GENERAL KNOWLEDGE (Veterinary Sciences)

Historical developments in Veterinary and Animal Sciences:

1. Pharmacology & Medicine

2735-2700 BC: Ancient Chinese herbal primitive type of materia medica ‘Pen Tsao’ written
 by Emperor Shennung.

2000 BC: Ancient Egyptian medicinal treatise ‘Kahun Papyrus’ was used. 1550 BC: Egyptian medicinal treatise ‘Ebers Papyrus’ was used.
460-375 BC: Hippocrates advocated little uses of drugs.
384-322 BC: Aristotle gave scientific basis of medicine.

380-287 BC: Theophrastus classified medicinal herbs according to their properties.

77 AD: First Materia Medica was written by Dioscorides describing herbs, minerals, and
 animal products as medicinal preparations.

131-201AD: Galen advocated use of many herbal preparations (polypharmacy), which
 subsequently became popular as galenical preparations.

1493-1541: Paracelsus (Original name: Phillip Von Hohenheim) pioneered the use of

chemicals and minerals in medicine. He introduced tinctures of several plants and inorganic chemicals for therapeutic uses. He is also often cited as coining the phrase "the dose makes the poison" or "All things are poison and nothing is without poison, only the dose permits something not to be poisonous."

1514-1544: First Pharmacopoeia was compiled by German Valerius Cordