- **Chronic infec.** of multiple systems due to no WBCs
  - Bacteremia
- **Death 1-3 days after CS**

- **History** (bracken fern area), CS
- Lab
  - **Platelet < 40,000**/ml (200,000 norm.)
  - **Profound leukopenia (neutropenia)**
  - **Nonregenerative anemia** less severe than thrombocytopenia due to longer half life of RBC



DDx:
- Leptospirosis (p 257)
- Anaplasmosis (p 92)
- Bacillary hemoglobinuria (p 90)
- *Crotalaria* spp
- Sweet clover (p 229)
- Warfarin poisoning (p 214)

- **Usually too late**
- **Batyl alcohol** as a bone marrow stimulant, but rarely works

Prognosis:
- **Grave** - platelets < 50,000, WBCs < 2000/µl usually die

Prevention:
- **Remove bracken fern**

Iron defc anemia

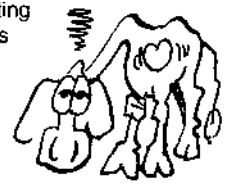
C3T 700; IM 1232; BR-hb 148; BR 385

- **Commonly assoc w/ chronic blood loss:** parasitism, bleeding ulcers, GI lesions or hemostatic defects, modest anemia in veal calves raised on milk diets, otherwise dietary defc seldom causes, even in neonates
- **CS:** often asymptomatic because adapt to slowly progressing anemia, cows m/ stand & graze w/ hematocrit of 5%
- **Dx:** PCV < 24%, microcytic, hypochromic anemia
- **Tx:** correct chronic blood loss; iron oral supplementation or feed additives

Chronic inflam. diz

C3T 695; IM 1233; BR 385; DC 55

- Cause: chronic internal or cutan. infec., immune-mediated processes resulting in chronic inflam., active malignant neoplasia, traumatic injuries or fractures
- Pathogenesis: sequestration of iron in liver & bone
- **CS & Dx:** CS of 1° diz, Mild to moderate nonregenerative anemia
- **Tx:** Tx primary disease process



DDx

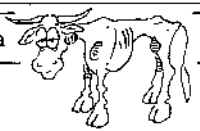
- Liver abscess (p 36)
- Chronic abscess
- Chronic BVD (p 253)
- Johne's diz (p 23)
- Chronic pneumonia (p 62)
- Chronic renal diz
- Bracken fern toxicosis (p 228)
- Neoplasia (p 268)

Internal parasites (IM 1234) • Trichostrongylus, due to bone marrow suppression

Leptospirosis (DC 55) • **See Gen pg 257**

Lymphosarcoma

- **See Gen pg 269:** Anemia m/b present w/ GI hemorrhage (microcytic, hypochromic), nonregenerative anemia



2° to Organ dysfunction

(DC 55)

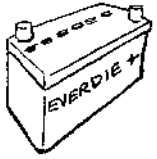
- Nonregenerative anemia (mild to moderate); chronic endocrine, hepatic, renal or GI diz

Cobalt/Vit B12 defc (Folic acid)

C3T 701; IM 1233, 908; BR-hb 149, 527; BR 385, 1374; Br 261; DC 509t; GI 791

- Cobalt needed for Vit B_{12}, Ruminants meet Vit B_{12} needs if sufficient Co; Deficiency = inefficient metabolism of propionate
- **CS:** Nonspecific: Decr growth, Weight loss, Unthrifty, Pale mucous membranes, Diarrhea, Lacrimation, Anorexia
- **Dx:** Hx, CS, Anemia (normocytic normochromic), FIGLU (formiminoglutamic acid) level in urine (0.08-0.2 µmol/ml) metabolite
- **Tx:** Vit B_{12} injection (2-3000 µg weekly)
- **Prevention:** Salt mineral mixes, top dressing of pasture, rumen pellets

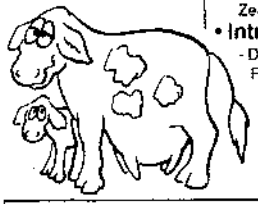
Lead toxicity



- **See NS pg 152,** Cattle indiscriminate eaters (crankase oil), interferes w/ heme synthesis (-SH enzymes) shortened RBC lifespan, cerebellar edema
- **CS:** CNS (bellowing, blind, maniacal, convulsions, ataxia), GI
- **Dx:** > 0.3 ppm in blood, nonregenerative anemia
- **Tx:** EDTA, Thiamine, Supportive, Rumenotomy

Hemolytic Anemia

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Post-parturient hemoglobinuria **"Red water diz"** Mk 455, C3T 323; IM 1229; BR-hb 148, 524, 542; BR 1362, 1428; DC 55 **	• **Uncommon**, 1-2 cows in a herd, minor economic losses • **High producing dairy cattle - < 6 wks after calving** • Cause unknown, predisposing factors: - **#1 Hypophosphatemia** . Low intake in low phosphate soils after a drought - lush pastures, housed cows in summer on pasture or winter for pasture cows . Phosphorus drainage into milk at early lactation - Eating hemolytic agents - turnips & beet pulp or cruciferous plants (rape & kale), m/not relate to parturition (see below) - Copper defc from molybdenum fertilizer (New Zealand) (see below) • **Intravascular hemolysis**, low P - Depressed glycolysis & ATP + incr. fragility to RBCs (spherical - rupture)	• **Acute** 3-5 ds - death • Weakness & staggering • ↓ Milk production • **Red-brown to black urine** • Inappetant m/b • Dehydrated • Pale mucous membranes, anemia • ↑ HR/RR, afebrile usually • Photosensitization, gangrene, sloughing of teats, tail, digits, diarrhea occasionally • Pica, osteomalacia, lameness, predisposition to botulism, GI obstruction m/b • **Icterus** if lives long enough • Survivors - slow recovery 3-6 wks **DDx:** • Chronic Cu toxicity (p 88) • Acute Leptospirosis (1° seen in calves, rare) (p 257) • Bacillary hemoglobinuria (p 90) • RBC parasites (anaplasmosis & babesia) (p 92) • Rape & kale toxicity (p 233) • Monensin toxicity (p 78) • Blood transfusion reaction • Blue green algae (p 237) • Pithomyces toxicity • Toxic drugs (phenothiazine, methylene blue) • Bracken fern toxicity (p 228) • Urolithiasis	• **History, CS - hemolysis** • **Lab:** - **Regenerative anemia** (if survives) . Basophilic stippling, Heinz bodies, Nucleated RBCs, anisocytosis & polychromasia - **Hemoglobinemia** (< 8 g/dl) - **Hemoglobinuria** (differentiate from myoglobinuria) (Labstix®), absence of RBCs in urine confirms - Low blood P **(hypophosphatemia)** (< 1 mg/dl, norm. 4-7) - Nonfatal cases - ketosis • **Postmortem:** - Icteric carcass - Pale, swollen liver, centrilobular necrosis - Hemoglobinuric nephrosis Discolored urine in bladder	• **Supportive, cause unknown** • IV fluids (add glucose) • Blood transfusions • Remove predisposing factors • **Phosphorus** IV & SQ 60 g Na acidic phosphate in 300 ml of sterile saline, also drench w/ 30 g Na phosphate or 150 g of bone meal or feed 100 g/d of dicalcium phosphate (DCP) • **Bone meal in feed** • Methylene blue IV (antioxidant) • Steroids (20 mg Dexamethasone IM) • Oral ketosis Tx • Copper glycinate SQ (copper defc areas) • Remove cruciform plants, feed quality hay • Severely affected don't respond • Marginally affected & eating - bonemeal over long period of time **Prevention:** • Nutrient analysis of feedstuff (P, Cu, Se) • **P supplementation** in defc. areas - Bone meal or Na acid phosphate or DCP or bone meal licks • Copper glycinate SQ mo before parturition or 20 g oxidized wire needles in copper defc areas • Limit cruciferous plants < 1.5 kg/d & restrict turnip & beet pulp in 1st 2 months of lactation



P

P defc, Hi prod. dairy after calving, Hemolysis
CS: Anemia, Red urine, Icterus, Death - 5 days
Dx: Hx, CS, Regen. anemia, Hemoglobinuria, PM
Tx: Phosphorus

Copper toxicity
*

- **See Tox pg 203**; Rare in cattle; 1° of sheep; Chronic copper over time, massive amounts of copper from liver (stress?) = Severe intravascular hemolysis
- **CS:** Acute intravascular hemolysis - Icterus, Dark urine, Excessive thirst, Weak, Incr. HR, RR, Painful back (nephrosis)
- **Dx:** PM gunmetal kidneys, Hx, CS, Red plasma, Hb-/methemoglobinuria, Heinz bodies in RBCs, Blood & kidney levels of Cu.
- **Tx:** Most die if CS, Tx intensive, Best Tx is prevention (correct Mo/Cu ratio in diet)
- **Px:** Grave, despite therapy. Usually not treated

Copper defc, Molybdenum toxicity ***

Hypocuprosis, SMCO poisoning

Mk 1197; C3& 397, 324; IM 904, 1232; BR-hb 148, 528, 566; BR 1493, 1379; Br 263, 218; BM&S 526; DC 250, 508t; L410; Pic 31

- Copper - important for Hb (hemoglobin) & osteoblasts
- 1° Deficiency - low dietary
  - Milk low in Cu
- **2° Assoc w/ excess molybdenum**, Zn, iron or Sulfate
- S methyl-L-cystein sulfoxide
- **Calves** > adult; Cattle > sheep

1° Cu defc, 2° Molybdenum/Sulfate excess
CS: Poor growth, Anemia, Loss of hair color
Tx: Copper injection

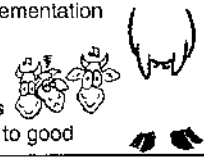
- **Poor weight gain**
- **Pale mucous membranes**
- Bone fragility (spontaneous fxs)
- Watery diarrhea
- Myocardial fibrosis
- **Physitis** enlarged ends to leg bones
- **Loss of hair color** (cattle)
- Congenital rickets
- Swayback or enzootic ataxia (lambs)
- CNS - demyelination - incoordination, blindness & death

- CS, History

DDx:
- **Poor wt. gain**
  - Parasitism (p 54)
  - Trace mineral defc (Se, Cobalt)
  - Nutritional (p 78)
  - Johne's disease (p 23)
- **Anemia**
  - Vit E/Se deficiency (p 78)
  - Ingestion (Lasalocid, gossypol, *Cassia occidentalis*, Phalaris spp.)
- Lympho- or fibrosarcoma (p 268)

- **Copper** (injectable or dietary)
  - 1 injection for 1° defc
  - Repeat inject. 2° defc every 4-6 wks
- Cu toxicity
  - Sheep more susceptible

Prevention
- Cu supplementation



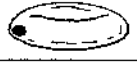
Prognosis
- Guarded to good

Heinz body hemolytic anemia,

Toxigenic hemolytic anemia, Kale, Beet pulp, Rye grass, Onion toxicity

C3T 323, 350; IM 1227, 1888; Br 613; P 278; Br-hb 148; BR 1566; DC 55; Tox 397

**

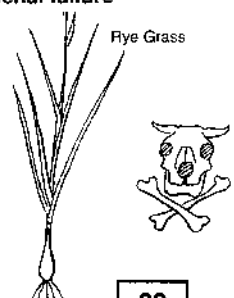


- **Oxidizing agents**
  - Plants:
    - . Wild or domestic **onions**
    - . Brassica family/cruciferous plants (turnips, rape, kale)
    - . Rye grass (*Secale cereale*)
    - . Selenium defc pastures in Florida
  - Copper defc (see above) N. Zealand
  - Phenothiazine (dewormer rarely used), methylene blue
  - Hypophosphatemia (see above)
- **Heinz bodies** formed by oxidative denaturing of hemoglobin in RBC (prot. clumps in RBCs)
- **Spleen removes** RBCs (reticuloendothelial system) - RBCs w/ Heinz bodies less deformable, oxidized & broken down (extravasc. hemolysis)
  - . Also change tonicity - intravascular hemolysis

Oxidative denaturing of Hb, Plants
CS: Pale, No fever, Weakness
Dx: Anemia, Heinz bodies, Hemoglobinemia
Tx: Remove plant, Support
Px: Good if mild, Poor if renal damage

- Weakness, depression
- Anorexia
- **Icterus** variable
- **Pale** mucous membranes
- **No fever**
- ↑ HR & RR
- Death losses can occur

- **Sequelae:**
  - **Hemoglobin nephrosis**
  - **Renal failure**



- **CS**
- **History of exposure** (Dx of leaves)

- Lab:
  - **Anemia** (varying degrees)
  - **Heinz bodies** (round to oval to serrated refractile granules)
    - . Located near cell margin, or protruding
    - . Crystal violet or new methylene blue stains to unfixed blood smears
  - Regenerative changes in few ds
  - **Coombs' negative**
  - **Hemoglobinemia & hemoglobinuria** (if profound RBC destruction)
  - ↑ Serum bilirubin (indirect)
  - **↑ BUN & creatinine**, modest to marked (reflects risk of hemoglobin nephrosis)
- Postmortem: Pulmonary edema, splenomegaly, hepatomegaly

DDx:
- See DDx for postparturient hemoglobinuria above

- **Remove source of toxicity**
- **Supportive:**
  - Blood transfusion if PCV < 10-12%
- **IV fluid** if evidence of renal damage
- Laxative (mineral oil) to empty GI of toxins

Prognosis
- Good if modest anemia
- Poor if renal damage (but can be saved)

Hemolytic Anemia

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Bacillary hemoglobinuria **"Red water diz"** Mk 323, C3T 571; IM 1223; BM&S 235; Br 553; BR-hb 290; BR 723; DC 55, 472; GI 934; Pa 97 *	• Sporadic • **Focal hepatic necrosis due to anaerobic hypoxic environment** - Migrating immature **flukes (*Fasciolas hepatica*)** - Tapeworm larval migration - High nitrate diet - Liver abscesses - Iatrogenic (liver biopsies) • ***Clostridium hemolyticum*** (*Cl. novyi* type D) in feces, water, soil & decomposing carcasses, ingest spores at pasture - Spore in anaerobiosis of liver to vegetative form & release - **Exotoxins** (beta lecithinase) . **Intravascular hemolysis** . Causes endothelial damage of arterioles = blood into all cavities of body • Western USA • Less common in sheep • **Summer & Autumn**, fluke season • Irrigated & poorly drained pastures	• **Found dead** • **Anemia, severe** • **"Port wine" urine** • Icterus • Acutely toxemic - Severely depressed & anorexic, ↓ milk production • Pain: arched back, "tucked up" abd., must be forced to move, grunting • Brisket edema • Hi temp., then subnormal temp. • Acute anoxia, decr. oxygen carrying capacity of RBCs - Tachycardia & tachypnea • **Course rapid**, 1/2 - 4 days • **Die due to hypoxia & toxemia**	• **Port wine-colored urine**, foams on agitation • **Lab:** - **Anemia,** PCV < 24%, Low # RBCs & Hgb, Discolored plasma - **Culture *Cl. hemolyticum*** - **Hemoglobinuria w/ no RBCs** • **Postmortem** - **"Anemic" liver infarcts** pathognomonic (pale elevations surrounded by reddish zone of congestion) - **Rapid rigor mortis** - **Blood in cavities** (thorax & abd) - SQ hemorrhages - Blood thin & clots slowly (no clotting factors - not DIC) - Bladder/dark urine - Kidneys dark & friable w/ hemorrhage - Spleen normal size - **Grossly adult liver flukes in bile ducts**	• **Emergency: very, very early** • **ABs** - penicillin or broad spectrum • **IV fluids** • Blood transfusions, well warranted($) • Part of herd not showing CS respond to Tx • Antitoxins, hyperimmune serum **Prognosis** • **Grave > 95% die w/o Tx**

Liver necrosis (flukes) + Clostridium = Diz
CS: Dead, Anemia, "Port wine" urine
Dx: Hx, CS, "Anemic" liver infarcts
Tx: Emerg. antitoxin, ABs, Fluids • Px: 95% die
Prevention: Vaccine, Flukacides, Fencing

DDx:
- Acute leptospirosis - 1° in calves (p 257)
- Toxicities (chronic Cu toxicity: sheep, goats & calves)
- Bracken fern toxicosis (p 228)
- Rape & kale intoxication (p 231)
- Post parturient hemoglobinuria (p 88)
- Anaplasmosis (spleen enlarged) (p 91) & Babesiosis (p 92)
- Anthrax (spleen enlarged) (p 247)

Control:
- **Fence** off highly irrigated, poorly drained pastures
- **Anthelmintics** (flukes) - Clorsolon® & Alfendazole®
- **Bury or burn carcass** to eliminate conc. of *Cl. hemolyticum*
- **Vaccination** - inactivated bacterin (immunity for 6 months)
  - 6 mos. booster in 3 wks, booster in 6 mo (hi risk area); 1 yr (low risk)
  - Does not affect toxin, not an antitoxin
  - Usually contained within a multi-Clostridia vaccine
- Geographic
  - Administer 4-6 wks prior to liver fluke season
  - If fluke present longer, vaccinate every 6 months
  - Goal to decr. number of organisms, can't eliminate

Hemolytic diz of newborn calves, Neonatal isoerythrolysis

Mk 21; IM 1867; C1T 857; BR-hb 149, 622; BR 384, 1612

★

- Rare
- Isoimmune hemolytic anemia
  - **Blood derived vaccines** for anaplasmosis may contain RBC antigens given to dam, antibodies made
  - Bull w/ same antigens m/ pass to calf
  - **Antibodies in colostrum destroy calf's RBCs**
- Owners often revaccinate dam if see red urine from calves, exacerbating problem

- **Calves normal at birth**
- **CS 24-36 hours after suckle** (colostrum)
  - Variable - mild to peracute
  - Depression, weakness
  - **Pale mucous membranes**
  - **Icterus** mild to mod. 1-2 days
  - **↑HR, RR** due to anemia
  - **Red urine**
  - Dyspnea (hypoxia)
- Peracute - die in 24 hours
- Mild - nonfatal anemia

- **History: dam vaccinated & anemic calf**
- **Anemia**
  - PCV 7% peracute, 18% in mild cases
- **+ Coombs' test**
- **Lytic &/or agglutination tests**
  Dam's milk agglutinates calf's RBCs & causes hemolysis if complement added
- Postmortem
  - Pale &/or icteric, splenomegaly
  - Pulmonary edema

- **Minimize stress**
- **Confine** (↓ exercise)
- **Transfusions if severe** anemia (PCV < 15%) not usually done
- Corticosteroids
- ABs m/ help

Prognosis:
- Varies
- Grave: peracute

Prevention
- Check vaccinated dam's titer against bull's RBCs
  - Use colostrum from another cow w/out a titer for 24-48 hrs

Blood-derived vaccines - Colostrum
CS: Anemic CS, Icterus
Dx: Hx of vaccine, Pos. Coombs' test
Tx: Minimize stress, Confine, Steroids

Trypanosomiasis ★

IM 1222; Br 736

- Flagellated protozoan causing serious diz throughout world, *T. theileri (americanum)* only one in N. America & chiefly of academic interest, m/b seen in blood smear
  Usually not pathogenic (rarely fever, depression & ↓ milk production)

Pink tooth, Erythropoietic porphyria ★

IM 1231; Br 153; DC 56; Pic 16; Derm 81

- **Rare** congenital disorder of hemoglobin production (1° in Holstein cattle), lack enzymes resulting in pigments that deposit in teeth & bone, Hemolysis
- **CS:** Slow growth rates, photosensitization, exfoliation of nonpigmented skin, reddish-brown teeth, modest anemia
- **Dx:** Pink fluorescence under UV light, brownish-red urine
- **Tx:** None, house indoors, out of sunlight, genetic counselling

Babesiosis, Pyroplasmosis, Tick Fever, Texas Fever, Red Water

Mk 69, IM 1217, 1049; C3T 584; Br-hb 451; BR 1171; Br 726; DC 55, 476

★

- **No new cases in USA since tick eradication program**
- **Protozoa:** *Babesia bigemina & B. bovis*
- **Tick, *Boophilus* spp.**
  - M/ also carry *Anaplasmosis marginale*
  - Combination of babesia or anaplasmosis can cause **tick fever** (Iristeza)
- Chronic carriers
- Calves - natural immunity, can become asymptomatic carriers
- *Bos indicus*, more resistant

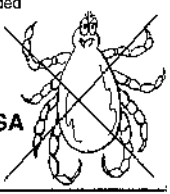
- Fever 104-107° F, malaise & anorexia
- **Hemolytic anemia**, rapid
- **"Red water"** (hemoglobinuria)
- Hypoxia, ↑HR & RR, pale muc. membr.
- Loud tachycardia
- **Icterus**, less common than in anaplasmosis
- **CNS** m/b cerebral babesiosis, hyperexcitable, convulse, opisthotonus, coma & death
- **Abortion & death**

- **CS, in tick areas**
- **Giemsa stained org.** in RBCs of thin blood smear (m/not find)
- **Anemia, PCV**-sharp drop 35 to < 10%
- Complement fixation (doesn't pick up carriers)
- Direct immunofluorescence
- **Postmortem**
  - Icterus
  - Enlarged spleen

- Tx: depends on PCV
- Whole blood transfusions, indicated w/ signs of anoxia, limit amount, usually 4 L
- **Fluids**
- **Imidocarb®** (protozoocide) - protects new animal up to 2 mos & premunition immunity

Prognosis
- PCV > 12% Good w/ early Tx of whole blood transfusions
- PCV < 12% Guarded

Control:
- **Successful eradication of tick in USA**



DDx (Same as anaplasmosis):
- Leptospirosis (p 257)
- Bacillary hemoglobinuria (p 90)
- RBC parasites - anaplasmosis (p 92)
- Postparturient hemoglobinuria (p 88)
- Trypanosomiasis (p 261)
- Theileriosis

CNS signs:
- Rabies (p144)
- Encephalitis (p 154)

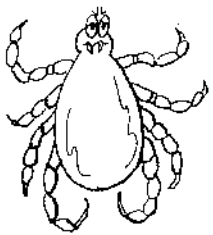
Tick life cycle - 3 weeks
- Female ingests parasites in a blood meal, passed transovarially to larval progeny
- Tick drops off the animal & lays eggs
- Eggs to larvae which attach to a new host
- Parasites in tick saliva enter bloodstream to RBCs, merozoites break out of RBC to infect others

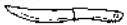
Not in USA
Tick (*Boophilus*) carried
Protozoan (*Babesia*) eradicated

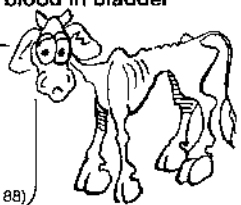
Anaplasmosis

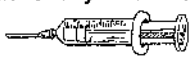
CARDIOVASCULAR SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Anaplasmosis **Gall sickness** Mk 68, C3T 588; IM 1314; BR-hb 439; BR 1146; Br 741; DC 478 ★★★	• **Peracute to chronic** • **Rickettsial** organism - ***Anaplasma marginale*** in USA *A. ovis* in other countries - **Intra-RBC bodies** (marginal) • ***Boophilus & Dermacenter*** (ticks) 1° vector, also mosquitoes & biting flies (*Tabanus* spp, *Stomoxys* spp) • **Iatrogenic**-bleeding, vaccination • Carriers • **Severity related to age** - **Calves - mild, no death** - Yearlings - severe, but recovery - **Adults die** - w/ 20-50% mortality • Parasitized RBCs eliminated by spleen so no hemoglobinuria • Late spring to early fall (anytime if iatrogenic) • Endemic in some areas, w/ chronic carriers, SE & SW United States	• **Calves** usually asymptomatic, lethargy & anorexia may be mild & last 1-2 ds • **Acute - adults** - Depression, inappetance, indolence, rapid ↓ milk production - ↑ **Temp.** 104-106°F, w/in 24 hrs., return to normal or subnormal before death - Dehydrated, muzzle dry - **Pale mucous membranes** - **Death** - **Abortion**, late gestation • **Chronic survivors** of hemolytic crisis - Prolonged convalescence, 3-4 wks - **Weight loss, icterus** - Dehydr. & constipation (decr. water intake) - Feces dark brown, mucous covered - Urinate frequently (conc. dark yellow) - If cerebral hypoxia, m/b aggressive • **Stress - die from hypoxia** • Older animals, stagger, weak, wander off	• History (endemic area), CS • **Lab:** - **Anemia** - extra-vascular hemolysis - **NO hemoglobinuria** - PCV < 30% at 1st, in 24 hr. 6-10% - Death ensues w/ 6% PCV - **Giemsa stain org. in RBC** blood smear - confirm (in febrile episode) - Regenerative anemia w/ poly-cytosis, basophilic stippling, reticulo-cytosis, anisocytosis - Serologically Dx: card agglutination, complement fixation, IFT, DNA probe well for asymptomatic carriers, not for early dx detection • **Postmortem** - Icterus usually evident - Enlarged spleen - **No blood in bladder**	• **Oxytetracycline** (long acting) in acute phases for 3-5 ds - Wait 1 wk, then repeat for 4 ds - Eliminates carriers • Blood transfusions • Water by stomach tube • **Careful handling** so don't get hypoxic & die **Prognosis** • PCV 12-20% - Good • PCV 8-12% - Guarded to poor • Less than 8% - Grave **Prevention & control:** • **Vector control** (difficult) - periodic spraying, ear tags, dust bags, etc., during vector season • Iatrogenic control (needles, dehorning) • **Vaccination - ANAPlaz®** - killed - Side effects, sensitizes cows to producing ABs against vaccine, when get later transfusion or dz itself - Given annually, prior to vector season - Doesn't provide good efficacy in preventing dz • **Prophylactic tetracycline ABs in feed**









If die acutely w/o icterus or anemia enlarged spleen may be mistaken for anthrax

Anaplasma marginale **(Rickettsia), Ticks, Iatrogenic**
CS: Adults - Anemia, Icterus & Fever
Dx: Low PCV, No hemoglobinuria, Giesma stain
Tx: Oxytetracycline, ANAPlaz (vac)
Px: PCV > 12% Good, < 8% Grave

DDx:
- **Anthrax** (no icterus) (p 247)
- Leptospirosis (hemoglobinuria) (p 257)
- Bacillary hemoglobinuria (p 90)
- Babesia (hemoglobinuria) (p 91)
- Post parturient hemoglobinuria (p 88)

Autoimmune hemolytic anemia, AIHA

IM 1225; BR-hb 148; DC 56

- 2° **process to:** Anaplasmosis (above), Babesiosis (pg 91), **Anti-RBC antibodies against own RBCs,** Antibodies complex w/ antigens on RBCs causing destruction & removal; Young
- CS: Variable, Depression, **Pale mucous membranes, Variable icterus,** ↑ HR & RR, Fever

URINARY SYSTEM - IV

Amyloidosis - Cystitis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Amyloidosis IM 993,1293; BR 103; BM&S 836; Br 122, 759; DC 360; GI 791; Pa 90 **	• Uncommon • **Amyloid** - twisted sheets of proteins • **> 4 yrs-old** • **Accumulation** assoc. w/ **chronic inflammation** (chronic mastitis, chronic peritonitis, etc.) • Multisystems - Amyloid deposited in glomeruli . Impaired permeability . Excessive protein loss into urine .. **Edema** . **Uremia** (oral lesions) - GI deposits .. **Malabsorption & diarrhea**	• **Intractable diarrhea** • **Weight loss** • **Ventral edema** of brisket, submandibular region (proportional to hypoproteinemia) • Oral lesions (due to uremia) • Profuse watery diarrhea **DDx:** Edema and diarrhea • Johne's diz (p 23) • Lymphosarcoma (p 268) • Parasitism (severe) (p 54) • Chronic diarrhea (p 22) • Malnutrition (p 266) • Peritonitis (p 53) • Rt. sided CHF (p 76) • Liver failure (p 34) Uremia - oral lesions	• Usually easy • **Nephrotic syndrome** - **Edema** - **Diarrhea** • Lab: - **Massive hypoproteinemia, hyperproteinuria** (think amyloidosis) (+4 on dipstick) - ↑ BUN & creatinine - Congo red stained amyloid protein in urine sediment • Postmortem: - Waxy, large kidneys, yellow-tan w/ wide cortex - **Histo: amyloid in glomeruli** • Rectal exam: - Kidney grossly enlarged, painless, w/ norm. lobation & consistency • Ultrasound - large kidney, not specific for this disease • Renal biopsy	• **Salvage** as early as possible (before weight loss) **Prognosis:** • **Grave** - salvage **Prevention:** • None, except control chronic inflammation

Uncommon, Adults, Amyloid protein, Assoc w/ Chronic Inflam.
CS: Nephrotic syndrome: Edema & Diarrhea; Weight loss
Dx: Hx, CS, Hypoproteinemia & Hyperproteinuria
Tx: Salvage before wt. loss • Px: grave

Glomerulonephritis

IM 994; BM&S 830; DC 359
*

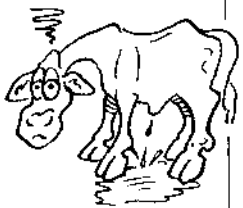
- **Rare, Immunological** disorder (antigen-antibody complexes in glomerular basement membrane), impairment of filtration. Bovine glomerulus morphologically different from other species & m/ be less susceptible to this diz
- CS: **Weight loss, chronic diarrhea, generalized edema**
- Dx: CS, Hx, Proteinuria, hypoalbuminemia, anemia, elev. serum creatinine & BUN, Renal biopsy
- DDx: Amyloidosis
- Tx: **Not described**, probably not indicated bec. advanced stage at Dx

CYSTITIS

IM 990; C3T 539; BR-hb 182; BR 448; BM&S 838; Br 560; DC 361

***

- Sporadic inflammatory disease
  - Cattle >> sheep
  - **Cystitis, ureteritis**
- **#1 *Corynebacterium renale***
  - Subacute pyelonephritis
- ***E. coli***, chronic urinary infec.
- *C. pilosum, C. cystitis*
- **2° Ascending problems**
  - Urinary calculi
    . Sets up inflam. of bladder wall
  - Difficult parturition, w/ trauma to urethra; metritis; conformational deformity
  - Handling (catheterization, etc., iatrogenic)
  - Venereal transfer
  - Urine splashing

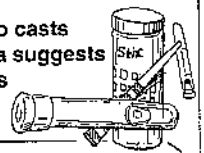


- **Frequent urination**
- **Gross hematuria** (blood clots)
- Long urinary posture
- Painful urination - kicking at belly, swishing tail
- Scalding of perineum, thigh
- Protruded penis in male

- **Chronic**
  - **Weight loss**
  - ↓ Milk production

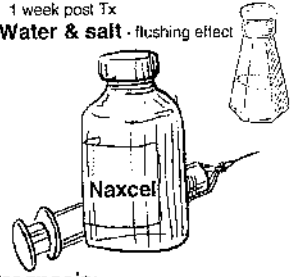
- **Cystitis in males - check for uroliths** (stones)

- **Almost pathognomonic: frequent bloody, painful urination containing blood clots**
- Ultrasound distinguishes between types
  - Rt. kidney - probe rt. paralumbar fossa
  - Lt. kidney - rectal probe
- Renal biopsy of lt. kidney
- Lab: Blood
  - Azotemia, but not until advanced
  - Inflam. leukogram (↑PMNs)
- Culture
- Urinalysis
  - **Hematuria**
  - **Bacteruria** (> 10^4/ml)
  - Pyuria
  - Cystitis - **no casts**
  - **Crystaluria suggests urolithiasis**



Treat early

- **ABs** based on urinalysis, culture & sen
  - *C. renale* - intensive penicillin
  - *E. coli* - resistant - $ - ampicillin
  - **Naxcel®, $ Ampicillin $** (broad spec) if culture not possible or *E. coli*
  - Reassess by culture & bacterial count 1 week post Tx
- **Water & salt** - flushing effect



Prognosis:

- Cystitis - good, if Tx early

Prevention & control

- Isolate (infectious)
- Hygiene - when handling urogenital tract
- Assoc w/ bulls, switch to artifi. insem. (AI)
- Difficult to remove from herd once established

Female > males - short wide urethra, infection easily ascends

DDx:

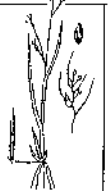
- **#1 - Urolithiasis** (crystaluria)(p 96)
- Abd. pain
  - GI disorders (no urinary disorders)
    . Obstruction (p 44)
    . Traumatic reticuloperitonitis (p 38)
- Hematuria
  - Enzootic hematuria (no pyuria or bacteruria)(p 228)
  - Leptospirosis (p 257)
  - Bacillary or postparturient hemoglobinuria (p 88, 90)
- Enlarged kidneys (no pyuria or bacteruria)
  - Hydronephrosis
  - Congenital cystic kidneys
  - Neoplasia
  - Amyloidosis (p 94)

2° ascending problem
CS: Frequent, Bloody, Painful urination w/ Blood clots
Dx: Hx, CS, US, UA (hematuria, bacteruria)
Tx: Antibiotics, Water & Salt • Px: Good

Sorghum cystitis/ataxia, Sudan/Johnson grass; Bladder paralysis, Lathyrism

*

- See Tox pg 242; Ataxia & cystitis in horses, cattle & sheep. Usually valuable forage. **Sorghum** spp., Johnson & Sudan grasses; Mechanism unknown, cyanide? • **Myelomalacia of lumbar, sacral & caudal spinal cord, Poisonous plants**
- **CS:** CNS: **posterior incoordination**; **"Dribbling"**, **Cystitis 2°**, Scalding of skin & dermatitis, Pyelonephritis sequela, Paresis of tail m/b
- **Dx:** Hx, CS, No specific tests, Urinalysis for cystitis; PM - Wallerian degeneration & swelling of axons
- **Tx:** Withdraw Sorghum, improve over wk-mo (m/not be complete), No specific Tx, ABs for urinary tract infec.
- **Px:** Recovery rare, **Control:** Diversify diet (Sorghum not a complete diet)



Johnson grass

Urolithiasis

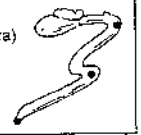
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Urolithiasis Mk 891; C3T 819; IM 976, BR-hb 183; BR 450; Br 127, 227; DC 364; S-J 1072; S-T 292; BM&S 841; R-M 368; S-U 659 ★★★	• **Urinary calculi - big problem** **- Feeder steers & range cattle** - Calculi form in bladder, nidus (desqua - mated cells & necrotic tissue), solutes pcpt out around nidus, mucoprotein solidifies around pcpt - Obstruction, when passes into urethra . Irregularly-shaped are trapped . Smooth stones pass • Predisposing factors - **Incr. in high concentrate diets** (pelleted rations, etc.) - Plants high in oxalates **- Low intake of water** **- Castration** (smaller urethra) **. Feedlot steers** **- Infection & inflammation** - Vit A deficiency - High estrogen diet - High urinary pH (alkaline) incr. w/ high conc. diet, intermittent feeding, urinary stasis • **Three syndromes** 1. Urethral obstruction - Distal bend of sigmoid flexure 2. Urethral rupture - Necrosis & penetration 3. Ruptured bladder 	**1. Urethral obstruction** • **Early blockage** **- Urethral pain**, straining & twitching of tail - Dribbling bloodstained urine • **Complete blockage** **- Dry preputial hair** (calculi on hairs) **- Tenesmus** (straining) - Off feed, depressed, ↑ HR & RR **- Colic** - "Tail pumping" when trying to urinate - Pulsation of urethra below anus - Untreated, isolate themselves, refuse to eat or drink, become uremic & die	• History • CS - dry preputial hairs, straining, colic • Rectal exam: **- Enlarged bladder** - **M**/ have enlarged ureter • Lab: Not done frequently	• **Unblock** - due to urethral diverticulum, can't catheterize so no retrograde flushing **- Aminopromazine** (antispasmodic) if early m/ relax enough to pass (causes slight straightening of sigmoid flexure) • **Surgery** to remove **- Perineal urethrostomy** • Fluid Tx, but m/ rupture bladder (diuresis) • **ABs** (sulfas, tetracyclines - long acting & concentrate in urine) 2° infect • **Cull** early if not easily unblocked, if not early then meat takes on uremic smell (condemned)
		2. Urethra rupture: if blockage not relieved • **"Waterbelly"** - urine into subQ, swelling ventral abdomen, initially soft, easily indented; then cellulitis, hot & painful • **Straining & colic relieved**, appetite norm. & defecation normal • Skin sloughing (due to urine scalding) • Untreated, death in 10%	• **CS - "waterbelly"** • No lab work - ($) • Ultrasound - echogenic calculus (urethra) • Aspirate "water belly" m/not smell unlessheated • **Lab:** ↑ Creatinine, BUN, ↓ Na & Cl Dehydration	• **To late to salvage because of uremic smell** • **Urethrostomy** - Allow animal to reach slaughter weight - Drain SQ urine by ventral lacerations - Cover w/ ABs & fluids **Prognosis:** • Poor for return to breeding (adhesion)
		3. Ruptured bladder (w/in 48 hrs) • **Temporary relief of CS**, for a few days • **Then uremia, depression, anorexia** • **Dehydration** (urine pulls fluid into abdomen) • **Dry preputial hairs** • **Pear-shaped** abdomen • Off feed, depressed • Fluid wave across abdomen • Peritonitis (urine) 	• **History of relieved colic** • Dry preputial hair + crystals • **Lab: Azotemia** **- ↑ creatinine** but < peritoneal fluid - ↑ potassium, decr. Na & Cl - Metabolic alkalosis • Rectal - **sm. bladder** in fluid • **Peritoneal tap:** **- Fluid - urine smell & red** - Hi peritoneal creatinine > serum • Uremic breath • Confine on dry floor & watch for urine	• **Trocar abdomen**, drain slowly • **Urethrostomy** so urinate w/in 48 hrs, don't fix bladder, hope it heals spontaneously • Fluids & ABs • **Salvage** animal in a few mo to avoid further complications **Px**: Poor to good, depending on the duration of rupture & intensive care postop - Only 50% recover after surgery - Uremic - poor - Hi serum K - grave (> 9 mg/dl)

Feed lot - struvite calculi (phosphate)
- Multiple stones usually (sand to large stones)

Range - silicate (silica plants) - single stone usually.
- Carbonate crystals less common in pastured animals

High risk animals
- **Castrated** males >>> females
  (feeder steers castrated early = small urethra)

Blockage sites (males)
- Cattle - sigmoid flexure, ishial arch, urethral orifice - usually single



Prevention of all syndromes
- **Water available** - heated in cold weather
- Early detection
- Acidify urine; good for phosphate calculi, not silicates
  - Ammonium chloride or ammonium sulfate
- **NaCl to diet** (2-4%) to incr. water consumption
- Ratio of 2 to 1 Calcium to Phosphate
- Vit A supplement to diet
- **Delay castration** - not at 3 months
- Oxytetracyclines or sulfas to decrease UT infection

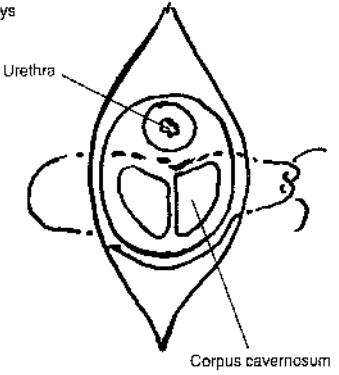
Feeder steers, 5-10 mos-old, Winter, High concentrate feed
CS: 1. Obstruction 2. Ruptured urethra 3. Ruptured bladder

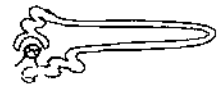
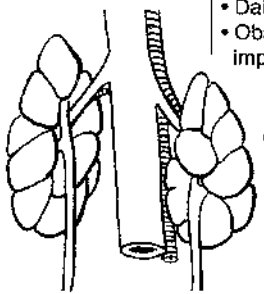
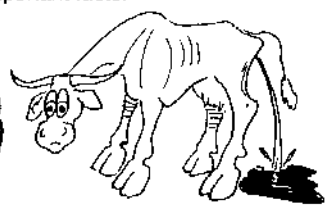
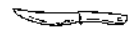
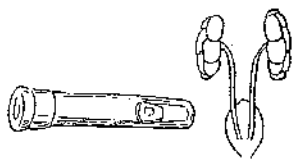
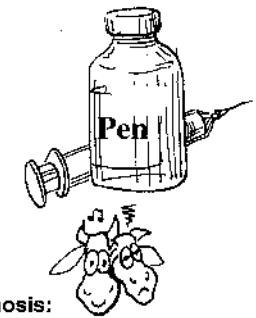
Surgeries:

Stone removal (for unruptured cases)
- Cast in dorsal recumbency
- Local infiltration of anesthetic, 4" area cranial to scrotum
- Grasp penis through skin
- **3" skin incision cranial to scrotum**
- Exteriorize penis by deeper incision through SQ
  - ID retractor penis mm. joining penis just dist. to sigmoid flexure (usual location of calculi)
  - Urethra runs on outside of curve (ventr.)
- Feel stones (calculi)
  - If possible, move stone to healthy tissue
- **Attempt to crush stone** (drive points of towel forceps into stone & massage pieces out, phosphate stones usually too soft to crush)
- **Incise into urethra** over calculi (if unable to crush)
- Tease stone out of small opening
- Flush out
- Determine state of urethra
- 1° closure if healthy & not traumatized
- Leave open if bruised, heals by second intention
- **Do not close skin**

Penile amputation (ruptured urethra)
- Couple of incisions on ventral abdomen to drain SQ urine
- Standing bull - epidural anesthesia
- Surgically prep perineal area to scrotum
- **6" skin incise to base of scrotum** on midline
- Bluntly dissect down to penis
- Grasp penis & pull penis out incision
- Tie vessels off, or dissect between penis & vessels, leaving vessels in place
  - Due to retraction w/ healing (scalding of urine if too short)
- **Cut penis**, corpus cavernosum on top of corpus spongiosum
- Tie suture to skin
- Pass suture through body of penis just dorsal to urethra
- Pass suture dorsally around penis & back through penile body (acts as tourniquet to help slow bleeding of corpus cavernosum)
- Tie suture to skin
- Close skin incision, putting no pressure on urethra

Ischial urethrotomy for ruptured bladder
- Drain abdominal cavity by paracentesis
  - Unnecessary to suture bladder, just keep it empty to heal
  - Insert an abd. drain paramedian betw. umbilicus & pubis for 48 hrs
- Standing, under epidural anesthesia
- Prep perineum
- **5" incision on midline starting 2" below anus**
- **Incise down to retractor penis & deeper to bulbospongiosus m.**
- Find tunica albuginea at dist. end of bulbospongiosus m.
- Palpate urethra
- **Incise tunica albuginea into corpus spongiosum**
- **1" incision into urethra**
- Remove stones by pushing up to urethrostomy incision w/ catheter (extend penis, by straightening out sigmoid flexure)
- **Pass a Foley catheter** w/ a stilette up urethra & into urinary bladder (inflate cuff), pushing catheter against cran. wall of urethra while passing urethral diverticulum (located caudally)
- **Close** tunica albuginea, SQ fascia & finally skin around catheter
- Put 1-way valve on end of catheter to stop negative pressure of abd. pulling air into bladder
- **Remove catheter in 5 days**
- Let heal by 2nd intention
- ABs for 3 days



Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Nephritis Br-hb 180; BR 445; DC 355; BM&S 634	• Not an important clinical entity, except for pyelonephritis or embolic nephritis - Glomerulonephritis only noticed at necropsy w/ no manifestation of diz - Interstitial nephritis accompanies leptospirosis, but CS more closely related to leptospirosis 			
Contagious pyelonephritis C3T 826; BR-hb 181, 272; BR 447, 646; Br 560, 127; DC 356 ***	• ***Corynebacterium renale*** considered specific agent, gram positive, short thick rods - Pili present give pathogenicity, pH < 6.8 lowers number - Obligate parasite of cattle - Strep, staph., *Actinomyces (Corynebacterium) pyogenes*, *E. coli* also implicated • **Ascending infection** • Females > males • > 3 yr-olds • Carrier animals • Dairy herds, winter • Obstruction (calculi) = stasis, important factor  	• Variable: initially m/b intermittent hematuria in healthy appearing cattle or colic • **Usually insidious onset** - Gradual loss of condition - ↓ Milk production - Fluctuating appetite - Intermittent fever - Bloody urine & debris - **PU** painful, small amounts of urine • Death due to kidney failure & blood loss 	• History (Hx), CS (clinical signs) • **Rectal palpation:** - Enlarged kidneys, ureters  - Painful kidneys • Urinalysis: - **Hematuria** - **Pyuria, bacteruria** - RBCs, WBCs, epithelial tissue debris - **Gram stain *C. renale***, FA - Usually no azotemia unless bilateral, or terminal stages • Postmortem:  - Kidney: enlarged, loss of lobulation . Mottled, greyish-white, necrotic areas . Dilated renal "pelvis" . Abscesses & necrotic streaks in parenchyma . Ureters dilated & filled w/ pus . Bladder wall & urethra thickened, edematous, hemorrhagic & necrotic 	• **Procaine penicillin G** (DOC), **large doses** sid 10 days • Monobasic sodium phosphate (acidifies urine) • Isolate, clean area - Treat early before tissue damage • Fluids if severely effected • Check other animals • Nephrectomy m/b in valuable animal (check other kidney 1st)  **Prognosis:** • **Guarded**: relapses common, clearing infection difficult • If tissue damage only temporary recovery, but m/ allow fattening before slaughter

***Corynebacterium renale*, Ascending**
CS: Insidious - Renal CS (Hematuria, Dysuria)
Dx: Rectal, Pyuria, Culture - PM
Tx: Penicillin (DOC) • Px: Guarded

DDx:
• Enzootic hematuria (afebrile)(p 228)
• Cystitis (p 95)

Embolic nephritis

★★★ DC 354

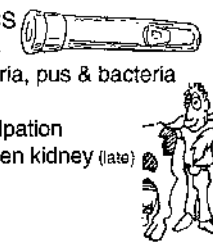
2° to purulent infec.
CS: Insidious
Tx: Long term ABs

- **Follows purulent infection** elsewhere in body or septicemia
- Cause: *Corynebacterium pyogenes? E. coli*
- 1° infec - Navel ill, Mastitis, Pneumonia, Hepatitis, Peritonitis

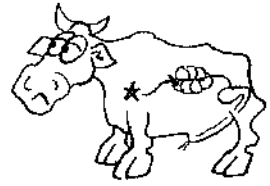
- **Unrecognized for a long time**
- ± Abdominal pain
- Extensive damage required before uremia

DDx: difficult
- Pyelonephritis (p 98)
- Cystitis (p 95)

- History, CS
- Urinalysis
  - Proteinuria, pus & bacteria
  - Culture
- Rectal palpation
  - Misshapen kidney (late)



- **Antibiotics** (C&S, culture & sensitivity) several weeks



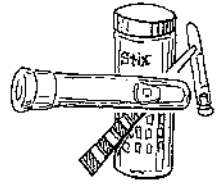
Uremia

BR 439; Sx-G 632; BM&S 829

- **Clinical signs (CS), not diz**
- Due to an inability to produce & eliminate a normal amount of urine
- Cause:
  - Circulatory defc.
  - Extensive kidney lesions (hydronephrosis, pyelonephritis)
  - Obstruction of urinary tract
  - Rupture of bladder or ureter
  - Poisonous plants
  - Heavy metals

- Depression & anorexia
- Muscular weakness, tremors
- **Labored breathing** (dyspnea)
- **Reduced urine output**
- Loss of condition
- Scleral congestion
- Ammonium (urine) breath
- Chronic uremia
  - **Ulcerations of oral tissue**
- ↑ HR
- Coma followed by death

- Proteinuria
- **↑ BUN, creatinine**



- **Treat cause**

Hydronephrosis

BR-hb 181; BR 447; BM&S 838; Sx-G 634

- Distention of kidney w/ urine
- Ureteral obstruction (rarely urethral)
- Unilateral usually

- Uremia

- Unilat. difficult to detect
- Rectal palpation of dilated ureters

- Relieve 1° diz (obstruction)

Enzootic hematuria

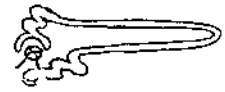
★★ DC 363

- **See pg 84, 228**; Cause unknown, bracken fern (worldwide), > 4 yr of age, cauliflower-like **bladder wall**
- **CS**: Acute (blood clots in urine, anemia, die in 1-2 weeks), Chronic (anemia, bladder tumors, 2° cystitis)
- **Dx**: Hx (Bracken fern), CS, Rectal (bladder thickening); PM: Chronic - Pedunculated mass from bladder wall
- **DDx**: Cystitis (pyuria & bacteruria), Pyelonephritis
- **Tx**: Salvage early
- **Prevention**: Clear Bracken fern ($)

Interstitial nephritis

★ BR-hb 180; BR 445

- **Rare**; Calves attributed to systemic coliform infec., Leptospirosis, Chronic, progressive nephritis seen in dogs, not reported in cattle
- CS: Death reported, more commonly as an incidental finding at meat inspection or necropsy
- Tx: no recommended Tx, ABs



Renal Failure

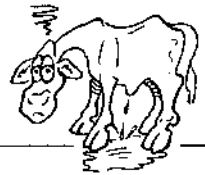
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

Acute renal failure, ARF

IM 953; C3T 24; BR-hb 175; BR 439; BM&S 829; Pic 210

**

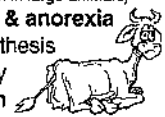
- **Not a primary condition in cattle**
- **2° condition**



Causes:

- **2° to acute infection/septicemia**
  - Septic metritis (pg 111)
  - Septic mastitis (pg 192)
  - Anthrax, Blackleg (pg 196), Malignant edema (pg 196), Shipping fever (pg 63), Endotoxemia, Abomasal torsion, Salmonellosis, Pregnancy toxemia
- **2° Nephrotoxins**
  - Poisonous plants (Oaks, Amaranthus, Isotropis, Rumex spp, Oxalates, dogbain, micotoxins)
  - Heavy metals (mercury, arsenic, cadmium, lead)
  - Drugs (aminoglycosides, Tetracyclines, sulfonamides, monensin)
  - Endogenous (bile, hemoglobin, myoglobin)
  - Miscellaneous (chlorinated hydrocarbons, ethylene glycol, Phenol & coal tar, phosphorus, blister beetle)
  - Anthelmintics (carbon tetrachloride, phenothiazine)
- **2° to hypoxia due to reduced blood flow**

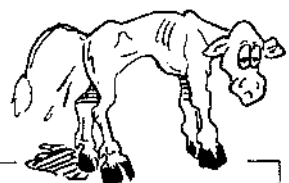
- **CS fairly nonspecific**
- **CS of 1° diz m/ mask**
- **Polyuria**
  - **Oliguric** (diminished urine; anuria very uncommon in large animals)
- **Depression & anorexia**



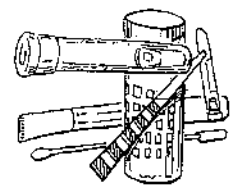
- Bleeding diathesis
- Recumbency
- **Dehydration**
- Uremia, muscular weakness, labored breathing, reduced urine output (none in obstruction), loss of condition, scleral congestion, ammonium (urine) odor to breath
- Chronic uremia (ulcerations of oral tissue, ↑ HR, muscular tremors, coma followed by death)
- M/b abdomenal pain, mild colic

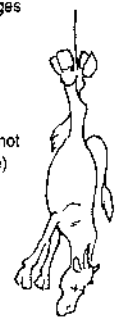
Complications

- Diarrhea
- Hemolysis (may also be result of renal failure)

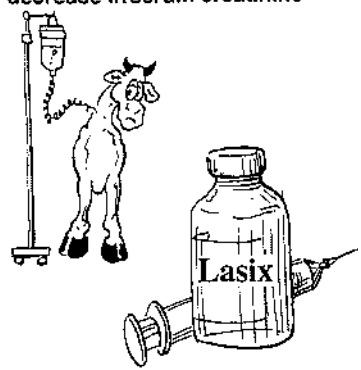


- History (exposure), Clinical signs
- **Dx: difficult** due to vague clinical signs
- Lab:
  - ↑ Creatinine & BUN
  - ↓ Cl, potassium (K), Ca, Na
  - ↑ P, Mg
  - Peracute nephrosis
    - Metabolic acidosis & hyperkalemia (K)
- **Urinalysis**
  - Proteinuria in cattle pathologic (normal = 0.3 g/l)
  - **Low sp. gravity** (< 1.020) (isosthenuria)
  - Urinary casts, granular or leukocytic
- **Ultrasound:** enlarged or abnormally-shaped kidneys, w/ abn. consistency to parenchyma
- **Postmortem:** m/b normal on gross exam, heavy, cut surface bulges
  - Perirenal edema
  - Histopathology
    - **Tubular necrosis**
    - **Casts in tubules**
- **Renal biopsy** (generally not done due to risk of hemorrhage)





- **Treat predisposing cause**
- Remove causative agent
- **Fluids:** restore blood volume
  - % dehydration x body weight over 4-6 hrs
- **If oliguric** after volume & electrolyte correction
  - Lasix® (furosemide) 1 mg/kg IV w/ fluids, repea every hour until urine flow
  - Mannitol 0.25 g/kg or
  - Dopamine 3-5 µg/kg/min IV
- **Normal urine flow,** more likely than oliguria
  - Fluids 40-80 ml/kg/day **until marked decrease in serum creatinine**



Prognosis:

- Good in early Dx & Tx of poisonous plants
- Poor if due to septic processes
- Renal failure > 1 d or perirenal edema or kidney enlargement, Px goes down
- Px monitored daily by checking creatinine

2° to Septic diz, Nephrotoxins, Ischemia

CS: Vague/Masked by 1° diz - Polyuria, Dehydration, Depression

Dx: Hx, CS, ↑ BUN, Proteinuria, SG < 1.020, Casts, Ultrasound

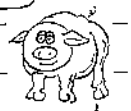
Tx: Tx 1°, Remove cause, Fluids, Check urine output

Oak poisoning,

Quercus poisoning, Oak bud or acorn poisoning

- **See Tox pg 234;** Oak, ***Quercus*** **spp.**, SW USA (**buds in spring**), Midwest & NE (**acorns in fall**); **#1 Cattle; Oak tannin**
- **CS:** Gradual onset; Peracute (edema, anuria, **m/b found dead**); Subacute (**diarrhea**); Advanced stages (**large volumes of dilute urine, dehydration**, icterus, hematuria, ammonium breath, oral lesions, occasional abortions)
- **Dx: Hx, CS,** ↑ SGOT, SGPT, **BUN** & creatinine, **dehydration, Low specific gravity, granular casts** & hematuria; PM: edema, **perirenal edema, renal lesions**
- **DDx:** Pigweed poisoning (similar lesions); Aminoglycosides poisoning, Clostridial diz, Viral diz (oral lesions)
- **Tx:** Remove from oaks, Stimulate rumen (oils), Fluids (dehydration & acidosis), Supplemental feed
- **Px: Grave** - rarely recover once renal dysfunction
- **Prevention:** 10-15% calcium hydroxide in grain ration to protect m/b, if exposure can't be prevented

Amaranthus, pigweed: See Tox pg 234: similar to oak, Acute tubular necrosis & perirenal edema in cattle & pigs, Toxic element not identified

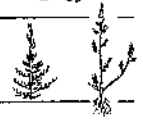


Mycotoxins

- **See Tox pg 265; Aspergillus & Penicillium spp., Nephrotoxic**

Oxalate

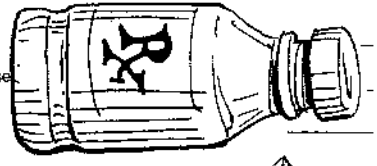
- **See Tox pg 224;** Halogeton, Greasewood, 1° cattle, West, Insoluble pcpt w/ Ca, Vascular necrosis & renal tubular blockage
- **CS:** Colic, Weakness, Frequent urination, **Crystals in urine**
- **Tx:** Hopeless once CS; Fluids, Ca gluconate



Aminoglycosides

**

- **See Tox 217; One of most common causes of tubular nephrosis**
- Neomycin most nephrotoxic > gentamycin > kanamycin > amikacin > streptomycin (least)
- Accumulate in tubular epithelial cells, disrupt metabolism & die



Sulfonamide & tetracycline ABs (C3T 818): Sulfonamides cause crystalluria, mainly of older sulfas (sulfathiazole), Tetracycline problem w/ high dose

NSAIDs (C3T 818): Not a potent nephrotoxin, m/b if given w/ aminoglycoside or if hypotension or dehydration; causes papillary necrosis & interstitial nephrosis

Amphotericin B *

- Antifungal drug, nephrotoxic even at therapeutic doses, too expensive to use in cattle

Ethylene Glycol, Antifreeze *

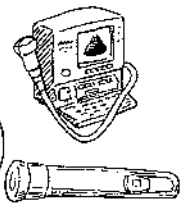
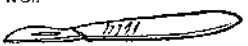
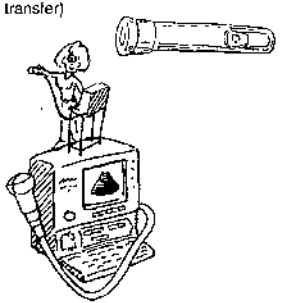
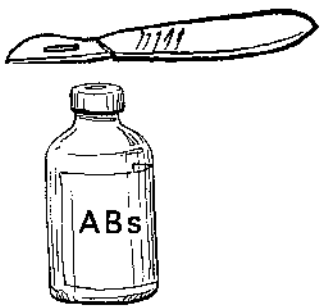
- **See Tox pg 209;** 1° dogs & cats, 1° lg. animal is ruminants, Sweet tasting alcohol, **forms insoluble Ca oxalate in renal tubules**
- **CS:** Hind limb ataxia, Salivation, Depressed sensorium, **Nystagmus**, Tonic clonic seizures, Status epilepticus, Acidosis, Dehydration
- **Dx: Azotemia,** ↑ **serum creatinine, Oxalate crystals in kidney,** microscope using polarized light
- **Tx:** Early w/in 12 hr of exposure, **20% ethanol** (50 ml./hr), Activated charcoal, $NaHCO_3$ IV, Replace fluids

Heavy metals

(C3T 823)

*

- **See Tox; Rare, Hg** (mercury), Arsenic, Cadmium, Lead
- **CS:** GI signs (↑ salivation, oral erosions, colic, hemorrhagic diarrhea); **CS of uremia** (depression, seizures, oliguria)
- **Dx:** Tubular necrosis, azotemia, isosthenuria, enzymuria, & electrolyte imbalances
- **Tx:** Dimercapterol, 1 lb of activated charcoal orally, ARF (acute renal failure) Tx

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Patent urachus IM 421; C3T 821; BR-hb 186; BR 101, 455; DC 365; S-J 1110; Br 152 ***	• Urachus connects bladder w/ allantoic sac during gestation • **Should close at birth** when umbilical cord is severed • Early severance or ligation of umbilical cord, inflammation, infection & excessive handling of neonate implicated **From navel to bladder** **CS: Dribbling from "navel", Moist hair** **Dx: Hx, CS, Ultrasound** **Tx: Chem. cauterization or Sx removal**	• **Moist hair around navel** • **Dribbling of urine from umbilicus** 	• Moist dribbling umbilicus • Lab: Serum IgG, CBC, urinalysis for systemic infec. • Ultrasound • Check for FPT (failure of passive transfer) **DDx:** • **Navel ill** 	• **Conservative** - **Chemical cauterization:** Tincture of iodine on cotton swab & swirl around inside urachus, must not be infected. **Most respond** • **Surgery:** remove urachus, taking off tip of bladder, remove umbilical v. & aa. as well  **Prevention:** • Minimum handling of neonate • Allow umbilical cord to rupture w/o ligation suggested
Navel ill **Omphalitis/ Omphalophlebitis, Umbilical infec.** IM 987, 422; C3T 101, 821; BR-hb 48; BR 140; Br 213; S-J 1110; DC 365 ***	• **See Musculoskeletal pg 172** • **Inflam. of umbilical structures** - **Umbilical arteries** connects internal iliac aa. to placenta (pass on either side of urinary bladder (become round ligg. of bladder) - **Umbilical vein** (single) connects placenta to liver (becomes round lig. of bladder in free edge of falciform ligament) - **Urachus:** connects the apex of urinary bladder to the allantoic cavity • **Abscesses** of any of above structures **- Local infection**, or **- Source of septicemia** • Cause: external envir. infec. (*Corynebacterium pyogenes, E. coli*, Proteus, Enterococcus spp.) • FPT (failure of passive transfer) potentiates **Inflam. Umbilical arteries , vein or urachus** **CS: Hot, draining navel, Septicemia • Dx: Hx, CS, US** **Tx: ABs, Sx - Removal**	• **Hot enlarged navel** (m/ look normal) • **Purulent drainage** • **Severely ill** (septicemia) m/b - Fever - Joint infection - Pneumonia - Diarrhea - Meningitis - Uveitis	• CS - purulent navel • Palpation to see depth of infec. • **Ultrasound** - visualize size of structures (persistent dilation) • Check for FPT (failure of passive transfer) 	• **Early ABs & supportive care** • Surgery: remove structures involved  **Prognosis** **Better if adequate colostrum**

REPRODUCTION - V

Anestrus

Anestrus

IM 247, 1373; Mk 1127; BR 456; R-M 247

***

- Anestrus: lack of estrus
- A clinical sign, not a diz; M/b normal physiological phenomenon, a sign of diz, or indicative of poor heat detection
- **Pregnancy #1** cause of anestrus - rule it out 1st. **Seasonal anestrus** in horses, not in cattle, which are not considered to be seasonal breeders
- **Prolonged luteal function/persistent elev. progesterone**
  - Causes: pregnancy, mummified fetus, pyometra
- **Dx:**
  - Reproductive & general history (Hx)
  - Thorough breeding soundness exam (BSE)
  - Evaluate estrus detection program
  - Rule out (R/O) pregnancy 1st
  - Animal side milk or serum progesterone test kits

Causes (IM 244, 1367)

- Pregnancy (p 106)
- Poor heat detection (p 105)
- Luteal cysts (p 108)
- Nursing beef cow
- Nutritional infertility/Weight loss (p 266)
- Heat stress
- Freemartinism (p 107)
- EED (early embryonic death)
- Urine pooling (p 113)
- Pyometra (pg 111)

Less common causes:

- Macerated or mummified fetus (p 107)
- Hydrometra or mucometra

Uncommon causes:

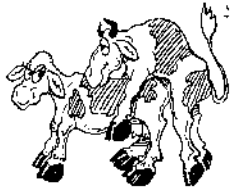
- Ovarian tumor
- Segmental aplasia (p 113)

Repeat breeders

tM 249; C3T 101, 821; BR 140; Br 449

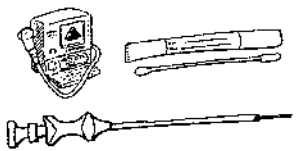
***

- **Bred during 3 or more successive periods w/o becoming pregnant**
- Management goal: < 10-15% repeat breeding in herd
- Pathogenesis
  - **FF** (failure of fertilization)
  - **EED** (early embryonic death)
- **DDx FF from EED**
  - Interestrus interval
    - . FF not affected
    - . EED prolongs interval (intermediate length to multiples of normal cycle lengths)
      - .. After maternal recognition of preg. at 15-17 d
  - FF &/or EED
    - . Heat stress incr. EED & by affecting spermatogenesis, also incr. FF



Diagnosis:

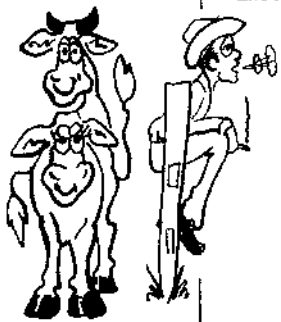
- **Evaluate heat detection**
  - **Milk progesterone level** to see if cow is in heat
- **Evaluate breeding technique**
- **Herd problem (multiple cows)**
  - **Bull or AI evaluation**
    - Physical condition, Semen quality, libido & ability to mount
      - . Trichomoniasis & campylobacteriosis
    - AI (artificial insemination) technique (semen quality): evaluate thawing, transportation, timing & deposition techniques
- **Individual problems - Cow**
  - Body condition - poor nutrition
  - Reproductive exam
    - . Urine pooling - FF (spermicidal)
    - . Cervical canal occlusion - FF
    - . Postpartum metritis - pus & debris - FF
    - . Endometritis & little pus - EED, not FF
  - **Uterine culture**
  - **Cytological smear**
  - **Endometrial biopsy**
    - Embryo flushing to DDx FF from EED
      - . Collecting unfertilized egg - FF
      - . Collecting degenerating embryo - EED
      - . Failure to collect either indicates oviduct blockage
  - **Ultrasound detection of pregnancy**
    - . Loss of embryo after detection w/ ultrasound confirms EED



- **Common causes:**
  - Poor heat detection (p 105)
  - Poor AI timing/technique
  - Malnutrition (p 266)
  - Follicular cysts (p 108)
  - Endometritis (p 111)
  - Campylobacteriosis (p 119)
  - Leptospirosis (p 121)
  - Trichomoniasis (p 120)
  - Inadequate involution of uterus
  - EED (early embryo death) (p 104)

See DDx chapter for less common & uncommon causes

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
AI/Breeding Unobserved estrus, Silent estrus Mk 1129; BM&S 848; IM 1527; C2T 781; C3T 776; Br 442; DC 343; R-M 153; S-UG 4; T 158 ***	• **False Hx of anestrus** (failure to cycle) - **90% cycle normally** - Only 10% truly anestrus - **Only 60% detected** on 2/d checks • Reasonable excuses for missing estrus - Silent estrus - Short duration of estrus in middle of night - Extreme environmental heat (don't show estrus) • **Estrous cycle** 21 days (18-24 days) - **Estrus, receptivity of 18 hours** - Ovulation 10-14 hours after estrus - 24-48 hours post estrus endometrial hemorrhage (90% of heifers & 50% of cows, no relationship to conception) - Diestrus 15 days (6-25 days) - Lifespan of sperm 24 hours - Lifespan of ova 6 hours	• **CS of estrus** - **#1 "Standing heat"** (willingness to stand while being mounted) - **Riding other cows**, more **common at night** than day (betw. 6 PM - 6 AM > 6 AM - 6 PM) decr. in hot or cold weather & during milking & feeding. Number of mounts/hr 2-8 - Homosexual behavior - Restlessness, bellowing - Reduced milk production - Relaxation & congestion of vulva - Clear, stringy mucous from vulva - Rifling of tail head, hair loss from being ridden • **CS of poor heat detection** - **Prolonged intervals** from calving to 1st breeding > 70-80 days - Prolonged interval betw. services - Insemination intervals of < 18 or > 25 days - **Record of progressive ovarian changes, but no record of observed estrus** - **> 15% cows open** at pregnancy check - Anestrus after service (m/ not be pregnant)	• **Eliminate other causes of anestrus** (pregnancy, pyometra, mummification) • **Establish if cycling or pregnant** - **Progesterone in milk** indicates cycling or pregnant . Hi progesterone in luteal phase, suspect bad detection of estrus - **Rectal - CL ≥ 1"** (2 cm) indicates pregnant or cycling **Rectal palpation** • Locate cervix, hook dors. intercornual lig. & flip tract into pelvic cavity - Palpation of ovaries & uterus Day 1: F (1"), CL absent or small, UT pits on pressure Day 2: ovulation depression Day 3: nothing, UT m/b endometrial bleeding Day 4 & 5: CH soft 0.5-1"; UR Day 6-17: **CL** 1"; F 1"; UR Day 18-21: CL small; F; UT F = Follicle CL = Corpus luteum CH = Corpus hemorrhagicum UT = Uterine tone UR = Relaxed uterus	• **Twice daily observation by experienced person still best** - **Teaser bull** (pg 107) - **Heat detectors** - still require observation . Glued to tail head, change color when crushed when mounted • **Accurate records** • Palpated CL - **Watch for estrus over next 2 wks** or - **Lutease® (PGF2a)** brings into heat by lutealizing CL . **1 shot:** Estrus in 3 day (2-5 d) after injection .. CL must be > 7 d old .. No effect on fertility .. ↑ observation in 2-5 d for standing heat .. Or insemination at 80 hrs (if no standing heat by then) will get 80% . **2 shots 11-12 days apart**, better than 1 because will bring all into heat .. Inseminate cattle 80 hrs after last injection or if standing heat .. Can be used to synchronize large number of animals at same time • **Insemination** betw. middle of estrus to 6 hours after estrus - If observed in estrus in morning - inseminate in afternoon of same day - If observed in afternoon, inseminate following morning



Management - Miss estrus, 12-16 hr estrus
CS: Long calving intervals, > 15% Open, Cycling
Dx: Hx, CS, Exam, Records
Tx: 2/d observation, Palpate ovaries, Heat detectors

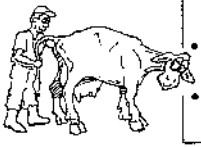
Pregnancy Diagnosis

Pregnancy diagnosis

C3T 126, 144; DC 349; R-M 121; VC/T 234

***

- **Early & accurate Dx important economically**
  - 25% that are bred & don't return to estrus are not pregnant
  - Predict parturition date
  - Separate pregnant from nonpregnant
  - Beef herd Dx & cull nonpregnant before winter feeding period



Presentation:
- Enlarged abdomen
- Udder enlargement about 4th month of pregnancy
- SQ edema of udder, teat & abd. wall in last 1-3 wks of gestation
- Mucous from vulva last 2 months of pregnancy

- **Dairy cows (AI)**
  - Rectal palpation at least **35 days** after AI
    - . CL always present in pregnancy (also in mid estrous cycle) on side of gravid horn
    - . ↑ in size of horn, accumulation of fetal fluid - 28 days
    - . 4 positive signs of pregnancy
      - .. 1. "Membrane slip", chorioallantoic membrane - 30-35 days
      - .. 2. Amniotic vesicle - 30-35 to 70 days; 3. Placentomes 65-70 days
      - 4. Fetus 65-70 days (not felt at 35 days)
  - Milk progesterone assay - Collect 21-24 ds after breeding
    - . Low level indicates nonpregnant (95% accurate)
    - . Hi level possible pregnancy (75% accurate); inaccuracies usually due to EED or cystic ovaries)
    - . More useful in determining nonpregnancy than pregnancy

Beef cattle are palpated later; those not pregnant are culled
- CL always present in pregnancy
- Placentomes: 65-70 days
- Fetus 65-70 days earliest, but maybe out of reach
- Uterine artery to gravid horn enlargement - 90 days (fremitus/pulsation)

Natural breeding & AI AI (Artificial insemination)

C3T 121, 799; Br 454; R-M 162, 383

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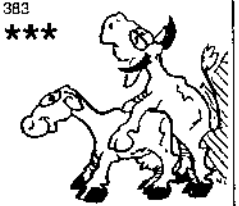
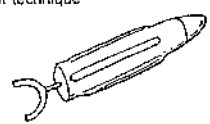


- **Calving interval economic goal**
  - Beef cows: 12 month calving interval
    - . Beef cow must calf every 12 mo in a defined calving season or are culled
  - Dairy cattle: 12-13 month calving interval
    - . Managed to maintain high level of milk production
    - . Cows that don't conceive or conceive too late are culled
- **Natural breeding**
  - Most beef cattle are bred naturally (95%)
- **AI (Artificial Insemination)**
  - **Dairy cows** - most are bred by AI (75%)
  - **Some purebred beef** AI'd once & then put out w/ a "clean up" bull (to get those not pregnant)
- **Cow categories**
  - Pregnant cows
  - Postpartum anestrus cows (calved w/in last 45 ds, time for involution & return to estrus)
  - "Open" cows to be rebred
    - . **35-50 d** to be rebred for a 12 mo calving interval
    - . 285 days gestation
    - . 45 d postpartum period (before back in estrus)
    - . Excessive "days open" - 90% due to failure of heat detection

- **Timing of AI**
  - **AM-PM rule: insemination** between middle of estrus to 6 hrs after estrus
    - . If observed estrus in morning - inseminate in afternoon of same day
    - . If observed estrus in afternoon, inseminate following morning
- **Factors affecting AI fertilization rates**
  - Maintain semen at -130° C or lower at all times (prevents recrystallization)
  - Inseminator expertise: place semen in uterus (junction of cervix & uterine body) quickly w/ minimal trauma to cervix & endometrium
  - AI fertilization rates of 90-100%, similar to natural breeding possible w/ proper technique
  - Average 60-90 day nonreturn rates - 70%



Anestrus, Prolonged luteal function

Mk 1127; IM 1528; C3T 810; Br 478; BM&S 979; R-M 208; T 247

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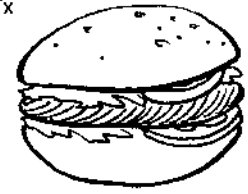
- Presentation: anestrus
- **Persistent elev. progesterone** > 1 ng/ml in all
- Causes: pregnancy, mummified fetus, pyometra, luteal cyst

- **Pregnancy:** Dx: Fetal membrane slip, Amniotic vesicle, Placentomes, Palpable fetus
  - Tx: Let calf, seldom unwanted pregnancy Unwanted pregnancy PGF_{2a} betw. 7-150 ds, PGF_{2a} + dexamethasone (20 mg) beyond 150 ds

- **Fetal mummification/maceration:** Dx: Palpation of dried, leather-like fetus, No fetal membrane slip, No placentomes, Full term & no abdominal swelling
  - Tx: PGF_{2a} injection, fetus usually expelled in 3 days; Manual removal if not expelled in 4 days

- **Pyometra:** Dx: No positive signs of pregnancy, Uterine enlargement, Vaginal discharge m/b

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Freemartinism, Twinning Mk 673; C3T 302, 310; IM 1530, 1757f; BR-hb 630; BR 109, 1627; Br 153; BM&S 973; Pic 163 **	• **Female born co-twin to a male, causing it to have a defective genital tract** - Anastomoses of placental circulation to the twin fetuses - Male differentiates 1st & transfers X-Y antigens which inhibits development of ovaries - 90% of female twins are freemartins - Single freemartin if male lost after 30 days of gestation	• **Anestrus female** • Small vulva 	• **Rectal** (breeding age animals) **- Hypoplasia of tubular genital organs** - Hypoplastic ovaries • Small animals (rare) - Small glass speculum . Short vagina (rarely extends past urethral opening) • **Karyotype** suspect female - male cells found 	• No Tx • **Cull** 

Teaser Bulls

R-M 375; S-T 267, 270; S-O 540; S-UG 27

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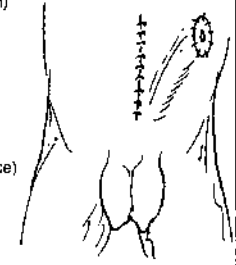
- **Bulls sterilized or made unable to achieve intromission**
- Used to identify cows in estrus, esp. w/ AI program in beef cattle
  - Mount cows in estrus & thus identify them (if someone is watching)
- **Prevent ejaculation** (Vasectomy, Epididymotomy, Urethrotomy)
  - Both vasectomy & epididymotomy allow intromission & possible spread of diz
  - Check sperm content before utilizing
- **Prevent insertion** (Suture penis to abd. muscles, Penile deviation)
  - Prevents spread of venereal diz
- Problem: bulls lose interest & need to be replaced in time

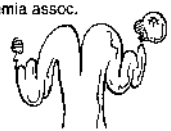
Vasectomy: - remove 1" of vas deferens
- Ejaculate at least 3 times before using as teaser (examine for sperm)

Epididymotomy - quick
- Stab tail of epididymis & w/ pressure protapse tail
- Cut off tail w/ scissors
- Check semen in 3 months to see if reunion has occurred

Penile deviation
- Want a bull that has bred cows, usually older, success rate better
- Circular incision (3" diameter) around preputial orifice
  - Circular skin incision (3") in flank region (just caud. & lat. to prepuce)
  - Make SQ tunnel from flank to base of scrotum
  - Drag prepuce through tunnel
  - Suture prepuce to surrounding circular incision edges
  - 6 weeks of rest afterwards
- Can combine w/ removal of tail of epididymis or vasectomy



Ovary

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Ovarian hypoplasia IM 1530; C3T 782; VC/T 302; BR 975; Br 152; S-O 588	• **Sporadic** • **Autosomal recessive trait** • Partial or complete; unilateral or bilateral 	• Anestrus • Sterile • Subfertile 	• **Rectal palpation** - Ovaries: cord-like thickenings to bean-sized - Uterus: cord-like to near normal size	• None • Cull  **DDx** • Nonfunctional ovaries & anestrus from - Malnutrition - "Debilitating diz"
Oophoritis IM 1532; BM&S 976	• Inflammation of ovary • Cause: Traumatic manipulation, enucleation of corpora lutea, attempts to drain ovarian cysts & ascending infection from uterus; Ovarian abscess (colic)			
Cystic ovarian diz, COD, Nymphomania, Buller cow Mk 874; C3T 774; C2T 779; IM 1520; BR 908; T 243; Br 451; BM&S 975; DC 345; R-M 243; VC/T 293, 298; Pic 165 *** 	• **Due to failure of ovulation** • **> 2.5 cm (> 1")** structure on ovary • Persists ≥ 10 days in absence of CL • **Follicular cysts** - thin walls, simple, multiple or multilobular on one or both ovaries • **Luteal cysts** - single unilat. structure w/ thick walls - More common in high producers - Jerseys & Guernseys predisposition • Rare in beef cattle • Cause: unknown - Low gonadotropin or ovarian dysfunction - Retained placenta - Metritis & hypocalcemia assoc. - Hereditary 	• **Anestrus** (70-80%) • **Nymphomania** (intense estrus) 20-30% - Constant or freq. estrus - Short interestrus intervals • Long standing cases - Relaxation of pelvic lig. - Prominence of tail head - **"Buller" cows**, masculine characteristics: crested neck (follicular cysts) 	• **History, CS** • Rectal - **Cyst-like structure (blister)** - **Flaccid uterus**  • Lab - Low plasma progesterone conc. - Milk progesterone high = luteal cyst  **DDx:** • **Cystic structures** - Normal preovulatory follicle . Uterus endematous - **Developing CL** (1st wk) . Repalpate to DDx • **Enlarged ovaries** - Salpingitis (p 109) - Hydrosalpinx - Oophoritis (p 108) - Ovarian abscesses - Ovarian neoplasia - Cysts of fimbria • **Hx: short interestrus** - Poor estrus detection (p 105) - Oxytocin adm. for milk letdown	• **Induce luteinization of cyst** & establish normal estrus - **hCG** (human chorionadotropic hormone) . Normal cycle in 3-4 weeks - **GnRH** (gonadotropin-releasing hormone) estrus in 18-23 days - **PgF2a + GnRH** . Reduce time of next estrus from 18-23 ds to 12 . Give PgF 9 days after GnRH - Manual rupture is archaic Tx (hemorrhage & adhesions sequela) • Spontaneous recovery common • **Cull**   **Prevention:** • **GnRH** 12-14 days after calving reduces prevalence of COD • Breed to daughters of low COD cows • Cull daughters of hi COD cows

Follicular or Luteal cysts
CS: Anestrus or Nymphomania, "Buller" cows
Dx: Hx, CS, Rectal cysts
Tx: Luteinize (hCG, GnRh, PgF_{2a})

Ovariectomy, "Spaying"

Mk 674; S-UG 99; VC/T 385

- Indicated
  - Pathological ovaries
  - Beef up young
  - Prolonged, uninterrupted milk production if done at height of cow's milk production (5-8 weeks postpartum)
  - Stop fertilization (don't have to worry about dystocia, etc.)

Feedlot mass "spaying" (can do many in a short time)

- Done in chute
- Lt. flank, knife to cut through skin & ext. abd. oblique muscle
- Twist hand through int. abd. oblique & peritoneum
- Grab both ovaries & snip off w/ scissors
- Ligation of ovarian stumps unnecessary
- Close abdomen w/ several interrupted "through & through" sutures

Midline in tiny calves

- Similar to cat
- Bringing ovaries to incision site (just cranial to udder)

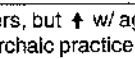
Older cows w/ larger vagina

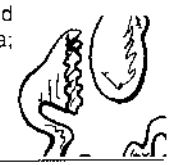
- Epidural anesthesia
- Incision through vagina & peritoneum dors. to cervix
- Incision dilated w/ fingers until hand in abd.
- Pull ovary into vagina
- Remove w/ ecraseur
- Careful not to involve small intestines
- Vaginal incision is not sutured

Ovarobursal diz, Ovarian hemorrhage

C3T 782; IM 1532

- Adhesions between ovary & fimbriae (mild to severe), uncommon in heifers, but ↑ w/ age, hemorrhage of ovulation. Acquired infection (mycoplasm) or trauma (manual enucleation of corpora lutea [archaic practice assoc. w/ Tx of anestrus or pyometra; prostaglandin Tx has replaced this practice])
- **CS:** Infertility - prevent entrance of ova into uterine tube, Rt > lt ovary
- **Dx:** Difficult: rectal m/ find some; US, Exploratory in valuable cows
- **Tx:** If unilat. palpate & breed when ovulation on unaffected side; Surgical removal of unilat. affected ovary





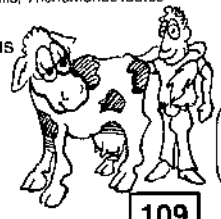
Salpingitis

C3T 782 C2T 789; IM 1532; BR 908; Br 453, DC 340; VC/T 319; Pic 166

**

- **Uterine tube inflammation**
  - Enlargement of uterine tubes
  - Bilateral or unilateral
- Causes:
  - **Following uterine infections**
    - Necrotizing & granulomatous salpingitis
    - *Actinomyces (Corynebacterium) pyogenes, Mycobacterium tuberculosis, Brucella abortus*
    - Mild infection, *Campylobacter fetus* sp venerealis, *Trichomonas foetus*
  - Sequela to ovarian manipulation
  - Sequela to aggressive irrigation of uterus
  - Inappropriate estrogen hormones

- **Infertility**



- **History (Hx), Clinical signs**
- **Rectal**
  - Mild, m/b missed
  - Insert fingers into ovarian bursa & roll tube betw. fingers & thumb
- **Exploratory laparotomy**, or peritoneoscopy
- Embryo recovery indicates 1 or both tubes patent

- **Usually unsuccessful**
  - Sexual rest in valuable animals
  - Uterine lavage (like when harvesting embryo) m/b therapeutic

Prevention:

- Prevent ovarian trauma (rupture of cysts or corpora lutea)
- Avoid excessive irrigation of uterus by infusion (100 ml in heifers or 150 ml in cows are excessive volumes)
- Avoid estrogen administration
- Prevent uterine infections

Uterine tube inflammation
CS: Infertility • Dx: Rectal
Tx: Unsuccessful • Px: Poor

DDx:

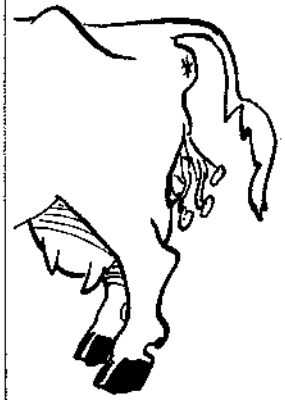
- Ovarian neoplasia
- Parovarian cysts
- Cystic ovary (p 108)

Pyosalpinx: segmental accumulation of pus in uterine tubes

Hydrosalpinx: accumulation of serous to mucoid fluid in uterine tube; sequela to chronic salpingitis

Uterus

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Retained placenta (RP), **Retained fetal membranes** Mk 696; C3T 769; C2T 773; IM 265, 1533; BM&S 980; BR 45, 1490; Br 428; DC 315; R-M 237; VC/S 313; T 237 ***	• Cotyledonary placenta • Retained fetal membranes **- Normally expelled in 3-8 hrs** **- Retained if >12 hrs** • Dairy >> beef • 10% retained placenta expected • **Predisposing factors** - Male calves (larger) - Twins - Dystocia - Short or long gestations - Uterine torsion - Dexamethasone induction of labor • Cause: - Fetal cotyledons fail to separate from maternal caruncles - Early calving (short gestation retards separation) • **Minimum effect on fertility** (in absence of 2° repro. abnormalities) • **Less of an emergency than in mare**	• **RP usually obvious** • **Majority: no serious CS** - Transient ↓ in appetite & milk production • Malodorous discharge & unsightly tissue hanging out • 4-10 days usually dispelled (w/ caruncle necrosis)	• **RP hanging out vulva** (partial retention m/ occur w/o anything hanging out)	• **Spontaneous in 4-10 days** • **No Tx is best Tx** • **Control intrauterine bacteria** - Manual removal, only if gentle traction w/ rotation works - **Contraindicated** if CS of septicemia (sequelae: septic metritis & peritonitis) . Many owners insist on removal • **IV calcium solution** - if 2° to hypocalcemia • Intrauterine oxytetracycline m/ reduce metritis, but pyometra m/ occur anyway, m/ reduce fertility - Doesn't expel placenta (necrosis does that) • **Intrauterine ABs** if septic metritis • Oxytocin of questionable value (doesn't reduce RP in normal calving or dystocia) • Prostaglandins of little value **Prognosis:** • **RP > 12 hrs** more likely to develop metritis • RP w/o metritis - minimal effect on fertility **Prevention:** • **Difficult** (sporadic & uncertain of cause) - Vaccine against infec. causes abortion (associated w/ RP) - Adequate dry period 6-8 weeks - Balanced ration (Ca⁺, K⁺, Vit. A & E & Se) • **Injection of Selenium & Vit. E** one month prior to calving in selenium defc areas



CS & Dx: Retained if > 12 hrs, no emergency
Tx: Let fall out
Px: Minimum effect on fertility

DDx:
- Prolapsed uterus (p 112)
- Prolapsed urinary bladder
- Prolapse of part of GI tract through genital rupture
- Prolapsed rectum or vagina
- Twin fetuses

Uterine infection

Endometritis, Metritis, Pyometra

Mk 692; C3T 770, 784; C2T 775; IM 1535; BR 908; T 227; Br 428, 455, 544, BM&S 967; DC 309; R-M 227: Pic 171

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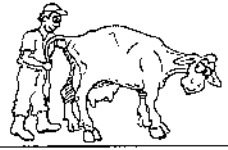
- **Endometritis** (endometrial inflam.)
- **Metritis** (inflam. of ALL layers of uterus)
- **Pyometra** (accumulation of pus in uterus)
- Causes:
  - Abnormal parturition
  - Gross contamination
- Organism:
  - ***Actinomyces pyogenes***
    - . Gram neg. anaerobic bacteria
  - Coliforms, *P. aeruginosa*, hemolytic Strep., gram pos. & gram neg. anaerobic bact.
  - Synergism betw. *A. pyogenes*, *Fusobacterium necrophorum* & Bacteroides spp to incr. severity
  - Clostridium occasionally - severe gangrenous metritis
  - **Penicillinase bact.** have little effect on fertility, but stop effectiveness of pen. when treating other bacteria
- **Predisposing factors:**
  - **Retained membranes**
  - Abortion, concurrent systemic diz, malnutrition, fat cow syndrome (over fed during dry period), imbalance of Ca & P in feed, contaminated envir. during calving, dystocia & manipulation
- **Beef < dairy** bec. calf in uncontaminated pasture
- Involution of uterus:
  - Normally occurs by 10-15 days (before that can't be safely retracted)
  - Fluid abnorm. after 14-18 days
  - Involution & repair by 40-50 days

- **Repeat breeder**
- **Endometritis normal**
  - 2-4 weeks after calving
  - Slight opacity to estrual mucosa
  - Slightly enlarged uterus
  - Abnormal if fetid or cow develops other CS
- **Metritis**
  - **Discharge from genital tract**
  - Septic metritis
    - . Fever, depression
    - . Anorexia
    - . Laminitis
  - Decr. milk yield
  - Unwilling or unable to rise

- **Pyometra**
  - **Few clinical signs, not ill**
  - **Anestrus** main complaint (persistent CL)
  - M/b vaginal discharge

- Complication of metritis
  - Peritonitis (perimetritis)
  - Laminitis

- History, CS (clinical signs)
- Vaginal speculum
- **Rectal palpation**
  - **Palpate fluid** (lochia or pus in uterus)
    - . Fluid abnormal in uterus after 14-18 days
    - . Friable & swollen uterus (be careful)
  - CL if pyometra
- **Microbiology**
  - **Bacterial cultures** - don't support or deny Dx of endometritis (contamination problem)
  - Used for sensitivity & tentative Dx
- Lab
  - Severe degen. lt. shift, toxic immature WBCs & marked incr. PMNs
    - . Associated w/ toxemia & sepsis



Lochia (normal vaginal discharge during 1st or 2nd wk postpartum) m/ look bad, but normal unless has a foul odor
R. Youngquist knows some funny words!

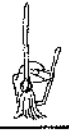
Cause:
- Barriers to infection of endometrial cavity (uterus)
  - Vulva, vestibular sphincter & cervix
- Parturition breaches all borders, also service & AI, exam, or defect in a barrier
- Bacteria that enter usually transient & eliminated during puerperium (period of confinement after labor)

- **Systemic prostaglandins** shortens estrous cycle, no milk withdrawal time
- **Systemic ABs** minimum of 3 days
  - Trimethoprim-sulfadoxine, tetracyclines, ampicillin (esp. if concurrent urinary tract infec.) & penicillin
- **Oxytocin** (evacuate uterus before local infusion) usually effective w/in 48 hours of parturition, if not, siphon
- **Uterine infusion** (large volumes [250- 500 ml] before involution
  - **Oxytetracycline** in povidone every 2nd day + penicillin systemically if fever
  - Observe withdrawal times in dairy cows
  - 1° pathog. *A. pyogenes* & gram neg. anaerobes
- **If not systemically ill, spontaneous recovery common**
- **Chronic**
  - Antibiotic infusion
  - Disinfectants (Lugol's sol.) causes necrosis of endometrium & regeneration m/ improve potential

Pyometra - destroy CL
- **PgF2a** (TOC) (3-9 days evacuation of uterus in most cows)
- Sexually rest 30 days (allows endometrium to heal)

Prognosis:
- Endometritis - Good if doesn't progress
- Pyometra - Good, esp. if Dx & Tx early

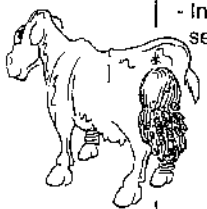
Prevention:
- Good nutrition
- Sanitation at calving & early postpartum period



RP, Metritis worse than endometritis
CS: Metritis: Genital discharge, Sepsis • Pyo.: Anestrus
Dx: Hx, CS, Rectal
Tx: Metritis: ABs, Infusion, Oxytocin • Pyo: PgF & Rest

Uterus

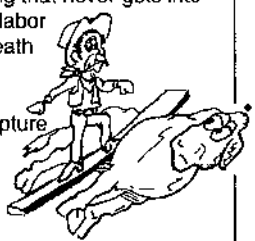
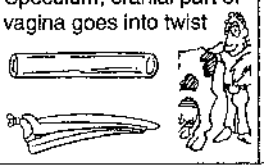
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Uterine prolapse Mk 700; VC/T 317; IM1542; BR334; DC 324; S-O 584; S-UG 90; S-T 285 ★★★	• **Most common in dairy cow** & sow • **Invagination of uterus & protrusion from the vulva** • Uterine eversion: invagination of uterine horn, not protruding from vulva • **Just after calving** usu. w/in a few hrs - M/b up to 5 ds after calving • **Assoc. w/ hypocalcemia** (results in lack of uterine tone & delayed involution) - Dystocia - Vaginal prolapse before calving - Inversion of uterine horn, not seen from outside	• **Protrusion of uterus from vulva** - Fresh initially - In few hrs tissue edematous & enlarged - Contaminated tissue (m/b lacerated & traumatized) • Straining, abd. pain, restlessness • Anorexia, ↑ pulse & RR • **Parturient paresis** common in dairy • **CS transient** usually • Sequelae - Shock - Hemorrhage (wt. pulls uterus away from blood supply) - Thromboembolism	• **CS obvious** • **Hypocalcemia** • ↑ PCV 	• Tell owner to protect uterus until you reach farm - **Restrain animal** (prevent trauma or escape) - Clean & protect uterus • **Tx hypocalcemia** before replacing • **Epidural anesthesia** m/b • **Replace uterus,** mild pre-surgical scrub of uterus. Remove placenta if easy, if not leave, standing or on sternum w/ legs pulled out behind to tilt pelvis - **Easy if fresh,** alternately massage dorsal & ventr. aspect to move cervical end in, then invert prolapsed horns - If enlarged & edematous, vigorously & carefully massage emollient ointments (or sugar) into edematous tissue - Clenbuteros (reported to relax uterus) - **Check for complete inversion:** Insert hand or wine bottle to tip of horns or fill w/ water then siphon off • **Oxytocin** (stim. contraction) after uterus replaced • **Antibiotics** • **Caslick's** (temporary closure of vulva w/ heavy sutures m/ or m/not be necessary to keep uterus in) • **Amputation** if severely traumatized or if impossible to replace, 1st check that bladder or sm. intestine not inside 



Dairy cow, After calving, Hypocalcemia
CS & Dx: Uterine prolapse
Tx: Clean, Replace, Oxytocin, ABs

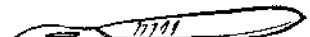
Prognosis:
Favorable - generally if no serious damage
• No tendency to recur at subsequent parturitions

Prevention & control
• **Balanced ration** (hypocalcemia)

Uterine torsion C3T 735; DC 322 ★★	• **Unrecognized & untreated commonly** • **Torsion of gravid uterus can result in death**	• **Unproductive straining at parturition** • Cow calving that never gets into 2nd stage labor • Sudden death • Sequela Uterine rupture 	• **Unrecognized** • Rectal palpation - Broad ligament crisscrossing abdomen (Dx) - Counterclockwise usually (viewed from behind) . Usually 360°, Cervix included • Speculum, cranial part of vagina goes into twist 	• **Try to manually untwist** - If open cervix, grab 1 appendage of calf & start swinging to get it over - Not usually successful • **"Plank & roll"** - cast cow toward torsion (counterclockwise usually so down on lt. side) - Plank placed in paralumbar fossa, someone stands on plank for weight - Ropes on legs, roll cow over - Hope body moves around uterus • **C-section** if "plank & roll" doesn't work - Opening on side uterus torsed toward - Once in abdomen . Try to correct torsion prior to C-section . If can't, do C-section when torsed .. Incision through broad lig. being very careful to keep hold of uterus . Then untwist uterus when calf is out 

Unrecognized & Untreated
CS: Straining at parturition, Sudden death
Dx: Hx, CS, Rectal palpation
Tx: Try to untwist: "plank & roll", C-section

Uterine tears
• If occur during parturition, need to be sutured, usually abdominal so must do abd. approach to repair tear



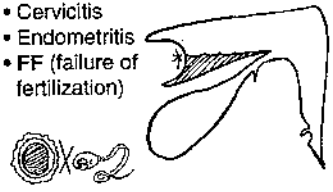
"Windsucker", Pneumovagina
IM 1546; S-O 559
***

• Occasional cause of infertility in cows (#1 cause of infertility in mares), Aspiration of air & contamination into vagina. Trauma to vestibule or vagina
• **CS:** Infertility
• **Tx:** Caslick's surgery + sexual rest, partially sew vulva closed

"Urine pooling" Urovagina
IM 1546; R-M 345; VC/T 311
***

• **Urine accumulating in vagina**
• Cause:
- Obstetric trauma that alters conformation (cranial vagina falls below pelvic floor)
- Delayed uterine involution
• **Toxic to sperm**
• ± Continuous or only occurring during estrus

• Cervicitis
• Endometritis
• **FF** (failure of fertilization)



• History (FF), CS
• Palpation/visualization

• **Some spontaneously correct during involution**
• **Surgical correction**

OB trauma, Urine toxic to sperm
CS: Infertility (FF)
Tx: Time or Sx

Tumors of uterus, cervix, vagina (IM 1544; DC 321, 333) • Rare; Uterine, cervical or vaginal tumors; Leiomyomas (benign), Lymphosarcoma m/ affect uterus (Px: Poor)
Large tumors must be differentiated from normal fetus, placentomes & abscesses

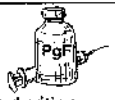
Segmental aplasia, White heifer diz
IM 1544; R-M 1921, 476
*

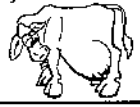
• Sporadic occurrence in all breeds of cattle, failure of part of genital tract to develop; cranial parts usually develop (ovaries, uterine tubes & uterine horns), m/ only be imperforate hymen (endometrial secretions can't escape)
• **CS:** Anestrus (fluid accumulation interferes w/ PGF release & luteolysis of CL)
• **Dx:** Rectal palpation
• **Tx:** Slaughter; Tx only for imperforate hymen (Sx incision releases fluid accumulation)

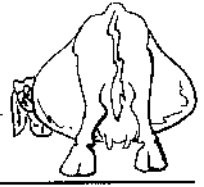
Hermaphrodite (BR 1653; BR-hb 632; Br 152) • Both true & pseudohermaphroditism • Tx: None, sterile, salvage

Hydrops amnii & hydrops allantois, Fetal dropsy
BR 306; Br 479; DC 323; R-M 207; S-J 1113
**

• Edema of chorioallantois, extreme accum. of fluid; Cause unknown, ankylosis of calves
• **CS:** Enormous abd. last trimester (both flanks & ventrum), dyspnea, death • Sequela: rupture prepubic tendon
• **Tx:** Prostaglandin F_{2a} (TOC) to induce parturition, Corticosteroids & oxytocin to hasten uterine contraction after parturition
• **Px:** Extremely guarded, recurrence uncommon, no prevention





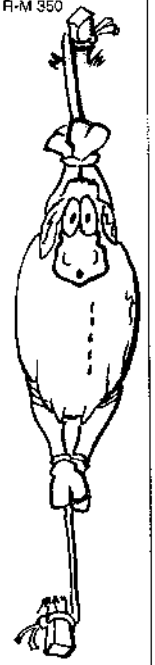


Rupture of prepubic tendon, Prepubic desmorrhexis (DC 326; Pic 45, 167)
**
• Cause hydrops allantois, excessive weight on abdomen

C-Section in the Cow

C-section, Cesarean, Cesarotomy, X-section

IM 262; S-O 594; S-T 318; S-UG 85; R-M 350



- **Considered in dystocia:**
  - Non-relaxed cervix (despite massage), uterine laceration, torsion (nonresponsive to repositioning) or rupture, oversized fetus (small heifer, large fetus), dead fetus (fetotomy 1st choice), monster fetus (fetotomy 1st choice), Hydrops allantois, irreducible malpresentations, severe placental hemorrhage near term, severely prolapsed vagina
  - Contraindicated as not economical - mummified fetus
- **Cesarean section or fetotomy is a judgement call**
  - Advantage of C-section: Possibility of live fetus, easier on small heifer
  - **Fetotomy requires experienced surgeon**

Procedure for all approaches

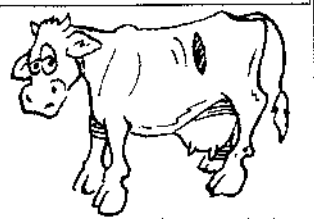
- Surgical prep., restraint, anesthesia
- Open through either flank or ventral abdomen
- Explore abdomen & judge condition of uterus
- **Grasp limb & pull tip of uterine horn out of incision**
- **Cut over greater curvature** (avoid cutting cotyledons)
- **Deliver fetus** using sterile OB chains (in hospital use overhead hoist)
  - OB chains on legs if cranial presentation
  - Pull head out if posterior presentation before OB chains on limb
  - **Enlarge incision if danger of tearing uterus**
  - Remove live calf slowly as in normal birth, do not tear umbilicus until breathing, stable & pulsation of umbilical artery subsides
  - Break umbilicus a distance away from body so can mummify & protect from infection
- Avoid spilling contaminated fluids (normal fluids are OK)
- Assess placenta - if loose remove, if not, leave in
- Insert uterine medication
- **Connell or Cushing suture** (inverting) closure of uterus (bury knots)
  - Start from prox. side bec. involuting uterus m/ pull quickly back into abd.; 2nd row m/ be required or contraindicated (infec.)
- **Replace uterus in normal position**
- **Close abdomen**
- **Oxytocin** for involution & milk let down
- Antibiotics if worried about contamination
- **Treat calf's navel w/ iodine**

- **Sequelae of C-section**
  - Risk of contamination & peritonitis
    - Normal uterine fluid - no harm
    - Dead (emphysematous fetus) causes problems
  - Adhesions principle determinant of success rate (breeding after C-section)
    - To prevent need atraumatic Sx, lavage & bury knots

Approaches

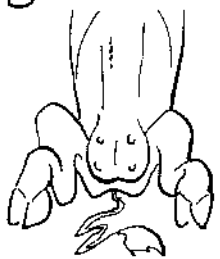
1• Standing C-section

- Limited to easily restrained cows that can stand throughout procedure
- Contraindicated for emphysematous fetuses (peritoneal contamination)
- **Left paralumbar vertical incision**
  - Easiest of all C-section approaches
  - Limits postsurgical herniation
  - Minimum restraint & assistance



2• Dorsal Recumbency

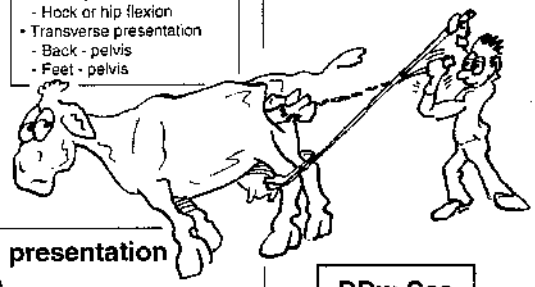
- Right or left paramedian (disadvantage SQ abdenal veins) or Midline
  - Advantages - Ease of exteriorizing uterus. Betterdrainage of fetal fluids (important if emphysematous fetus), Fetotomy easy to perform, easier to suture uterine tears, easier to sell since incision not as visible
  - Disadvantages - dehiscence of ventral incisionmore likely, Not as easy as left standing, rumentympani & breathing compromised, requires more assistance, usually takes longer

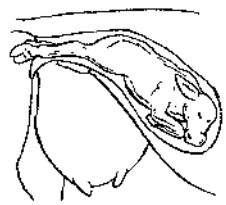


3. Lateral recumbency

- **Oblique incision best,** Incise just inside fold of flank
  - Advantage - directly over uterus, Done in lateral recumbency, has all of other dorsal recumbency advantages

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Dystocia IM 260; BR 109, DC 319; R-M 123, 214; VC/T 323 ★★★	• **Difficult delivery** - When either of 1st or 2nd stages of parturition are prolonged or not progressive • **Major cause of calf losses** (34-50%) - Highest in heifers calving for 1st time • **#1 fetus too big for maternal pelvis** - Inversely proportional to replacement heifers age & size • **Three Stages of Parturition** - Stage 1: characterized by restlessness & occas. colic signs . Ends when cervix dilates & fetal parts enter birth canal - Stage 2: Delivery of calf . Passage of unbroken amniotic sac through vulva . Abdominal press stimulated by fetus in birth canal . Survival of 8 hours after start of stage 2 is possible - Stage 3: expulsion of fetal membranes • **Normal presentations** - Cranial: both forefeet into canal w/ nose atop forelimbs - Caudal presentation can be delivered w/out assistance, but likelihood of stillbirth increases - All others considered abnormal	• **Dystocia**/indications for intervention - 1st stage longer than 6 hrs - Stage 2 for 2 hours & progress is slow or absent - Amnionic sac hanging out of vulva for 2 hrs • **Sequelae:** - **Retained placenta:** not passed w/in 8-12 hours of delivery - Uterine rupture Abnormal postures/positions • Cranial presentation - Dorso-ilial, dorso-pubic - Retained forelimb - Elbow lock - Foot-nape - Dog sitting - Head deviation - Poll in pelvis • Caudal presentations - Hock or hip flexion • Transverse presentation - Back - pelvis - Feet - pelvis	• Hx, CS • **Examine birth canal** - Clean & disinfect perineum - Copious lubrication - Evaluate dilation of cervix & size of pelvis if feet not out of vulva (uncommon) • **Fetus alive?**: withdrawal when nose, mouth or interdigital space pinched; blink when eyes touch, contracts anus when finger inserted, pulse in umbilicus or heart beat • Position: dorso-sacral • Presentation - Manipulate dist. limbs to differentiate cranial & caudal presentation . Both fetlock & carpus flex same way –> forelimbs . Fetlock & tarsus flex opposite –> hindlimbs - Finding head or tail also cluest • Posture: how limbs & head are arranged	• **Lubrication!** • Dilating birth canal m/b necessary, lubricate, insert & interlock hands, stretch canal • **Mutation** (manually correct presentations, positions & postures) - Repulsion & reposition to cran. or caud. presentation • **Forced extraction** (standing or right lateral recumbency) - **Cranial presentation** . Loop of chain above fetlocks & half hitch below fetlocks, pull . "Walk" shoulders by alternate traction on limbs (no: C-section) . Stimulate breathing when head & forelimbs out (clean & tickle nose w/ straw) . Rotate 45-90° when head & forelimbs out to prevent hip lock . If hip lock, stop, allow calf to breath .. Repel & re-rotate, pull calf towards dam's side .. Once hip lock broken, calf slides out - **Caud. presentation** (more complications) . Rotate 45-90° to pass hips, pull dorsocaudally . Once hips pass, re-rotate & calf usually slides out .. Extract as quickly as possible to prevent asphyxiation - Fetal extractors: if maximum of 3 traction assistants not available . Do not use a jeep or "come along" to a tree! • If can't mutate enough for traction - C-section - deliver live baby - Fetotomy - cut in pieces & deliver pieces, requires expertise .Better than C-section if dead, emphysematous & the dam toxic





Difficult delivery, 3 stages, Cran./caud. presentation
CS: 6 hrs - 1st stage, 2 hrs - 2nd stage
Dx: Alive? Presentation
Tx: Mutation, Extraction, Fetotomy, X-section

DDx: See page 291

Vagina - Vulva

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

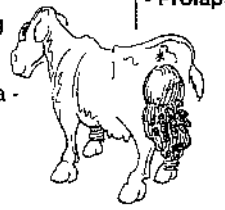
Vaginal prolapse

Mk 701; DC 332; R-M 346; S-O 584; S-UG 73

***

- **Most common in cow & ewe**
- **Late pregnancy, before calving**
- Older cows (usually multiparous) 5-10 yr
  - Hereford & Ayrshire predisposed
- Hereditary
- **Caused by straining**
- **Predisposing factors**
  - Relaxation of pelvic canal near parturition
  - Incr. abd. pressure
  - Intra-abd. fat
  - Rumen distension
  - Constipation
  - Prolapse itself, causing more straining

- **Prolapse of vagina**
- **Continued straining**



- **Sequelae:**
  - Occlusion of urethra - bladder rupture
  - Uterine prolapse after parturition

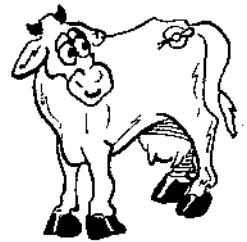
- **Prolapse of vagina**

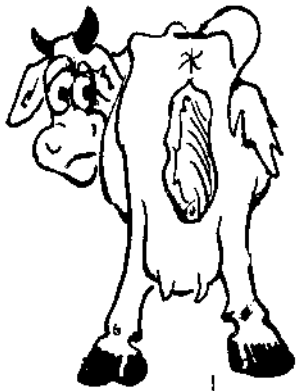
- **Replace:**
  - **Epidural**
  - Wash w/ soap, water & rinse
  - Apply gentle pressure to reduce edema

- **Topical antibiotics**
- **Retain vagina in position**
  - Suture vulva (small opening so can still urinate) or
  - Anchor vagina in pelvic canal (see box)
  - Cervicopexy (see box)
- **Remove retaining devices** during stage 1 of parturition
- Once calved, replace retaining device until next breeding

Prevention & control:

- Do not breed predisposed cows
- Do not over feed in last trimester
- Suturing or retention devices (Johnson prolapse retainer) prevent intermittent prolapse
- Alcohol epidural (long acting to prevent straining)





Straining before calving
CS & Dx: Prolapsed vagina
Tx: Clean & Replace, Anchor vagina

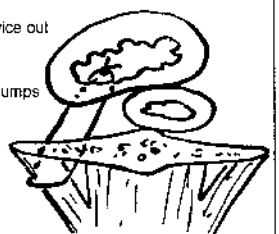
Stabilize vagina

Anchor vagina through sacropelvic ligament

- Stay sutures, Johnson button, or plastic disc on tube w/ trocar
- Take device into vagina
- Locate point above palpable internal iliac artery
- Push device through vaginal wall, sacrotuberous lig. & skin
  - Not likely to be far enough to get ischiatic nerve
- When trocar tents skin, inject bleb of local anesthetic & nick
- Tie sutures or connect outer button w/ pin
- Cow can calf through this
- After parturition, remove
- Sometimes cows really strain & m/ rip device out

Cervicopexy - cadillac method

- 2 lateral branches of prepubic tendon to bumps on pelvis (iliopectic eminence)
- Catheterize prior
- Take bite of ventral os of cervix & through side of prepubic tendon done blindly, watch out for vessels!
- Braunamid® suture, long length
- M/b done postpartum on cows you want to keep



Vulvitis & Vaginitis

Mk 701; C3T 773; C2T 778; IM 1546; BR 908; DC 330, 334; VC/T 312

***

- **Trauma**
  - Breeding
  - Parturition
  - Exam
  - Relief of dystocia
- Pneumovagina
- Bacteria nonspecific (*A. pyogenes, E. coli*, Staph. & Strep.)
- Fertility usually not compromised

- Moderate discharge - mucopurulent
- **Congestion & edema of vagina**
- Tenesmus
- Anorexia

DDx:
- Vaginal discharge
  - Retained placenta (p 110)
  - Rabies (p 144)

- **Hx, CS**
- **PE**

- **Mild: spontaneously recover**
- Lavage of vagina (dilute aqueous antiseptics)
- Epidural (↓ tenesmus & aspiration of air)
- Caslick's (prevent aspiration of air m/b)

Prognosis:
- Good - mild
- Necrotic - m/b fatal

Granular vulvitis

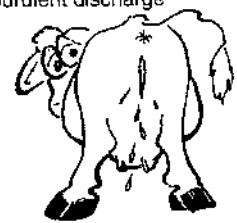
Mk 701; C3T 773; IM 1547; BR 908; DC 335; VC/T 311

**

Papules in vulva
Spontan. cure

- **Irritants or antigens** - nonspecific hyperplastic lymphatic response
  - Similar hyperplasia of lymphatic follicles of bull's penis
- Young animals - antigens
- Cause:
  - IPV
  - Most unknown - idiopathic
  - *Ureaplasma diversum*

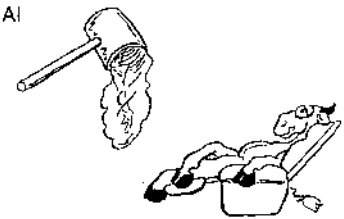
- **Raised granules or papules** of vulvar mucosa
- Mucopurulent discharge



DDx:
- **IPV** (Infectious pustular vulvovaginitis) (p 117)

- **Granules & papules**

- **Subside spontaneous** (10-14 ds)
- Sexual rest - 2 weeks
- AI



Infectious pustular vulvo-vaginitis (IPV) IBR

Mk 730, C3T 773; IM 253; BR 1061; VC/T 311

**

IBR
Spontaneous recovery

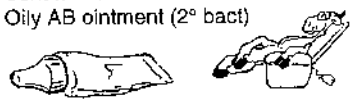
- **Herpesvirus I** (IBR - infectious bovine rhinotracheitis)
- Resp. & genital forms of diz
  - Rarely occur together
  - Abortion rarely follows genital form
- Transm. by coitus & mechanical
- **Spreads rapidly through herd**
- Genital carriers

- **Mucopurulent discharge**
- **Pustules to ulcers** (3 mm) vulva & penile mucosa
- Infertility due to reluctance to breed
- Fetid, watery, reddish discharge
- **CS subside in 10-30 days** (transient immunity)

DDx:
- Granular vulvitis (less severe) (p 117)

- **Hx & CS usually**
- **M/ do virus isolation**

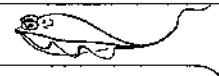
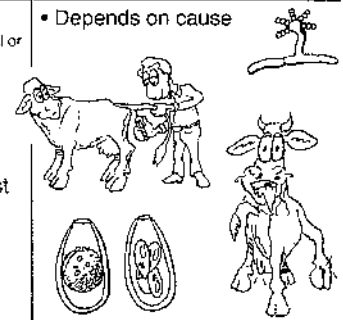
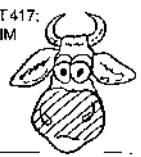
- **Spontaneous recovery** (Tx not required)
- Sexual rest 3-4 weeks
- Oily AB ointment (2° bact)



Prognosis:
- **Excellent**

Prevention:
- IBR vaccine before outbreak (not effective in face of outbreak)
- AI, need to be free of virus

Abortions

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Abortion Mk 1142, BR 893; VC/T 343; C3T 787 ★★★ 	• **Expulsion of dead or nonviable fetus** • **Most undiagnosed.** 25% diagnosed by labs from submitted fetuses • Causes same, no matter location, but % of each varies • Called **infertility** when unnoticed abortion (EED) • If fetus retained - autolyses (opaque cornea, soft mushy organs, gelatinous bloodtinged SQ & placenta)	• Infertility • Abortion  **Causes of abortion (See pg 291)** • IBR (p 118) • *A. pyogenes* (p 119) • Misc. bacteria (p 119) • Campylobacter (p 119) • Salmonella (p 259) • Mycotic • Anomalies/genetic • BVD (p 121) • Brucella (p 122) • Listeria (p 122) • Leptospira (p 121) • EBA (p 123) • Dystocia (p 115) • Ureaplasma (p 123) • Bovine protozoal (Neospora) (p 123) • Toxoplasma (p 123) • Mycoplasma (p 120) • Sarcocystis (p 120) • Bluetongue (p 120) • Trauma, AI, twins, poisonous plants, etc.	**Diagnose** • Hx (vaccine history, herd problem, AI or natural, PM of fetus, placenta, etc.) • CS • Lab: m/b justified economically - Whole fresh fetuses - Placentas - Serology: paired sera best 	• Depends on cause 
Infectious bovine rhinotracheitis IBR, "Rednose" Mk 730; C3T 417; VC/T 348; IM 571, 908, 247; BR 1061; B&R 847; T 250 ★★★ 	• **Common cause of abortions** • **Bovine herpesvirus 1 (BHV 1)** • Multiple system diz - No effect on future breedings • **Older carriers** - 1° reservoir for younger animals (latent infection in neural tissue) - Contagious - aerosolization of viral particles - Found in semen, nasal secretion, resp. secr. • Recovery = long term immunity • **IPV virus different from abortion virus** 	1) Upper resp. tract, calf > 6 mo. "Red nose" 2) 2° bronchopneumonia (Pasteurella) 3) Enteric form (calves) - Intractable diarrhea **4) IPV** - Infec. pustular vulvovaginitis • Abortions not a sequela • No permanent infertility **5) Abortion** • **Infertility** if early infec. causing EED (early embryonic death) • **Abortion storms ($)** 25-60% of herd • Initial infec. to dam 20-50 ds earlier • **Seldom CS in dam** • Rarely fetus to term, but stillborn or die in 1st wk of life • No effect on future breedings **6) Encephalitic - calves** 	• **Hx (previous infec. of dam)** • Autolysis of fetus obscures gross lesions • Histopath: focal necrotizing lesions of tissue • Viral isolation from placenta or fetal lung (pos. in 1/3 cases) • Viral antigen in fetal tissue 	• **IPV** - Stop breeding until CS gone • Abortion **- No lasting effect on fertility**  **Vaccines:** • **MLV - IM** feedlot cattle - Can cause abortions - Ok for young & open females • **MLV - IN** (intranasal) - breeders - Will NOT cause abortions - Faster immunity? - Will not interfere w/ passive immunity

Feedlot/Resp. form; Breeders/Abortion, Carriers
CS: Abortion storms - Weeks after Dam infec.
Dx: Hx, CS, Histopath, Viral isolation or Antigens
Tx: No effect on fertility • Vaccinate

Actinomyces pyogenes

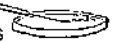
VC/T 357

***

- **Common cause of abortions**
- Maternal bacteremia presumed cause

- Abortion at any stage of gestation
- Most in late gestation
- ± Retained placenta

- Isolate in nearly pure culture from abomasal contents of fetus



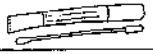
- R/O other causes
- Placentitis & bronchopneumonia most common lesions

- Control measures impractical because of sporadic nature of abortions

Misc. bacterial abortion ***

IM 1558, 1560; Br 471; VC/T 357

- Miscellaneous bacteria together cause a high percentage of abortions; Salmonella spp., *C. fetus, E. coli, Pasteurella* spp., *Pseudomonas* spp., *Haemophilus* spp., *Serratia marcescens*, Staph. spp., Strep spp., *Yersinia pseudotuberculosis*. Maternal bacteremia presumed cause
- CS, Dx & control similar to *A. pyogenes*



Bovine Campylo-bacteriosis, Vibriosis

Mk 660; VC/T 354; CST 512; 784; C2T 789; IM 1556; BR-hb 349; BR 822; Br 462, 471; DC 337; R-M 263, 296

***

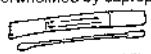
- ***Campylobacter fetus***, sp. ***venerealis***
  - Obligate parasite of bovine genital tract, doesn't affect other species
  - Gr. neg. curved or spiral rod, motile (polar flagellum)
- **Infertility** (EED - early embryonic death)
  - Sporadic abortions at 5-6 mo
- **Transm. - coitus**
- **Subclinical carrier bulls** (crypts of prepuce)
  - Pregnant carriers
- Pathophysiology
  - Vaginal infec. (mucopurulent endometritis), also cervix, uterus & uterine tube
  - Persists for 2-3 mo
  - Prevents conception or EED (early embryonic death), resorption
  - Irregular returns to estrus
  - Less common abortion up to 6 mo of gestation
- Problem in replacement heifers

- 1° **temporary infertility** (esp. replacement heifers) due to EED
  - **Repeat breeders**
  - **Irregular estrus cycles**
  - Hi % returning to estrus
  - **Prolonged interestrus periods**
  - Calving late (bec. repeat breeders)
  - Thin, overworked bull
  - Unobserved herd: 1st clue different stages of pregnancy
- 2° **abortion, low incidence** (< 5% of herd) anytime (between 4-6 months)

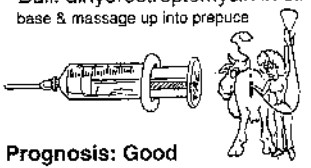
DDx (impossible w/o lab):
- **Trichomoniasis** (p 220)

- **History, CS**
- **Demonstrate or isolate org.**
  - **Darkfield microscope**
  - **Curved rod w/ darting corkscrew motility**
  - Culture from placenta or fetal abomasal content

  - Inoculate **Clark's media** (immediately)
  - 72 hr for results
  - No contamination or overwhelmed
- Mucus agglutination test
  - Survey herd for infection
- Swab & culture penis & preputial mucosa
  - Difficult bec. org. slow growing & often overwhelmed by saprophytes



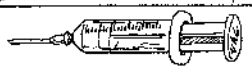
- **Recover spontan. w/in 5 mo**
  - Resist reinfection then
- Intrauterine infusion hastens recovery
- **Vaccinate infec. cow**, booster in 6-8 weeks, booster 1 mo before breeding (dramatically improves fertility)
- Bull: dihydrostreptomycin in oil base & massage up into prepuce



Prognosis: Good
- Spontaneous recovery & resist reinfection
- Severe endometritis or salpingitis infertility m/b permanent

Herd infertility (EED), Carrier bulls
CS: Repeat breeders, Low % abortion
Dx: Isolate
Tx: Recover in 5 mos. • AI, Vaccinate

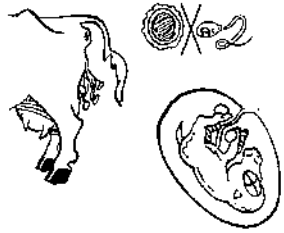
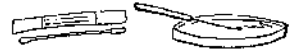
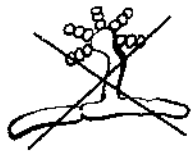
Prevention



- **Vaccination**
  - Heifer - killed bacterin 1 month before breeding, booster 2 weeks later (IM) ≥ 4 wk (Mk)
  - Bull vaccinate w/ 2.5 X cow dose repeatedly to prevent carrier state
    - Need 6 negilar cultures to be considered free
  - Revaccinate bulls & cows annually
  - AI from noninfected bulls or treat semen w/ streptomycin

- **AI** (artificial insemination) exclusively controls diz by preventing transm.

Abortion

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Trichomoniasis Mk 662; C3T 608, 785; C2T 790; IM 1565; BR 796; Br 472; DC 338; R-M 275, 298; VC/T 358 *** 	• ***Trichomonas foetus*** (protozoan) • **Transmissions venereal** - Colonizes vagina, cervix, uterus & oviduct **- Bulls are mechanical carriers** • Pathophysiology - Doesn't interfere w/ conception - **EED** (early embryonic death) freq. w/in 1st 2 months of infection - 2-6 mos period of immunity to reinfection - Clearance in 3 mo., rarely past 6 months - Resistance not permanent, 1-1.5 yrs susceptible again **- Infections in bulls over 4 year-old permanent** **- Young bull resistant to infec.**	• **Infertility (EED)** **- Hi nonpregnancy rate** **- ↑ calving interval to 100 days** • **Occasional pyometra** (uncommon sequela to early embryonic death) • Early occasional abortion (3-4 months gestation) between 5-30% - Placenta retained or expelled • Infection after 4 months of gestation usually deliver live calf 	• **Hx (bull breed cows)** • **Clinical signs** • **ID & culture trichomonads** - Preputial smegma cultured from fornix of prepuce - bulls - Cervicovaginal mucus, uterine exudate, placental fluids or fetal abomasal contents **- Diamond's media** - Transport at ambient temp., out of sunlight, not refrigerated & promptly to lab **- Microscope** (size 10 X 15 µm) . 3 anterior flagella & undulating membane . Jerky, rolling motion  **DDx:** • Campylobacter (p 119) - No pyometra, ID organism	• **Cull infected cows** or give 3 months sexual rest  • Bull - Imidazole (ipronidazole), Dimetridazole, Metronidazole (Flagyl®), not officially approved  **Prevention:** • **AI** reduces, but doesn't eliminate chance of infection • Young bulls in natural breeding helps reduce incidence - Divide herd into groups old & new, different bull for each - Test old bulls repeatedly  • **Quit breeding for 3 months** 
"VD", Bulls/Permanent infection **CS: Infertility (100 d calving interval)** **Dx: ID (Diamond's media)** **Tx: Cull or Rest • Prevention: AI**				
Mycotic abortions VC/T 361; C3T 525; IM 1563; BR 1160; Br 472, 764; R-M 298 *** 	• ***Aspergillus fumigatus*** - #1 fungal abortion in mare & cow (Mucor, Allescheria, Coccidioides, Histoplasma, Candida, Cryptococcus) • **Sporadic** • Winter more common • **1-10% of abortions** - regional • Predisposing factors - Stable confinement - Fungal contaminated feed - Steroid or AB feeds • Ingestion or inhalation - Granulomas in lungs or stomach - Hematogenous spread to placenta	• **Abortion 3rd trimester** (often near term) - 1 or 2 animals in herd • Dam no clinical signs  • Sequela: - Retained placenta	• **History, CS + fungus** (from specific lesions)  • Postmortem **- Thick, leathery placenta (placentitis)**, esp. chorioallantois (maternal side) **- Fetal bronchopneumonia** - Ringworm-like lesions (2-25%) • **Fungal culture** of placenta, abomasal fluid or lungs • **Histopath.**, KOH wet mount from skin scrapings	• **Fertility not affected**  **Control:** • Reduce exposure to fungus
Sporadic, Fungal **CS: Last trimester; RP** **Dx: Leathery placentitis, Culture** **Tx: Fertility OK**				

Bovine viral diarrhea abortion

Mk 166, C3T 432; IM 1552; Br 492; R-M 254, 298

***

- Multisystem viral diz, GI, Resp., Abortion, Mucosal disease
- **Togavirus**
  - **Cytopathic & noncytopathic biotypes**
  - Immunosuppressive w/ predispose to other diseases
- Transmission:
  - Direct contact w/ sick or carriers
  - Indirect from contaminated material
  - **Transplacentally**
- Worldwide
- 1° yearlings, up to 2-3 years
- Pathophys. of repro. infections
  - **Prevents conception** if infec. at breeding
  - **1st 4 months = fetal death & abortion** (usually)

1. Majority - usually unobserved systemic infect.
2. Classical BVD - Gastroenteritis
   - Diarrhea, oral erosions, recover in 10 ds
3. Respiratory signs w/ fever, recovery in 10 ds
4. **Transplacental infection**
   - **Abortion** - any stage (1-4 months)
   - **History of repeat breeding** (no conception, fetal absorption)
   - **"Weak calf" syndrome**
     - **Dysplastic lesions**
     - Teratogenic effects (cerebellar hypoplasia, ocular defects) or
     - Persistently infected & develop **mucosal diz** later if infection w/ cytopathic BVD virus
5. Mucosal disease (chronic BVD)
   - 100% fatality, Oral erosions, lameness
6. Cerebellar hypoplasia (see pg 124)

- **Difficult to Dx**
- **Mummified** or
- **Dysplastic lesions** (cerebellar hypoplasia or dysplasia, hydrocephalus, microencephaly, retinal dysplasia, spinal dysmyelinogenesis, brachygnathia, alopecia, bronchiolar dysplasia, arthrogryposis, cataracts, optic neuritis)
- Mild nonsuppurative placentitis (histo)
- Viral isolation from fetal tissue seldom successful
- FA, ELIZA

Prevention & control

- Vaccination - good for dairy herds & beef cow/calf operations, questionable for feedlots
- **Screening & elimination** of persistent infected cattle (see box)

Prognosis: Breeding back: good to excellent

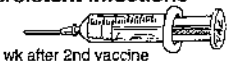
MLV vaccine (MLV):
- Not in pregnant cows - fetopathic

Killed vaccine (KV):
- Most recommend killed vaccine at 6 mos
- Only use killed in pregnant

Vaccination schedule:
- 1° immunization 2 wks - booster; Annual revaccination

Breeding farm
- Vaccinate all breeding-age cattle
- Vaccinate nulliparous heifers between 6 -14 mos twice (KV)
- Goal is to reduce losses, not eliminate infec. agent

Screening to eliminate persistent infections
& clean up a herd



- Vac. all over 6 mo twice (KV)
- Serum neutralization titers on all 1 wk after 2nd vaccine
- Seronegative or low titer cattle (naive or persistent shedders) - virus isolation
- If virus present, but no antibodies, they are persistent shedders - cull
- Repeat in calves less than 6 mos when they reach 6 mos old
- Test calves born 7 to 8 mos after screening program

Multisystem diz
CS: Repro (Abortion, Repeat breeders, Weak calf)
Dx: Mummy, Dysplastic
Control: Vac. , Screen & Eliminate •Px: Fertility OK

Leptospiral abortion

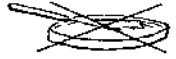
Mk 353, 356, 1085; VC/T 352; C3T 541; IM 1558; R-M 267, 298; VC/T 352; T 267; Br 471

***

- ***Leptospira harjo*** #1 (*L. pomona, L. canicola, L. icterohemorrhagiae*, etc.)
- Abortion weeks-mos after infection
- Abortion < 10%
- Ubiquitous, persistent infections
- Shed in urine & pass through abraded skin
- **Public health** - infective to man, caution

- **Calves** - fever, anorexia & dyspnea
- **Older cattle**
  - Drop in milk production for 10 ds
  - **Infertility**
  - **Abortion** (4 mos to term, esp 3rd trimester)
  - **Birth of weak or dead calf**
  - Icterus, hemoglobinuria, agalactia, fever
  - Frequent abort w/o CS

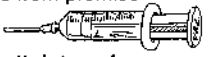
- **Difficult**
- **FA of fetal kidney**
- **Maternal serology**
- Bacterial isolation impractical



DDx:
- Brucellosis (p 122)
- Campylobacteriosis (p 119)
- Trichomoniasis (p 120)

- **Abortion outbreak**
  - **Vac. herd w/ killed bacterin**
  - **Oxytetracycline** (m/b limited to sick cows in dairy herd)
  - Isolate aborting cows & Tx w/ streptomycin if not destined for slaughter
- Remove aborted fetuses & placentas from premise

Vaccine:



- **6-12 month intervals** or more frequent in bad areas

Infertility, Abortion outbreaks
Tx: Vac (MKV) in outbreak, Oxytetracycline
Vaccine 2-12 mos

Abortion

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Brucellosis, Bang's disease, Contagious abortion, *Brucella abortus*	• ***Brucella abortus***, gram negative coccobacilli • **Contagious diz** (spreads rapidly in unvaccinated herd w/ many abortions) - **Cows only abort once** • Cattle >>> sheep, goats, pig & dogs • Incidence in USA 0.2% in 1989; 2/3rds of USA Brucella free • **Transmission** - **1° Ingestion** - Organism shed in milk & uterine discharges - Venereal transm. rare - Brucella m/ enter body through mucous membranes, conjunctiva, wounds or even intact skin - Mechanical vectors (including man) • **Public health - undulant fever**	• **Abortion** (after 5th months) - Stillborn calves • Reduced milk yield • Healthy cow • Bulls: seminal vesicles, ampullae & epididymides & testes • Sequelae - Retained placenta - Mastitis - Lameness	• **Culture of *B. abortus*** from fetal lung, abomasum, or placenta, uterine or mammary secretions • Standard plate or tube serum agglutination test **- 1:100 agglutination** - unvac. - 1:200 for vaccinated animals	• **Report to State & Feds** • **Quarantine & slaughter** all reactors in herd diagnosed positive to brucellosis
Mk 667; C3T 551; C2T 791; IM 1555; BR 787; Br 471, 476; DC 482, L 117; R-M 271, 296 **	**Contagious abortions, ingestion • Reportable** **Dx: Culture, Agglutination test** **Tx: Screening, Quarantine & Slaughter** **Prevention: B free, Strain 19 vac., Rt ear tag**	• **Screening tests:** - **BRT** (Brucella milk ring test) every 3-4 mo to ID infec. dairy herds - Pool milk of herd & test - Positive herds - individual blood tested on all - **Reactors - slaughtered** - **MCT** (market cattle testing): for nondairy herds - Collect sera from cattle for slaughter at markets - Reactors are traced to herd of origin & all animal tested - **Reactors slaughtered** • **Brucella free herds** maintained by BRT (dairy) & MCT (nondairy) & slaughter **- 2-3 successive neg. tests** given at regular intervals		**Protect herd:** • Replacement - vaccinated calves or nonpregnant heifers • If must, have pregnant & fresh cows from brucellosis-free areas (seronegative) • Isolate replacement for ≥ 30 d & retest before adding to herd **Vaccination:** • *B. abortus* **Strain 19** to calves 4-12 mos old incr. resistance to infec. (not complete) - Small % develop antibodies that m/ persist for yrs. (confuses Dx tests) - USDA tattoo in rt. ear of vaccinated animals
Listeriosis abortion	• ***Listeria monocytogenes*** - Gram pos. pleomorphic coccobacilli • Placentitis & septicemia kill fetus (often retained several ds before expulsion) • Sporadic < 15% • Winter • **Spoiled silage** (elev. pH enhances growth of org.) • **Public health** - aborted tissues infect people (handle w/ care)	• **Encephalitis or abortion - adults** • **Septicemia - fetuses & neonates** • **Late abortions** in last 2 mo of gestation • Fever • Depression • **RP** (retained placenta) • Endometritis • **Often dam shows no signs** **PH** • Infectious to man	• **Hx** (history), **CS** • **Culture** readily from aborted fetus (serovars 1 & 4b) • **Impression smears** (Gram pos. pleomorphic coccobacilli) • Postmortem: - Autolyzed fetus - Gray-white hepatic foci (0.5-1 mm) - Placentitis & endometritis (histo.)	• **Transient, tends to resist reinfection** • **Tetracyclines** (m/b in rest of pregnant animals in herd) • Segregate aborting animals • Remove fetuses & placentas from premises Prevention: • **Avoid spoiled silage feeding**
C3T 580; IM 1559; BR 660; Br 471; R-M 296; VDT 356 **	**Spoiled silage** **Culture**			

Epizootic bovine abortion (EBA), Foothill abortion

Mk 654; C3T 455; IM 1554; BR 794; DC 339; R-M 260, 298; VC/T 363

- **Late abortn. in foothills of Calif.**
- Cause: ? Not *Chlamydia psittaci*
  - **Tick** (*Ornithodorus coriaceus*) vector
  - Calif, Nevada, Oregon, N. Mex.
- Pathophysiology
  - Transformation & proliferation of fetal lymphocytes & macrophages
  - IgG & IgM elevated
  - **90 days for fetal lesions** (so no abortion if infection after 6 months)

Cause? Tick vector
CS: Late abortions, Weak calves, Cows OK
Tx: Chlortetracycline reduces abortion

- **Late abortion (6-7 months)** or
- **Weak calves** (especially from heifers)
- **Cows show no CS**

- Hx (tick), CS
- Postmortem:
  - Enlarged spleen
- Pathologic exam of fetus
  - ↑ **IgG in fetal blood**
- **No serologic test because agent unknown**

- **Chlortetracycline** reduces rate of abortion

Chlortetracycline

Prevention & control:
- Seldom abort in subsequent pregnancies
- No vaccine
- Expose heifers to tick before breeding
- Change from spring to fall calving (reduces exposure to tick only during last trimester)

Ureaplasma

IM 1562; BR 906; R-M 282, 298; VC/T 357; T 282

- Infection common, abortion - rare; Small bacterium w/o cell walls, ability to hydrolyze urea differentiates it from mycoplasma, Assoc. w/ granular vulvitis & abortion in cattle
- CS: Reddish nodules in vulvar mucosa, mucopurulent discharge, not systemically ill, abortions
- Dx: Isolate organism from genital mucosa, placenta or fetal stomach or lung
- Tx: Tetracycline infusions of uterus

Sarcocystis

IM 1563; BR 1191; VC/T 361

- **See Gen 261**; *Sarcocystis cruzi* (protozoan); carnivore - cattle life cycle, ingestion of carnivore feces, protozoa usually encysts in muscle w/ no CS
- CS: most cattle infec. w/ sarcocystis, but show no CS of infection; depression, anorexia, wt. loss, lameness, hair loss, death; abortions in late gestation
- Dx: FA of protozoa in cotyledon or caruncle
- Tx: none developed • Control: keep canine or feline feces away from cows, & don't let carnivores eat placenta, aborted feces or ruminant carcasses

Toxoplasmosis (IM 1568; BR-hb 461, BR 1201; Br 246) • *Toxoplasma gondii* (protozoan) Abortion not well documented in cattle, not important cause, but a rule out

Mycoplasma

IM 1560; DC 336; R-M 289; T 288

******

- ***Mycoplasma bovis***, *Mycoplasma bovigenitalium* common in genital tract. Transmission m/b venereal
- CS: Infertility more common than abortion, Abortion, Granular vulvovaginitis, endometritis
- Dx: Placentitis & fetal pneumonia, **Isolate Mycoplasma** from genital tract, milk, placenta or fetus (not diagnostic), Eliminate other causes
- Tx: **Tetracycline or Tylosin**

Chlamydial (VC/T 364; R-M 279) • Experimental abortion, not sure if natural

Bluetongue (IM 1552; R-M 258, 298; VC/T 351) • Infection common, but fetal infection rare, if fetus infection - CNS teratogenic (hydroencephaly), fetal death, mummification or abortion

Bovine protozoal (Neospora) abortion

IM 1565; DC 339; VC/T 359

- **Newly recognized**, *Neospora* (protozoa similar to *T. gondii*), Major problem in California, 4-6 mo (3-9) of gestation, Transmission unknown
- **CS:** Sporadic, multiple or storms of abortions, Only clinical sign, Year round abortions, Occasional live calves w/ protozoal encephalomyelitis, CNS: dysfunction, limb paresis, unable to stand, BAR, m/ live several wks w/ supportive Tx
- **Dx:** Hx, CS, PM: Fetuses - autolyzed, Histopath of fetal brain
- **Tx:** No effective Tx • Control: Difficult bec. life cycle & mode of transmission unknown

Pregnancy Related Conditions

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
BVD - Cerebellar hypoplasia C3T 858; IM 1103; BM&S 1023 **	• See Gen pg 253 • BVD infec. of pregnant cows - 100-170 days - congenital cerebellar hypoplasia - 90-100 ds - abortion or stillbirth	• **At birth - "Weak calf" syndrome** • **Truncal ataxia** • **Opisthotonus** • **Base-wide stance** • Intentional head tremors • Hypermetria, hyperreflexia • Nystagmus or strabismus • Deficient menace response (not blind unless ocular malformation) • Other signs - corneal opacity, thymic atrophy, microphthalmia, retinal degeneration	• Hx, CS • BVD antibodies in precolostral blood	• **None** **Prognosis:** • **Grave** - rarely improves Prevention: BVD vac. (p 252)

BVD - Pregnant cow
CS: At birth - Ataxia, Wide-based, Tremors
Tx: None • Px: Grave

Bluetongue can also cause cerebellar hypoplasia

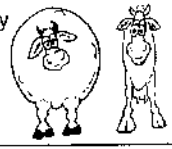
Miscellaneous CNS genetic conditions	• **See Neuro pg 135**, Cerebellar abiotrophy, Hydrocephalus, Inherited congenital myoclonus, Occipito-atlantal malformation, Dodder calves, Progressive ataxia, Spinal bifida, Cerebellar malformations, Arnold-Chiari Syndrome, Weaver Syndrome, Bovine familial convulsions & ataxia, Maple syrup diz, Inherited congenital myoclonus
Other genetic defects	• Disorders of hemostasis (pg 84); Pink tooth (pg 91); Heart defects (pg 79); Skin dizs (pg 191); Hermaphrodite (pg 113); Segmental hypoplasia of repro. tract (pg 113) Elso heel (pg 137); Freemartin (pg 107), Ovarian hypoplasia (pg 108)
Postparturient hemoglobinuria	• **See pg 88**; High producing dairy cattle 2-4 wks after calving; Cause: unknown, Hypophosphatemia • **CS:** Intravascular hemolysis => hemoglobinuria & anemia; icterus • **Dx:** Hx, CS, Red urine, Regenerative anemia, Low phosphorus levels in blood • **Tx:** IV fluids, Phosphorus supplementation • **Px:** Severely affected don't respond **P+**
Poisonous plants Br 473	• **See Tox pg 241: Abortions:** Locoweed, Wild tobaccos, Nitrate/nitrite poisoning, Pyrrolizidine alkaloid toxicity, Broomsnakeweed, Oak poisoning, Ponderosa pine • **Teratogenic plants:** Lupine & Poison hemlock (p 241) " Crooked calf diz" as in lupine toxicosis • **Zearalenone:** Rare; Estrogenic chem. (mold), Natural contamination of ear corn stored in cribs, Cattle more resistant than swine CS: Reduced conception rate

Fat cow syndrome

- **See GI pg 32**; Diz of fat dairy cows that have just calved (1-3 ds)
- **CS:** Anorexic, Severe ketonuria, Recumbency, CNS, Terminal tachycardia & coma
- **Dx:** Hypoglycemia, Ketones, Liver biopsy, if high lipid (> 35%) floats
- **Tx:** IV glucose, Oral propylene glycol, Results are poor
- **Px:** Poor • **Control**: don't allow to get fat during dry period

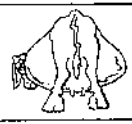
Ketosis, Acetonemia, Ketonemia

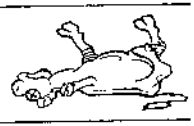
- **See GI pg. 33**; Diz of dairy cows at peak lactation (3 ds post calving, hi energy demand - low energy
- **CS:** Wasting & CNS
- **Dx:** Ketones, Tx response
- **Tx:** Glucose + steroids + propylene glycol + feed
- **Px:** Rarely die



Pregnancy toxemia

- **See GI pg. 32**; Rare diz of fat pregnant beef cows - no feed last 2 mo, twins (more common in sheep)
- **CS:** Recumbent & die before calving
- **Dx:** Ketonuria - fatty liver
- **Tx:** Too late usually, Induce parturition
- **Px:** Grave, most die



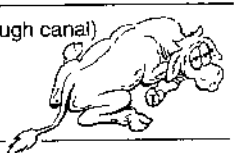


Postparturient paresis, Milk fever

- **See Card. pg. 148**; Adult high prod. dairy cows (Jerseys), 0-72 hr after birth, Drain of Ca to milk, Hypocalcemia (release of ACh at NMJ)
- **CS:** Early - Wobbly standing, bellowing, Downer cow (head turned to flank); Lat. recumbency as approaches coma
- **Dx:** Hx, CS, Lab analysis
- **Tx:** Watch postpartum for 72 hrs, Early IV Ca gluconate (SQ or IP) Repeat in 8-12 hrs, IV phosphorus
- **Px:** Untreated - coma die; Down > 48 hrs - myositis, m/ never be able to stand
- **Prevention:** Lower Ca intake during dry period (just hay) Vit. D, High doses of Ca 1 d before, at, & 1 d after calving

Calving paralysis

- **See Neuro pg. 137**; Obturator & sciatic nerves, Dystocia (calf damaging obturator & ischiatic nerves on way through canal)
- **CS:** Splay leggedness, "Splits", Recumbency w/ hind legs to each side
- **Dx:** Hx (just calved)
- **Tx:** Keep on firm ground, no slippery surfaces, Tie hocks together just prox. to calcaneus, Hope function returns



Downer cow

- **See Gen pg. 267**; Most common sequel to recumbency of parturient paresis, other causes: bone, muscle or nerve damage, Systemic illnesses, Trauma & lymphosarcoma, metabolic disorders 2° to milk fever
- **CS:** Unable to rise 24 hrs, "Creeping" or "crawling"; Nonalert downer cows
- **Dx:** R/O, Tx milk fever, Rectal exam, CK & AST; PM: degeneration of muscles & nerves of hindlimb
- **Tx:** Good footing, Retreat milk fever, Phosphorus, Stimulate to rise, If all fails - supportive care
- **Px:** Good if gets up (obviously) Many will rise w/in 2 wks if eating & drinking & good nursing

Bull — REPRODUCTION

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Penile hematoma, "Broken penis" *** C3T 797; BM&S 479; Br 502; R-M 356; S-UG 10; S-T 297; S-J 1042; S-O 538; Pic 158	• Most common injury in Bull • **Tearing of tunica albuginea** into corpus cavernosum - Transverse tear - Dorsum of penis at distal flexure - Peak thrust of coitus, corpus cavernosus pressure is 100X arterial pressure - **Explosion of blood** into surrounding tissue, damaging elastic tissue around penis • **Disease of inexperienced**, over exuberant male, catches penis, bending it	• Pain & stiffness • **Swelling just cranial to scrotum** • Dark purple prepuce • Sequelae: - **Prolapse of prepuce** - Abscess if infected - Damage to sensory nn. on dors. aspect, numb end of penis - Adhesions, restriction - Acquired vascular shunts between corpus cavernosum & dors. veins, erection impossible	• **Hx, CS: Swelling** • Paracentesis w/ large needle into clot gives biopsy	1• **Conservative Tx:** - Systemic antibiotics - Ice, hosing w/ water - Massage moving skin back & forth - **#1 sexual rest - 3 months** 2• **Sx: 1-2 days after injury** - **Remove hematoma** digitally - **Suture tear** - **2 months sexual rest** - NSAIDs - Antibiotics **Prognosis:** • **Guarded,** Dep on #1 size, abscesses, nerve damage, adhesions or vascular shunts
Torn tunica albuginea **CS: Swelling cran. to scrotum** **Dx: Needle biopsy** **Tx: Sexual rest, ABs, Ice; Sx**		**DDx:** • Laceration of prepuce		
Phimosis IM 1566; S-O 528; S-UG 38 **	• **Inability to protrude the penis**, Causes: sequel to injury & scarring (cicatrix formation), contusions, lacerations, abrasions, frostbite • **CS & Dx**: Inability to protrude penis • **Tx:** Minor injuries m/ resolve spontaneously; Hygiene: clean preputial cavity daily & infuse w/ hydrogen peroxide, Infuse oily antibiotics; Broad spec. ABs systemically; If prepuce prolapsed, protect w/ bandages & hold in place w/ purse string suture, Sx removal of scar tissue m/b necessary after healing complete • **Px:** depends on severity of injury			
Paraphimosis, Penile prolapse *** IM 1566; S-UG 43	• **Inability to withdraw penis into prepuce**; Causes: **trauma,** tumor, denervation, rabies • **CS & Dx**: Protruded traumatized penis, edema, swelling & balanoposthitis, Surface of penis dry, thickened & inelastic • **Tx:** Prompt Tx to reduce swelling & edema & return to prepuce, Freq. cleaning & oily AB soaked bandages, Support penis next to body, Return to prepuce as soon as possible, pack sheath w/ petroleum jelly to prevent adhesions • **Px:** Poor if can't retract penis in a few days			
Priapism	• Persistent erection w/o sexual arousal			

Preputial prolapse

Mk 672; C3T 797; IM 240, 1760t; T 141; BM&S 1187; R-M 363; S-UG 38; S-O 531, 529; Pic 158

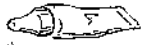
***

- **Pendulous prepuce**
  - Bos indicus, Zebu, Brahmas, Santa Gertrudis (common problem)
- Trauma (contusion &/or laceration)
  - Edema causes preputial prolapse
  - If attempt coitus, splitting on ventrum of prepuce

- **Collar of pink mucosa** hanging out
- Trauma exacerbates problem
- Trouble urinating if swollen

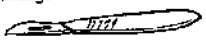
- Pink mucosa out prepuce
- Clean & evaluate for viability

- **Conservative Tx**
  - Clean w/ lanolin ointments
  - Push soft rubber hose (fits around penis) up into prepuce, push mucosa back
  - Bandage prepuce



- **Circumcision** (see box)

Circumcision - if traumatized & not viable
- permanent cure
- Done similar to rectal prolapse Sx
- Use squeeze chute
- Use ring block around prepuce
- Overlapping mattress sutures hold 2 layers together
- Cut off excess
- 2 mucosal edges apposed & sutured
- Place tubing around penis & bandage
- Leave bandage 10-14 days
- Sexual rest for 30 days



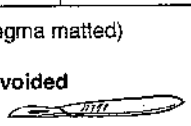
Pendulous prepuce, Trauma - Coitus
CS: Pink mucosal protrusion
Tx: Bandage, Circumcision

Balano-posthitis

C3T 797; IM 1568; Br 486, 502

**

- **Inflammation of glans penis (balanitis) & prepuce (posthitis)**; Causes: Trauma, **Hair ring** (smegma matted) around preputial orifice or penis, Herpes virus 1, **IBR/IVP**
- **CS & Dx: Stenosis of preputial orifice, adhesions betw. penis & prepuce, Pain, Copulation avoided**
- **Tx: Spontaneous usually; Symptomatic, Sexual rest, Sx removal of hair rings**



Penile deviation

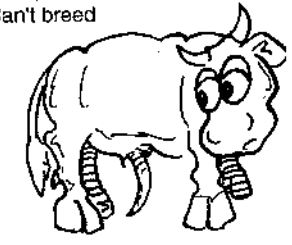
Mk 672; C3T 797; IM 240; T 141; BM&S 1181; R-M 359; S-UG 20; Pic 157

**

- **Dorsal apical ligament**
  - Fans out over dorsum of penis
  - Just dorsal to tunica albuginea
  - Normally causes ventr. bend & counter-clockwise spiral
- Deviation: if dors. lig. slips off to lt. & causes corkscrew appearance to penis during erection
- 3-4 year-old, highly fit bulls

Dors. apical lig., Adult bulls
CS: Spiral or ventr. deviation
Tx: Sx shorten lig. or Fascia lata graft

- Deviation of penis (ventral or spiral)
- Can't breed

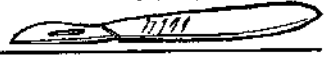


- Hx, CS
- Observe bull trying to breed unsuccessfully

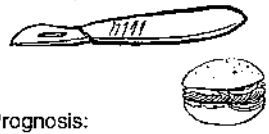
- Stabilize by suturing down dors. lig.
  - Usually not enough alone due to excessive force
- Shortening dorsal ligament
- Homologous graft of fascia lata betw. tunica albuginea & ligament

DDx:
- Persistent frenulum

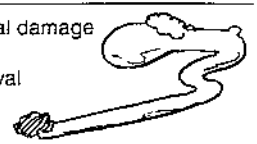
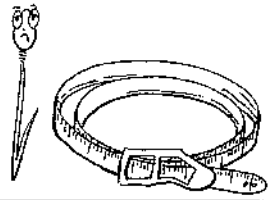
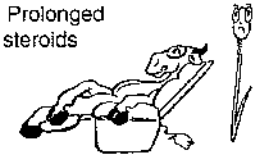
Warts, viral papillomas (C3T 798): See Skin pg 190; Freq. on penis, but not on prepuce • Tx: Surgical removal preferred over thermocautery (deep necrosis)



Male — REPRODUCTION

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Persistent frenulum ** Mk 673; Im 240, 1760t; Br 502; C3T 796; BM&S 1186	• Congenital fibrous band from tip of penis to prepuce • Highly hereditary - Few blood vessels in band • Inherited - recessive? **Congenital, Hereditary** **CS/Dx: Ventr. deviation of penis** **Tx: Cut; Cull in purebred herds**	• **Ventral deviation of penis** - Noticed when coitus attempted - Rarely is entrance accomplished 	• Hx (young) • Ventral deviation during attempted coitus **DDx:** • Penile deviation	• **Surgically cut band** • **Cull in purebred herds**  Prognosis: • Good - able to breed in 2 weeks

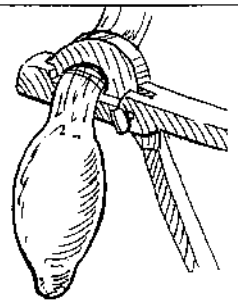
Dorsal laceration of penis (VC/T 796): m/ interrupt sensory nerve supply essential for intromission & ejaculation • Dx: Attempt to mate, scars • Tx: none

Tumors of penis & prepuce *** IM 1569	• Fibropapilloma most common, single or multiple, usually young bulls; Cause: papilloma viruses through epithelial damage • CS: small - none; Large: m/ prevent withdrawal of penis into prepuce, hemorrhage (friable) • Tx: Many spontaneously regress in a few months (most likely in bulls approaching 2 yr-old), Vaccines, Sx removal (recurrence common); Sx amputation • Control: Vaccinate 	
Testicular hypoplasia IM 1571, 1759t; BR-hb 631; BR 1627; Br 152, 504, 491; C3T 796 *** 	• Aplasia - rare (complete absence of 1 or both testicles) • **Hypoplasia** unilat. or bilateral, both scrotal or abdomenal testicles; Cause: transplacental infec. or intoxication, hormonal insufficiency, Zinc defc, impaired testicular descent, vascular disturbances, abnormal karyotype • **CS & Dx:** Small testicle; scrotal circumference normally at least 32 cm at 12 months old, ejaculates m/b azoospermia or low # of sperm w/ numerous morphologic defects • **No successful Tretment**	
Testicular degeneration, Heat injury IM 1571; C3T 795; Br 491, 504 ***	• ↑ **Temperature** (cryptorchid, ectopic testes, inguinal hernias), Systemic diz temporary infertility due to hi temp., Prolonged high environmental temp. + high humidity; Torsion of spermatic cord, scrotal edema, obstruction of epididymis, steroids • **CS:** Small testicles • **DDx:** Testicular hypoplasia (hard to DDx) • **Dx:** PE & semen exam; US, testicular biopsy last resort bec. of hemorrhage & pressure necrosis • **Tx:** Remove cause, Sexual rest • **Px:** If temporary, improved semen in 4-5 months	

Castration, Orchiectomy

R-M 373; S-UG 62; S-J 1062; S-T 289

- Common procedure in feedlot animals
- Animal standing in chute & tailed up for restraint
  - Skin incision
    - . Small calves: remove bottom third of scrotum w/ a scalpel
    - . Larger cattle: scalpel or Newburry knife incise from above testicle to distal scrotum
  - Pull out testicle surrounded by vaginal tunics (closed castration)
  - Emasculator high on spermatic cord
    - . **"Nut to nut"** of emasculators, make sure cutting edge is distal to crushing
    - . **Maintain crush for 1-2 minutes**
  - Leave wound to granulate in
- Emasculotome can also be used, it doesn't leave a wound



Cryptorchidism

IM 1571, 1759; BR-hb 632; BR 1653; Br 152; S-J 1065

- Most are located in SQ tissue near inguinal ring, occasionally testicle lies transversely in scrotum rather than in normal vertical position, true abdominal cryptorchidism is rare
- Tx: Abdominal cryptorchid: any laparotomy incision, locate testicle between inguinal ring & kidney

Testicular neoplasia

IM 1572

**

- **1° rare**, Interstitial cell (Leydig cell) tumors (don't produce hormones usu.), seminomas
- **CS:** Enlarged testicle, ↓ sperm count m/b, fertility m/ not be affected
- **Tx:** Unilat. surgical removal (wait until end of breeding season if semen quality OK)
  Bilateral: wait until semen quality falls to negate use in breeding, then remove

Acute orchitis

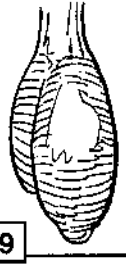
IM 1572; C3T 795

**

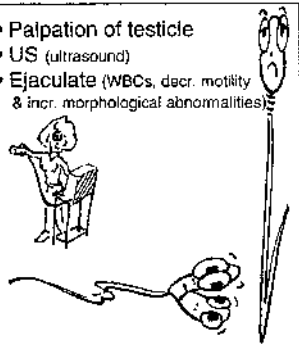
- **Inflammation of testicles**
- Small % of males
- Unilateral
- Cause: trauma or infec. (*Brucella abortus, Mycobacterium tuberculosis, Actinomyces pyogenes, Nocardia farcinica*, bovine herpesvirus III (IBR/IPV)

Infec. or Trauma - IBR
CS: Hot, painful testes
Tx: Cold Tx, Rest, ABs

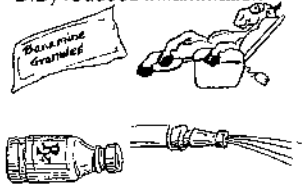
- **Hot, swollen, painful testicle**
- **Refuse to mate**
- Chronic: testicular atrophy, fibrosis & sterility



- Palpation of testicle
- US (ultrasound)
- Ejaculate (WBCs, decr. motility & incr. morphological abnormalities)

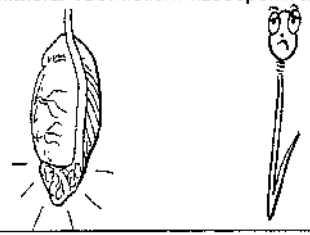
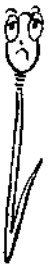
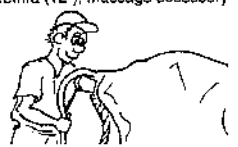
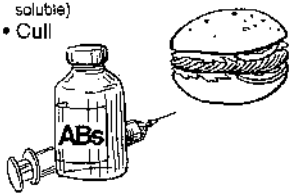


- **Sexual rest**
- ABs IV (C&S - culture & sensitivity) 1-2 weeks past resolution of pain
- NSAIDs
- **Cold hydrotherapy** (30 min BID) reduces inflammation



Bull Infertility: See pg 289

Bull — REPRODUCTION

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Varicocele IM 1573; C3T 794 **	• **Abnormally distended & tortuous veins of pampiniform plexus,** Backflow & stasis in veins, infertility causes disturbances in thermoregulatory mechanism (counter current heat exchange between hot artery & cool veins, keeping testicle temp. down) • **CS & Dx: Nonpainful "bag of worms"** w/in spermatic cord • **Tx:** If thrombosis: unilateral castration (transect spermatic cord prox. to thrombus)			
Epididymitis IM 1573; C3T 794; Br 492 **	• **Inflam. of epididymis, esp. tail** • Cause: Infection or trauma, - 1° or 2° to orchitis or infec. of accessory sex glands; *Brucella abortus, Actinobacillus seminis, Actinomyces pyogenes* • Obstruction often develops **Tail of epididymis, Obstruction** **CS: Infertility, Pain, Swelling** **Dx: Palpation, Culture** **Tx: Spontaneous, ABs, Unilateral removal**	• **Infertility (due to obstruction)** • Pain • Enlargement of tail of epididymis • Adhesions to vaginal tunics • Chronic abscesses, periorchitis & fibrosis • Granulomas if sperm escape accessory sex glands 	• Palpate epididymis, especially tail, (induration, spermatic granulomas, abscesses & enlargement) • Culture, ejaculate - abnormal sperm • Bilateral obstruction: azoospermia 	• Spontaneous recovery in some • **ABs** (C&S) 1-2 weeks after inflammation cells gone from semen • **No cure if obstructive** • Remove testicle & epididymis if unilateral (valuable bull)  • **Prognosis: Poor** - obstruction usually occurs, preventing sperm from leaving
Seminal vesiculitis C3T 793; IM 1574; Br 493; DC 341 **	• Common • Young > old < 5% adults, 5-50% young bulls • Hi-energy ration, housed together, - Homosexual activities • Cause - *A. pyogenes, B. abortus, Mycobacterium tuberculosis,* mycoplasmas, ureaplasmas, *Chlamydia psittaci, Haemophilus somnus* **Common, Homosexuality** **CS: Few • Dx: Rectal, Culture, Semen** **Tx: Broad spec. ABs**	• **Few signs** • ± Deterioration of semen quality • Severe cases: - Pain (reluctance to move, stiff gait, tense abdomen) - Refuse to mate - Infertility • Concurrent infections: - Epididymitis, orchitis 	• **Rectal palpation** - Acute - normal to enlarged seminal vesicles, **painful** - Chronic: enlarged, lose lobularity & fibrotic • Semen m/ contain PMNs & RBCs • Culture vesicular secretions (sterile catheter up urethra (12"), massage accessory sex glands) 	• Spontaneous recovery in many • **Broad spectrum ABs** (culture in vitro sensitivity) 2-4 weeks • Tx failures occur (Erythromycin, trimethoprim (both hi pKa & fat soluble), not aminoglycosides (low pKa & not fat soluble) • Cull 

NERVOUS SYSTEM - VI

Spinal Cord

UMN & LMN CS: helps differentiate peripheral from central lesions; & if central, helps localize level of the lesion

- **LMN CS** to area innervated by damaged spinal cord segment (not UMN CS bec. UMN requires intact LMNs)
- **UMN CS** caud. to damage spinal cord segment

Degree of signs depends on amount of damage to spinal cord (white &/or gray matter)

LOWER MOTOR NEURON (LMN): motor part of reflex arc to muscles or glands (peripheral nerves). Spontaneously active w/out input of UMN

LMN damage: (periphery or cell body in CNS) (thumbs down)

- **Flaccid paresis or paralysis** ("limp as a dish rag")
- **Tone - ↓ to none** (hypotonia - atonia)
- **Reflexes - ↓ to absent** (hyporeflexia - areflexia)
- **Fast atrophy** (neurogenic atrophy) w/in 1 wk

UPPER MOTOR NEURON (UMN): CNS neuron affecting LMN (peripheral or cran. nerves). Initiates & maintains conscious movements & provides tone to extensor muscles (posture). Excitatory UMNs (inactive until needed) & inhibitory UMN (constantly keep LMN under control)

UMN damage: (thumbs up) loss of ability to initiate voluntary motor activity & possibly uncontrolled hyperactivity of LMNs due to decr. inhibition

- **Tone - normal to ↑**
- **Reflexes - normal or ↑** (normoreflexia or hyperreflexia)
- **Spastic paresis or paralysis**
- **Slow disuse atrophy**
- **Extensors facilitated** (extended limb)

Lesion localization - NS (From Dr. Charles Hutchison's lectures; BR 459)

SHIFF-SHERRINGTON SYNDROME: hyperextension of the forelimbs w/ lesions to thoracic spinal cord, removal of ascending inhibition (bad prognostic sign, serious spinal cord lesion)

Proprioception loss: usually 1st CS in spinal cord compression
For localization, interpreted the same as LMN/UMN

- **Ataxia**
- Postural deficits (wide base stance, knuckle over)
- Delayed initiation of movement

Superficial pain loss: lost at same time as motor function is lost. If superficial pain perceived, will also have deep pain. (A withdrawal reflex DOES NOT require perception of pain.)

Deep pain: 1st to show & last to disappear (**"first to show, last to go"**). Loss of deep pain a bad prognostic sign. Evaluated only when superficial pain is absent.

Cutaneous trunci reflex or panniculus reflex: a normal twitching of cutan. trunci m. to stimuli. Sensory fibers from lat. wall dermatomes pass craniodorsally to thoracolumbar spinal cord segments (1 or 2 vertebrae cranially). Ascending sensory tracts extend up the spinal cord to **lat. thoracic n. (C8)** which innervates cutan. trunci muscle.

- **Panniculus absent** localizes to 1 - 2 vertebrae caud. to spinal cord lesion

Hyperesthesia: abnormal increased sensitivity. Spinal cord segment lesions cause a focal hyperesthesia to the dermatome supplied.

Diffuse or multifocal pain: often due to inflammation.

Focal pain: often due to compression of spinal cord or nerve root.

CS & spinal cord region damaged

C1-5: Cervical region

- No LMN to all limbs
- UMN, proprioc. & pain defc - all limbs

C6-T2: Cervicothoracic region

- LMN - thoracic limb
- UMN, propriocep. & pain defc - hindlimbs

T3-L3: Thoracic & thoracolumbar region

- Normal thoracic limb (+/- Shiff-Sherrington)
- UMN, proprioc. & pain defc - pelvic limbs
- Cutan. trunci absent 1-2 vertebrae caud.

L4-S2: Lumbosacral region

- Normal thoracic limbs
- LMN - pelvic limbs

S3-Cd5: Sacral region (cauda equina)

- UMN - to bladder, anus & urethra (flaccid paralysis of anus, no defecation)
- Loss of sensation to tail, penis, vulva & perineum
- Distended flaccid bladder, incontinence

Lesions betw. C1-S2

- UMN - pelvic region
  - Anal & tail tone normal
  - Bladder m/b distended, urethralis m. normal

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment - Prognosis

Spinal dysfunction

IM 1004; C3T 863; VC/N 184; BR-hb 210; BR 498; L 351; DC 426; N-L 244, 1266

***

- **Focal:** extramedullary compression (more common)
  - Common sites: C2-C4, T10-T13, L3-L6
  - Calves 3-6 mo due to softening of bones from nutrit. osteodystrophies, Vit. D, Calcium/Copper defc.
  - Adult - slipping, fx of lumbosacral spine
- **Diffuse/multifocal** (less common)

Causes: Focal
- Abnormal bone mineralization
- Spinal abscesses
- Trauma - fxs
- Lymphosarcoma
- Spondylosis
- Congenital vertebral malformation

Causes: Diffuse/Multifocal
- Hypoderma
- Rabies
- Ascending bact. myelitis
- Meningomyelitis
- Delayed OP toxicity
- Poisonous plants
- Congenital
- Tetanus
- Botulism
- Hypocalcemia
- Vit A defc
- White muscle diz
- Downer cow
- Coxofemoral luxation

LMN - "thumb down" (flaccid)
UMN - "thumb up" (spastic)
CS: C2-4: 4 spastic limbs
C5-T2: Flaccid FL*, Spastic HL*
T3-L3: Norm. FL, Spastic HL
L4-Cd5: Norm. FL, Flaccid HL
S3-Cd5: Norm. FL & HL
Dx: Hx, CS, PE, Rectal
Tx: Euthanasia or wait & see

*FL = forelimb; HL = hindlimb

C2-4: Cervical region
- Noncompressive - stiff neck
- Mild compression - ataxia (proprioception - "first to go")
- Severe
  - Recumbent
  - BAR to depressed
  - M/b phrenic n., paralysis of diaphragm - death
  - **UMNs all 4 limbs** (spastic)

C5-T2: Cervicothoracic region
- LMN thoracic limb (flaccid)
- UMN pelvic limb (spastic)

T3-L3: Thoracic & thoracolumbar
- Norm. thoracic limb (± Shiff-Sherrington)
- UMN cs, proprioc. & pain defc - pelvic limbs
- Cutan. trunci absent 1-2 vertebrae caud.
  - Dog sitting posture
  - When in sternal recumbency - pelvic limbs extended, not tucked up

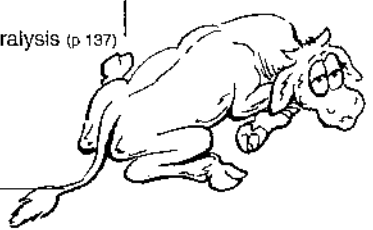
L4-S2: Lumbosacral region
- Normal thoracic limbs
- LMN signs pelvic limbs

S3-Cd5: Sacral region (cauda equina)
- Norm. limbs
- UMN signs to bladder, anus & urethra (flaccid paralysis of anus, no defecation)
- Loss of sensation to tail, penis, vulva & perineum
- Distended, flaccid bladder, incontinence

Lesions betw. C1-S2
- UMN - pelvic region
  - Anal & tail tone normal
  - Bladder m/b distended, urethralis m. normal

- History, CS
- Physical exam
  - Sensation
  - Reflex arcs
  - Tail/anal tone
- Rectal palpation
  - Anal tone
  - Bladder tone
  - Rads

DDx:
- Neurological (Central/Peripheral)
  - Neuritis (p 136)
  - Obturator nerve paralysis (p 137)
- Musculoskeletal
  - Myositis
  - Fxs
- Metabolic
  - Milk fever (p 148)



- **Evaluate suffering** (manage or salvage from evaluation)
- **Manage pain** (if severe, Banamine®: PBZ)
- **Evaluate repeatedly over 1st hours for prognosis**
- **Salvage - if unable to rise after several days or if suffering**
  - If bladder problem
  - If paralyzed rectum

- **Most recoveries spontaneous**, not influenced by drugs, some still give: dexamethasone if acute
- Slings: If fx stable & animal stands w/ assistance

Prognosis:
- **Good: if clinical signs ↓ in 48 hrs**
  - Repeated neurological exams (1st several hrs) - not from radiographs, bec. pieces likely to be in different position than at injury
- Longer recumbent & neurologically impaired, poorer prognosis
- Lymphosarcoma, Spinal abscess, Fxs - poor

Neurologic Diseases — NERVOUS SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Vertebral body abscesses, Osteomyelitis Mk 691; C3T 877; IM 1134; VC/N 187; BR 521; DC 422; N-L 277 ***	• **Hematogenous infection** • Young cattle 1 mo - 2 yrs - Neonates - septicemia (lack of passive transfer or omphalitis) - *Actinomyces pyogenes* • Adult w/ bacteremia - *Fusobacterium necrophorum* • Compresses spinal cord	• **Mimics spinal trauma** - focal signs depends on which vertebrae, see preceding pg for localization) • Acute neurological signs (m/b chronic) • ↑ Temp. (helpful in Dx) • **Sick**, bacteremia, septicemia • CS of other systems involved • **Pain**, heat, swelling over site usually • Standing or recumbent • If standing often reluctant to move due to pain • Sequelae - Meningitis, if erodes - Pathological fxs	• **History, CS , PE** • **Lab:** - Epidural abscess, CSF normal - Inside dura: CSF > 100 PMNs/dl, Protein > 200 mg/dl - CBC other diz (incr. fibrinogen, anemia w/ chronic infection) • **Rads** - osteomyelitis (random hypolucency & sclerosis) - Definitive Dx • Myelogram (site of compression)	• **Euthanasia** (too young for slaughter usually) • $ Long term ABs (antibiotics) - Generally effective if early (Cult/Sensitivity) - Broad spec. ABs if culture inconclusive - Procaine pen G for 2-3 months **Prognosis:** • Poor to grave, euthanasia
Young cattle, Hematogenous **CS: Mimics focal spinal cord trauma** **Dx: Hx, CS, PE, Lab, Rads** **Tx: Euthanasia, Long term ABs** **Px: Poor to Grave**				DDx: • Abscesses around spinal cord • Downer cow syndrome (p 267) • Postparturient related peripheral nerve damage • Trauma of spinal cord (p 133) • Metabolic defc (hypocalcemia) • Spinal cord lesions • Spinal fxs
Verminous myelitis/ myeloencephalitis, Cerebrospinal nematodiasis, Cattle grubs **	• **See pg 182**, Systemic organophosphate grub treatment when parasites are in CNS, Larvae of *Hypoderma bovis* (heel fly); More common economic problem is damage to hides due to "warbles" & wt. loss due to "gadding about" (running from heel flies) • **CS:** Diffuse spinal cord CNS signs 2 ds after organophosphate deworming - stiffness of rear limbs, ataxia, paraparesis & paraplegia • **Dx:** Hx of grub Tx 2 ds previously & CNS signs • **Tx:** None • **Prevention:** Don't Tx grubs in summer (July to Oct.), Tx in fall			
Vertebral spondylosis Mk 529; C3T 877; BR-hb 676; BR 1718; Br 390;IM 1131, 1298; VC/N 186; DC 400 *** **Aged bulls**	• **Aged bulls** • **High Ca diet** • **Bony proliferation** along vertebral bodies & facets & ankylosis of adjacent vertebrae - Fxs during AI semen collection	• Slowly progressive, stiff hind-limb gait, weakness • Recumbency (assoc. w/ vertebral body fracture) • Difficulty mounting (bulls) • Pain - lumbar vertebrae	• **History, CS** • $ Rads	• **No specific Tx** • Analgesics to prolong use of bull **Prognosis:** • Poor- m/ stop progression by changing diet

Lymphosarcoma
of Spinal Cord

Mk 592, IM 1136; C3T 917; VC/N 186; DC 424

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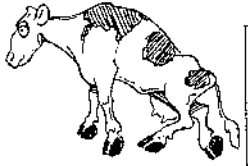


- **See Gen, pg 268**
- **> 5 yrs-old, Adult**
- **Cauda equina** & lumbar segments of spinal cord
- **Pathophysiology**
  - Extradural
  - Compressive, usually involves white matter, unless severe

> 5 yr old - Compression
CS: CNS to rear end
Dx: Difficult
Tx: Euthanasia

- Indistinguishable from spinal fx
- **Variable** (degree of compression)
- **Progressive onset**
- **Cauda equina** (common site)
  - **Flaccid tail & anus**
  - **Dysuria,** urine scalding
  - **Distended bladder**
  - Perineal analgesia
  - **+/- ataxia, paraparesis** (if far enough cranial, dog-sit)
- **BAR** (bright, alert, responsive)
- Other systems involved
- Cranial nerves normal, unless involvement of the eye

- **Dx difficult** unless other systems involved
- History, CS
- CSF tap: m/ biopsy tumor
  - Neoplastic cells, CSF normal
- BAR points toward this diz
- If BLV positive, m/ support Dx
- Rads usually not helpful
- Postmortem: Definitive diagnoses

Tumors other than lymphosarcoma are **rare** in cattle

- **No therapy**

Prognosis: Grave, euthanasia

Control
- Control vectors (blood transmission)
- Eliminate lymphosarcoma from herd by testing & culling positive animals; possible, but costly

DDx:
- Abscesses around spinal cord
- Downer cow syndrome (p 267)
- Obturator n. damage (p 137)
- Trauma of spinal cord (p 133)
- Metabolic defc (hypocalcemia)
- Cervical spinal cord lesions
- Spinal fracture (p 133)
- Cattle grubs (p 182, 134)

Occipito-atlanto malformation
Mk 593; IM 1142; N-L 258

★

- Rare, Devon calves
- Developmental defect
- Spinal cord compression
  - Lesion to UMN & conscious proprioceptive pathways

- Focal spinal cord CS
- M/b dead at birth
- Ataxic at birth or in few wks
- Difficulty bending head to suckle
- Torticollis ("wryneck", twisted neck)
- Symmetric UMN CS (Cervical)
  - #1 tetraplegia or tetraparesis
  - Proprioceptive deficits (ataxia)
  - Hyperreflexia & hypertonia

- M/b palpate malformation axis
- Rads - definitive Dx

DDx:
- Normal awkwardness at birth
- SEE DDx for spinal trauma

- None

Miscellaneous genetic conditions (BR-hb 213,630; BR 503; C3T 92)

Dodder calves (IM 1148; BR-hb 643; BR 1647; Br 698) • Rare, congenital, lethal in Jerseys; down w/intermittent spasms, nystagmus

Progressive ataxia of Charolais calves (Mk 592; IM 1145;VC/N 189) • Rare, inherited?

Spinal bifida (Mk 586; IM 1148) • Rare; paresis & para- or tetraplegia

Cerebellar malformations (IM 1105) • Reported in 2 Ayrshire calves & in Jersey calves

Arnold-Chiari Syndrome (Mk 578; Br 699) • Cerebellum through foramen magnum

Weaver Syndrome (Mk 581, 592; BR-hb 639; BR 1640; IM 1144; VC/N 189; C3T 92; DC 428; N-L 262)
- Brown Swiss calves, rare, genetic, progressive degenerative myeloencephalopathy, begins at 6 mos.; Course: 12-18 mos. • Tx: Euthanasia

Bovine familial convulsions & ataxia (IM 1105; BR-hb 641; BR 1644; N-L 234)
- Angus cattle, multiple tetanic clonic convulsions & a spastic ataxia that persists for several mos, gradually recover by 2 yrs old; fatten & slaughter, don't breed (possibly genetic)

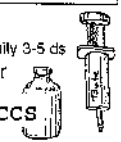
Neuraxial edema; Maple syrup diz (BR-hb 639; BR 1641; Br 149; 695; IM 1111; N-L 200)
- Rare, polled Hereford calves, amino acid metabolism problems
- CS: Dullness, opisthotonus, recumbency, poor response to touch or auditory stimulus
- Dx: Elevated ketones in urine & burnt sugar smell to urine, vacuoles in neuraxis, esp. white matter

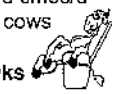
Inherited congenital myoclonus (BR-hb 642; BR 1645; Br 149; IM 1112; N-L 200)
- Rare; Hereford & polled Hereford-cross calves; short gestation, hip joint lesions
- CS: BAR (bright & alert), but recumbent, some unable to move heads, Extension & crossing of hind limbs, hypersensitivity to sound & touch, Myoclonic spasms & body rigidity on stimulation
- Tx: none; Euthanasia

Peripheral Nerves

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Peripheral nerve damage IM 1169; C3T 68; L 337; VC/N 193; N-L 337 ***	• **Low incidence** • **Problems localized to only 1 limb** (monoparesis) by **LMN** signs • Problem in specific nerve roots, nerve or group of nerves or muscles they innervate • Cause: usually trauma	• Gait & posture abnormalities • Loss of cutaneous sensation	• CS, Hx	• **Reduction of inflammation** - Dexamethasone (0.5 mg/kg) daily 3-5 ds - Phenylbutazone IV 1st 24 hr - Cold packs 1st 24 hr • **Relief of pain** - **NSAIDs:** Banamine®, Phenylbutazone (PBZ) • **Stall Rest** w/ good footing/bedding • Recumbent animals turned 6-8 times/d • Calcium gluconate to downer cows **Px: Poor if dysfunction > 2 wks**

Brachial plexus	C6-T1		
• Subscapular	C6-7	Supraspinatus & infraspinatus mm.	
• Musculocutaneous	C6-8	Biceps brachii, coracobrachialis, brachialis mm.	
• Radial	C6-T2	All extensors of arm & forearm	
• Median	C8-T2	Most of flexors mm. of forearm	
• Ulnar	C8-T2	Some of flexors mm. of forearm	
Lumbosacral plexus	L4-S2		
• Obturator	L4-6	Adductor mm. of limb	
• Femoral	L3-6	Extensors mm. of stifle (quadriceps)	
• Ischiatic	L5-S2	Caudolat. mm. of thigh, flexors & extensors of leg	
• Peroneal	L5-S2	Extensors mm. of leg	
• Tibial	L5-S2	Flexors mm. of leg	

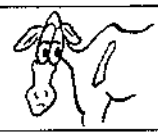


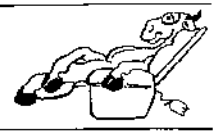


"Sweeney", Suprascapular paralysis (IM 1169; Br 364; VC/N 193; L 339; DC 428; N-L 337)

**

• Trauma to suprascapular n. where it crosses cran. border of scapula
• **CS: Acute - lat. slipping of shoulder; Chronic - atrophy, "Sweeney"** (prominent scapular spine)
• **Tx:** Rest • **Prognosis:** Not severely incapacitated





Brachial plexus evulsion (IM 1169; Br 365; VC/N 194; L 341; DC 430; N-L 341): ★ Excessive traction during calving • CS: variable on nerves involved • Tx: NSAIDs & support • Px: depends on severity

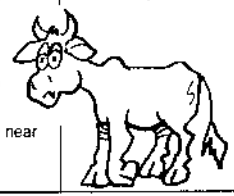
Radial n.

IM 1169; VC/N 196; C3T 68; BR 1320; Br 365; L 338; S-U 68; N-L 339; DC 429 ***

Extensor mm "Dropped elbow" Knuckling over

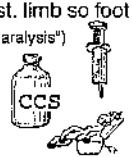
• **Radial nerve**: dives into triceps brachii m.
- Passes in brachial groove to emerge on **lat. side** of limb under the dist. border of lat. head of triceps
• **Innervates all extensor mm.** of limb
• Cause of paralysis
- Direct trauma
- Lat. recumbency w/o padding on lat. side of limb (where it emerges under triceps)

• **"High radial nerve paralysis"** injury above entrance into the triceps m.
- **"Dropped elbow"**
- **Unable to bear weight** on limb
- Neurogenic atrophy of extensor mm. of limb
- + CS of lower radial nerve injury
• **"Lower radial n. paralysis"** (injury near lat. elbow)
- **Knuckling over** (fetlock joint)



• **History, CS**

• Tx: (see above) Time & TLC to see if function returns
• Animal can learn to **"flip"** dist. limb so foot lands correctly ("flower radial n. paralysis")



Prognosis:
• **Poor** if dysfunction > **2 wks**

Sciatic n. paralysis (IM 1170; C3T 959; Br 366; VC/N 206; DC 431; N-L 341; L 346)

***

• Most commonly in postpartum cows, part of "obturator n. paralysis" syndrome; injection in gluteal mm. in neonates, pelvic fxs, tumors, abscesses • CS: Limb hangs at rest, dropped stifle, knuckling, but can bear wt. (femoral n. intact) • Tx: see above

Femoral n. paralysis (IM 1169; VC/N 198; Br 366; L 342; DC 430; N-L 341): *** Overstretching (struggling downer cow, calf during dystocia) • CS: Can't bear wt. (extensors of stifle) • Tx: see above

Peroneal n. paralysis

Mk 500; IM 1170; VC/N 208; C3T 322; Br 367; L 347; DC 433, N-L 344

- **Peroneal n.**: supf. as crosses lat. surface of gastrocnemius m.
- Recumbent postpartum dairy cows w/ hypocalcemia or other causes (lying on nerve)

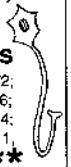
★★★

- **Knuckling at fetlock**, wear dors. surface
- Hyperextension of hock
- Desensitization of craniolat. limb from stifle to hoof
- Trip
- **Usually temporary**

- Hindlimb lameness w/ fetlock flexed

- **Tx: see above**
- **Time, usually recovers**

Obturator n. paresis, Calving paralysis

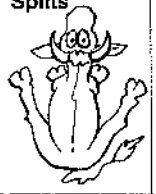


Mk 495; IM 1172; C3T 322; Br 366; VC/N 202; L 344; DC 433, N-L 311, 342, 345 ★★★

- **Obturator nerve**: passes down shaft of ilium (pelvic inlet) through obturator foramen
  - **Supplies adductors** of hindlimb
- **Dystocia** (calf damaging obturator & ischiatic nerves on way through canal)
- Plays a role in "downer cow syndrome" in milk fever
- **Coxofemoral luxation or femoral neck fxs** sequelae

- Nonslip surfaces - minimum deficit
- **Splay leggedness** (severe abduction)
  - **"Splits"** to sides on slippery surfaces (can't adduct limbs)
- Hopping gait
- Recumbency w/ hind legs to each side
- No cutaneous sensation loss

- **Just calved**
- **"Splits"**



- Tx: see above
- Keep on firm ground, no slippery surfaces
- Hobbles around on dist. metatarsus

Spastic syndrome,

Periodic spasticity; Stretches, Barn Cramps, Crampy, Krampfigkeit

Mk 503; IM 1147; VC/N 168; BR 463; Br 149, 388; L 363; N-L 216

★★★

- **Adult > 3 yr**, Holsteins & Guernseys
- Genetic in nature
- Beef rarely affected

DDx:
- Tetanus (recumbency) (p 145)
- Spastic paresis (calves)
- Laminitis
- Colic
- Peritonitis

- **Episodic spasms & stiffness** of both hindlimbs, progresses to rest of body
- Standing animal
- No CS when recumbent
- Normal gait between episodes
- Lasts for mins, then relaxes, looks like **stretching**
- Episodes closer & closer together in time

- CS, History
- Age - Adult dairy cattle
- Progressive

- **Provide ample exercise**, relieves spasms - No cure, just manage

Prognosis:
- **Good if adequate exercise**

Spastic paresis, Elso Heel

Mk 592, 502; C3T 92; VC/N 168; BR-hb 641; BR 463, 1644; Br 149, 387, 685, 700; DC 399; N-L 216

★★★

- **Calves 3 wks -12 mos**
- More common than stretching
- **M/b hereditary**, ("Elso" a bull w/ lots of affected offspring)
- Holsteins & Angus (all breeds affected)
- **Myotonia**: sustained contraction of muscles w/ stimulation

- **Taunt gastrocs & SDF** (supf. digital flexor)
  - **Hock & stifle in full extension,** calcaneus against tibia
  - Initially 1 then both hindlimbs
- **At all times** when standing
- Pendulum walk (can't flex hock, so circumduct to keep limb from dragging)
- Tail elevated (when walking)
- Progressive

- CS
- **Age < 12 mos**
- Initially 1 limb affected

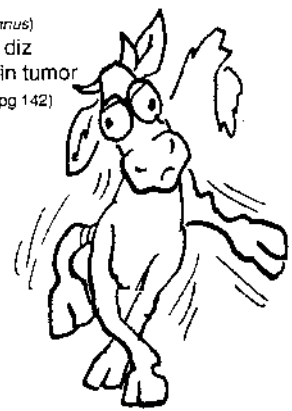
- **Salvage**
- Salvage procedure to gain weight, not for breeding (hereditary)
  - Sx - cut branches of **tibial n. to gastroc**
  - Sx - **tenotomy** of gastroc. & partial tenotomy of SDF

Prognosis:
- Cut tibial n. - 54% success
- Tenotomy - 40%

DDx - Spastic syndrome from paresis
Syndrome: Adults - Intermittent
Paresis: Calves - Constant

DDx:
- Spastic syndrome (adults) (p 137)
- Gonitis (inflam. of stifle)
- Dors. luxation of patella
- Progressive posterior paresis

Brain

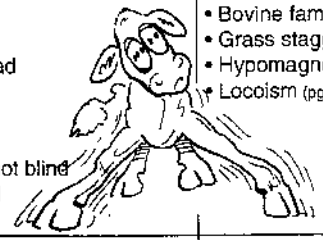
Condition/Facts	Presentation/CS	Causes
Brain stem lesions (IM 159; VC/N 182; BR-hb 204; BR 481) **Brain stem:** midbrain, pons & medulla • **RAS** (reticular activating system): concerned w/ conscious level • **Proprioceptive fibers** pass through • **Cranial nerves** assoc. w/ brainstem • **UMN, sensory & proprioceptive fibers** pass through • **Walking motion reflexes** - Generated in centers caud. to the midbrain - Initiated rostral to midbrain (higher centers) - Descending motor tracts from higher centers cross over in the midbrain	• **↓Consciousness** (depression, stupor, coma) - Profound depression (RAS) • **Deficits in CN III - XII** • **Vestibular system CS** (see below) • **Proprioceptive (Proprcpt) deficit & gait** - Proprcpt. defc. w/ norm. gait - midbrain or rostral - Proprcpt defc. w/ abnorm. gait - caud. to midbrain • **UMN & proprioceptive deficits all limbs**	**Causes** • Listeriosis (pg 143) • Thromboembolic meningoencephalitis (TEME) (pg 141) • Otitis interna/vestibular diz (pg 142) • Brain abscess or tumor • Horner's syndrome (can be due to oculomotor n. damage) • Hypovitaminosis A (pg 142)
	Proprioceptive deficit & gait - Proprioceptive deficit w/ norm. gait - midbrain or rostral - Proprioceptive deficit w/ abnorm. gait - caud. to midbrain - Rostral lesions (cerebro-diencephalic) - contralateral (opposite) proprioceptive defc., normal gait - Caud. to the midbrain (brain stem & spinal cord) - ipsilateral (same side) proprioceptive defc., abnormal gait - Midbrain lesions - normal gait & proprioceptive deficit on both sides	
Lesion - Vestibular System • Control posture in relationship to gravity; & **eye movements in relationship to head movements** • **Peripheral vestibular centers**: inner ear (labyrinth, receptors, & vestibular n., not proprioceptive fibers) • **Central vestibular** (vestibular nuclei in brain stem & centers in cerebellum) motor, sensory & proprioceptive centers (brain stem) located in area  	• **Head tilt** • **Nystagmus** • **Ataxia** • **Possibly circling & falling towards lesion** • **Strabismus** • **Central vestibular diz** (brain stem) also shows: - **Nystagmus in any direction** - Postural deficits (proprioception) & paresis (UMN) - Depression (RAS in area of vestibular nuclei) - Recumbency, lesion side down - Lean against wall - Loss of perception of sensation • **Peripheral vestibular diz** also show: - **Nystagmus - horizontal only** - No UMN signs (paresis) - Ataxia bec. of loss of balance, not due to proprioception - No decr. sensorium or depression	• Listeriosis (pg 143) • TEME (*Haemophilus somnus*) • Peripheral vestibular diz • Brain abscess or brain tumor • Otitis media/interna (pg 142) 

Cerebellar lesions

Mk 578; VC/N 181; BR-hb 639; BR 858

- **Coordinates movements**, but does not initiate them
- **Vestibular system connections** to help coordinate balance & posture
- Proprioceptive fibers don't pass through cerebellum
- **Menace response**, somehow cerebellum plays a role

- **Incoordination (ataxia)** (excessive range, rate & force of movement)
  - **Wide-based stance** from balance deficits, not proprioception
- Tremors
- Abnormal movements of the head
- **Vestibular diz signs**, including:
  - Head tilt
  - Nystagmus
- Loss of menace response, but not blind
- BAR, because RAS not affected
- **No proprioceptive deficits**



- Cerebellar hypoplasia
- BVD, Blue tongue, Akabane, Border diz
- Cerebellar abiotrophy (pg 143)
- Bovine familial convulsions & ataxia (pg 135)
- Grass staggers (Bermuda, Dallis, Rye grass, Kikyu, Canary)
- Hypomagnesemia (pg 146)
- Locoism (pg 147)

Cerebral lesions

Mk 578; IM 1037; VC/N 179; BR-hb 199; BR 481

Cerebral hemispheres & basal nuclei

- **Voluntary motor control, behavior, & mental status**
- **Interprets vision & audition, proprioception & general sensations**
- **Thalamus**: functionally, it is closely related to the cerebrum to which it relays information

- **Mild to marked depression** (less than brain stem lesion)
- **Alterations in behavior** (aggression, rage, hypersexuality)
- Seizures
- Propulsive circling (wide)
- Head pressing, continual chewing (odontoprisis)
- Normal gait in straight line w/ abnorm. postural reactions (proprioception loss, stumbling, knuckling over at fetlock)
- **Blindness** (occipital lobe) w/ normal pupillary responses

- Rabies (pg 144)
- Trauma/hematoma
- Lead poisoning (pg 152)
- Salt poisoning (pg 153)
- Vit A defc (pg 142)
- Plant poisoning, *Conium, Cicuta, Laburnum*, Milkweeds, *Aconitum, Aesculus, Astragalus, Solanum*, etc.
- Pseudorabies (pg 141)
- Malignant catarrhal fever
- Urea poisoning (pg 153)
- IBR (pg 154)
- Insecticide poisoning
- Dehorning/sinusitis

- Nervous coccidiosis (pg 150)
- Hypocalcemia
- Hepatoencephalopathy (pg 154)
- Hypoxia/anoxia
- Hypomagnesemia (pg 146)
- Hypoglycemia
- Hydrocephalus (pg 143)
- Idiopathic epilepsy (pg 154)
- Narcolepsy (pg 154)

Hypothalamus

- **Controls the autonomic nervous system (ANS) & the endocrine system**

Autonomic & endocrine abnormalities

- Polyuria/Polydipsia (PU/PD)
- Altered sleep patterns
- Rage to affectionate behavior
- Abnormal appetite

Pituitary abscess (IM 1035)

- Sporadic ataxia, Death

BVD - Cerebellar hypoplasia

IM 1103; N-L 230

- **See Repro. pg 124**; Infection of pregnant cows at 100-170 days: congenital cerebellar hypoplasia; infection at 90-100 days: abortion or stillbirth
- **CS:** At birth - truncal ataxia, opisthotonus, wide-base stance, intentional head tremors, hypermetria, hyperreflexia, nystagmus or strabismus
- **Dx:** Hx, CS, BVD antibodies in precolostral blood
- **Tx:** None • **Px:** Grave - rarely improves

Bluetongue can also cause cerebellar hypoplasia

Brain

NERVOUS SYSTEM

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Polioencephalomalacia, PEM, Thiamine defc, Cerebrocortical necrosis, Cerebral edema, Mk 614; IM 1055; C3T 859; BR-hb 668; BR 1699; Br 225; VC/N 107; Pic 139; N-L 104 ★★★	• **Thiamine (Vit B1) defc** • Calves & lambs (fast growing) • **Causes; not clear** - **2° to grain overload** - **Hi CHO**, low roughage diet - **Sudden diet changes** (to conc. & corn silage) - **Hi sulfate levels** - **Kochia** (poisonous plant) • **Pathophysiology** - **Thiamine** normally produced by rumenal flora - CHO - change flora to thiaminase producers - **Thiamine necessary for CHO metab. to glucose** - **↓Glucose to brain** . Cerebral edema & necrosis	• **Sporadic** w/ occas. outbreaks • **"Star gazing"** (dorsomed. strabismus) pathognomonic, trochlear n., unknown cause) • Isolation & anorexia • **Depression** • ↓Rumen activity • **Centrally blind** (no menace response, but intact pupillary response) • **Head pressing** • Opisthotonus • Ataxic (while still standing) • Comatose, convulse & death	• History, CS: "Star gazing" • **Response to thiamine Tx** • RBC transketolase, fecal or ruminal thiaminase assays • Postmortem - Cortical fluorescence confirms - Lamellar necrosis - Ultraviolet light (false negatives)	• **Emergency** (brain cells dying by millions) • **Thiamine** whether Dx or not - If respond then Dx (signif. changes in demeanor, 3 wk convalescence) - IV Thiamine hydrochloride (10-20 mg/kg). Repeated 4 x/d, then 2 x/d - If no response, check DDx • **↓ CHO** (to rest of herd) • High quality roughage 5 days prior to return to concentrates • Transfaunate rumen • Anticonvulsants • Dexamethasone to decr. inflammation & stabilize membranes • No IV glucose becauses CHO metabbilism impaired **Control** • Thiamine supplementation • Gradual change to concentrates • Check sulfate levels & Kochia plant
Brain abscesses IM 1036; BR 489; BR-hb 205; Pic 143; DC 409; N-L 90 ★★	• ***Actinomyces pyogenes*** • Hematogenously spread from other organ systems via bacteria emboli • Dehorning due to ascending infec. from sinuses - Affinity for the pituitary gland & hypothalamus	• Slower onset & more asymmetrical than meningitis • CNS CS vary, dep. on location ***Actinomyces pyogenes***	• Presumptive Dx on abscesses in other parts of body or chronic infection • Incr. # of PMNs in CSF (usually not done)	• Penicillin DOC **DDx:** • Meningitis

DDx
- Lead poisoning (p 152)
- Nitrofuran toxicity
- Urea toxicity (p 153)
- Salt intoxication (p 153)
- Hypomagnesemia (p 146)
- Hepatoencephalopathy (p 154)
- Meningitis or encephalitis (p 151)
- TEME (p 141)
- Brain abscess (p 140)
- Type D Clostridia enterotoxemia
- Vit A defc (p 142)
- Chlorinated hydrocarbon (p 207)

Hi CHO = Thiamine defc - ↓ Glucose to brain
CS: CNS - Star gazing, Centrally blind
Dx: Response to thiamine Tx
Tx: Emergency - Thiamine

Haemophilus septicemia, TEME, ITEME

Thromboembolic meningoencephalitis,

Mk 602, C3T 546; IM 1092; C3T 662; BR 486; Br 811; VC/N 61; Pic 144; N-L 87

***

- ***Haemophilus somnus***, Gram neg. pleomorphic rod or coccobacillus
- **Calves, Feedlot**, 4-12 mos
  - 4 wks after entering feedlot
- **Septicemic diz**
  - Tropism for brain (cerebellum & brain stem)
  - Lungs (pneumonia more common)
  - Joint infections
  - Infertility, metritis, vulvitis, orchitis, conjunctivitis, otitis, mastitis
- Morbidity low 2-10%

Calves, 4 wks after entering feedlot
CS: Resp. + CNS + Joint
Dx: Calf (Resp. + CNS + Joint); CSF
Tx: Hi ABs + Thiamine

- **Respiratory CS**: alone or leading to CNS CS
  - Cough, dyspnea, pleuritis, fever
- **CNS - cerebellum & brain stem**
  - **Depression**
  - **Ataxia**, paralysis
  - Knuckling at fetlock, fall while walking, interference (proprioceptive deficits)
  - Blindness
  - **Recumbency**
  - Opisthotonic, nystagmus, strabismus, head tilt
  - Coma & death - 36 hrs m/b
- **Septic arthritis** hock & stifle
- Retinal hemorrhages (vasculitis) seen w/ all forms

- **Calves w/ CNS, resp., & joint disease**
- **Lab**
  - **CSF analysis**
    - . Neutrophilia (elev. PMNs)
    - . ↑ protein
    - . Xanthochromia
  - *H. somnus* org. hard to culture
- **Postmortem**
  - Vasculitis to septic infarcts & abscesses

DDx:
- **Polioencephalomalacia** (p 140)
- Hypovitaminosis A (p 142)
- Listeriosis (p 143)
- Malignant catarrhal fever (but other system involvement)
- Lead poisoning (p 152)

Polioencephalomalacia (PEM) cannot be distinguished clinically from TEME so give thiamine along w/ ABs

- **Effective if early** (check other feedlot cattle every 2 hrs)
- **IV ABs** at hi levels (double dosages)
  - **Micotil®**
  - **Oxytetracycline**
  - Penicillin/streptomycin
- **Also thiamine** - In case m/b PEM, if cow has headache give thiamine
- Chlortetracycline in feed for 10 ds (for herd Tx)
- Course of disease 2-3 wks

Micotil

Prognosis:
- Good if early
- Mortality 90% if not Treated early,
  - Once recumbent - grave

Thiamine

Bacterin - available, but only 80% seroconvert
- Given at time of weaning, prior to shipping to feedlot (should be preconditioned to go to feedlot, but not cost effective. At most castrations & weaning on farms, then rest [vac., etc.] at feedlot)

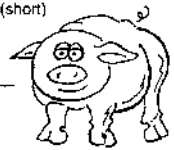
Pseudorabies,

Aujesky's diz, Mad Itch, Infec. Bulbar Paralysis

Mk 602, IM 1017; VC/N 49; C3T 422; BR-hb 419; BR 1094; Br 705; DC 415; N-L 86, 361; Pic 147

**

- **Herpes virus**
- **1° seen in swine** (swine resistant to clinical diz, latently infec. on recovery - Spreads to ruminants)
- **Fatal diz in cattle** - CNS
- **Hx: contact w/ swine**
- IP: 90 to 156 hrs (short)



Pigs - Herpes virus
CS: Mad itch, Salivation
Dx: Swine contact + CS • DDx: Rabies
Tx: Fatal

- Initial excitement phase (m/b aggressive, agitated)
- **Mad itch, acute pruritus**, self mutilation (chewing & biting themselves)
- **Salivation**
- **Abnormal behavior** (depression or aggression)
- Weakness & ataxia, paralysis
- Convulsions & death 24-48 hrs after initial CS
- Found dead (short IP)

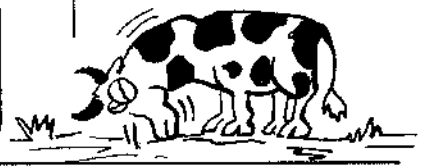
- **CS + Exposure to swine**
- **Brain submitted for rabies**

DDx:
- Rabies (p 144)
- PEM (p 140)
- Salt poisoning (p 153)
- Meningitis (p 151)
- Lead poisoning (p 152)
- Hypomagnesemia (p 146)
- Enterotoxemia (p 149)

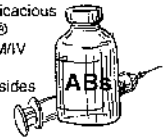
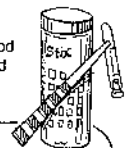
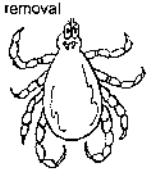
- **None**, once contacted virus
- No vaccine

Prognosis:
- **Fatal**, occasional spontaneous recovery

Control:
- Prevent contact w/ swine
- Disinfect area (quaternary ammonium)



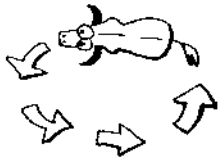
Brain

Condition	Facts/Cause	Presentation	Diagnosis	Treatment
Otitis media & otitis interna Mk 312; IM 1094; C3T 854; 142; VC/N 183; BR-hb 207; BR 493; Br 216; DC 435; N-L 186 ***  **Sequela to resp. infection** **CS: Vestibular & Facial n., BAR** **Dx: CS + Norm. proprioception** **Tx: Long term ABs**	• **Common diz** in cattle & sheep • **Cause** **- Usu. sequela to resp. infec.** (*Pasteurella pneumonia*, *C. pseudotuberculosis*, *H. somnus*) - Ascending infection from pharynx or larynx - 2° to ext. ear infec. (rare) - Hematogenously (rare)	• **BAR** • **VESTIBULAR asymmetrical signs** **- Head tilt** (to side of lesion) **- Circle & fall to affected side** **- Constant horizontal nystagmus** (fast phase away from lesion) • **Facial nerve** commonly involved - Drooped ear - Flaccid lips & nostrils • Ptosis (upper eyelid drop, side of lesion) • ± Ascend up cranial nerve to brain stem (CS referable to location) 	• **CS of vestibular diz** • BAR • No significant deficiency in proprioception • **Nystagmus constantly horizontal** **DDx:** • Central vestibular diz • Listeriosis (p 143) • TEME (p 141) • Migrating parasites • Abscesses (p 140) • Tumors (p 143)	• **Long term ABs**, several wks, early Tx is most efficacious - Micotil®, Naxcel® - Oxytetracycline IM/IV - Penicillin - Aural aminoglycosides contraindicated  **Prognosis:** • Good w/ early treatment • Poor if ascension to midbrain **DDx:** • Central vestibular diz - CS - Sytemically depressed - Nystagmus varies in direction - Marked gait abnormalities
Hypovitaminosis A * Mk 1199; IM 1064; C3T 911; BR-hb 546; BR 1449; Br 220; DC 464; VC/N 119; N-L 131 *  **Rare - Better nutrition now**	• **Vit. A maintains integrity of epithelial tissue** • **Diet** - **Rare now** due to better nutrition - Hi grain or poor roughage diets - Rare if quality roughage - Winter pastures (poor quality) • Beef 6-8 mo (rapid growth) • Neuro - incr. intracranial pressure	• Lacrimation • Watery diarrhea • Nasal discharge • Coughing, resp. involvement • Eyes - Neurologic CS - **Blindness**, dilated, nonresponsive pupils • Convulsion, coma & die, due to cerebral edema • Abn. poor hair coat • Poor weight gain • **Abortions**, retained placenta & weak neonates in range cattle occasionally • Lameness  	• History • Lab: - Vit. A levels in blood - Vit. A levels in feed  **DDx:** • Lead poisoning (p 152) • PEM (norm. pupillary light reflexes) (p 140)	• **Injections of preformed Vit. A**, after Tx eye signs may persist **Prognosis:** • Good - if Tx prior to convulsions • Poor - if dilated pupils **Control:** • Vit. A supplement • Green feed 
Tick paralysis * Mk 624; BR-hb 620; BR 1610; VC/N 103; N-L 315 **CS: Paralysis** **Tx: Remove tick - Recover rapidly**	• Rare, Dogs most commonly, but can cause losses in calves • *Dermacenter andersoni*, *D. variabilis* • Neurotoxin - motor polyneuropathy 	• Hindlimb paralysis initially • Rapidly progressive • **Paralysis** • Sensation usually preserved • Difficult breathing, swallowing & chewing • Respiratory failure possible • Recovery rapid if tick removed 	• Tick + CS • Recovery on tick removal **DDx:** • Botulism • Rabies 	• **Remove tick: recover rapidly** (1-3 days)  Prognosis: good

Listeriosis, Circling Diz,

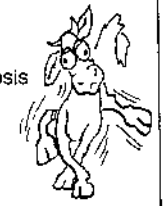
Listeriosis,
Mk 356,1603, IM 1088; C3T 580; Plc 142; BR-hb 278; BR 484, 660; Br 703; VC/N 75; DC 410; N-L 189

★★★

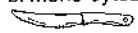


Brain stem meningoencephalitis
(most common in ruminants)
- ***Listeria monocytogenes***
  - Gram positive rod
  - Present in soil, silage & feces
  - Assoc. w/ **silage feeding** (therefore in winter or spring, prior to new pasture growth)
  - **Microabscesses** in brain
  - #1 Bact. infec. of CNS in adults
- Herd outbreaks
- **Brain stem & cran. nerve "lateralizing" diz** - adults
  - Ascending infec. cran. nerves
- **Septicemia** - neonates & steers
  - More common in monogastric animals, seen in lambs & **calves** before rumen is functional
  - < 3 wk of age
- **Abortions** (late gestation)

- **Depressed** (RAS)
- Fever, anorexia
- Unilateral limb signs
  - Knuckle over
  - Weakness to paralysis
- **Unilat. cranial nerve CS** (see box)
  - Lip droops, inability to blink
  - Head tilt, Nystagmus
  - **Circling, Ataxia**
  - ↓ Facial sensation
  - **Dysphagia** (difficult swallowing), m/b only sign (paralysis of facial & throat muscles)
  - Stertorous breathing
  - Paralysis of tongue ipsilateral
- **ABORTIONS** (late gestation)
  - Encephalitic form & abortions usually don't occur simultaneously
- **SEPTICEMIA**
  - Dysentery
  - Focal hepatic necrosis

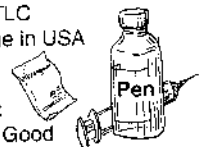


- Isolation & ID org. (difficult, brain, fetal tissue)
- Herd outbreak of brain stem diz w/ unilat. signs of circling
- **Unilat. involvement of multiple cran. nn.** highly suggestive
- CSF fluid - ↑ # of mono-cytes (thus name)
- **Postmortem:**
  - **Microabscesses in brain**



Cranial Nerves:
- **Facial n.** paralysis
  - Lip droop, inability to blink
  - 2° keratoconjunctivitis
- **Vestibulocochlear n.** (CN 8)
  - Head tilt
  - Nystagmus
  - **Circling**
  - Ataxia
- **Trigeminal** (CN 5)
  - Decr. facial sensation
  - Poor jaw tone
- **Cranial nerves 9 & 10**
  - Dysphagia (trouble swallowing)
  - Stertorous breathing
- **Hypoglossal** (CN XII)
  - Paralysis of tongue, ipsilateral

- **Early**
- **Tetracyclines** (high doses, but m/b followed by fatal relapse, therapeutic levels in brain difficult)
- Penicillin - high dose
- Isolate (long time, 1 mo)
- Take off silage on trial basis
- IV fluids, TLC
- NO vaccine in USA



Prognosis:
- Early Tx - Good
- Recumbent, coma - Grave

Control:
- **No spoiled silage**

DDx
- Brain stem abscesses (p 140)
- Inner ear infections (p 142)
- Rabies (p 144)
- Bacterial meningitis (p 151)
- TEME (p 141)
- Polioencephalomalacia (p 140)
- Lead poisoning (p 152)

Silage - Outbreak - #1 bact. infec. of CNS, Unilateral
CS: Brain stem (Circling, CrNs) - Septicemia - Abortions
Dx: CS, CSF, PM (Abscesses)
Tx: High dose tetracycline

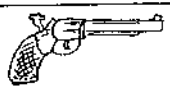
Public Health **PH**
- **Humans/listeriosis** from milk or secretions • CS: septicemia, meningitis & abortions

Brain tumors

IM 1083; BR-hb 206; BR 491

★

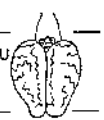
- Cause compression of brain stem; Cran. Nerves V, VII & VIII & cerebellum
- Tumors: medulloblastoma, ependymoblastoma, neurofibrosarcoma, meningioma, meningeal hemangioma, angioblastoma, neurofibroma
- **CS & Dx:** Hypermetric gait, ataxia, Depression, Facial paresis/paralysis, Facial anesthesia/analgesia, Head tilt, strabismus & nystagmus
- **Tx:** None



Cerebellar abiotrophy

(IM 1068, 1104; C3T 93; BR-hb 639; BR 1636; Br 148; N-L 232) • **Degeneration of formed cerebellar tissue due to premature aging, 3-9 mo-old Holstein heifers (NE U Can); also in Hereford, Ayrshire & Jerseys; Hereditary (recessive gene)** • **CS:** Normal at birth, Cerebellar CS at 3-9 mo, progresses rapidly for several days then stabilizes, m/ remain static or slowly progress to recumbency • **DDx:** Cerebellar hypoplasia (present at birth) • **Tx:** Euthanasia

★★

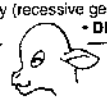


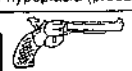
Hydrocephalus

(CT 530; C3T 92; BR-hb 201; BR 201, 147, 483)

★

- Dome-shaped cranium, Neurologic deficits





Botulism & Rabies

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

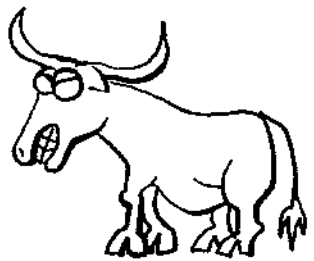
Rabies

Mk 619; IM 1024; C3T 414; BR-hb 417; BR 1087; Br 706; DC 413; GI 708; L 119; N-L 82, 361; VC/N 45; Pic 146

**

Facts/Cause

- **Rhabdovirus** (Lyssavirus)
  - Worldwide, except some free islands (Eng.)
  - **Fatal neurological diz of warm blooded animals**
  - Reservoirs (bats, dogs, foxes, skunks & raccoons)
- **Pathophysiology**
  - Transm: bites (virus in saliva)
  - Reaches CNS over peripheral nn.
  - From CNS to salivary glands over nerves
  - IP 3 wks - 3 mo (different length nerves)
- **Progressive & rapidly fatal diz**



Presentation/CS

- **Behavioral changes** (1st)
- **Tenesmus** (constant sign)
- M/ or m/n "salivate"
- Progressive lameness, ataxia & posterior paresis

- **Furious form ("mad dog" form)**
  - Alert, not normal placid expression
  - Muscle tremors
  - Bloat
  - **Tenesmus**
  - **Aggression, bellowing**, belligerent, attack & pursue (as diz progresses, less belligerent)
  - Run frantically through fences, etc.
  - Hypersexuality, mounting objects, paraphimosis
  - Tactile/auditory stim. behavioral changes
  - **Pruritic**
  - Proprioceptive deficits
  - Recumbent, convulse, Die w/in 2-4 ds

- **Dumb form**
  - **Severely depressed**
  - **Profuse salivation, dysphagia** (inability to swallow due to pharyngeal paralysis)
  - Anorexia, temp > 103° F, drooped head
  - Flaccid paralysis, wide base stance, difficulty rising
  - **Die - laryngeal paralysis**

- **Paralytic form** (common in cattle)
  - **Flaccid tetraparesis or paraparesis**
- **Forms can overlap**

Diagnosis

- **Notify authorities**
  - PM done by state officials
  - **FA staining tech.** (Ag/Ab) (fast)
  - **Intracerebral inoculation - mice**, examine brain in 5 ds
  - Negri bodies - microscopic brain sections (hippocampus) (historic method)

DDx:

Abnormal behavior
- Digestive disorders
- Injury
- FB in mouth
- Lead poisoning (p 152)
- Early infec. diz

Inability to swallow
- Choke (p 15)
- FB lodged between teeth
- Ingestion of irritating subst.
- Obstruction (p 44)

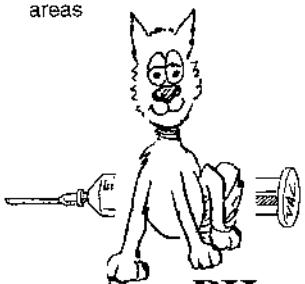
CNS
- Focal spinal cord diz (p 133)

Lameness
- Musculoskeletal prblms.

Treatment

- **Isolate/Euthanize & notify authorities**
  - Valuable animal isolate for at least 6 mo

Control:
- Mass vaccination of dogs & cats
- Approved vaccines for cattle
  - Recommend annual vaccinations in endemic areas



PH

Public Health
Human immunization strongly recommended for veterinarians

DDx for all abnormal behavior
Furious, Dumb & Paralytic forms - All fatal
CS: Behavior changes, Tenesmus
Dx: Notify authorities - they post
Tx: Euthanize - 6 mo isolation

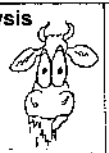
Botulism, Forage poisoning

Mk 328, IM 1159; C3T 568; BR-hb 285; BR 680; Br 554; DC 439; GI 708; L 121; N-L 315; VC/N 93; Pic 205

*

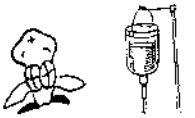
- Rare
- **Lethal food poisoning** of man & animal
- ***Clostridium botulinum*** (type B, C & D)
  - **Toxin**: ? blocks **Acetylcholine at NMJ** (neuromuscular junction), motor peripheral nn. affected, not sensory or CNS
  - Gram pos., anaerobic, spore forming
  - Ubiquitous in soil
- Assoc. w/ **silage feeding**
  - Wound contamination, Carcasses m/ harbor
  - Poultry litter
- Individ. sporadic cases > herd outbreaks

- **Progressive muscular paralysis**
  - Mimics rabies
  - **Muscle weakness & ataxia** (hindlimbs 1st then cranially) m/ persist for wks if nonfatal
  - Disturbed vision
  - **Salivation & dysphagia** (paralysis of tongue)
  - Droopy expression, protruded tongue, ptosis (ANS)
  - GI: rumen atony, bloat, constipation & mucus-covered feces
  - Urinary: distended atonic bladder
- **Death - 24 hrs or persists for wks**



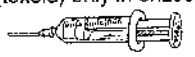
- **Difficult to confirm Dx,** improbable to demonstrate toxin in tissue or feed
- **Inject mice** w/ serum, gut content or organs from affected animal => resp. distress & death
- **Presumptive Dx:**
  - Motor paralysis
  - Suspected
  - Eliminate other causes
  - Hx of silage feeding

- **Symptomatic**
  - Fluid, nutrition, nursing
  - Controversy over value of purgatives
- Antitoxin of little value even in early stages



Prognosis:
- **Grave**: Acute & peracute will die

Control:
- Proper disposal of carcasses
- No decaying grass or spoiled silage in diet
- Vaccine (toxoid) only in enzootic areas



ACh at NMJ - Silage - Individual
CS: Rapidly fatal motor paralysis (mimics Rabies)
Dx: Difficult, Mice inoculation
Tx: Supportive if alive • Px: Grave

DDx:
- Rabies (p 144)
- 2nd-stage milk fever (responds to Ca Tx) (p 148)
- Listeriosis (p 143)
- Bovine spongiform encephalopathy (no paralysis)(p 154)

Tetanus, Lockjaw

Mk 330; IM 1150; C3T 567; BR-hb 284; BR 677; Br 567; DC 436; L 120; N-L 202; VC/N 89; Pic 205

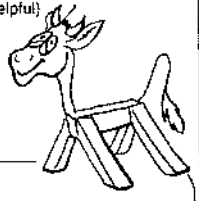
**

- ***Clostridium tetani***
  - Toxin producing, Spore in soil/feces
  - World wide distribution
  - All species susceptible (#1 horse & man)
- Gen. individ. cattle, not herd outbreak
- IP 10-14 d (wk - wks)
- Transm.: Contamination of uterus (dairy), tail docking, castrations, dehorning, bull rings, infec. umbilical stalks, deep puncture wounds
- **Toxin** ascends nerves to spinal cord, causing ascending paralysis, if excess toxin in blood to brain, descending tetanus, toxins: tetanospasmin, tenolysin & nonspasmogenic
- **Reduce inhibition to motor nerves, causing hypertonia & spasms**

Toxin - Decr. inhib. on motor nerves
CS: Muscular rigidity => "Sawhorse"
Tx: Penicillin, Muscle relaxants, Quiet
Px: Good if standing; Long recovery

- **Initially muscle spasms**
  - Masseter, neck, hindlimb
- General stiffness
- **Tonic spasms** & hyperesthesia
- **Sound & tactile stimuli** (incr. # & severity)
- **Muscular rigidity**
  - **"Lockjaw"** (masseter)
  - Prolapse of 3rd eyelid (horses >> cattle)
  - **Erect ears**
  - Retracted eyelids
  - **"Pump handle" tail**
  - **"Sawhorse" stance** (extensor rigidity)
- **Bloat** common & m/b presenting CS
- Excess salivation
- Regurgitation of feed & water
- Convulsion - recumbency
- Fatal usually if convulsions

- **Usu. presumptive Dx:** History & CS
- No reliable clinical test for Dx (CSF tap, culturing not too helpful)



DDx
- Polioencephalomalacia (p 140)
- Enterotoxemia (p 149)
- Lead toxicity (p 152)
- Salt poisoning (p 153)
- Bact. & viral encephalitis (p 151)

1. **Remove source**
2. **High levels of penicillin** (lavage uterus w/ penicillin). Give systemically, plus debride & inject wound site
3. **Antitoxin** if early (prevents toxin binding to nerves, once bound, can't unbind)
4. **Muscle relaxation**
   - Acetylpromazine + 5% pentobarbital (cheap), or Diazepam ($)
5. **Support**
   - **Quiet, dark stall,** pack ears w/ cotton
   - **Good footing,** deep bedding, m/b sling
   - **Good nutrition**, rumenotomy

Px: Good, if can make stand, better than horses; if survive 7 ds - fair to good; Long recovery, 3-4 wks

Prevention: No immunity on recovery
- Generally don't vaccinate (because more resistant than horses & small ruminants)

Poisonous Plants — NERVOUS SYSTEM

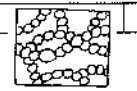
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Hypomagnesemia Grass tetany, Milk tetany Wheat pasture, Crested wheatgrass poisoning, Winter tetany, **Transport tetany** Green oat poisoning, Barley poisoning, Grass Staggers Mk 445, IM 1115, 1474, 453; C3T 318; BR-hb 513, 535; BR 1322, 1332, 1402; Br 583, 219; DC 505t; N-L 119; VC/N 126; Pic 140 ★★★	• **Magnesium ion defc** - Assoc. w/ low Ca occasionally - 70% stored in bones so not readily available for blood, Need daily intake (20 g/d) - Blood Mg low, pulled from CSF & extracellular fluid by lactation • **Lactating beef cow < 7 yrs**, highest incidence, m/b nonlactating stressed - **Heifers spared** • **Hypomagnesemia facilitates NMJ** (neuromuscular junction) - **Tetanic spasms**/Clonic convulsions • **Precipitating factors** - Lactation (depletes Mg) - Stress/winter/transport - Anorexia • **Grass (winter) tetany** - low Mg forage (< 0.2%) - Lactating cows in winter & spring, pastures low in Mg, Young green < older pastures, Grass forage < legumes, High moisture < dry grasses - Fertilized w/ nitrogen & potassium - low Mg (grow too fast, wheat, barley, oats) • **Mild or chronic lactating tetany** (lactation pulls Mg from blood) • **Milk tetany** - calves on milk indoors (milk relatively low in Mg, CS in 2 to 4 mo-olds) Indoors>>pasture raised, diarrhea m/ exacerbate • **Transport tetany**: stress brings on CS • Other factors - Hi K or ammonia forage (compete w/ Mg uptake) - High K/protein decr. absorption of Mg, Incr. loss w/diarrhea (less time for absorption) - Cold climates cause anorexia w/ marginal Mg	• **Adult tetany** - Acute or gradual (dep. on diet) - **Anorexia, Isolation, Alert** - **Hyperexcitable** (twitching erect ears) - **Tetanic muscle spasms**: fasciculations, head & neck tremors, high stepping forelimb gait - Bellowing & frenzy if severe - **Staggering ataxia, recumbency** - **Violent clonic convulsions & opisthotonus** (precipitated by stimuli & alternates w/ tetanic spasms - Salivation & frothing at mouth - Snapping eyelids - Nystagmus & involuntary eye movements - Incr. HR, loud heart sounds (m/b audible from a distance) - Rapid, forceful respirations - **Death - resp. failure** during a seizure (often w/in hours of start of seizures) - Found dead w/ evidence of convulsions • **Mild or chronic lactation tetany** - Vague syndrome of many animals - Anorexia, decr. milk - Odd facial expressions or behavior • **Milk tetany** - **Calves: 2-4 mos old** - **CS similar to adults** - **Eyes** m/ bulge or retract, prolapsed 3rd eyelid	• **CS, History only because of need for rapid therapy** • Confirm herd problem - serum or urine Mg sample from multiple animals **DDx:** **Adults** • Rabies (p 144) • Other viral encephalitides • Hypocalemia (p 148) • Nervous ketosis (p 149) • Nervous coccidiosis (p 150) • *Claviceps paspali* • Tetanus (p 145) • Rye grass staggers (p 146) • Chem. intoxicants (strychnine) (p 152) • Heavy metals (lead, arsenic) (p 152) **Calves** • Polioencephalomalacia (p 140) • Enterotoxemia (p 149) • Tetanus (p 145) • Lead toxicity (p 152) • Salt poisoning (p 153) • Bactr. & viral encephalitis (p 151) **Postpartum paresis** (dullness & weakness)	• **Emergency**: if convulsions m/b too late • **IV Milk fever Ca/Mg combo** (Ca borogluconate w/ 5% Mg hypophosphate) slowly - Avoid solutions w/ potassium - Monitor heart • SQ 200-300 ml 20% Mg sulfate • Mg-rich enema • Mg oxide orally, 60 g/d., or SQ, or legume hay m/ prevent relapse **Tx: Calves** • IV commercial preparation 6% Mg borogluconate (125 ml) **Prognosis:** • **Good if treated early** • **Guarded if convulsions & tetany** **Prevention:** • Mineral blocks & salt licks • Mg fertilization on pasture - Most efficacious way

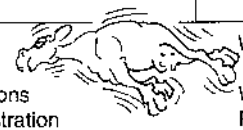
Low Mg, Stim. NMJ - Adult & Calf forms
CS: Tetanic spasms, Violent convulsions, Death
Dx: CS, Hx, Tx response
Tx: Emergency - Ca/Mg combo IV

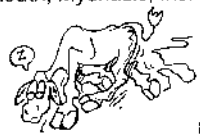
Tx response:
- Improvement in 3-5 hrs (do not disturb, tranquilize if convulsions)
- Relapses common in 3-6 hrs (SQ 50% Mg, sloughing)
- 20% of treated die during a convulsion (bec. Mg crosses blood-brain barrier slowly)

Other Poisonous Plants Affecting the Nervous System (VC/N 156)

Poisonous Plant	Clinical Signs	Comments
• **Sorghum (lathyrism)** (pg 242)	Ataxia, "Dribbling", Cystitis	Withdraw, ABs (cystitis), Recovery rare
• **Dallis grass (*Paspalum* spp)**	Staggers, tremors, "Goose stepping"	
• **Locoweed (*Astragalus*, *Oxytropis* spp)** (pg 236)	Blind staggers, vision, circling, convulsions	Weak calves, Abortions
• **Algae poisoning** (pg 237)	Acute death, excitement, seizures, prostration	Rapid, Hepatic diz
• **Ergot (*Claviceps* spp)** (pg 237)	Ataxia, aggressiveness, collapse, convulsions, opisthotonus	Fungal parasite of grasses
• **Marijuana (*Canabis*)**	Drowsiness, depression, ataxia	Growing wild (WW II hemp plants)
• **Selenium toxicity** (pg 226)	Chronic "blind staggers", weakness, dyspnea, blindness	
• **Jimsonweed (*Datura* spp)** (pg 239)	Trembling, aggressive mania, convulsions, death	P- CN - Dry mouth, Mydriasis, Incr. HR
• **Water hemlock (*Cicuta* spp)** (pg 238)	Sudden death, trembling, twitching, mania, violent convulsions	Aquatic
• **Poison hemlock (*Conium* spp)** (pg 238)	Trembling, mania, coma, death	Semiaquatic
• **Tobacco (*Nicotine* spp)** (pg 239)	Trembling, mania, convulsion, coma, death	Tranquilize
• **Milkweeds (*Asplepias* spp)** (pg 230)	Tremors, ataxia, hyperpnea, tachycardia, collapse, death	Unpalatable
• **Death camas (*Zygadenas* spp)** (pg 239)	Trembling, hyperpnea, convulsions, collapse, coma, death	
• **Larkspur (*Delphinium* spp)** (pg 235)	Trembling, ataxia, collapse, resp. paralysis, death	Toxin decr. after flowering
• **Monkshood (*Anconitum* spp)**	Trembling, ataxia, collapse, resp. paralysis, death	Less common than delphinium
• **Buckeye (*Aesculus* spp)**	Twitching, abnormal gait	Toxic to bees
• **Nightshade (*Solanaum* spp)** (pg 239)	Trembling, ataxia, weakness, collapse, convulsions, death	




IBR

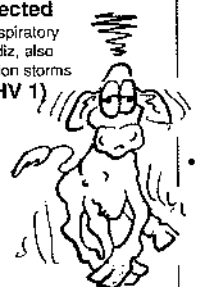
Encephalitic diz,

"Rednose"

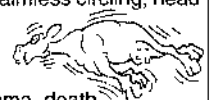
Mk 730; C3T 417, 837; IM 1009, 639; BR-hb 409; BR 1061; Br 256; DC 80; 197; GI 777; R-M 250; Derm 106; N-L 361

***

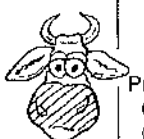
- **See Gen 252**
- **Acute fatal encephalitic form**
  - **Calves < 6 months old**
  - **Occasionally infected**
- Adults: common upper respiratory tract/bronchopneumonia diz, also enteric form, IPB, & abortion storms
- **Herpesvirus 1 (BHV 1)**



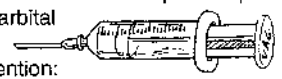
- **CNS signs - 100% mortality**
  - Incoordination (proprioception)
  - Alternating excitement, depression
  - Blindness
  - Head pressing, aimless circling, head tilt, nystagmus
  - Salivation
  - Bellowing
  - Convulsions, coma, death
- Mild nasal & ocular discharge




- History, CS
- Antibody titer only good indication of exposure
- Serum Neutralization Test - TOC
- Necropsy
  - Lesion in cerebral cortex, internal capsule
  - Immunoperoxidase test (monoclonal antibodies)
  - Virus isolation



- No adequate treatment
- Keep warm
- If convulsions: diazapam or phenobarbital



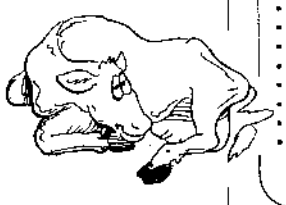
Prevention:

- Vaccination just before weaning may prevent all clinical forms of IBR

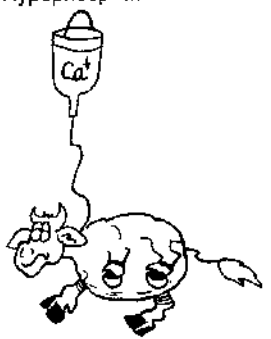
Prognosis:

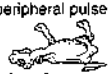
Grave near 100% die in 5 days (occasional recovery)

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Postparturient paresis, Milk fever, Parturient paresis, Hypocalcemia Mk 451; C3T 304; BR-hb 510; BR 245, 1314; Br 577; IM 1464; DC 499; N-L 210; VC/N 133; Pic	• **5-9 yr-old high prod. dairy cows** (Jerseys) - 3-6 lactation, not 1st calf heifers • Assoc. w/ endotoxemia • **0-72 hr after birth** (m/b before, during, or mos after) - Drain of Ca to milk • **Hypocalcemia** decr. ionized Ca (3-7 mg/dl, normal 10) • **Serum Mg** - Decreased -> tetany - Elevated -> flaccid paralysis • Decr. feed intake at parturition due to other illness (e.g., metritis) • Incidence in herd 8%-75% • **Calcium required for:** - **Release of ACh at NMJ** - Stasis of gut (smooth muscle) - Decr. cardiac output - Skeletal muscle weakness - Decr. peripheral perfusion, hypothermia & depression	**3 syndromes** depending on Ca levels **1. Early** (stage I, 6.5 mg/dl) • **Wobbly standing, bellowing** (excitement, treading or restless, trembling over body, hypersensitive & teeth grinding) **2. Downer cow** - (stage II, sternal recumbency, 5.5 mg/dl) • **Head turned to flank** • Drowsy or sleepy • Dull eyes, dilated pupils w/ poor pupillary light response • Pulse weak, rapid (facial a.) • Extremities cool (check ears) • Dilated flaccid anus • No rumenal contractions **3. Lat. recumbency** as approaches coma • **Position predisposes to bloat, regurgitation, & aspiration pneumonia** • Flaccid paralysis, worsening circulatory signs m/b no peripheral pulse • HR > 100 bpm • **Untreated - coma, death** (due to cardiovascular compromise) • **Down > 48 hrs - myositis,** m/ never be able to stand	• **Hx (old dairy cow - calving)** • CS (Downer cow) • Hypocalcemia • Hypophosphatemia	• **Watch postpartum for 72 hrs** • **Early IV Ca gluconate** (to avoid muscular or nervous damage) (250-500 mL, 25% sol) - Given over 10-20 min. . Auscultate heart & peripheral pulses (facial a.) for change in HR or cardiac arrhythmias leading to cardiac arrest - **SQ or IP** (less cardiac failure) (asepsis & 50 ml per site so no local reactions) • **Retreat in 8-12 hrs** (those that relapse or fail to get up) • Ketosis (250-500 ml of 50% dextrose IV) • IV phosphorus in field if doesn't respond to Ca Tx & no blood analysis • Commercial preparations containing Ca, Mg & K can be tried • Inflate udder, if no response to anything else



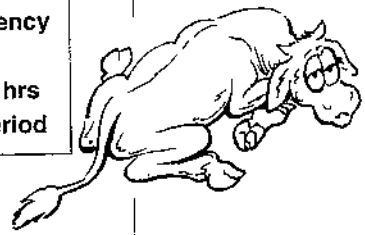
DDx:
- Mastitis, esp. coliform (p 192)
- Metritis (p 111)
- Grass tetany (p 146)
- Acute indigestion (p 28)
- Traumatic gastritis
- Coxofemoral luxation (BAR) (p 166)
- Obturator paralysis (BAR) (p 137)
- Spinal compression (BAR)(p 133)
- Pelvic fractures (BAR)(p 133)
- Hypomagnesium - prolonged excitability, strong peripheral pulses & not at parturition (p 146)





Prevention: appropriate feeding during dry period, ability to mobilize Ca in response to PTH & incr. absorption of Ca from GI, requiring PTH & Vit D
- Lower Ca intake during dry period (i.e., 80-100 mg Ca/d., 2-3 x this in lactating)
  - Excessive amounts of Ca during dry period causes a decr. in synthesis of PTH, which takes time to change
- Feed just hay during dry period (want Ca/P ratio of 2.3 to 1, but better to check amount of Ca. Some alfalfa 2% Ca. Need 0.4% Ca for dry cows
- Massive doses of Vit D (20-30 million units daily) in feed 5-7 d before parturition will reduce incidence (incr. Ca from GI tract), but if parturition more than 4 ds later, cow more susceptible (toxicity also a concern)
- Single IV injection of crystalline Vit D 8 ds before calving effective, if doesn't calf give another injection
- High doses of Ca 1 d before, at, & 1 d after calving
- High Cl^- & Sulfa diets, ammonium chloride & ammonium sulfate in basal diet, working w/ nutritionists

High prod. dairy, After birth, ↓Ca
CS: Wobbly - Downer - Lat. recumbency
Dx: Hx, CS
Tx: IV Ca gluconate, Retreat in 8-12 hrs
Prevention: Lower Ca during dry period



Characteristic responses to Ca therapy:
- Tremors over flank, then spread to entire body
- Improved cardiac function, stronger heart sounds, pulse rate decr.
- Eructation & defecation, muzzle starts to sweat
- Animal rises gen. w/in an hour, then urinates. 60% usually stand 1-2 hrs into therapy
- If not within 8-12 hrs, must re-eval.; may need P or Mg or more Ca, or may have toxemia

Down long time & little response or relapse
- Maintain in sternal recumbency - allows eructation
- Water & electrolytes
- Roll from side to side if doesn't immediately rise, or sling if available. Get off heavy muscles
- Check udder for mastitis either prior to parturition or due to recumbency
- Complications in 15-25%, w/ relapses see in 8-10 hrs. M/b displaced abomasum (usually recurrent), aspiration pneumonia, mastitis, metritis w/ open cervix postpartuient, musculo-skeletal damage, nerve damage, uterine prolapse (not often), but with uterine inertia & low Ca

Rumen alkalosis: Soy bean or high protein engorgement, Fermentation reduced & saliva continues • CS: Muscle tremors, Convulsions, Slow, shallow breathing, then dyspnea • Tx: Ringer's

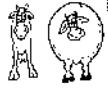
Enterotoxemia
***

- **See Gen pg 250** ; ***Clostridium perfringens*** types B&C, Well fed calves up to 1 mo
- **CS**: Acute diarrhea, Dysentery, Abd. pain, **Convulsions, Opisthotonus**, Death m/b in few hrs, Recovery over couple of ds possible
- **Dx**: PM - Hemorrhagic enteritis & ulcerations of mucosa, Gram stain for gram +, rod-shaped bact., Toxin detection of filtrates
- **Tx: Usually ineffective**, Hyperimmune serum, Antibiotics PO, Outbreak in newborns: antiserum immediately after birth
- **Prevention:** Vaccination of pregnant dam in last 3rd of pregnancy, initially 2 doses 1 mo apart then annually

Fatty liver/ Pregnancy toxemia
***

- **See GI pg 32**; Sporadic diz in fat, pregnant cows, Fat (dairy), Pregnancy toxemia (beef)
- **CS:** Fat pregnant cows, anorectic, restlessness & incoordination, sternal recumbency, rapid resp. & grunting, 7-10 ds comatose & death
- **Dx:** Ketonemia, ketonuria, hypoglycemia & proteinuria, Elev. liver enzymes, PM: Enlarged, fatty liver
- **Tx:** Generally ineffective, esp. if recumbent, steroids, glucose, fluids, propylene glycol, induce parturition, supplement herd
- **Px:** Grave

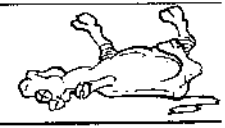
Nervous ketosis
DC 419
***



- **See GI pg 32**; Metabolic diz of lactating cows, days to few wks postcalving, reduced CHOs - metabolizes fat = ketoses
- **CS:** Weight loss, circling, staggering, head pressing, blind, acetone breath, self limiting; subclinical: no CS
- **Dx:** Hypoglycemia, ketonemia & ketonuria (Ketostix®), Response to Tx
- **Tx:** Glucose IV, Glucocorticoids IV, Propylene glycol PO
- **Px:** Rarely die, return to milk production important
- **Prevention:** Hi plane of nutrition before calving, incr. after parturition

Babesiosis, Tick fever
*

- **See Cardio. pg 91**, Tick borne erythocytic diz, tick eradicated in USA - protozoan, Babesia (many types). *B. bigemina* & *B. bovis*
- **CS:** Fever, Hemolytic anemia, "Red water", icterus, **cerebral hypoxia**: hyperexcitable & convulse, opthisthotonus, coma & die, Abortion and death
- **Successful eradication of tick in USA**

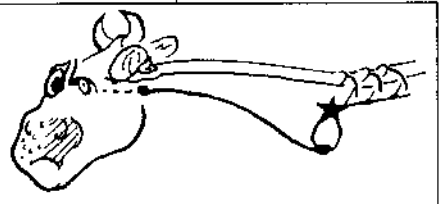


Horner's Syndrome

Condition	Facts/Cause	Clinical Signs	Diagnosis	Treatment
Horner's syndrome IM 1100; C3T 855; BR 433; DC 446; N-L 147 **	• **A syndrome, not a disease** • **Disruption of sympathetic pathways to head** (see box) • Causes - Compression of gray matter of T1-3 spinal cord segments - Injection in neck (vagosympathetic trunk) - Mediastinal/thoracic abscesses - Cervical abscesses or tumors - Space occupying lesions of cran. thorax - Esophageal rupture - Otitis media or interna - Retrobulbar abscesses or tumors • Brainstem (mesencephalon) lesions at level of rostral colliculus, m/ cause miosis - Poliocencephalomalacia - Lead poisoning • **Horse >> cattle**	• **Ipsilateral (same side) CS** - **Miosis** (small pupil, same side, due to loss of sympathetic innervation) - **Enophthalmos** (sinking of eyeball, paralysis of periorbital smooth muscle) - **Ptosis** (drooping of upper eyelid, paralysis of smooth muscle) - Regional warmth (hyperthermia) - Loss of sweating on ipsilat. side of planum nasale	• Find location of damage - Physical exam - Palpate jugular groove for swelling - Rads of cervical vertebrae - Check chest (auscultation, rads) - Gait & proprioceptive responses	• Depends on cause - Injection damage: quickly infiltrate (inject) saline (perivascular) to dilute out & NSAIDs **Prognosis:** • Neurological signs often irreversible

Sympathetic disruption to head
CS: Miosis, Enophthalmos, Ptosis, Sweating

Sympathetic pathway
- Descend from brainstem down neck to synapse in T1-T3 segments of spinal cord
- Preganglionic fibers pass over T1-T3 spinal nerves to sympathetic trunk in dors. thorax
- Pass through stellate (cervicothoracic) & middle cervical ganglia to pass up neck in vagosympathetic trunk to synapse in the cranial cervical ganglion
- Postganglionic fibers pass to sweat glands of head, dilator muscles of the iris, periorbital smooth muscles & periarteriolar musculature



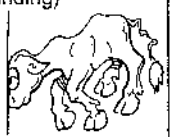
Malignant catarrhal fever: See GI pg 10; "Sheep assoc" viral diz of GI & resp. systems. CNS CS occasionally from disseminated necrotizing vasculitis of CNS

*

(trembling, incoordination, stupor, depression, terminal nystagmus, belligerence & bellowing, fever, hemorrhagic diarrhea • Dx: Hx (Sheep), CS, Microscope (vasculitis)
• Tx: Unsuccessful • Px: > 95% die in 2-18 ds

Nervous coccidiosis IM 1041; BR-hb 454; BR 1181; Br 701; CV/N 104 ***	• See Gen pg. 260 • Coccidial protozoan • *Eimeria bovis, E. zuernii* • Mechanism unclear • 2 yr, winter	• **Depression**, somnolence • **Blindness** • **Ataxia**/conscious proprioceptive deficits • Odontoprisis (teeth grinding) • **Hyperexcitability** • Propulsive walking • Head pressing • Intermittent seizures, progressing	• History, CS, Postmortem	• **Therapeutic Tx ineffective** • Try 1 treatment of Sulfa bolus, amprolium, thiamine, ABs, fluids & leave calf alone **Prognosis: Grave** Control • Monensin (100 mg/kg 30 d) prophylactic feeding

Eimeria
CS: CNS - Blindness, Ataxia, Seizures
Tx: None effective



Monensin

Meningitis

Mk 608; IM 1030; BR-hb 207; BR 493; Br 215; DC 407; N-L 86

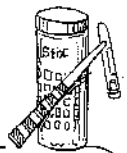
★★★

- **Neonate**
  - Sequela of septicemia (*E. coli* or Strep.)
  - **Failure of passive transfer** (FPT) predisposes to navel ill &/or enteritis
  - . Hematogenous spread to CNS
- **Adult**
  - **TEME** (*H. somnus*) (see pg 141)
  - *Pasteurella haemolyticum* & *P. multocida, Pseudomonas aeruginosa* (septic mastitis)
  - Embolic showers (endocarditis)

Neonate - FPT, Adult TEME
CS: CNS
Dx: CS, CSF, PM
Tx: Emergency - ABs

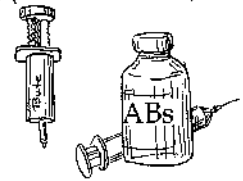
- Fever, anorexia,
- **Stiff neck**, Hyperesthesia
- **Tonic clonic convulsions**
- Behavior: depression to mania
- Tetraparesis, hyperreflexia, circling & falling to one side
- Subtle intention tremors
- Vocalization
- **Cranial n. dysfunction** (facial tremors, facial palsy, nystagmus, blindness, anisocoria, strabismus)
- Propulsive walking, coma & status epilepticus
- Recumbency, convulse repeatedly, rigid, hyperreflexic & tetanic
- Concomitant conditions
  - Phalophlebitis
  - Septic arthritis
  - Anterior uveitis
  - Panophthalmitis

- History, CS
- CSF tap & culture
- Postmortem
  - Swollen meninges
  - Cloudy CSF



DDx:
- Metabolic encephalopathies
- Hypoglycemia
- Hypomagnesemia (p 146)
- Septicemia
- Neonatal maladjustment syndrome
- Seizure syndrome (p 295)
- Hepatoencephalopathy (p 154)
- Trauma (p 133)

- **Emergency: Early recognition & Tx**
- **Large dose - Broad spec. ABs 10-14 ds,** Culture & sensitivity
  - Naxel®, Penicillin, 3rd gen Cephalosporins, Trimethoprim-sulfonamide (TMS) combo
  - NOT chloramphenicol or tetracyclines
- Plasma/blood transfusion (IgG)
- Supportive therapy
  - Fluids
  - **Sedation** (Valium®, 0.01-0.4 mg/kg IV; phenobarbital, 20 mg/kg IV)
  - . Long term control of convulsions
  - .. Valium®, phenobarbital
  - Analgesics (Banamine® & PBZ)



Prognosis: Guarded

Sporadic bovine encephalomyelitis, Buss diz, Transmissible serositis, Meningoencephalitis

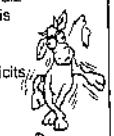
Mk 624, IM 1029; BR-hb 422; BR 1105; Br 706; N-L 87; VC/N 58

★

- **Rare**, endemic on some farms
- Chlamydia (psittacosis); also a form caused by a paramyxovirus
- Cattle & buffalo only
- Transmission: unknown
- Pathophysiology
  - Vasculitis

Rare, Chlamydia
CS: Resp, GI, CNS
Dx: Elementary bodies, Culture
Tx: Tetracyclines

- Multisystem diz
- Fever, anorexia, depression, stiffness
- **Resp**: nasal discharge, dyspnea, cough
  - Grunt - Pleuritis - pain like hardware diz
- **Lameness**: painful hooves, polyarthritis
- **GI** (initial diarrhea)
- **CNS** (encephalitis)
  - Ataxia, conscious proprioceptive deficits
  - Circling, head tilt, opisthotonus, hyperesthesia, stiff neck
  - Convulsions & coma
- Die in 4-10 d



- Elementary bodies in pleural & peritoneal effusions highly suggestive
- Culture chlamydia - blood & body fluids injected into a guinea pig IP

- **Tetracyclines** effective early

Prognosis: Death rate 31%

Miscellaneous

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Lead toxicity Mk 1674, IM 1071; BR-hb 558; BR 1469; Br 617, 704; VC/N 137; N-L 97; Pic 216 ***	• **Cattle >> horses** • **#1 inorganic poisonings** • Cattle indiscriminate eaters, more likely to lick or chew lead objects & drink used motor oil • Ingestion >>> through skin **- Old batteries #1** - Vegetation & soil contaminated from fallout from smelters & mining - Leaded gases, Crankcase oil - Painted fences • Cumulative over time • Pathophysiology - Pb deposited in bone, "sink organ" - Interferes w/ -SH enzymes (sulfhydryl) involved in heme synthesis - Shortens RBCs life & basophilic stippling - Rapidly enters brain = Acute cerebellar hemorrhage & edema (capillary dysfunction)	• **Encephalopathy - GI** **- Acute** - Bellow - Stagger (proprioceptive) **- Blind, head pressing** **- Maniacal excitement** (crash into objects) **- Death w/in 2 hrs** or - Convulsions (intermittent) - Depression, ataxia, circling & grinding teeth **- "Snapping of eyelids"** • **GI** - Constipation - Colic - Diarrhea older cattle - Bloat (crankcase oil) • "Lead line" on teeth **rarely** seen **Pb**	• CS • **Conc. whole blood (> 0.3 ppm) diagnostic** • **Admin. $CaNa_2$ EDTA** & measure rise in Pb in plasma (solubilizes bone stores) • Measure lead in environment • Postmortem: - Edema & congestion of cerebral cortex (occipital lobe)	• Depends on degree of CNS damage **- $CaNa_2$ EDTA** IV or SQ (chelating agent, solubilizes from tissue, incr. urinary excretion) **- Thiamine** therapy for cattle (m/ make Pb-thiamine complexes that are excreted) • **Mg sulfate** - D-penicillamine (oral chelating agent) given to dogs, **not** to horses or ruminants • Good nursing • Supportive care - water • Rumenotomy & laxative in rumen to remove lead from GI

#1 inorg. poison, Old batteries
CS: CNS & GI - Maniacal
Dx: > 0.3 ppm in blood
Tx: EDTA, Thiamine

DDx:
- Inorganic arsenic
- Nervous acetonemia
- Polioencephalomalacia (p 140)
- Moldy feeds
- Vitamin A deficiency (p 142)

Strychnine *

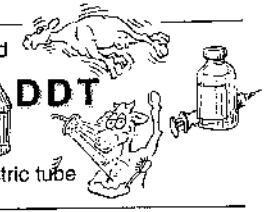
- See **Tox pg 208**; **To kill burrowing rodents & Coyotes,** No rationale for its use! **Stimulates CNS**, Interferes w/ inhibitory neurons of spinal cord
- **CS: Uncontrolled reflex activity - extensor rigidity, "Saw horse" stance, Tonic seizures. Death due to exhaustion or hypoxia**
- **Dx:** CS, Check for strychnine: stomach contents, liver, kidney
- **Tx: Control seizures** (diazepam), Muscular relaxation (GGE), Robaxin®, Maintain oxygenation, Quiet, darkened environment, Activated charcoal orally, Diuresis, Laxative

OPs, Organophosphates & Carbamate **

- See **Tox pg 206**; Major cause of poisonings now, Pesticides & anthelmintics, inhib. of AChE, Overstim. of p-ANS, skeletal mm. & CNS
- **CS:** Acute, Colic, Diarrhea, "Slobbering", Dyspnea, CNS CS: Tetany, Hyperexcitability or depression, Usually no convulsive seizure
- **Dx:** Hx w/in 48 hrs + parasympathetic signs tentative Dx of OPs or carbamate poisoning, Response to atropine therapy
- **Tx:** Emergency: Atropine, ASAP: 2 PAM, Activated charcoal & osmotic laxatives
  Contraindicated: morphine, succinylcholine & phenothiazine tranquilizers

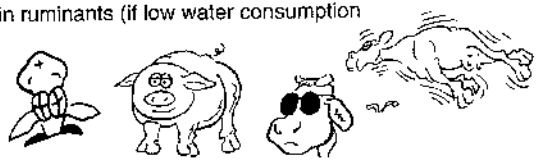
Chlorinated hydrocarbons (HCH) **

- **See Tox pg 207**; Use curtailed bec. of persistence in environment (DDT [prototype]), Lindane approved for use around livestock, Sources: contaminated feed or water, Recommended levels no problem, Diffuse stimulant of CNS
- **CS**: Stimulation or depression of CNS, Depression alternates fasciculation, Convulsive seizures (unlike OPs) Death during severe seizure, Fever, Dehydration, anorexia
- **Dx:** Hx, CS, Lab (levels in blood, serum or urine), PM (Absence of lesions, ppm of CHC in liver & brain tissue
- **Tx:** No antidote, Symptomatic: Dermal - wash; Oral: oil, activated charcoal, CNS: Barbiturate, Valium® IV fluids or gastric tube



Water deprivation, Salt poisoning, Sodium toxicity **

- **See Tox pg 205: Water deprivation**/ "Salt poisoning", Swine & poultry, Occasionally in ruminants (if low water consumption
- **GI tract** (vomiting, diarrhea, abd. pain, anorexia, mucous in feces); **CNS** (blindness, seizures, partial paralysis, knuckling) **Die w/in 24 hrs of CS**
- Dx: CS, Hx of limited water intake, Na conc. in plasma & CSF >160 mEq/L, Necropsy
- Tx: **IV fluids,** induce diuresis & correct gradually, too fast = cerebellar edema, Lasix®
- **Px: Grave** - most die

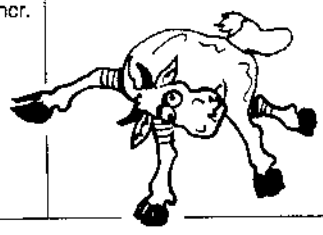


Urea toxicity NPN, ***

- **See Tox pg 204**
- Urea not poisonous
- **Ammonium (NH_3) is toxic**
- Sources: NPN feed additive
- Need to adapt over days to weeks
- Mechanism: Inhibits TCA cycle: incr. in lactate (acidosis)

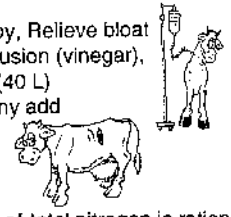
Excess NPN converted to ammonium
CS: Acute, "Bonkers", Convulsions, Death
Dx: Hx, CS, Ammonia smell, Lab, PM
Tx: Difficult (rapid), Relieve bloat, Fluids

- **Rapidly progressive** 20-60 min
- **Muscle tremors initially**
- **"Bovine bonkers"**
- Rumen atony => **bloat**
- Terminal convulsions to death



- **CS, History, dietary exposure**
- Smell ammonia m/b

- **Often impossible - speed of CS**
- Fluid therapy, Relieve bloat
- Ruminal infusion (vinegar), feed water (40 L)
- Rumenotomy add hay slurry



Prevention:
- NPN < 1/3 of total nitrogen in ration
- Slowly adapt to NPN feed

Prognosis: highly fatal

Narcolepsy/ cataplexy *

IM 1088; BR-hb 194; N-L 136

- **Rare, reported in a Brahman bull**; sleep episodes at inappropriate times, Stimulation (restraint, feeding, change in environment) causes animal to fall down & appear comatose; animal appears normal between episodes
- **Tx:** Imipramine (0.5 mg/kg) a tricyclic antidepressant or amphetamine sulfate m/ prevent narcoleptic attacks

Epilepsy *

IM 1084; BR-hb 209, BR 497; N-L 95

- Extremely rare, described in Herefords & Brown Swiss • Cause: genetic? So rare no specific Tx regime
- Tx not indicated: incurable

Mad Cow Diz

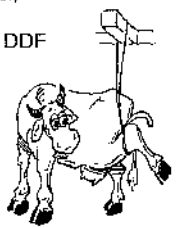
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Hepatic encephalopathy, Walking diz IM 195; BR-hb 117; BR 321	• Severe hepatic insufficiency due to liver diz or portosytemic shunts - **Hepatitis** - **Porto-caval shunts** - **Poisonous plants** • **Results in abnormal mentation** • Pathophysiology: - Accumulation of ammonia, mercaptans, etc. to brain	• **Diffuse cerebral impairment** - Behavioral changes (docile to aggressive or vice versa) - Mania, Excessive vocalization - Depression & anorexia - Stand w/ head hanging, jerking it up occasionally - Grimacing, twitching of muzzle & lips - Head pressing - **Compulsive, oblivious walking** - Aggressive or maniacal - Blindness w/ time - **Seizures & coma terminally** (w/in hours or months, depending on cause)	• History, CS • Lab: liver failure - Ammonium - Liver enzymes: GGT, SDH, LDH - Excretion test: bilirubin elevated	• **Empirical & supportive** - IV glucose (correct hypoglycemia) - Nutrition - low protein, high CHO diet (grass hay/citrus or beet pulp) - Mineral oil (slow absorption of toxic products) **Prognosis:** • **Poor to hopeless**, but occasional recoveries recorded
Bovine spongiform encephalopathy, BSE, Mad cow diz, Crazy cow diz IM 1010, BR-hb 426, BR 1116; DC 419 *	• Not reported in USA • **Found in Britain in 1985** - Holstein-Friesian - 4-5 years old average - **Incubation period 1-2 years** - **Huge scare in 1995**, human deaths reported, banning of British beef, crisis • Implicated in human diz (**Creutzfeldt-Jakob diz** & kuru) • Concern over threat of introduction into USA - USA halted importation from England - Eliminated sheep byproducts in cattle feed • Cause: - **Scrapie-like prion** or slow virus (may be same organism that causes scrapie in sheep) - Current theory: **sheep by-products** in meat & bone meal in cattle feed caused diz	• **Hyperexcitability** • Anxious/apprehensive: won't pass through gates • Hyperesthesia to sound & touch • Progressive belligerence/aggression (kicking) • Progressive, hypermetric ataxia • Frenzy & falling down • Facial & ear twitching • Excessive grooming • Short course 6 months	• History (**England**), CS • Histopathology of brain - Bilateral, symmetric degenerative changes w/ vacuolation of neurons & gray matter - Scrapie-associated fibrils (EM) • CSF normal	• **Fatal** • **Euthanasia** - recumbency • Surveillance for introduction into USA • **Reportable** DDx: • Rabies (p 144) • Hypomagnesemia (p 146) • Nervous acetonemia • Lead poisoning (p 152) • Polioencephalomalacia (p 140) • Brain abscess (p 140) • Spinal abscess (p 134) • Hepatoencephalopathy (p 154) • Tremogenic toxins **Prognosis: fatal in 6 months - 100%**

Liver failure
Cerebral - Compulsive walking
Hopeless

Britain - PH?
Crisis - 1995

MUSCULOSKELETON - VII

Foot Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Ulceration of the sole, **Pododermatitis circumspecta, Rusterholz ulcer, Granuloma of sole** Mk 502; C3T 866; Pic 95; VC/L 35; S-O 200; L 174; DC 372 ★★★ 	• **Common** • **Axial side at junction of sole & heel** - **Lat. hind claw** most commonly - Med. front claw less commonly - **Bilateral tendency** • Cause unknown - **Trauma to solar corium** . Bending of sole causes pressure necrosis - Corium stops producing horn & **granulation tissue** forms • Predisposition - Corkscrew claw - Concrete >pasture (chronic bruising) - ? Nutrition, Wet conditions	• **Lameness** - **Base wide rear limbs, stance & walk** (if lat. hind claw) - **M/ stand w/ toes on edge of gutter** • Variable conditions - **Discoloration** (yellowish color)  - Bruising - Ulcer - **Knob of granulation tissue** (1/2" in diameter) • Sequela - Rupture of DDF tendon 	• History, CS  • Hoof testers • Trim • Check both legs (often bilat.)  	• Time consuming & frustrating • If just bruising, leave sole as protective cover • **Debride granulation tissue**  • **Rest claw** by elevating it - **Wooden block** (commercially made 0.5 to 1 inch, wear out in a month) - Med. claw must be normal & trimmed flat - Epoxy ("Technovit®") block to claw - Build up collar of Technovit® or block will fall off • Bandaging controversial - If clean & dry & ability to change, OK - Otherwise, not in filth • Koppertox® (drying agent) • Can't compete for food &/or water, so counsel owner   **Prognosis:** • **3-6 wks to heal**
?, Lat. hind > Med. front, Junction of sole & heel **CS: Lame, Bruise to granulation knob** **Dx: Hx, CS, Hoof testers, Pare** **Tx: Debride & Rest (Wooden block) - 3-6 wks**				
Bruised sole Mk 507; BR 868, 510t; Br 354; S-O 193; L 182 ★★★	• **Bruising** • Trauma (stones, irregular ground, etc.) - Excessive trimming of abaxial wall transfers weight to sole - Hard surfaces, excessive wear of sole - Ruptures minute blood vessels in corium	• **Lameness** • **Purple-red discoloration** • M/b asymptomatic (find while trimming)  • Sequela - M/ become an abscess	• History, CS  • **Hoof testers** • **Pare out sole** 	• **Allow nature to heal**  - Confinement - Soft bedding - Leave on pasture **Prevention:** • Keep on pasture 
Trauma **CS/Dx: Lame, Discoloration** **Tx: Rest - Spontaneous recovery**				

Subsolar abscess, Puncture of sole

Pododermatitis traumatica

IM 1317; C3T 864; BR 868; VC/L 35; S-O 196; Pic 90; DC 370; L 182

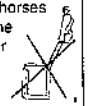
***

- **#1 lameness of cattle (90%)**
- Causes: damage to sole
  - **FB** (foreign body) **penetration**
    - . M/not be infected if it doesn't reach corium
    - . Abscess forms in sensitive corium if infected
  - **Laminitis**
  - **White line separation**
  - **Cracks**
- **#1 Lat. claw (hind foot)**, med. claw (front foot)

- **3 legged lameness** often
- Reluctance to bear wt on toe
  - Base-wide or base-narrow stance
- Drainage above coronary band in time

- **Sequelae**
  - Osteomyelitis of coffin joint
  - Tenosynovitis

- **Hoof testers** (repeat 3-4 times)
- **Pare out sole**
  - Follow black lines or visualized punctures
- Rads - not indicated & often unrewarding in cattle, in horses used to see if joint or bone involvement & taken prior to FB removal)



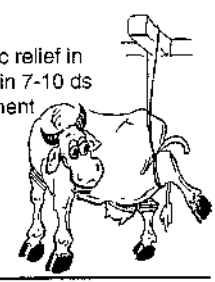
- **Remove foreign body** (m/ cure lameness if it hasn't penetrated the corium)
- **#1 Adequate drainage**
  - **Pare out** dark tract, remove all undermined sole
    - . Leave any new sole deep to abscess
    - . Release pus & possible gas
    - . Don't block drainage hole
  - Trim wall to 1/3" (1 cm) below reforming sole (longer wall - manure & mud accumulation)

- **Bandage or not?**
  - Clean & dress w/ antibiotic (powder)
    - . Plastic bag taped over claw (to keep clean)
  - No, if soaked w/ urine or manure
    - . Leave open + drying agent (Koppertox®)
    - . Clean & drying agent BID or EOD
    - . Simple sole abscesses heal nicely w/o bandaging

- NSAIDS - "Bute" (for pain) (10 mg/kg/d)
- **Wood block** on unaffected claw to keep wt. off affected one (attach by epoxy [Technovit®] & allow to wear off in a couple of weeks)
- **White line diz**
  - **Drain** (remove hoof right above abscess to allow drainage out wall instead of at ground surface)
  - If draining from coronet, expose entire tract (or septic navicular bursitis m/ occur)
- Heel abscess as above; if separation of hoof from laminae; remove old hoof in stages

Prognosis:

- **Good** - dramatic relief in 24 hrs, recover in 7-10 ds
  - If no improvement reevaluate



90% of lameness; FB/Laminitis/Cracks
CS: Lameness
Dx: Pare out sole, Hoof testers, Rads
Tx: Drainage, NSAIDs, Wooden block

Predisposing factors:
- **Filthy environment**
- **Corkscrew claw** (pg 160)
- Inadequate foot care
- **Puncture wounds**
- Trauma

DDx
- Fractures
- Stifle injury (p 166)

IVRA (intravenous regional anesthesia, Bier block)
- Tourniquet below tarsus or hock
- Inject anesthetic into superficial veins

Toe	• **Front of sole/dors. region** (toe, anterior)	• **Lameness rapid & severe** • **3-legged lame** • Heat, swelling, localized pain
Heel 	• **Plant/palm.** (heel, posterior) • No frog (unlike horse) & thick heels so navicular bursae rarely affected • M/ travel up sensitive laminae & separate hoof from laminae - New heel growth over laminae	• **Lameness - slower & less severe** • Heat, swelling, localized pain • M/ drain above coronet of heel
White line diz L 191 	• **Type of subsolar abscess** • Junction betw. hoof & sole - Common site of infec., more so than horses - Infection tracts under sole, up laminae & out at coronet • **Hind limbs - plantar lateral side** • **Front limbs - dorsomedial toe**	• **Lameness** • Pus m/b released at coronary band (like "gravel" in horses)

Foot Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Vertical claw cracks or Fissures Quarter/Sand cracks Mk 499; C3T 865; Br 362; VC/L36; S-O 211; Pic 101; L 171; DC 379 ***	• **Dors. or dorsoabaxial hoof wall** • Types - From bearing surface proximally - **From coronary band** distally - **Infected or not** • **Front feet > rear, beef bulls** • Causes - **Dryness** to hoof due to **loss of periople** (waterproof stratum externa) . Sandy soil wears . Age; late summer & fall - **Trauma to coronet**	• **Crack in horn** **- M/b no lameness** • Infection - Purulent discharge - Lameness • Chronic no indication of recovery **Sequela** • **Infection of coffin** (dist. interphalangeal) **joint** 	• **History, CS** • **Hoof testers** to verify cause of lameness  • Blood from crack indicates sensitive laminae involvement • **Palpate coronary band routinely** (dirt can hide) 	• **Rarely need Tx if not into laminae** **- Trim foot, shorten toe** • **If cosmetic care requested:** Remove broken horn - Fill crack w/ methyl methacrylate, Embedded staples - Seal prox. end of crack w/ hot iron • **Infection** **- Clean out & widen w/ hoof groover** **- If abscess:** pair out; if dry m/ fill w/ acrylic; if draining leave open **- ABs**  • **Wooden block on unaffected claw if crack from coronet to ground** **Prevention:** • **Varnish or apply thick oil to hoof wall**
Horizontal Cracks **Fissure/Sand cracks, Fissure ungulae horizontalis, Thimbling, Thimble toe** Mk 499; C3T 865; S-O 215; Pic 102; L 170 **	• **Adult dairy cows** • Following systemic infec. w/ fever - Severe systemic illness, metritis or mastitis, nutrition - Completely inhibits horn growth • **Horizontal separation of hoof** (loss of continuity of hoof wall parallel to coronet) • All 8 claws usually affected	• Initially inflam. of coronary band & slight lameness • Recovery • **Then encircling depression** of hoof wall, except at heel • **Thimbling**: separation of dist. hoof (mos to a yr later when groove is close to ground) **- Severe pain**	• History, CS 	• **Remove as much dist. hoof as possible** (thimble) w/o entering sensitive laminae - "Dub" toe as short as possible - Repeat if necessary **Prognosis:** • Good: 4-6 wks to grow out & fall off 

Dry hoof (loss of periople)
CS: Crack ± Lameness
Dx: Hoof testers, Palpate coronary band
Tx: Rest; Infec.: Widen, ABs, Wooden block

Adult dairy, Systemic illness + Fever
CS: Depression to Thimbling, Lame
Tx: Foot trim + Time

Foot rot,

Interdigital necrobacillosis, Interdigital phlegmon, "Foul-in-the-foot"

Mk 501, C3T 869; IM 1173; Br 356; BR-hb 342, 227; BR 509, 867; Pic 96; L 151; DC 380

***

- **Common**
- **Inflam. of interdigital SQ tissue**
- Hindlimbs most common
  - 1 or more feet affected
- #1 lameness in young stocker & fattening units
- Dairy - young heifers
- Cause - infectious
  - ***Fusobacterium necrophorum***, *Bacteroides nodosus* & *B. melaninogenicus*, fungus
    . Fusobacterium ubiquitous in environment
  - Trauma - skin broken, bact. invade
    . Wet environment, or
    . Dry, hard ground causing abrasions
  - Local immunity? Digit seldom affected twice
- Predisposing: short heels & long toes

- **Lameness** (sudden onset, moderate to severe)
  - Fetlock & pastern held flexed w/ little wt. on toe)
- Deep tissue: Interdigital space swollen & painful (m/ spread claws), palmar > dors.
- **Interdigital space fissure & necrosis**
- **Foul odor, but little pus**
- ↑ Temperature
- ↓ Milk production
- Weight loss

Complications
- Septic arthritis
- Tenosynovitis

- **History, CS, foul odor**
- Biopsy - culture

DDx
- FB (p 157)
- Stable foot rot (p 159)
- Interdigital hyperplasia (corns) (p 160)
- Other causes of lameness
  - Sole ulcers (p 156)
  - Sole abscesses (p 157)

Prevention
- **Reduce trauma** (move off stibble & stones)
  - Attempt to keep feet dry
- **Foot baths**, 5% formalin, 10% copper sulfate or 10% zinc sulfate weekly
- Chlortetracycline feeding (feedlots), Oral iodides (EDDI, ethylenediamine dihydroiodide) in feed

- **Mild cases**
  - **Usually rapid healing, 2-4 days**
  - **ABs: Penicillin**, sulfonamides, tetracyclines (shortens course of dz)
- **If necrotic areas present:**
  - **Clean & debride**
  - Remove necrotic interdigital mass
  - Koppertox®, Copper sulfate (5%)
  - AB bandages
  - Wire claws together
  - Clean environment

- **Suppurative arthritis** or tenosynovitis
  - **Surgical removal of claw**
    - But if > 80% of digit removed culled w/ in 1 yr
    - Surgical drainage & arthrodesis of coffin joint in valuable animals

Prognosis:
- Good - once necrotic tissue is removed or sloughs, heals rapidly usually
- Poor - if arthritis or tenosynovitis

Deep/SQ, Common, *F. necrophorum*, Stockers
CS: Lameness, Smelly, Rotten interdigital fissure, Swelling
Dx: Hx, CS, Odor
Tx: ABs, Debridement
Prevention: Foot baths, Feed additives

Stable foot rot, "Scald"

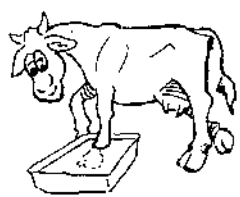
Interdigital dermatitis, Chronic necrotic pododermatitis, "Slurry heel"

Mk 501; IM 1416; BR 510; Br 357; C3T 868; Pic 100; L 158 ***

- **Supf. inflam. of interdigital skin**
- ***Bacteroides nodosus*** agent?
  - Not part of natural farm flora, can be eradicated
  - *F. necrophorum* increases severity
- 60% of herd m/ be affected
- Hind feet
- Predisposing
  - **Wet stable, standing in slurry**

- **Interdigital eczema**, esp. betw. bulbs
  - Secretions oozing from dorsal commissures of cleft, then dry crust
  - No lameness, but sensitive to touch
  - Little swelling
- **2° Erosion of heels**, undermines heel horn
  - Lame (sensitive gait, cowhocked stance, oversized lat. claw)
    . 2° sole ulcer - lat. claw

- History, CS
- Lab confirmation difficult

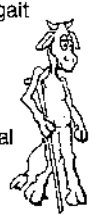
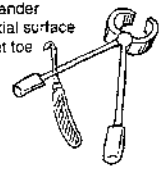
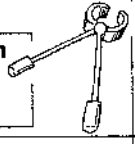
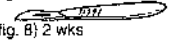
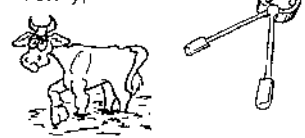
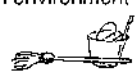


- **Superficial infections**
  - **Turn out to pasture** (usually spontaneously resolves)
  - Footbaths BID - 5% copper sulfate or 3% formaldehyde
  - ABs for severe infections
- **2° heel erosions**
  - Paring of claw to shift weight to medial claw
  - Affix block to medial claw

Prevention:
- **Formalin foot bath** (3%) for 1 wk

Supf., *B. nodosus*, Wet environment
CS: Interdigital eczema, Heel erosions (lameness)
Dx: Hx, CS
Tx: Eczema (pasture, formalin), Erosions (pare, block)

Foot Disease

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Corkscrew claws, **Curled toe** IM 1317; BR 1650; BR&G 1650; BM&S 585; Pic 102; S-O 216 ***	• **Lat. hind claws, bilat.** (hereditary) • > 5 yrs-old • Inherited conformation, stifle varum or acquired due to chronic lameness in opposite limb • Growth of **abaxial horn** underneath sole **Lat. hind claw, Hereditary, Abaxial growth** **CS: Rolling gait** **Tx: Repeated trimmings**	• **Corkscrew claw** (toe twists) - Walking on abaxial wall • Lameness, rolling gait • Sequelae - Sole ulcers - Osteolysis of pedal bone 	• Visualization 	• **Once established, little hope to resolve** • **Trimming** to control gross abnormalities - Electric rotary hoof sander - Remove bulk of abaxial surface - Remove corkscrew at toe 
Corns, * ** Quittor; Hyperplasia interdigitalis, **Interdigital fibroma** Mk 496; BR 868; Br 151; BM&S 587; Pic 97; C3T 871, 867; DC 382; L 162	• **Common in beef & adult dairy** • **Hindfeet** >> forefeet; Bull > cow • Causes - Chronic irritation . Overfinishing (overweight) (corn) . Moist, filthy environment, infection . Splayed toes predispose . Hereditary? • Normally only one animal, if more suspect virus (warts)  **Interdigital growth, Overfinishing, Filth** **CS/Dx: Growth, Variable lameness** **Tx: Rest, Cull or Sx** 	• **Corn**: Proliferative lesion of skin dors. & plant./palm. to interdigital space - **Thickening of skin** - Traumatized by claws • ± Lameness - Once halfway down interdigital space, lameness - Infected, ulcerative or traumatized => lameness - Palmar/plantar - pinched by claw (pain) Prevention • Cull if hereditary • Routine foot trimming • Clean, dry environment	• **History, CS** • **Hyperplasia** **DDx** • 1° wound infec. • Warts (p 160) • Foot rot (p 159) • Trauma 	• **Small; m/spontaneously regress** - Clean, dry environment - Clean & bandage if ulcerative or infected • **Cull or Sx** if conservative Tx is not effective • **Surgical removal**  - Use IVRA w/ tourniquet - Fusiform incision around base of mass, m/ extend between 2 digits. remove fat pad if redundant  - Tight AB bandage (fig. 8) 2 wks - Wire toes together m/b, then remove sutures • Recurrence, so counsel owners - Cauterization of underlying tissue (antimony trichloride or copper sulfate) • Cryosurgery also effective • Commercial or autogenous wart vaccines if numerous animals affected
Verrucosa granulosa **Dermatitis verrucosa, Interdigital fibropapilloma** Mk 496; BM&S 587; C3T 867; DC 383; L 160	• Proliferative lesion • **Usually above bulbs of heel**, plantar • *Fusobacterium necrophorum* + fungus • Filthy, moist environment • Long toes keep heel in water • **Hindfeet** **Above bulbs, Long toe** **CS: Wartlike** **Tx: Trim, Sx**	• **Wartlike growth** - Matted, dried serum • **Rarely lameness** 	• History, CS 	• **Foot trim** (shorten toe, preserve heel) • Radical excision (cautery for hemostasis) • Bandage, dry clean environment 

Septic pedal arthritis

Mk 467; IM 1295; S-O 202; S-T 289; S-N 249; Pic 93; DC 373; L 197

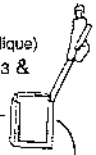
***

- **Common, Deep sepsis**
- **Very serious condition**
- **In coffin joint, navicular bursa or synovial sheaths**
- Cause - extension from:
  - Interdigital lesions (joint supf. in dors. cleft)
  - Septic sand cracks (located slightly abaxial to insertion of extensor tendon, joint supf. here also)
  - Abscesses of white line into coffin joint or navicular bursa
  - Sole ulceration

Factors - amputation
- Value of animal
- Size (2000 lb. hard time on 1 digit)
- Usually < 1200-1400 lb. dairy cows

- **Very lame, very painful**
- Coronet swollen, inflamed & painful
- Interdigital granulation tissue, pus drainage
- **Stop lactation**

- **History, CS**
- Rads can help
  - Offset each digit (oblique)
  - Osteomyelitis in P2-3 & sepsis in P1-2

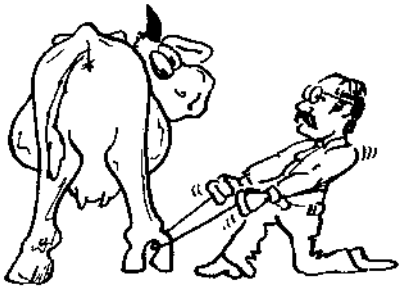


DDx
- Foot rot (bilat. swelling)(p 159)
- Stable foot rot (p 159)

1• **Amputate digit** as it's very painful, unless of great value or very large animal
2• **Streetnail procedure** (deep drainage procedure)
- Resection of DDF

- Opening coffin joint
- Flush apparatus to dors. side
- Bloat trocar - or tubes

Prognosis:
- **Guarded**



Amputation of digit (L 229)
- Cutting skin flap & doing proper closure causes less healing time
- Dors. incision in middle of claw, not middle of leg
- Lift skin flap from hoof (circumferentially)
- **Amputate through dist. end of P1**
  - Cannot go higher than 1/3 of P1 (artery, nerves to other digit)
  - Angle cut so skin flap can be sutured axially
  - Gigli wire: start wire in straight, then turn to angle cut, cutting through flexor tendons & ligate digital vessels
- IVRA best anesthetic
- Tight bandage, if see bleeding, put more on & wrap tighter
- If cannot remove all infected tissue, don't close completely
  - Drainage

Coffin joint, Navicular bursa, Synovial sheaths
Extension of interdig. dizs, Sole abscess/Ulceration
CS/Dx: Very painful, Swollen coronet
Tx: Amputate claw (< 1200 lbs)

Gangrene, Fescue foot gangrene, Ergot gangrene

Mk 497; IM 1312; CST 870; Pic 124, Tox 394

**

• See Gen pg 264
- **Dry gangrene of lower legs & feet**
- **Rear limbs** especially
- **Consuming tall fescue** (*Festuca arundinacea*), toxin in stems & leaves
- Ergot infested feeds (Claviceps)
- Cold temperatures contribute
- High levels of nitrogen in soil
- CS w/n 10-14 ds of grazing

Tall fescue, Ergot
CS: Sloughing of skin of distal limbs
Tx: Remove source, ABs; Nothing for gangrene

- **Initially hindlimb lameness**
- Local heat, swelling, severe pain
- Cold pasterns, red coronary band
- **Line of demarcation** between hock & claw - fetlock or pastern
  - Skin below dry, gangrenous & eventually **sloughs**
  - Tail & ears also
- Unable to walk or stand

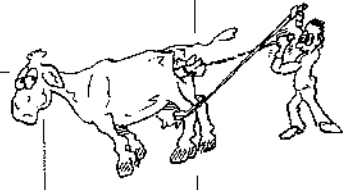
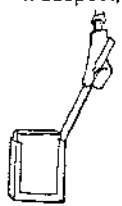
- History, CS
- **Tall fescue** in pasture
- Claviceps-infested feed

DDx:
- **Early:** Foot injury, foot rot (p 159), laminitis (p163)
- **Late:** "Alkali diz" (selenium toxicosis) (p 226)
  - Frostbite (p 163)
  - Foot rot (p 159)
  - Trauma

- Remove from pasture
  - Antibiotics, slow recovery
- **Once necrosis: Slaughter**

Prevention:
- Mix legumes & growing low toxic strains of tall fescue (mowing doesn't help!)

Laminitis

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Fractures of P3 Mk 498; C3T 879; C2T 896; IM 1334; Br 362; DC 380; S-O 301; Pic 104; L 215, 229 **  **Common, Often bilateral** **CS: 3 legged, Cross legs** **Dx: Hoof testers, Rads** **Tx: Wooden block, Amput. last resort**	• Common • Trauma: Medial front claw usually • Articular & transverse usually - DDF distracts fragments • **Often bilateral** • Cause poorly understood - Trauma - Nutritional - fluorosis - Foreign body penetration, osteomyelitis	• **3-legged lameness,** lay down a lot, reluctant to get up • **Cross legged** (to keep weight off med. claw) • Incr. digital pulse • Heat in foot  **DDx:** • **Laminitis** (if bilat. lameness)(p 163) • FB penetration (p 157)	• **Hoof testers** • **Rads - definitive Dx & location** - Special angles to see process fxs (m/ be hard to see due to little displacement) - Retake in a couple of wks bec. lines more pronounced w/ remodeling  **Other digital fxs** • Navicular bone fxs - confined to horse • P1 & P2 - 1° confined to horse	• **Wooden block on unaffected claw** (keep wt. off affected claw) • Penetrating FB fxs: Surgical removal of loose or necrotic fragments  • **Claw amputation last resort**, no use if bilateral  **Prognosis:** • **Good**: complete healing up to 18 mo - Clinical soundness in 4-6 wks
Cannon bone fx **Condylar/ articular fx** C3T 879; Br 373; VC/L 150; Mk 498; IM 1331; S-O 309 *** **Physeal fxs, Calf pulling** **CS: Lame, Swelling, Crepitation** **Dx: Hx, CS, Rads** **Tx: Reduce & cast • Px: Good**	• **Very common,** fused Mc/Mt III & IV • **#1 - Distal physeal fxs** - **Calves < 3 mo** - Salter-Harris type II dist. end, bit of metaphysis still attached by periosteum on concave side • Shaft fxs • Cause - **Pulling calf** (need half hitches below & above fetlock; if just one hitch, do below fetlock) - Trauma 	• **Looks hyperextended** • **Mild to severe lameness** • Swelling & crepitation 	• CS - effusions • **Fx movement & crepitation** (sound of fx ends rubbing together) • Rads - 4 views: DP, LM, MO & LO - Look very carefully for fissure fxs • **Fissure fxs of cannon bone subtle & easy to miss** - If suspect, immediate rads  **DDx:** • Luxation of fetlock	• **Reduce** (lat. recumbency w/ concave side upward, gravity helps, m/ need calving jack) • **Half leg cast** (include foot, but not stifle) - If doubtful, put in full leg cast for 1 mo, then cut cast in half for use another 4-5 wks **Prognosis:** • Good • Displaced & delayed Tx: - Guarded to Poor • Sometimes calving tears neurovascular structures to dist. limb, **10 ds after fixing hoof m/ fall off**, must warn owners!

Laminitis, Founder, Pododermatitis aseptica diffusa, Aseptic pododermatitis

Mk 500; IM 1300; BR-hb 823; BR 1617, 510; Br 380; C3T 867; C2T 896; DC 376; L 219; S-O 189, 215; Pic 104

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- **Not as dramatic as in horses**
  - **No rotation**
  - **Subclinical usually**
  - **Hindlimbs** more commonly involved (opposite of horse)
- Dairy heifers/cows (hi-conc diet) or steers on hi-CHO diets
- Causes
  - **#1 Endotoxins** (vasoactive)
  - Cell walls of gram neg. bacteria
  - Killed by **lactic acidosis**
- Pathophysiology in laminae
  - **Uncoupling of laminae** betw. hoof & P3 (breaks down) due to ischemia, degeneration, inflam., pain & necrosis from:
    - Vasoconstriction leading to arteriovenous shunting (from laminae to deep structures of foot)
    - Coagulopathy leading to thrombosis
- **Most get better**
- **Founder (annular) rings** - horizontal lines on hoof wall reflect old bouts of laminitis
- Causes (see box)

Endotoxins, Fat postpartum heifer
CS: Subclinical, Lameness, "Slipper foot"
Dx: Hx, CS, Hoof testers
Tx: Treat cause, Banamine®

- **Less marked than horse**
- **Anorexia, depression**
- **Reluctance to move**
- **Diarrhea**
- **Posture:** all legs under body or fore- & hindlimbs extended forward, arched back
  - Leg crossing or narrow walking indicates medial claw only affected
- **Recumbent**
- **"Slipper foot"** (chronic)
  - Long hooves, turned up at toe
  - Heavy ridging on wall
  - **Sole softens & turns yellow**

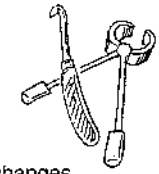
Subclinical
- No abnormal gait or posture
- Soft horn, bloodstained & yellow, waxy appearance

Sequelae
- White line diz
- Sole ulcers
- Sole has more blood w/ laminitis, so bleeds easy when paring (arteriovenous shunts)

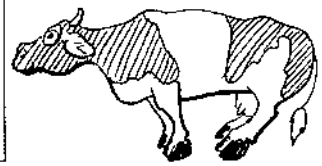
- **Arterial blood pressure depressed** (opposite of horse)
- **Hoof testers,** pain over entire sole, esp. over toe
- **CHRONIC:**
  - Hoof growth & rings in hoof wall
- **Herd**
  - High incidence of midlactation lameness, white line diz & sole ulcers

Causes:
- **#1 Fat heifers right after calving** (fed high conc. & kept on concrete surfaces)
- **Grain founder**: overload of grain (wheat, corn, barley >> oats), Incr. lactic acid bact., low pH lyses gram neg. bact. (release of **endotoxin**)
- **Sustained hi-CHO** fed over long time (subacute or subclinical)
- **Colonic torsion** (breakdown of mucosa allows endotoxins into portal circulation)
- **Retained placenta**: postparturient laminitis (always serious)
- **Pleuropneumonia**
- **Septic metritis**
- **Endotoxemia** (always serious)

- Emergency - acute
- **Tx cause**
  - Grain overload - mineral oil
    - Rumenotomy if early
  - Septicemia - ABs
- **Get moving** to incr. circulation in feet
  - Medical Tx controversial (Steroids, antihistamines, antiprostaglandins [NSAIDs])
  - Banamine® (analgesic & decreases endotoxins)
- **Chronic - repeated trimming**



Prevention:
- Slow feed changes
- Trim entire herd 2 x/yr



Frostbite

Mk 498, 627; IM 1438; BR-hb 556; BR 1465; BM&S 495; Derm 68

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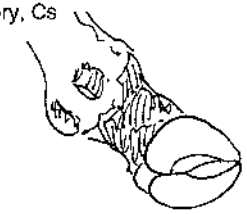
- Calves born in cold (windchill factor -18° C (< 0° F)
- Feet & other extremities, ears, tail, teats, scrotum & dist. limbs
- Damaged tissue more susceptible to cold in future

CS: Devitalized/Sloughed ears, Hooves
Tx: Usually too late

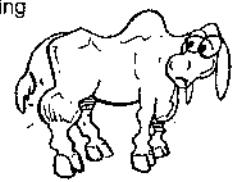
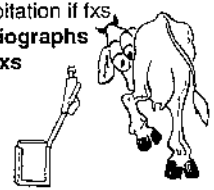
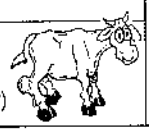
- Reluctance to move
- Recumbency
- **Devitalized** ear tips, crusty muzzle, cold hindfeet
- Days-wks later **sloughing** of tissue, including hooves

- History, Cs



- **Usually too late**
- **Emergency: thaw rapidly in warm water (100-111°F)**
  - Analgesics (thawing painful)
  - Do not massage during thawing
  - Avoid premature debridement
  - Damaged areas left exposed (not bandaged)
  - Supportive care (high protein, high calorie, vitamin supplementation)
  - Restrain to prevent self mutilation
- **No treatment once CS**

Tarsus

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Tarsal hydrarthrosis, "Bog Spavin" VC/L 169; L 289, 174, 181, 182 **	• Chronic distention of tibiotarsal (TT) & prox. intertarsal (PIT) joints • Common in "postlegged" cattle - Also cattle confined in stanchion w/ concrete floors w/ no exercise **CS: "Postlegged", Fluid distention, No lameness** **Tx: Drain & Steroids**	• **Fluid distention** TT & PIT joints • Little or no lameness - M/ tread w/ hind limbs & lie down more 	• History, CS • Radiographs - No findings	• **Salvage (get another bull)** • Aspirate fluids • Inject corticosteroids - relief for wks-mos - Dorsomedial pouch of TT joint   Prevention • Exercise & plywood on stanchion floor
Septic tarsitis C3T 876; VC/L 169; L 306 ***	• **Infectious arthritis** - 1 of joints of polyarthritis in navel ill . Mycoplasma . Haemophilus - Penetration wounds - Extension of tarsal cellulitis **Navel ill, Penetration, Cellulitis** **CS/Dx: Lame, Swelling** **Tx: ABs, Lavage**	• **Severe lameness** • Joint stiffness • Swelling 	• History, CS • Palpation for pain • Arthrocentesis - Cultures often negative • Radiographs  • Noninfectious arthritis (DJD) in postlegged cattle - OC (osteochondrosis) also reported	• **Noninfectious: rest**  • **Infectious arthritis** - **Systemic antibiotics** - Joint lavage 
Luxations of tarsal joints S-O 307 **	• **Frequent** (cattle & horses) • TT (tibiotarsal), PIT (prox. intertarsal) & TMt (tarsometatarsal) joints • **Not** DIT (dist. intertarsal) joint bec. it doesn't cross the entire tarsus (4th tarsal bone interrupts) • If no accompanying fxs or damage to tarsocrural joint, they can be successfully treated • Cause: **severe wrenching or twisting** (sudden slip or fall)	• **Obvious 3-legged lameness** • **Limb deformity** • Displacement of tibia cran. & dist. in talocrural luxation (worst) **Frequent; TT, PIT &TMt joints** **CS/Dx: 3-legged; Deformity** **Tx: Reduce & Cast**	• **History, CS** • Crepitation if fxs • **Radiographs for fxs** 	• **Reduction** - Sometimes impossible in talocrural luxation (m/ have to cut collateral lig.) • **Immobilization** - **Full limb cast** (up around stifle) - Snug to minimize motion **Prognosis** • Good - for simple luxation DIT & TMt • Guarded - w/ fxs • Poor - comminuted fxs • Poor - luxation of talocrural (difficult to reduce)
Capped hock * BM&S 871; Pic 118	• Acquired bursa formed due to chronic trauma • **CS:** No lameness, Fluctuant swelling (hardens w/ time) • **Dx:** Hx, CS • **Tx:** Stop trauma: put out to pasture (summer), well-bedded straw (winter)			

Tarsal cellulitis/ hygroma

Mk 811; LAS 193; Pic 117; DC 398; Br 389; BM&S 871; L 370; S-O 174

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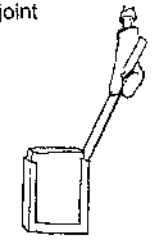
- Common in cattle
- Lat. side of tarsus
- **Chronic irritation & trauma** (inadequate bedding in housed cattle on concrete)
- **False bursa** (sac of fluid on tarsus) m/b
- **Worry about 2° infec. & invasion of joint**

- **Bulge on lat. side**, usually hard unless bursa or abscess develops
  - Sac of fluid, synovial-like, clear & yellow, some viscosity
- **Abrasion** m/b w/ abscessation
- Cellulitis above & below hock
- **No lameness** unless invades joint
  - Swelling if into tibiotarsal joint
  - No swelling if in dist. tarsal joints

- History, CS
- Radiograph to see if invaded joint



- **Tx often frustrating**
- Acutely - stop trauma (bedding)
- **Cosmetic**, reducing size is difficult
  - Drain abscesses & remove necrotic tissue
  - Bursa: drain, steroids & bandage
  - ABs, NSAIDs, local stimulants & hydrotherapy used, but response is slow
- **If septic arthritis**, must treat, poor Px
  - Dist. tarsal joints have better Px than proximal

Prevention (important)
- More bedding, etc.; drain bursa early

Chronic trauma - Cellulitis, Abscess, Bursa - 2° joint infec.?
CS: Lat. swelling, No lameness
Tx: Frustrating, Cosmetic

Tibial fxs

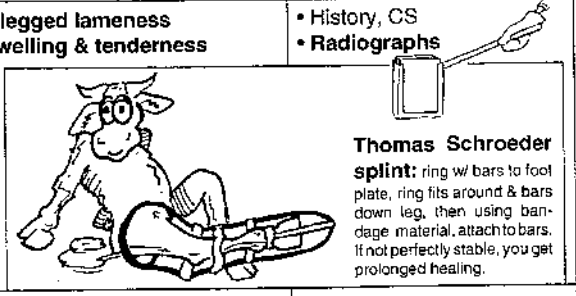
Mk 498; IM 1331; C3T 879; Br 373; VC/L 125, 151; DC 400; BM&S 883; S-N 261

**

- **Cows - try to fix** (horses - shoot)
  - Thick skin so doesn't compound medially
  - Cattle will lie down & look after themselves (horses don't)
- Midshaft oblique or spiral most common
  - Also prox. & dist. epiphyseal fxs
- **Invariably override**
- **Traumatic cause**

- **3-legged lameness**
- **Swelling & tenderness**

- History, CS
- **Radiographs**



Thomas Schroeder splint: ring w/ bars to foot plate, ring fits around & bars down leg, then using bandage material, attach to bars. If not perfectly stable, you get prolonged healing.

- **1. Salvage**
- **2. Confine & time**
- **3. Thomas Schroeder splints**
  - Not perfectly stable, long time to heal
- **Calves** - also Thomas Schroeder splints
- 2 compression plates in calves under 200 lbs
- Plates not sensible in adults
- Fx too high to cast normally

Prognosis
- **Poor**, withhold Px in calves until Tx attempted in simple, uncomplicated fxs
- Poor: complicated or compound fxs

Midshaft, Override
CS/Dx: 3-legged, Rads
Tx: Thomas-Schroeder splint

Femoral fractures

Mk 498; IM 1331; C3T 879; CV/L 151, 158; Br 373; DC 400; Pic 108; BM&S 881; S-N 261

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- **Distal physes in neonates**
  - **Dystocia or trauma**
- Capital (slipped) physis (SH-type I)
- **Adults are salvaged, Rare, "Mac truck" trauma**
- Younger the better
- WI. & comminution important Px factors

- **3-legged lameness**
- **Shortened limb**
- **Hock held higher than other**
- **Downer cow**
- Dimpling of musculature over fracture
- M/b swelling

- **History, CS**
- Palpation - excessive movement of distal limb
  - **Crepitation** m/b (auscultation)
  - Patella loose, med. to lat.
- **Slipped capital physis in young, difficult to Dx**
- **Radiograph - definitive Dx**
  - Unfortunately many portable (handheld) units can't penetrate adults

- **Salvage for adults**
- **Confine & time**
- **Calves salvage, confinement or Sx**
  - **Physeal & shaft Fxs**
    - Stacked intramedullary pins (pin migration)
    - 2 bone plates in very young. Suction drains
- Calves - slipped capital physis
  - Knowles pins in nondisplaced head
  - Femoral head ostectomy

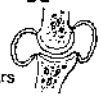
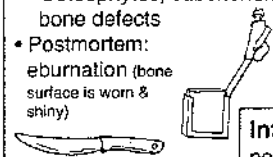
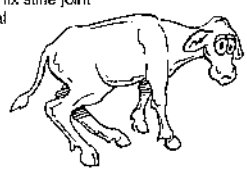
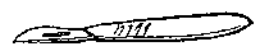
Px depends on age, weight, location
- **Poor - salvage adults**
- Guarded - physis Fxs

Calves: Physeal fractures
CS/Dx: 3-legged, Short limb
Tx: Adults-Salvage; Calves-Internal fixation

DDx
- Slipped capital physis from coxofemoral luxation

Pelvic Limb

MUSCULOSKELETON

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Gonitis - Synovitis & DJD of stifle Br 383; VC/L 162; C3T 877; BR 527; Pic 114; BM&S 878; L 302 ***	• **#1 hindlimb lameness** • Inflammation of stifle • **Overweight & straight legged** • Types - Subchondral bone cysts - Meniscal tears - Med. > lat. collat. ligament tears - Cranial cruciate rupture - OC (osteochondrosis) lat. femoral trochlea - Inherited 	• **Lameness** • Shortened stride, dragging hooves • ± Distention • Partial condemnation at slaughter  	• **History, CS** • **Radiographs** - Initially no signs - DJD: Chronic degeneration - Osteophytes, subchondral bone defects • Postmortem: eburnation (bone surface is worn & shiny) 	• **Tx cause**: collat. lig - rest & imbrication • **Rest** • **No Tx for DJD**, progressive • Aspirin, phenylbutazone (for pain) • Sx for smaller animals can be tried 
2nd to foot as cause of lameness, #1 HL lameness **Tx: Tx cause, Rest**				**Infectious gonitis**: rare, in calves part of polyarthritis • Tx: ABs, joint lavage
Cran. cruciate rupture Br 383; C3T 875; Pic 114; BM&S 878; DC 393; L 282 **	• **Uncommon** • **Bulling, slip & fall** - Acute tearing of ligament - Severe chronic DJD due to instability in tearing cruciate ligament • Cranial cruciate prevents tibia moving cranially in relation to femur 	• **Stifle effusion** (subtle) • **Instability** m/b - Tibia displaces cran. when walking • **Lameness** - Shortened cran. stride - Variable weight bearing 	• **Drawer sign** (see box)  • **Radiographs** - Intercondylar spine cranial to lat. condyle instead of overlapping them - Craniocaudal view - DJD • Drain off effusion & see if unstable	• Rest for partial tears • **Imbrication**: 2 lines of sutures in deep fascia - patella to tibial crest • Intra-articular replacement  Prognosis • Poor to guarded w/ Sx
CS: Lame, Effusion, Instability **Dx: Drawer sign, Rads** **Tx: Imbrication**		**Drawer sign** - put knee against calcaneus & pull tibial crest sharply backward, then release (different from dog) • If tibia pops forward when released = cran. cruciate problem		
Patellar luxation VC/L 162; Br 377; L 274 **	• **Rare** • **Lateral >> med. luxation in calves** • Unable to fix stifle joint • Congenital 	• Presented in few-days-old calf • **Won't bear weight** • **Characteristic stance - crouching**	• Difficult to know if congenital or nerve damage • Radiographs won't help much	• Sx: Pull patella back into trochlear groove • **Imbricate** to tighten tissue  **Prognosis** • Guarded
Lateral luxation - Calves **CS/Dx: Crouching** **DDx: Femoral n. paralysis** **Tx: Imbrication**		**DDx** • **Congenital abnormality** in stifle (trochlear groove too shallow or laxity of ligament) • **Femoral n.** damage or paresis	**Upward fixation**: stiff hindlimb, jerky action, intermittent catching in extension, then stringhalt flexion • Tx: Medial patellar desmotomy	

Coxitis, Hip dysplasia

Pic 113, VC/L 154; Br 382; BM&S 880; L 294 ***

- **#2 hindlimb lameness** after stifle
- Usually DJD, rarely infectious
- Adults usually, calves - hip dysplasia
- Bilateral commonly

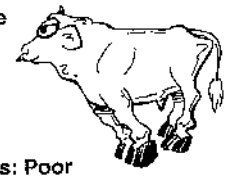
#2 hindlimb lameness, Adults, Bilateral
CS: "Rolling gait", Drag hooves • Tx: None

- Insidious, Muscle wasting
- **Stifle out, hocks in**
- **"Rolling gait"**, lateral hindquarter movement
- **Dragging hooves**
- If infectious - acute CS

- CS, History
- Crepitation (palpation or rectal)

Hip dysplasia (Br 382; VC/L 157): Rare & sporadic, Male calves < 2 yrs old, rapid weight gains, Heritable

- **Tx: none**
- **Salvage**



Prognosis: Poor

Coxofemoral luxation

Br 375; VC/L 198; C3T 876; S-O 324; Pic 108; BM&S 881; L 269

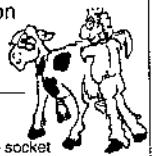
**

- **Common in cattle,** shallow acetabulum & no accessory ligament as in the horse
- **2-5 yr-old cows associated w/ parturition** (maximum ligament relaxation)
  - **Slippery floors**
  - **Obturator nerve paralysis**
  - Milk fever, Dystocia
  - Breeding accidents
- Position of femur
  - **Craniodorsal** most common (80%)
  - Caudoventral into obturator foramen (assoc. w/ obturator nerve paralysis)

Craniodorsal 80%, Parturition
CS: Acute lameness, Recumbent
Dx: Asymmetry, Rectal
Tx: Reduction, Hobbles • Px: Guarded

- **Lameness:** Leg rotated laterally w/ toe-out, hock-in, stifle-out
  - Craniodorsal - shorter limb
- **Recumbent**, unable to rise, lie extended & abducted slightly
- Sequela: **Downer cow**

- **Palpate:** altered distance betw. greater trochanters, tuber ischia, tuber coxae
  - Trochanters asymmetrical
- **Manipulate leg** - crepitance
- Rectal palpation
- Radiographs (calves)



DDx
- Femoral neck fxs
- Slipped capital physis
- Acetabular fxs
- Fxs - gr. trochanter

- **Closed reduction** tried 1st
  - Deep Rhompun® sedation (0.22 mg/kg IV)
  - Must get femoral head over rim of acetabulum & into socket
  - First find out which way its luxated
    - Craniodorsal luxation: pull caudoventrally & rotate to put back in
    - Calving jack for traction, attaching pastern & jacking leg down
  - Confirm replacement by sound & feel
- **Open reduction** (if closed reduction doesn't work & valuable animal)
  - Craniolateral approach to coxofemoral joint
    - Advantages, can clean out acetabulum (blood clot or muscle)
    - Steinman pin in head used as lever, costs more, risk of infection

- **Salvage**
  - Emergency w/in 24 hrs
  - Adults - Reduction in vain
    - Closed tried first w/in 24 hrs
    - Open reduction if valuable animal
    - Reluxation common as animal rises
      - Shackle above hocks 24-48 hrs
      - Keep on firm footing (well bedded)
- Calves: femoral head osteotomy m/ be considered

Prognosis
- Guarded - dorsocranial
- Poor - ventrocranial & ventrocaudal
- Recumbent - worse prognosis
- > 24 hr poor due to soft tissue damage (joint capsule torn, then pushed into muscles)

Pelvic fractures

Mk 498; VC/L 153; Pic 112; Br 374; DC 400; S-O 332; S-N 260

**

- **Rare, except tuber coxae**
- **"Knocked down hip", tuber coxae fracture** classic injury in cattle
  - **Hitting "hook"** on door frame
- Other fractures: Wing & shaft of ilium, tuber coxae, symphysis pubis, obturator foramen, acetabulum & ischium
  - Trauma in all cases - "Splits" (acetabular fxs)

"Knocked down hip"
CS: Little problem unless sequestrum • Px - Good
Other hip fxs: Downer cow; Poor Px

- **"Dropped hip"** - tuber coxae
  - Little lameness or problems
  - M/b sequestra & fistulous tract
- Other fractures:
  - Downer cow
  - Iliac shaft fxs - very lame
  - Symphyseal or obturator foramen fxs
    - **Lame in both limbs**
  - Complications
    - Severance of iliac arteries
    - Coxitis (DJD of hip - acetabular fxs)
    - Reduction of pelvic diameter in cows

- **History, CS**
- Manipulation of limb & crepitation & pain, except tuber coxae fractures
- **Rectal palpation**
  - Move cow w/ hand in rectum
  - Feel crepitation
  - Grasp tuber coxae & move w/ hand in rectum
- Radiographs - but needs to be in recumbency & m/ make worse during recovery phase

- **Tuber coxae fractures**
  - Leave, resolving in 2-3 weeks
  - Sx: remove fragments if draining
- Other pelvic fractures
  - **No surgical method developed**
  - Box stall confinement 3 mo. (up to a year)
  - **Cull**

Prognosis
- **Good** for tuber coxae
- **Poor** - other fxs

Thoracic Limb — MUSCULOSKELETON

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Gastrocnemius rupture BM&S 865; BR 1320; C3T 880; Br 380; DC 388; L 390; S-O 236; Pic 118 **	• **Uncommon** • Unilateral >> bilateral, usually complete • Attempting to stand from postpartum paralysis	• **"Hamstring"** • Swelling • Inability to fix hock or stifle • Knuckling of fetlock • Complete rupture - hock on ground	• History, CS 	• Confine in well bedded stall • Thomas splint in extension • Prognosis: Complete rupture - Grave

Peroneus tertius rupture (BM&S 866; CB 880; Br 380; DC 389; L 393): • Rare, Can stand, CS/Dx: hock extended while stifle flexed (dysfunction of reciprocal apparatus as in horse)
** | • Tx: Stall confinement, most respond in 1-4 wks

Serratus ventralis rupture (Br 380; L 396; Pic 122): Spectacular, scapula projects above back, "loose shoulder", Jerseys
** | • Tx: if complete, incurable, but emergency slaughter not necessary

Contracted flexor ** tendons, **Curled calf disease, Arthrogryposis** C3T 880; IM 1286; Br 380; BR-hb 632, 644; BR 1663, 1648; Pic 11; BM&S 868; DC 397; L 97, 99, 381; N-L 262; S-O 249; S-N 245	• **DDF, SDF, & m/b interosseous mm** • Forelimb > hindlimbs • Most common congenital abnormality - Hereditary: congenital ankylosis - Large fetal size - dystocia - Akabane virus & toxic plants • Acquired - Disuse of limbs 2° to fractures, tendon injuries, nutrition or rapid growth	• **Mild, self correcting** • Flexion of carpus & fetlock • Walk on pastern or fetlock - Abrasions • Sequela: - Septic arthritis 	• History, CS • R/O (Rule out) other assoc. **congenital defects**: - Split palate - Arthrogryposis of carpus & tarsus Prognosis • Mild - Good • Poor if > 90° angle	• **Mild: manually stretch tendons** • Moderate: splint leg (1/2 section of PVC pipe) weekly removal & replacement, leave toes exposed, Sx if no response in 4 wks • Severe cases: Sx at 2-3 wks old - Carpus: longitudinal incision of flexor retinaculum & superficial part of SDF . If no improvement section DDF & deep part of SDF & m/b palmar carpal ligament - Fetlock . Section supf. part of SDF, if no improvement: section DDF & deep part of SDF - Bandage & cast after all surgeries

Lacerated tendons (C3T 880; DC 389; S-O 395): Kicking, or sharp object to plantar aspect of metatarsal region • CS: Contaminated wound • Tx: Extensive debridement, m/ delay suturing until sepsis is controlled; if gap, heals by 2nd intention; immobilize limb - 3 mo to heal; cast, splint in flexion. Fiber implants used.
***

Tenosynovitis (BM&S 870; DC 385; L 383): Inflam. of digital sheath, Cause: penetrating wound • CS: Distention of synovial sheath; Sequelae: Restricted movement due to adhesions & septic arthritis of fetlock (extension) • Tx: establish drainage
***

Bursitis/hygroma, Carpus: Acquired bursa formed due to chronic trauma; Usually not into joint, Some m/b related to *B. abortus* infec.
BM&S 871; Br 390; L 373
** | • CS: No lameness (unless mech. interference due to swelling, Fluctuant swelling (hardens w/ time) • Dx: History, CS • Tx: Stop trauma: put out to pasture (summer), well-bedded area (winter); Drainage only if lameness or decr. feed intake/production; inject AB/Steroid (repeat weekly). Sx removal time consuming & bloody. Astringent (copper sulfate/iodine) destruction not advised (severe local reaction)

Radial fractures

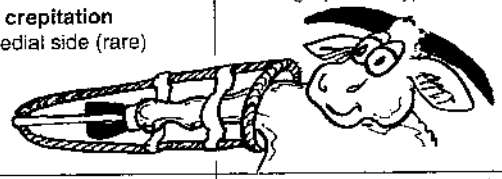
Mk 498; VC/L 115, 125; IM 1331; BM&S 881; DC 400; S-N 261; S-O 309

**

- **Uncommon**
- **High energy injuries** (Mack truck)
- Transverse, oblique (most common), comminuted, open or closed
- **Open fxs uncommon** (med. surface)
- **Proximal fx worst, esp. if articular**
- **Adult cattle better Px than horses** bec. will lay down

Cast & Thomas splint

- **Nonweight bearing lameness**
- **Swelling**
- **Instability, crepitation**
- Open on medial side (rare)



- **Easy to Dx**
- Radiographs for type

- **Salvage or stall rest**
  - Young, if mid shaft fx, can probably fix
  - **Full-limb casts w/ Thomas splints**
    NO full-limb casts alone
  - **Bone plating** in young
  - Distal fractures full limb cast alone m/b
- **Prognosis: Guarded to poor**

Olecranon fractures (Ulnar) *

Mk 498; S-O 312; IM 1331; BM&S 881; DC 400

- Olecranon serves as lever arm for triceps, not a weight bearing bone
- **Direct trauma** (kicked)
- Distracted or nondistracted
- Articular or nonarticular
- **Salter type I of growth plate**

Like radial n. paralysis - "Dropped elbow"
Tx: Rest - Bone plating

- **Like radial nerve paralysis**
  - **"Dropped elbow"**, leg dragging, swings from shoulder
  - Unable to extend elbow
- Variable heal, pain & swelling

DDx
- **Radial n. paralysis**

- **History, CS, Manipulation**
- Radiographs - extent of fx

Prognosis w/ Sx
- Good - nondisplaced, nonarticular fx
- Guarded - nondisplaced, articular fx
- Guarded - internal fixation
- Guarded to poor - physeal fxs

- **Salvage or stall rest**
- **Rest & full leg splint**
  - Nondistracted, nonarticular fxs
  - Absolute stall rest 6-8 wk
- **Bone plating**
  - Comminuted, articular or distracted
  - Narrow dynamic compression plate (contour)
  - Almost instant improvement
  - Stall confinement until heal, drain 12-48 hr
- **Physeal fx: Fig. 8 band wiring** or bone screw

Humeral fractures

Mk 498; Br 373, IM 1331; BM&S 881; JJDC 400; S-N 261)

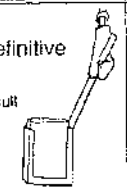
**

- **Uncommon**
- **"Mack truck" trauma** (bone thick, short & covered by muscles)
- Middle third, dist. segment displaced caudally
- Rare to compound
- **RADIAL N. DAMAGE** main concern (travels in brachial groove), Trauma to severance

Radial n. damage?
CS: Swollen, Shortening, 3 legged, Dropped elbow
Tx: Calf-confine, pin or plate; Adult-sling
Px: Reserve until fx heals

- **Swollen shortened arm**
- **3 legged lameness**
- **"Dropped elbow"**
- Instability

- CS
- Radiographs definitive Dx
- Crepitation (difficult bec. of muscles, stethoscope)



Prognosis
- **Reserve until fx heals bec. of complications**
  - Radial n. paralysis
  - Failure of plates & migration of pins
- Unfavorable - adults

- **Calves < 6 mo**
  - **Stall confinement 6 wk**
    . Bandage forearm to thoracic wall
    . Dropped elbow m/ remain, but can support weight
  - Intermedullary pinning
    . ASIF nailing & bone plating
    . Pin migration races healing
  - Plating
- **Adult - salvage**
  - Confine in sling 6-8 wk
  - PVC pipe splint to prevent flexural contracture

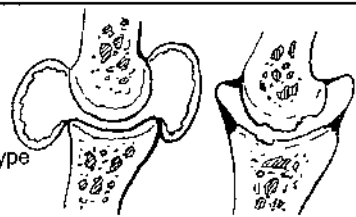
Scapular fxs

Mk 498; IM 1335; L 323

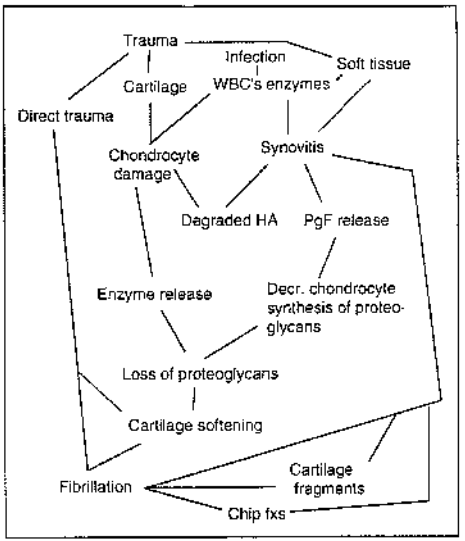
*

- **Rare**, Most - simple. Spine, **Supraglenoid tubercle**, Neck, Glenoid cavity; **Trauma**
- **CS:** Lameness - mild to nonweight bearing, **Shortening of cran. stride**
- **Dx: Direct palpation, Close observation of swelling,** Crepitation, **Rads definitive Dx**
- **Tx:** Bone sequestra - surgical removal, **Stall rest in sling:** nonarticular fxs (bony union in several mo.)
- **Px: Good** - nonarticular; **Poor** - dist. neck fxs, glenoid fossa fxs

Joint Injuries & Joint Diz (BR 522, 1441; Br 381, 383)



- **Group of disorders characterized by cartilage degeneration**
  - Cartilage has a limited potential for healing
    . Superficial defects of cartilage do not heal
    . Full thickness defects heal by granulation tissue to a weaker cartilage type
- Causes
  - Trauma: single incidence or repeated ("wear & tear")
  - **Capsulitis & synovitis**: Type 1 synovial membrane damage or Type 2 (fxs, or direct trauma to cartilage)
  - Direct cartilage damage (fxs); OC osteochondrosis; Joint instability/luxation; Age; Infections
- All of above cause **synovitis** (inflam. joint capsule)
  - Starts a vicious cycle of cartilage damage
  - Chronic process leads to chip fxs & cartilage fragments which further leads to more synovitis
  - Progresses to **DJD** (degenerative joint diz)/osteoarthritis/osteoarthrosis



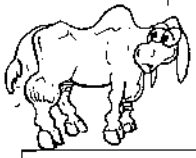
Pathophysiology: Trauma/infection - self-perpetuating vicious cycle leading to DJD
- Complex & not fully understood
- Lack of correlation betw. pathological changes & clinical significance
- Direct trauma results in cartilage, chondrocyte & bone damage & causes **synovitis**
- Infectious arthritis: WBC's protease & collagenases cause destruction of cartilage & **synovitis**
- **Synovitis**: inflammation resulting in release of damaging products
  - Lysosomal enzymes & prostaglandins: degrade proteoglycans in articular cartilage
  - Prostaglandin syntheses (local): degrade proteoglycans & suppress synthesis of proteoglycans & glycosaminoglycans by chondrocytes
  - Synthesis of interleukins: initiates destruction of chondrocytes
  - WBCs release destructive enzymes & O_2 free radicals: degrade hyaluronic acid & proteoglycans
- **Effects of damaging products**
  - Loss of proteoglycans that hold water & hydrate cartilage
    . Decr. elasticity & resistance to compression
  - Decr. hyaluronic acid which bind proteoglycans & lubricates joint
  - Incr. enzymes that break down cartilage matrix
- **Results in softened cartilage which is more prone to damage** (vicious cycle leading to DJD)

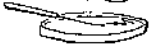
Proteoglycans (mucopolysaccharides)
- Linear hyaluronic acid (HA) molecule
- Glycosaminoglycans (GAG) side chains (numerous)
  . Repeating units of disaccharides
  . Polyionic nature (negative charge propels each other to form tense meshwork holding large amounts of water)
  . Provides cartilage w/ resistance to compression
- Glycoprotein attach glycosaminoglycans to HA

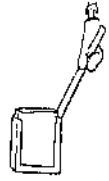
Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Traumatic synovitis/ capsulitis BR 527; Br 383 ******	• **Synovitis**: inflam. of synovial membrane • **Capsulitis**: inflam. of fibrous joint capsule - **Type 1: w/o significant articular cartilage damage** - **Type 2: w/ cartilage damage** • **Leads to osteoarthritis (DJD)** • **Stifle, hip, hock & carpus** • Cause: trauma, fxs, infection • Pathophysiology: synovitis (see above), leads to DJD w/o treatment	• **Lameness**, variable • **Distention of joint** - Fibrotic thickening of joint capsule • Pain acutely • Heat **Predisposing factors:** synovitis & DJD • Overweight • Poor conformation: straight legged • OC (osteochondrosis) • Subchondral bone cysts in stifle • Inherited predisposition • Joint instability following trauma • Nutritional - Hi P, low Ca diet, copper defc, fluoride poisoning (decr. strength of subchondral bone) • Forced traction of breech birth (vascular damage to hip)	• Effusion: digital palpation, compare to other limbs • **Pain on flexion tests** • **Block out joint** • **Radiographs:** DDx 1° from 2° - **Type 1: Minimal or none** - **Type 2: Bone or lig. damage** • **+ Intrasynovial block** - Synovial fluid for analysis at time of block • Arthrocentesis - ↓ Viscosity (diluted hyaluronic acid) - ↑ Protein - WBCs	• **Emergency: stop inflam.** Type 1 before cartilage damage; Type 2 slow continued damage, once DJD irreversible - **Rest** important - 2-3 months - **Phenylbutazone** (decr inflam. & decr. PgF production), 10 mg/kg OP initially then 5 mg/kg, or - Aspirin 100 mg/kg PO BID - **Severe 1° synovitis: above Tx +** . **Corticosteroids** IA: 1 injection to reduce damaging inflam., Most potent antiinflam. drug . Depo-medrol® (methylprednisolone acetate) or Vetalog® (triamcinolone acetonide) **Prognosis:** • Good if type 1 (no radiographic changes) • DJD - too late
Trauma: Cycle of cartilage breakdown => DJD **CS: Lameness, Swelling, Pain** **Dx: Hx, CS, Rads (cartilage damage)** **Tx: Before DJD - Rest, NSAIDs, Steroids**				
DJD, Degenerative joint disease, Degenerative arthropathy, Osteoarthritis Mk 496; IM 1281; C3T 876; Br-hb 225, 547; BR 1441, 146; Br 382; DC 393; L 291 ******	• **Degeneration of articular cartilage w/ periarticular remodeling** • **Hip & stifle mainly** • **Cause** - **Synovitis** - **Fxs** - **Infection** - **Osteochondrosis**	• **Lameness - Pain** • Heat (infec. arthritis > 2° DJD) • Joint effusion • Slowly progressive history • Bony enlargements • Atrophy, m/ lead to condemnation at slaughter • **Show bulls on hi grain diet** - Lame (6 mo - 2 yr) - Both hip joints - Crepitation of degenerative joint • **Adult cows** - Stifle - med. condyle of femur - Lameness & stiffness	• **History, CS** • Intra-articular anesthesia • **Radiographs** - **Squaring off** of joint margins - **Osteophyte** production (periarticular osseous remodeling) - **Subchondral irregularity** (indicates cartilage damaged over it) • **Synovial fluid** - Neutrophilia, Hemorrhage, Elev. proteins, ↓ **viscosity** (diluted hyaluronic acid) • **Postmortem:** - **Eburnation**, white & shiny appearance to subchondral bone due to chronic trauma	• **Changes usually irreversibly** • Palliative Tx in valuable breeding animal - Can be hereditary • Inspect diet - Avoid overfinishing Prognosis: • Too late
Cartilage degeneration **CS: Lameness** **Dx: Hx, CS, Rads (Osteophytes)** **Tx: Too late - Tx when synovitis**				

Arthritis

Condition	Facts/Cause	Presentation	Diagnosis	Treatment
Adult septic arthritis, **Infectious arthritis** Mk 469; C3T 873; IM 1273; BR 527; DC 385; L 286; Br 385 ★★★ • Emergency •	• **Bacterial infection in a joint,** also viral & fungal • **Cartilage damage** • Cause **1. Penetrating wound** **2. Hematogenous** (esp. young) • Less common, assoc w/: • Chronic reticuloperitonitis • Septic metritis • Sole, liver abscesses • Interdigital pododermatitis **3. Iatrogenic** (joint aspiration or injection) • #1 site: dist. interphalangeal joint - Fetlock - Tarsus, stifle & hip from hematogenous spread • Pathogens: *A. pyogenes, E. coli,* Staph & Strep spp, *Fusobacterium necrophorum, Bacteroides melaninogenicus* (anaerobic), mycoplasma, chlamydia • Pathophysiology - devastating - **Rapid cartilage damage** due to release of enzymes; hi WBCs, fibrin & bacteria . Invasion of bacteria - inflammation . PMNs & fibrin, enzymes & proteinaceous debris . Loss of GAGs (protects cartilage)	• **3 legged lameness** • **Joint effusion** (swelling) • **Heat** • **Periarticular swelling** (edema & cellulitis to fibrosis) • Fever - low grade • Progresses rapidly • Open drainage m/b - If draining often not sore (pressure of distension causes pain) • Anorexia & milk drop • Complications: - Recurrence - Chronic synovitis & DJD	• **CS & synovial fluid** (pos. culture not necessary) • **Flexion** - severely painful • **Synovium collection** before ABs! - **C&S** (culture & sensitivity) - EDTA - WBC count & differential - **WBCs (most PMNs) + TP** . WBCs > 30,000/µl . > 90% PMNs . TP > 2 g/100 ml . Low viscosity & decr. in mucin clot . Cloudy - **Positive bact. culture** diagnostic . Usually negative so doesn't R/O • **Radiographs** - Early (< 14 ds usually not helpful) . No bony changes . Soft tissue swelling/Effusion . R/O Fxs or osteomyelitis - Later cartilage & bone changes . Periosteal proliferation . Narrowing of joint space (cartilage damage) - Subchondral bone lysis • Arthroscopy, cartilage damage - Sx done in horses, refer to surgical facility if economics dictates for cattle	**Emergency** (sterilize joint & remove enzymes & proteinaceous debris) key to success is early Dx & aggressive Tx • 1. Sterile synovial fluid collection 1st • **2. Start on broad spec. ABs IV not IA, 3 wks past resolution** (Na ampicillin) - Change if C&S dictates (usually can't isolate bact.) • **3. Drainage** (removes bacteria, WBCs & destructive products (lysosomes) - **Needle lavage early** before fibrin plugs (14-16 gauge), aseptic technique . **Balanced electrolyte sol.** - 0.1% Betadyne® (> 5 L) . Single needle: distend joint then aspirate out, repeat until fluid is clear. Silastic catheters m/b placed & sutured to skin for repeated lavage . Through & through lavage (2 needles in joint, periodically block outflow to distend joint) .. Repeat lavage daily, stop when cell counts stabilize at 10-15,000/ml - **Arthrotomy, debride & lavage:** if fibrin occludes needles . Indwelling suction drains - until synovia sterile, days to weeks • **4. Sterile support bandages,** watch for strike - Immobilize only 8 hrs/d or reduced range of motion • **5. NSAIDs:** "Bute" (phenylbutazone) 9 mg/kg PO, maintenance 4.5 mg/kg PO EOD (every other d) (analgesia & antiinflam. [block prostaglandin synthesis])







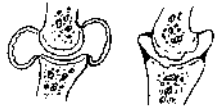
Penetrating wounds, Hematogenous - Cartilage damage
CS: 3 legged lame, Effusion
Dx: Hx, CS + Synovial fluid
Tx: Emergency - ABs + Drainage + PBZ + Bandage

Neonatal septic arthritis/ Osteomyelitis, Polyarticular septic arthritis, "Joint ill", "Navel ill",

Septic arthritis, infectious arthritis
Mk 417, 469; C3T 101, 821, 873; BR-hb 48, 226; BR 140, 527; Br 213; S-J 1110)
***

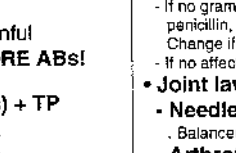
- **Bact. infec. in a calf's joints**
  - Mycoplasm & chlamydial infec. also
  - **Usually systemic infec. also**
- < 2 wks
- Multiple joints usu. (carpus, tarsus, stifle)
- Cause
  - **Hematogenous** (almost always)
    - Umbilical infection (navel ill)
      - Classical origin
    - Following any systemic bact. infect./septicemia
      - Salm., *E. coli*, Strep. spp, Staph. spp. *Actinomyces pyogenes*, Erysipelothrix,
- Predisposition
  - **FPT** (failure of passive transfer)
  - Poor hygiene during calving
- Pathophys. - Cartilage damage
  - Bacteria, inflam., fibrin
  - Release of enzymes, hi WBCs & bacteria cause cartilage damage
  - Loss of GAGs (cartilage protectants)

- **± Systemically ill:**
  - Depression, Inappetence, Fever, Elev. heart rate
- **Variable lameness**
  - **Mild initially, progressing rapidly to nonwt. bearing**
  - Reluctance to move
- **Joint effusion**
  - 1 or more joints, thickening of dors. joint capsule, hock, stifle, carpus
- **Polyarticular** common (hock, stifle, carpus)
- **Heat**
- Fever
- Complications:
  - **Osteomyelitis**
  - Recurrence
  - DJD

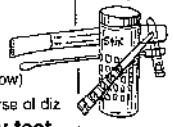


DDx
- Intra-articular fxs
- Physeal fxs

- **Similar to adult septic arthritis**
- Early Dx vital bec. of cartilage damage
- Flexion - severely painful
- **Synovial fluid BEFORE ABs!**
  - Turbidity almost always
  - **WBCs (most PMNs) + TP**
    - WBCs > 30,000/μL
    - > 90% PMNs
    - TP > 2 mg/ml
  - Pos. culture definitive, **Negative common & doesn't R/O sepsis**
    - **Assume infec. if ↑ WBCs & TP** (synovial fluid)
- **Radiographs: not helpful acutely**
  - Early - soft tissue swelling, effusion
  - If no bone lesions re-rad in 7 ds
    - Periosteal proliferation (DJD)
    - Narrowing of joint space
  - **R/O Osteomyelitis** (see below)
- **Blood culture** m/b early in course of diz
- **FPT - zinc sulfate turbidity test for passive transfer**



Emergency (remove, bact. enzymes & material)
- **#1 Systemic ABs** 2-3 wks
  - If no gram stain, start on brd. spec. ABs, penicillin, ampicillin, tetracyclines, Change if C&S dictates
  - If no affect in 1-2 ds, more aggressive
- **Joint lavage** (remove material)
  - **Needle lavage early**
    - Balanced electrolyte sol. + ABs
  - **Arthrotomy, debridement & lavage:** Penrose drains or suction drains to keep open, more helpful in stifle then complex carpus & tarsus
- **Sterile support bandages**
- **Rest** (for cartilage to heal & strengthen)
- NSAIDs (don't exceed recommended doses [ulcers])
- Supportive care: fluids for enteritis
- IV plasma if FPT



Prognosis
- **Poor/grave**

Prevention
- **Colostrum** early after birth

Systemic, Hematogenous, Navel ill, FPT
CS: Sick, Lameness, Swelling
Dx: Hx, CS, Synovial fluid, Zinc sulfate
Tx: Systemic ABs, Lavage, Bandages
Px: Poor

***Haemophilus somnus*, Calves, Feedlot, Septicemic diz:** TEME, Lungs, Joint Infections in those that have averted fatal septicemia, **Septic arthritis** hock & stifle, Swollen joints & tendon sheaths, Poor condition, Stiffness

Chlamydia polyarthritis

BR-hb 437, BR 1143
**

- *Chlamydia psittaci*
  - In soil & manure
- Endemically or epidemically in sheep, goats & calves
- Major importance to sheep industry
- Enters through umbilical stump

- Stiffness
- Shifting leg lameness
- Fever
- M/b keratoconjunctivitis

- History, CS
- Culture - easily seen
- Giemsa stained smears for elementary inclusion bodies
- FA, rising titers

- Tetracycline (20 mg/kg IM/SQ EOD) 3 treatments
- Tylosin
- Erythromycin
- Do not medicate feed or water - reluctant to eat or drink

No vaccine

Osteomyelitis

Condition	Facts/Causes	Presentation/CS	Diagnosis	Treatment
Hematogenous (neonatal) osteomyelitis Mk 556; C3T 881; IM 1267, BR-hb 224; BR 521; Br 392; DC 385 ** 	• **Closely associated w/ septic arthritis** • **Hematogenous** most common - **Calves 6-12 mo** - **Navel ill** - usually spreads to joint, but can go to metaphysis/osteomyelitis - **Salmonella spp**, Pasteurella, *Actinomyces pyogenes, E. coli* • Pathophysiology - Bact. to metaphysis (sluggish blood flow), physis & epiphysis, M/ spread to joint - **Bone necrosis & sequestrum formation** • **FPT** (failure of passive transfer)	• **Early nonspecific** • ± **Systemic signs** - Depression, listless, pyrexia (fever) - M/ only be slightly off • **Severe lameness** w/ cellulitis & phlegmon - M/b draining tracts • Recumbency due to systemic illness or multilimb lameness • Osteomyelitis of vertebrae - M/b neurologic signs & lameness Sequela: • **Suppurative arthritis**	• Palpate for pain over metaphysis • Lab: inflammation - Blood cultures - WBCs - elev. or lowered w/ lt. shift - Elev. plasma fibrinogen • **Zinc sulfate for FPT** • **Radiographs** - **Acute: no changes** - check for fxs - **Osteomyelitis** 10-14 d to see . **Lytic changes** (loss of bone density) . Sclerotic margins of lytic areas . **Sequestrum** (piece of bone in lytic area) **w/ involucrum** (surrounding envelope) . Endosteal & periosteal thickening - M/b septic arthritis signs in 2-3 wks . Periosteal proliferation . Narrowing of joint space	• **Tx any navel ill, pneumonia, septicemia** • Plasma transfer if FPT • Sx treat umbilical infection • **Broad spec. ABs** - high levels 3-4 wks • **Bandage support** • **If no response** - **Local debridement & irrigation** **Prognosis** • **Poor** esp. if multiple sites - Recurrence if all involved tissue not removed **Prevention** • **Colostrum**

Hematogenous, Septic joints, FPT
CS: ± Sick, Lame
Dx: Hx, CS • DDx: Septic arthritis
Tx: Tx Navel ill, ABs, Debridement

DDx:
• Trauma (stepped on)
• Fractures

Adult osteomyelitis C3T 881; BR 651; Br 392; DC 396 ** 	• Suppurative bact. infec. of bone • **Direct trauma to bone** - Hematogenous spread rare • Bone necrosis & sequestrum formation • *Actinomyces (Corynebacterium) pyogenes* most common	• **Lameness, wound** • Postural deformities • Heat • Drainage m/b • ± Fever • Osteomyelitis of vertebrae - M/b neurologic signs & lameness 	• **Assume osteomyelitis if wound & excessive pain** • Palpate for pain over site • Lab: inflammation - WBCs - elev. or lowered w/ lt. shift - Elev. plasma fibrinogen • **Radiographs** - **Acute: no changes** - check for fxs - **Osteomyelitis** 10-14 d to see . **Lytic changes** (loss of bone density) . Sclerotic margins of lytic areas . **Sequestrum** (piece of bone in lytic area) **w/ involucrum** (surrounding envelope) . Endosteal & periosteal thickening	• **Emergency** • **Sx** - Surgical lavage, debridement & curettage (remove infected bone) - Drains & sterile bandages • **Broad spec. ABs** - high levels 2-5 wks • Limb support • PBZ (phenylbutazone) for pain **Prognosis** • **Good**

Trauma
CS: Lameness, Wound
Dx: Wound & Excessive pain
Tx: Emerg., Debride, ABs, Support, PBZ

DDx:
• Fractures

Physeal dysplasia, "Physitis", "Epiphysitis"

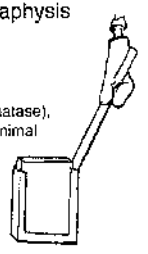
IM 1250; BR 1437; Br 393; L 332

**

- **Enlargement of growth plates**
  - **Long bones**
- Young, rapidly fattening cattle
  - 5-12 mo
  - **Hindlimbs > FL**
  - **Carpus & fetlock esp.**
- **Cause - not exactly defined**
  - **Overnutrition**
  - Copper defc (molybdenosis) in young growing cattle on pasture
  - Calves raised on slatted floors
  - **Compression trauma** to part of physeal blood supply (metaphyseal) on med. side (weight bearing) m/ cause premature closure

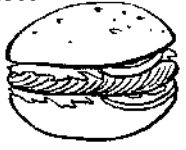
- **Symmetrical swelling**
  - **Metaphyseal faring** (enlargement of ends of long bones)
- **Weight loss in beef** cattle (9-18 mo)
- Pain in enlarged area in lame calves or yearlings

- **Palpate swelling - warmth**
  - **Mild pressure - none, mod. pain**
  - **Deep palpation - severe pain**
- **Radiology** (possible findings)
  - **Metaphyseal flaring**
    - Widening of metaphysis
  - Sclerosis & lysis
- Lab
  - Usually normal
  - Hi ALP (alkaline phosphatase), but typical of growing animal



- **Copper related - diet changes**
- **Rest & lightweight cast**

- **Noncopper - salvage before more weight loss**



Prevention

- Correct diet - copper

Growth plates, Rapidly fattening young, Copper defc
CS: Symmetrical swelling, Wt. loss, Pain
Dx: Hx, CS, Rads
Tx: Copper; Salvage

- "Epiphysitis" - misnomer bec. **no active inflammation**
  - Dysplasia of growth plate better term (growth plate, not epiphysis)
  - Misnamed rickets - not related to Vit. D defc

Sprains & Luxation

IM 1283; L 218, 267

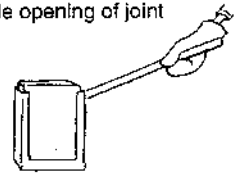
**

- **Sprain** - stretching or tearing of support ligg. of a joint; Mild sprain: few fibers torn, integrity not lost; Moderate sprain: Part of lig. torn w/ some loss of function
  - Severe sprain: complete loss of function of lig. w/ separation of ends
- **Luxation: dislocation of joint**
- **Subluxation**: partial dislocation
  - Loss of integrity of 1 or more ligg. (severe sprain); Avulsion fxs of attachment of lig.
- Pathophysiology
  - **Instability leads to synovitis which leads to DJD**

- **Sprains variable:**
  - Mild sprain m/ go unnoticed
  - Moderate sprain: some laxity in joint
  - Severe sprain: instability of joint, m/b luxation of joint, extensive swelling, tenderness, lameness & weakness
- **Luxation**
  - **Obvious nonweight bearing lameness**
  - **Postural deformity**
  - Dislocation of joint
    - Instability of joint

- Sequela
  - Synovitis/DJD (degen. joint diz)

- History, CS
- Radiographs
  - In stressed position
  - Variable opening of joint



DDx:
- Catastrophic fx
- Osteomyelitis (p 174)
- Suppurative joint diz (p 172)

- **Prevent synovitis & DJD**
- **1 reduce swelling**

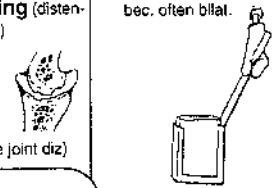
  - **Cold water or ice** as soon as possible (reduce hemorrhage & minimize swelling)
- **2. Stabilize or immobilize joint**
  - Mild: 4-sheet cotton dressing w/ flannel wrap; few days
  - More severe: heavy wraps or cast & stall confinement
- **3. Pain relief**

  - Phenylbutazone (up to 4 mg/kg OP or IV BID)
    - Reduce inflammation & relieve pain
- **4. Rest**

Instability leads to synovitis & DJD
CS: Sprain-Variable; Lux.-3 legs, Deformed
Dx: Hx, CS, Rads
Tx: Prevent synovitis, Cold, Stabilize, Rest

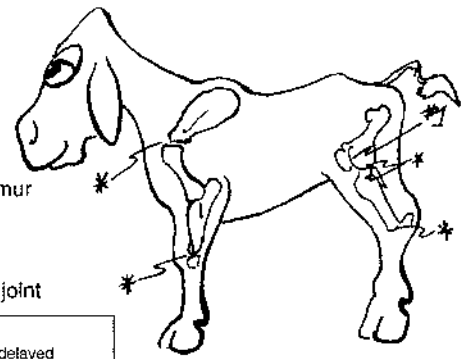
OCD

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Osteochondrosis (OC), Dyschondroplasia & Osteochondrosis dissecans (OCD) VC/L 47; C3T 875; IM 1261; Pic 122; Br 381; DC 392 **	• **Low significance in cattle, ↓ prod - dairy, bull breeding problems** • **Failure in endochondral ossification** - Fast growing cartilage thickens & ossification is delayed - Focal areas of deep cartilage dies & necroses • **#1 site in stifle** • Manifestations - **1. Articular cartilage** . **OC (osteochondrosis): defect of articular cartilage** . **OCD** (osteochondrosis dissecans): OC w/ dissecting flap of cartilage, m/ remain attached or separate (**joint mice**), m/ calcify . **Subchondral cysts**: (not always OC) - 2. Metaphyseal physis (growth plate) . Physitis/epiphysitis (not always OC) • History - **Males > females** . **Feedlot steers (9%)** . **Middle aged dairy bulls** (12%) affects breeding • **Cause:** cartilage maturation abnormalities - ill defined, multifactorial (meaning we don't know!) - **Fast growing young + other factors** . **Overnutrition (high energy/protein diets)** . Concrete floors >> clay floors . Trauma: causing or affecting abnormal cartilage (disrupt blood supply?) mounting, head butting	• **Variable lameness** depending on joint, age, weight • Asymptomatic • Mildly progressive lameness • **Variable swelling** (distention of joint/synovitis) • Weight loss • ↓ Milk prod. • Sequela - DJD (degenerative joint diz)	• **History, CS** • Regional nerve & joint blocks to localize (used in horse) • **Radiology** - Rads of opposite limb bec. often bilat.	• **Conservative** - **Rest** - **Restricted feed intake** - **NSAIDs for comfort** • Arthroscopic Sx - Debridement **Prevention:** • Do not overfeed • Check for mineral balancing diets (copper/calcium/zinc) horses



DDx
- Septic arthritis (p 172)
- Osteomyelitis (p 174)
- Bone abscess
- True bone cyst

COMMON SITES
- Stifle
  - #1 Lat. trochlear ridge of femur
  - Condyles of femur & tibia
- Prox. end of humerus
- Dist. end of radius
- Condyles of atlanto-occipital joint



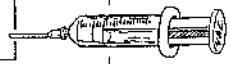
Failure of cartilage ossification, Fast growing males
CS: Variable lameness & Swelling
Dx: Hx < CS, Rads
Tx: Rest, Diet, NSAIDs - Sx

Failure in endochondral ossification
- Fast growing cartilage thickens & ossification is delayed
- Grows past its nutritional supply
- Soft, thickened cartilage prone to traumatic lissures
  . Fissure m/ cause a cartilage flap
  . Or m/ heal over, forming a cyst that m/ communicate w/ joint
- Cyst m/ also be formed by retention of abnormal cartilage

SKIN - EYE- MAMMARY - VIII

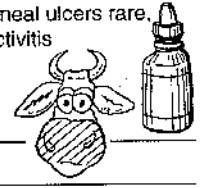
Eye

SKIN - EYE - MAMMARY

Condition	Facts/Cause	Presentation /CS	Diagnosis	Treatment - Prognosis
Pinkeye, Infectious bovine keratitis (IBK), Infectious ophthalmia Mk 305, 800; C3T 834; IM 1363; BR-hb 243, 245, 321; BR 556, 813; DC 451 *** 	• **Common, economic losses** • ***Moraxella bovis*** - Gram neg. coccobacillus - Pili to bind to corneal epithelium  • **Contagious**, many in herd - Spreads rapidly in herd • Calves (< 1 yr) > adults • **Herefords** & Hereford crosses; least susceptible are Charolais & crosses, Angus • **Factors associated w/ IBK** - **Light eyelid pigment** - **Ultraviolet light - Sunlight** - **Face flies** (Musca spp); irritant & vector - IBR & mycoplasma infec. potentiate - **Dust** & other mechanical irritants - Vit A deficiency (summer months)	• Acute - **Conjunctivitis always** - **Keratitis** (inflammed cornea) - Incr. lacrimation, photophobia - Blepharospasm (spasm of eyelids, obicularis oculi m.) - **Central edema** - opacification of cornea (stains w/ fluorescein) - Small ulcers - Mucopurulent ocular discharge • Resolves, or • Severe - 2-3 days  - **Opaque cornea** - **Blind** - **Pinkeye** - Blood vessels from limbus - **Heal (corneal scar)** • Rarely rupture of cornea (uveitis, w/ hypopyon)	• **History, CS usually** • Difficult to culture organism - Stuart's media - Ames' media (transport)  **DDx:** • IBR (URT, conjunctivitis, keratitis & ulcers not central) (p 252) • Malignant catarrhal fever (p10) • Foreign bodies • Eyeworm (p 179) • **Economic impact** - ↓ Weight gain - ↓ Milk production - Cost of Tx - ↓ Value	• **IM Liquamycin LA-200** (long acting oxytetracycline) alternate days until healed - 2 doses LA-200 3 ds apart eliminates carriers - Never tetracycline conjunctivally • Resolves in 2-3 wks  • Isolate (contagious) • Topical or subconjunctival Tx effective if properly done, but too much trouble (ampicillin, genticin, penicillin)  **Control** • **Face flies**, insecticide dust bags, ear tags in both ears (impregnated w/ permethrin) • **Shade areas** • Silver nitrate as prophylaxis or single dose oxytetracycline IM to calves & new animals • Hygiene of animal handlers • Controversy - vaccines - Give IBK & IBR vac. separately  Vaccine can cause conjunctivitis in man
***Moraxella bovis*, Contagious, Herefords** **CS: Conjunctivitis, Corneal edema, Blindness** **Tx: Linquamycin LA-200**				

IBR, Conjunctivitis form, Infectious Bovine Rhinotracheitis ***
C3T 837; IM 1367; BR 1061

• See pg 252; Herpesvirus; Several animals infected, 1° eye manifestation or assoc. w/ resp. or reproductive form
• CS: Conjunctivitis (white plaques, necrosis [ulcers], ocular discharge [serous to mucopurulent]), 2° keratitis (corneal edema, neovascularization). Corneal ulcers rare. Anterior uveitis (hypotony, iris congestion, miosis), resolves in 4-5 wks, Fever, Anorexia, ↓ Milk prod., Abortions wks after conjunctivitis
• Dx: Hx, CS, Assoc. systemic illness; Virus isolation; FA or conjunctival scraping; Serology
• Tx: Topical ABs, Atropine to effect (mydriasis) if anterior uveitis; Isolate
• Px: Most recover in 4-5 wks; Annual vaccine recommended



Pasteurella spp (C3T 837): **See pg 63; calves, conjunctivitis, rhinitis, pharyngitis & pneumonia • Tx: aimed at pneumonia, Systemic ABs

Mycoplasma spp (C3T 837; IM 1369): Epizootic conjunctivitis, summer (calves & face flies) • CS: mild - serous discharge, conjunctival hyperemia • Dx: swabs moistened w/ Hayflick broth
**
• Tx: Self limiting in 3-5 wks, Topical or IM oxytetracycline; no effective vaccine

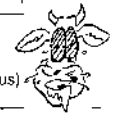
Other causes of conjunctivitis (C3T 837): *C. pyogenes*, Leptospira spp., Acinetobacter spp., *Moraxella ovis*, Aspergillus spp., Adenovirus, Tuberculosis, Bluetongue virus

Infectious uveitis ***

C3T 837; Br 718; DC 461

- **Neonatal septicemia** - *E. coli*, Corynebacterium spp., Klebsiella, Listeria, Salmonella, Strep. spp., **FPT** (failure of passive transfer) • CS: Corneal edema, episcleral vascular injection, cloudy ocular media, constricted pupil, iris congestion; Septicemia CS (fever, swollen joints, umbilical abscess, pneumonia, enteritis, endotoxemia)
- **Adult:** Uncommon, Systemic infec.: mastitis, metritis, endocarditis, TEME • CS: Fibrinous anterior uveitis, CS of suppurative diz; TEME - posterior uvea lesions; Sequelae synechiae & chorioretinal scars • Tx: Systemic ABs & support, Topical ABs or AB/steroid (if no ulcers) + 1% atropine QID

MCF head & eye form, ★ (Malignant catarrhal fever) (C3T 838; IM 1368): See pg 10; Hi fever, conjunctivitis, miosis, corneal edema, exudate in anterior chamber • Tx: fatal, isolate & no sheep



BVD-assoc. congenital ocular diz ★★ (C3T 838; IM 1369): fetus in 2nd trimester • CS: cerebellar hypoplasia/ocular lesions (retinal dysplasia, microophthalmia, cataracts, born blind, nystagmus)

Listeriosis monocytogenes (C3T 838; IM 1370): encephalitis & ocular CS (facial paralysis, ptosis, conjunctivitis, med. strabismus, blindness, uveitis w/ hypopyon • Dx: Isolate at necropsy • Tx: Brd spec. ABs early

Retrobulbar leukosis ★ (C3T 838; IM 1370; DC 445): M/ cause unilat. or bilat. exophthalmos, chemosis & exposure keratitis • Px: grave

Cancer eye,

Ocular squamous cell carcinoma (OSCC)

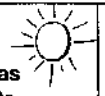
Mk 298; C3T 847; IM 1392; BR-hb 679; BR 1721; DC 460; S-J 1193; S-T 293; S-N 69)

***

- **#1 neoplasm of cattle & all large animals economically**
- **Benign & malignant**, premalignant stages
- 30% regress spontaneously
- Cause, multifactorial, assoc w/:
  - **Herefords, white-faced**, Hereditary, **Sunlight, Dust**, Hi nutrition
- **Peak age 7-8 yr**
- **Common sites: Conjunctiva** (Lat. limbus (corneoscleral junction), Lower eyelid margin, 3rd eyelid (nictitating membr.), Med. canthus of eye, **Cornea**

#1 $ tumor - Herefords, Condemned carcasses
CS: Benign, Malignant (Irregular, Necrotic)
Dx: Hx, CS, Lab
Tx: Remove (Scrape, Enucleation), Slaughter

ORBITAL MASSES



- **Premalignant**
  - **Plaques or papillomas**
    - Benign, smooth, white
- **Malignant**
  - Irregular, pink structures
  - Erosive & **necrotic**, m/b foul odor
  - Invasive into bone
  - Metastasis (rare) to **parotid** & cervical lymph nodes (parotid cut at meat inspection)
- Sequela
  - **Condemned carcasses** 12.5% due to OSCC, destroyed eye, bone invasion, necrosis, metastasis to parotid lnn., any cachexia. Remove head & pass body for those affected less than above

- **Hx, CS - plaques or tumors**
- Confirm - impression smear cytology (rapid)
- Biopsy - fix w/ 10% buffered formalin
- Spatula - topical, fixed w/ ethanol
- Lymph node fine needle aspirate, Biopsy
- **Benign:** Anuclear, keratinized squamous cells, coarse keratin w/ enlarged nuclei, Tend not to invade basement membrane
- **Malignant:** Bazaar, very large nuclei, Prominent nucleoli, Invades basement membrane

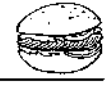
DDx

- Trauma
- Infection
- Pink eye (p 178)
- Ocular dermoid
- Fibroma, fibrosarcoma
- Lymphosarcoma

- **Treat early**, 50% of precancerous lesions m/ regress spontaneously
- **Send to slaughter**
- **Remove tumor**
  - Scrape plaques
  - Cryosurgery (double freeze)
  - Hyperthermia (122° F)
  - **Enucleation** or
  - Exenteration (removal of entire contents of orbit) in advanced lesions
  - Radiation - not for field work
- Recurrence common

Px: some fail to respond to Tx

Control
- Hereditary, cull affected & offspring, select for adnexia pigment
- Shade, reduce dust
- Tx early
- Tattoo nonpigmented lids



Facial nerve paralysis: ***

Cause: trauma or middle ear infections can result in keratoconjunctiva sicca (dry eye) due to disruption of innervation to lacrimal gland & inability to close eye

IM 1172; DC 435; N-L 162

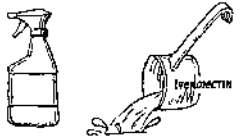
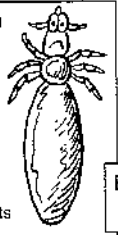
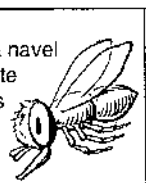
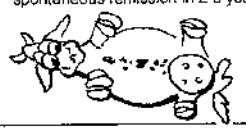
Eyeworm, ★ Thelaziasis

Mk 304; C3T 838; BR 1276; Br 755; IM 1390

- **Thelazia** spp *T. gluosa, T. skrjabini, T. rhodesii* (most harmful), < 1" long, in 1/3 of all cattle in USA, **Face fly, *Musca autumnalis***, common vector (feeds on eye excretions, deposits worm) Found invading lacrimal gland & ducts, gland of 3rd eyelid, nasolacrimal ducts, on cornea, in conjunctival sac, under eyelids
- **CS: Asymptomatic typical in USA**; Europe & Asia - conjunctivitis, photophobia & keratitis
- **Dx:** Visualization, **Incidental finding during surgery**
- Tx: **Not usually necessary (asymptomatic)**, if found mechanical removal following instillation of local anesthetic, ABs/steroid ointment for inflammation, Levamisole & Ivermectin

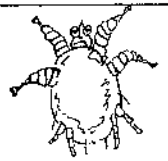
Bovine cornea tougher than other species

Parasites — SKIN - EYE - MAMMARY

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Lice, Pediculosis, Lousiness Mk 818; C3T 886; IM 1422; Br 250, 682; BR 1291; Pic 34 *** 	• **Winter** - N. USA > Summer • Transmission: Direct contact - Life cycle: entirely on host, 2-4 wks - Ova on floor m/ hatch in 2 wk in warm weather • Species specific, live on host 	• **Pruritus** (scratching, rubbing & biting) • **Damage to hides,** roughened hair coat, alopecia, excoriations, unthrifty appearance • Restless, irritable • **Lose weight** - less eating • **Anemia** (w/ large number of sucking lice)	• **History, CS** • **PE: Observation** - Part hairs on head, face, ears, neck, back topline, dewlap, escutcheon, tail base & tail switch - **Nits** (louse eggs attached to hair)	• **Topical insecticides** - Winter: Pour on, dust, powders - Summer: Sprays & dips - 2-3 Tx 2 wk apart will cure - Retreat for eggs • Spray premises • Ivermectin for sucking lice • Pour on ivermectin gets both sucking & biting lice • Follow local laws for w/drawal times & tissue residue tolerance 
		Biting  Sucking  • **Damalinia** (order Mallophaga) - Biting louse (chewing mandible) • **Haematopinus**, Solenopotes, Linognathus - (order Anoplura) - Sucking louse (retractable stylet mouth parts) • **Louse eggs** (nits) on hairs (pale, transparent & oval) • **Nymphs** - smaller, but identical to adults	**DDx** • Mange (p 181) • Ringworm (p 185) • Dermatophilus (p 183) • Pseudorabies (p 141)	
	Winter; Direct contact **CS: Pruritus, Hide damage, Anemia** **Dx: Hx, CS, PE (Lice/Nits)** **Tx: Insecticides, Ivermectin - Sucking**		Economics - tremendous damage to hides	
Strongyloidosis, *Pelodera strongyloides*, Rhabditic dermatitis (Mk 810; BR 1272): • **Rare, *Pelodera (Rhabditis) strongyloides*** . Transm.: contact w/ wet, infected, decaying bedding • CS: **Pustules**, extremities, ventr. abd. & thorax, perineum, Alopecia • Dx: Nematode larvae, **Skin scrapings**, Bedding • Tx: Eliminate bedding, **Spontaneous recovery, Dip or spray w/ insecticides** *				
Stephanofilariasis, Filarial dermatitis *** Mk 81; C3T 890; IM 1428; BR-hb 491; BR 1278; Br 754; DC 249; Pic 36	• ***Stephanofilaria stilesi***, adults 1/4", found in dermis at base of hair follicles - Female horn fly (*Haematobia irritans*) intermediate host • West & SW, all USA, beef breeds • Minor economic importance **Little economic importance**	• **Circumscribed dermatitis** • **Ventr. midline** betw. brisket & navel • Acute - blood or serous exudate • Chronic - smooth, dry, hairless • Hyperkeratosis, parakeratosis 	• Skin scrapings: macerated in isotonic saline sol., microscope for adults & microfilaria • Skin biopsy 	• **No Tx recommended** because not economically important, spontaneous remission in 2-3 years 
Trombiculidiasis, Chiggers, Harvest mite, Leg itch ** C3T 886; IM 1422; BR-hb 505; BR 1302	Trombiculid larvae of mites - *Trombicula (Eutrombicula) alfreddugesi* - Adult & nymph free living, parasite of small rodents, also cattle, sheep & humans - Hypersensitivity to saliva • Late summer & fall • Pasture or wooded areas 	• Pruritic dermatitis - Dist. limb, face, muzzle, neck, ventr. chest, abd. • Crusts, excoriations, edema, exudations 	• History, CS • Larvae (grossly red or orange, 6 legged) • Skin scrapings 	• **Spontaneous remission** usually (bec short season) • Severe infections - Single dipping or spraying (2% lime sulfur, malathion, coumaphos) 

Mange, *** Barn Itch

Mk 812; IM 1423; BR-hb 507; BR 1304; Br 250, 682; Pfc 32



Reportable, Damages skin, Hypersensitivity, 2° bact. infec.
CS: Pruritus, Econ. losses (Hide damage, ↓ Body condition, ↓ Milk prod.
Dx: Hx, CS, Multiple skin scraping/biopsy
Tx: Insecticides, Ivermectin • Reportable disease •

Chorioptic mange, leg, foot tail, scrotal mange Symbiotic scab

DC 247
***

- ***Chorioptes bovis*** - round bodies, long legs & short, unsegmented pedicles
  - Surface dwelling - hypersensitivity
- **Most common cattle mange**
  - **Winter stabled dairy - NE USA**
- "Leg mange" if starts on legs

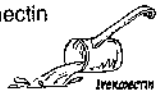
• Reportable •

- **Variable pruritus**
- **Papules, crusts & scabs, alopecia**
  - Winter: Perineum, caud. udder, thigh
  - Summer: Coronary band, interdigital space, muzzle

- Skin scrapings (easy)

Location
- Chonoptes & sarcoptes in stratum corneum
- Psoroptes in hair follicle
- Demodex in hair follicle & sebaceous glands

- **Report to feds**
  - Crotoxphos (spray 0.25%) once
  - Lime sulfur 2% 4 wkly Txs
  - Ivermectin



Psoroptic mange, Common scabies, Body mange

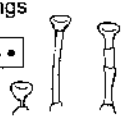
*

- ***Psoroptes ovis*** - round bodies & segmented pedicles, Life cycle 10-12 d
- Feedlot & range cattle
- Central & western states
- Eradication from sheep in USA

- **Pruritus**, papules, pustules, crusts, scabs
  - Generalized crusting dermatosis
- **Starts on withers**, spreads to entire body
- Death in untreated calves & yearlings m/b
- Chronic or acute in young dairy during winter

- Skin scrapings

• Reportable •



- **Reportable diz USDA**
  - **Isolate, quarantine & Tx**
  - **Ivermectin SQ, Dipping**

Sarcoptic mange, Barn itch, head mange

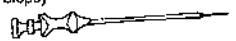
***

- ***Sarcoptes scabiei*** var ***bovis***
  - Round bodies, terminal anus, short legs & long, unsegmented pedicles
  - Burrowing
- **Reportable**
- Uncommon in ruminants, important in pigs
- Can be transmitted to man
- Transmission: direct contact (m/b fomites)

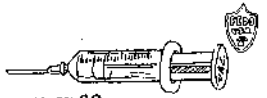
- **Pruritus**
- **Starts on head & neck**, spreads
- Squamous, crusted skin
- Skin thickens & forms large folds
- Damage of a single mite is tremendous
- Can generalize if not treated

• Reportable •

- Vacuum cleaner, filter sampling, ear swabs > skin scrapings or biopsy



- **Report to feds**
- **Ivermectin** single SQ injection



Demodex, ** Follicular mange, Demodicosis, Demodectic mange

- ***Rare***
- **Demodex spp** - cigar shape w/ short, stubby legs
  - Normal resident of skin, live in hair follicle & sebaceous glands, not contagious diz
- **Rare in lg. animals**
- Holstein dairy cattle most commonly
- Transmission: cow to calf at nursing
- Possible hereditary predisposition

- **Asymptomatic usually**
- **Nonpruritic**
- Lesions on face, neck & shoulder
- Rarely spreads over entire body
- Sm. papules & **nodules**
  - **White waxy material** can be expressed (contains mites)
- Some thick skin & crusts, forms heavy folds

- Incise nodules & examine (microscope)

- **Usually asymptomatic so not treated**
- Neguvon® (trichlorfon) whole body dipping 3 Txs EOD
- Severely affected culled

Psorergatic mange (cattle itch mite)

*

- Rare

- Nonpruritic, scaling

- Minimal lesions & low economic loss. so usu. none

Dermatology — SKIN - EYE - MAMMARY

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Cattle grubs, Hypodermiasis, Warbles, Hypodermatosis Mk 780; C3T 889; IM 1139,1429; BR-hb 493; BR 464, 176, 1282; Br 248, 678; DC242; N-L 92, 285 ***	• ***Hypoderma bovis*** (Heel fly, Warble fly) - *H. bovis* - North - *H. lineatum* - South • Economic loss **- Damage to meat & hide** - Expend energy gadding & not eating . Wt. loss • Organophosphate (OPs) grub treatment - Inflammatory response - Granuloma around dead parasite	• **"Gadding about"/Summer:** run from swarms of heel flies • **Hypodermal rash/Summer** (hatched larvae penetrating skin, dist. limbs, painful, exude yellow serum) • **Warbles/Spring** (cysts) on back, firm & raised w/ a breathing hole • **OPs kill in fall** - *H. bovis* -weakness & ataxia in hindlimbs, paralysis - *H. lineatum* (esophagus) . Dysphagia, drooling & bloat **"Gadding about"**: wild running w/ tails in air, herd stampedes out of fear of "Heel" flies (don't bite, but scare w/ buzz)	• History, CS • Intradermal skin test, early Dx	• **Pour-on insecticides shortly after heel fly season** - Completed before larvae reach spinal cord or esophagus (before Oct 15th in Oklahoma) • Sx remove (NEVER squeeze parasite or rn/ cause hyperallergic reaction) **Life cycle 9-12 months** **"Heel fly" season, late spring or early summer** • Attach eggs to hair of cattle (lower limbs) • Eggs hatch, enter skin & migrate - *H. bovis* to spinal cord region in epidural fat - *H. lineatum* to esophagus - Stay over winter 2-4 months • **2nd migration to back Jan - Feb** - Create breathing holes in skin - **Warbles** (cysts) around larvae • 3rd stage emerge & drop to ground, 1-3 months flies emerge • Adults live < 1 week (chase cattle's heels)
Heel fly larvae, Migrate, Overwinter, Migrate out back **CS: #1 hide damage, Wt. loss, Anaphylaxis, CNS** **Tx: Pour on OPs, Ivermectin before Oct. 15th**				
Cutaneous onchocerciasis, Worm nodule diz Mk 808;C3T 889; IM 1427; BR-hb 489; BR 1276 **	• **Onchocerca spp.** - Adults - normally live in ligamentum nuchae or gastrosplenic lig., 2" long - Microfilaria: migrate into dermis . Ventral midline, facial area • ***Culicoides*** intermediate host - L3 (3rd stage larvae) enter host through lesions by feeding vector • Tropical & subtropical	• **Most asymptomatic** • SQ nodules (1" diameter) - Brisket (#1), stifle & lat. thigh • Dermatitis similar to demodectic mange or pox **DDx** • Ringworm (p185) • Demodectic mange (p 181)	• History, CS • **#1 - Response to therapy** • Microfilaria preparation - Not diagnostic bec. many have no CS - Neg. microfilaria doesn't definitely exclude	• **Surgical excision of individual nodules** • **Ivermectin** Ivermectin SQ
Screw worm myiasis *	• **See Gen 271**; Blowfly lays eggs on wound of live animal, larvae eat live tissue, producing liquefactious necrosis of tissue; hot, humid weather • **CS:** Cavernous lesion filled w/ larvae • **Dx:** Hx, CS, Maggots in wounds • **Tx:** Reportable, eradicated in USA, occasional cases on Texas border of Mexico	**Eradicated in USA** • Reportable •		

Dermatophilosis, Cutaneous streptotrichosis

Mk 787, C3T 894; IM 1411; BR-hb 337; BR 857; DC 228; Derm 136

***

- **Common supf. bact infec.**
- Contagious diz
- ***Dermatophilus congolensis*** (gram +, branching aerobic organism)
  - **Zoospores** germinate in moist damaged skin to form mycelium
  - Mycelium proliferates in living skin
  - Suspected in soil, but can't be isolated
- Transmission: Direct contact w/ reservoir host, fomites or insects, crusts
  - **Crusts contain org.** up to 42 mos
  - Accounts for repeated outbreaks
- Predisposing factors
  - Macerated/traumatized skin
  - Rainy season (wet damages skin)
  - External parasites
  - Nonhygienic conditions

Bacteria; Damaged skin + Zoospores
CS: Crusts & Pus, "Paintbrush"
Dx: Hx, CS, Smear - "Railroad tracks"
Tx: Topical bath - Keep dry

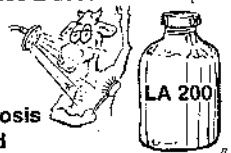
- **Proliferative, suppurative crusts**
- **Pus** under yellow crusts
- **"Paintbrush"** appearance (pus matted hair)
- **Painful, not pruritic**
- Hair breaks & falls off (infected area)
- Rump & topline, dist. extremities; face (calves - milk scald), brisket, axilla, groin, udder, teats, scrotum, prepuce, perineum, tail
- Chronic/healing stage: dried crusts, scaling & alopecia similar to ringworm
- > 50% of body: wt. loss, dehydration - Death
- If untreated, can generalize, esp. in calves
- Udder infections can stop animals from being milked out appropriately

DDx:
- Mange (p 181)
- Ringworm (p 185)
- Pseudorabies (p 141)

- **Presume cutan. crusts due to dermatophilus until proven otherwise**
- **Direct smear of pus**

- Minced preps of crust, on slide (microscope)
- Stain w/ Diff-Quik®
  - **"Railroad tract"** long chains of cocci, branching, filamentous
- If neg., submit crusts or punch biopsy to a microbiologist before rule out

- Remove crusts w/ brush & mild soap
- **Dispose of infective crusts**
- **Topical total body washes** daily for 5 d, then weekly until healed
  - Betadyne® (povidone-iodine) shampoo
  - Copper sulfate 0.2%. 1 if potassium aluminum sulfate
- Severe or generalized infection
  - LA 200 2 doses 48 hrs apart



Prognosis
- **Good**
- **Poor** if > 50% of body

Prevention
- Remove underlying factors
  - Moist conditions, parasites that damage supf. layers of skin
  - Ear tags for parasites
- Keep dry

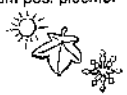
Dermatophytosis, Dermatomycoses

• See pg 185; This fungal diz (**"Ringworm"**) is mentioned here bec. of similarity of name w/ Dermatophilus (bacteria)

Ulcerative lymphadenitis, Cutaneous abscesses, *

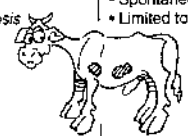
Mk 66; IM 1251; BR-hb 241, 275; C3T 896; BR 553, 655; Br 579; Pic 39; S-J 138; DC 476; Derm 133

- **Rare** in cattle, Common in sheep & goats
- *Actinomyces (Corynebacterium) pseudotuberculosis* (gram pos. pleomorphic rod)
- Herd problem, sporadic
- Cen. & S. California
- Late summer to winter



- **Ventral lymphadenitis**
- **Large ulcers of skin** on lat. body, neck & face (8" in diameter)
  - **"Spongy" necrotic debris**
- **Ulcerative dermatitis**
- No significant illness

- History, CS
- Isolation of *A. pseudotuberculosis*

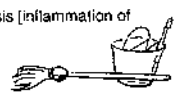


- Spontaneous healing often
- Limited topical Tx

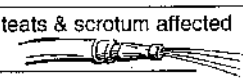
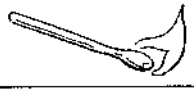
Folliculitis/ Furunculosis *

Mk 828; IM 1413; C3T 896; BR-hb 240; BR 550; Derm 126

- **Rare in cattle, common in goats & sheep; Inflam. of hair follicles** (folliculitis [inflam. of hair follicle], furunculosis [inflammation of follicle & surrounding dermis]), #1 **Staph**, trauma & poor hygiene
- **CS:** Tail & perineum lesions, less common on scrotum & face, pruritus & pain variable
- **Tx:** topical cleaning, drying, systemic ABs, Chlorhexidine 5-7 days, then 2 x/week until resolves



Miscellaneous — SKIN - EYE - MAMMARY

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment
Wounds S-J 144; BM&S 1102; S-O 154, 167 ***	• Trauma to skin • Opened or closed 	• **Abrasion:** scraping of surface • **Contusions:** disrupted tissue w/o complete separation of surface • **Laceration:** opening of surface • **Avulsion:** tears w/ loss of tissue, opened	• Wound  	• **Opened wounds** - Remove devitalized tissue & hair - Cleanse wound (bulb syringe/dental waterpik) - Close wound (healing by 1° intention) . Clean < 6-8 hrs => primary closure - Leave open (healing by 2° intention) or delay closure: extensive destruction, gunshot, bites, excessively dirty, infected • Bandage, ABs 
Photodermatitis (IM 1294; C3T 904; BR 546) • **See Tox pg 232**, pathological sunburn to light colored skin caused by 1° photosensitizing or 2° hepatotoxic substances *** 				
Frostbite (Mk 627; IM 1438; S 291; BR-hb 556; BR 1465; DC 237; Derm 68 • **See Musc pg 163: Uncommon** in healthy animal, Ears, tail, teats & scrotum affected ***	• **Tx:** Thaw tissue **rapidly** in warm water (100-111° F), analgesics & massage, supportive care  			
Intertigo (C3T 901): Supf. inflam. dermatosis of opposed skin causing friction, maceration & moisture & irritation; 2° bact. infec. Dairy (edema of udder at parturition) *** 	• **CS:** Supf. inflam. dermatosis or contact betw. udder & medial thigh - erythema, oozing, crusting, 2° bact., severe - necrosis & foul odor • **Tx:** Gentle antiseptic soaps (chlorhexidine) & astringent rinses (aluminum acetate) BID - TID; Severe cases - diuretics (Lasix® [furosemide]) & frequent massage (reduce edema); When dry = dusting w/ powder BID-TID (reduce friction) • Px: heals in 4-12 wks			
Hematoma (C3T 902; S-O 157): Circumscribed area of hemorrhage into tissue; Cause: sudden blunt or prolonged (ear shaking) trauma **	• **CS:** Acute onset, fluctuant, SQ, ± pain; stifle, ischial tuberosity, lat. thorax, point of shoulder, middle of back • **Dx:** Hx, CS, PE, Needle aspiration for blood • Tx: allow to heal 			
Gangrene C3T 902; BR-hb 241; BR 689, 554; DC 237; Derm 67 **	Severe tissue necrosis & sloughing (moist - impairment of lymphatic & venous drainage; or dry - impairment of arterial supply) • Causes: external pressure (pressure cores), internal pressure (severe edema), burns (thermal, chemical, friction, electrical), frostbite, snake bite, vasculitis, ergotism, fescue toxicity, infec. Salm., MCF, BHM, Bovine lumpy skin, Staph., Clostridium • **CS:** Moist gangrene: putrefaction, decubital ulcers (pressure points), swollen, discolored, foul necrotic areas; Dry: mummification			
Burns (C3T 902; Br 764; BM&S 1102; BR 334; DC 235; Derm 67): Rare; thermal (fires), electrical (electrocution, lightening), friction (rope burns), chemical (topical or caustic Rx) ** 	• **CS: 1°** Supf.- erythema, edema, pain; **2°** entire epidermis (erythema, edema, pain, vesicles); **3°** epidermis & dermis & appendages (necrosis, ulcerations, anesthesia, scarring); **4°** skin + fascia, muscles & tendons; **Rope burns** - watch for circumferential scarring acting as a tourniquet • **Tx:** Cetrimide (0.5%) in lanolin daily, Topical ABs			
Chemical toxicosis ★ (C3T 904): Selenium, Molybdenum, Arsenic, Mercury, Chlorinated napthalene, Polychlorinated & Iodinism 				

Ringworm, Dermatomycosis

Mk 791; C3T 890; IM 1419; BR-hb 447; BR 1164; Br 680; DC 226

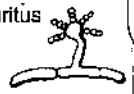
***

- **Mycotic - fungal**
- ***Trichophyton verrucosum*** (gram + branching, aerobic organism)
- Saprophyte in soil
- Calves >> adults
- Winter stabled animals anytime

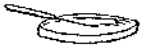
Trichophyton, Winter stabled
CS: Ring lesions (Crusts, Alopecia)
Dx: Hx, CS, Cultures, Scrapings
Tx: Self limiting, Antifungals

- **Ringlike lesions** (as spread centrifugally)
- **Multifocal lesions**
- **Alopecia** (hair breaks & falls off)
- **Scaling**
- **Crusting excessive - Wartlike**

- Head, around eyes, neck, shoulders & sides of thorax
- No pain or pruritus



- **CS - alopecia & crusts**
- Fungal cultures (of broken hairs at periphery, not crusts)
  - Dermatophyte test media
- Skin scrapings (hyphae & spores)



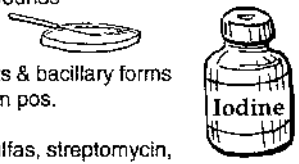
DDx
- Mange (p 181)
- *Dermatophilus congolensis* (p 183)
- Pseudorabies (p 141)

- **Self limiting**, 6-12 wks, or when let out to pasture in spring
- Fungal products topical to decr. spread
  - Betadyne®, tamed Iodine shampoos, thiabendazole paste (Tresaderm®), lime sulfur sol, Captan, iodophors
- Systemic Tx controversial, Griseofulvin, not recommended

Mycetoma, Granulomatous skin infec. (C3T 892; BR-hb 242, BR 556, IM 1421)

- **Eumycotic mycetoma** *
  - **Rare;** Fungi, Penetrating wound, Drechslera spp, Helminthosporium spp
  - **CS:** Nasal granulomas, ulcerative, suppurative & fibrotic, Ulcerative nodules (rump, thigh, tail, ears &/or vulva)
  - **Tx:** None reported

- **Actinomycotic mycetomas** ***
  - **Mycetomas** caused by bacterial granulomatous infec (Nocardia, Actinomyces & Actinobacillus) entering through wounds
  - **CS:** Swellings, Draining sinuses, Granules
  - **Dx:** Cytology, culture, biopsy
    - Nocardia: beaded, gram pos. branching filaments & bacillary forms
    - Actinomyces: small filaments, rods & cocci, gram pos.
    - Actinobacilli: gram neg. bacilli
  - **Tx: Iodides**, sulfonamides, tetracyclines, triple sulfas, streptomycin, penicillin, isonazide - variable results



Bovine farcy (C3T 892): Nocardia; Painless, firm, SQ nodules (limbs, head, neck), Ulcerative, odorless, thick, cheesy, gray or yllw exudate, lymphadenitis & regional lymphadenopathy

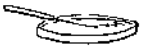
Actinomycosis (Lumpy jaw) See pg 13

Actinobacillus (Wooden tongue) See pg 13

Pythiosis, Phycomycosis *

C3T 893 *

- **Rare; Fungus** - Pythium spp. (Hyphomyces). Aquatic fungi w/ aquatic motile zoospores, Summer & fall in tropical & temperate areas
- **CS:** SQ fungal infec. (Dist. extremities or ventrum usually), focal ulceration w/ dermal thickening, draining tracts, watery, purulent exudation, periarticular swelling
- **Dx:** Biopsy & culture, multifocal pyogranulomas (branching hyphae) surrounded, Cultured on Sabouraud's dextrose agar
- **Tx:** Not enough data, Sx extirpation & amphotericin B in horses (too expensive in cattle)

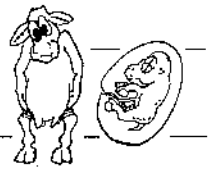


Aspergillosis

C3T 893

*

Rare; Ubiquitous in soil, skin; monomorphic mold, microconidia (spores); Predisposing: stress, prolonged AB therapy, Immunodeficiency
- **CS:** Primary dlz of Resp., GI, Mastitis, Abortion; Skin **rare** (SQ granuloma)
- **Dx:** repeated isolation bec. common flora of skin
- **Tx:** None reported in large animals



Mycotoxicosis * (C3T 908): Ergotism, Fescue toxicosis, Stachybotryotoxicosis

Virus — SKIN - EYE - MAMMARY

Condition	Facts/Cause	Presentation/CS	Diagnosis	Treatment

Viral diz w/ skin lesions (C3T 899): Generalized viral dizs that have skin lesions as part of their presentation

Bovine papular stomatitis: See pg 8; Worldwide, papules, crusts on muzzle, nostrils, lips; Self limiting

Foot & mouth diz: See pg 11; picornavirus, highly contagious diz; Skin CS: vesicles on mouth, muzzle, nostrils, coronet, interdigital space, udder & teats; hooves m/b sloughed

Vesicular stomatitis: see pg 11; Rhabdovirus, identical to foot & mouth diz; Reportable

Bluetongue: See pg 10: mainly sheep diz, indistinguishable from vesicular stomatitis & foot-&-mouth diz

Rinderpest: see pg 9; Exotic, highly contagious diz of ruminants & swine

Malignant catarrhal fever: See pg 10, sporadic, highly fatal systemic diz; Skin CS: erythema, scaling, necrosis, ulceration of muzzle, face, udder, teats, vulva & scrotum; oozing necrosis of perineal, axillary, inguinal & back regions

Infect. bovine rhinotracheitis (IBR): See pg 82: Herpesvirus 1, Resp/Enteric/CNS/Abortions; Skin lesions: erythema ("red nose"), pustules, necrosis & ulceration of muzzle &/or vulva

Pseudorabies: See pg 141; rapidly fatal diz, herpesvirus, intense pruritus & frenzied rubbing, chewing, kicking affected skin

BVD: See pg 22; pestivirus, GI/Resp/Chronic diz; Skin CS: Erosions, necrosis of muzzle, lips, nostrils, vulva, prepuce, coronet & interdigital space; M/b alopecia of perineum, thighs & neck

Bovine pseudolumpy skin diz (C3T 899; DC 230; Derm 108): Herpesvirus 2; • CS: multiple, slightly raised plaques & nodules, supf. in skin, central depression & supf. necrosis

Pseudo-cowpox, Milker's nodules, Paravaccinia

Mk 823; C3T 898; IM 1418; BR-hb 434; BR 1135; Br 322; DC 276; Derm 102

★★★

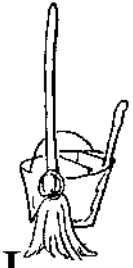
- **Mild infection of udder & teats**
- Parapoxvirus (related to BPS)
- Widespread, worldwide
- Slowly spreads through herd
- Little immunity develops (re-infects on subsequent lactations)
- Common in U.S. & difficult to distinguish from pox lesions

- **Small red papules** on teats & udder to vesicles or pustules
- Scab (removed w/o pain), granulation beneath scabs, heals from center
- **Horseshoe or circular ring of scabs**
- M/ persist for mos, rough teats
- Deep ulceration rare
- Also on udder, med. thigh or scrotum
- **Incr. incidence of mastitis**

- CS: Scabs confused w/ others
- **Horseshoe scab pathognomonic**
- Electron microscope for viral particles (sure!)

DDx
- **Bovine herpes mammillitis** (p 187)
- Bovine papular stomatitis (p 8)
- Warts (p 190)
- Traumatic injuries
- Rare (vaccinia, cowpox & horsepox)

- Control spread
- Hygiene
- Segregation



Prognosis: Good

PH

Public health
- Man - infected - painless, but itchy, purplish red nodules on fingers & hands, disappear in weeks

Mild infec. udder & teats, Like cowpox
CS: Horseshoe scabs
Dx: Hx, CS, Horseshoe scabs
Tx: Control spread (Segregate & Hygiene)

Cowpox (Mk 823; C3T 898, Br-hb 433; BR 1133; Br 323; Derm 99) • **Extremely rare,** reported in Europe, Poxvirus, related to vaccinia & smallpox • CS: Raw ulcerations, Scabs on teats & udder; **Public health**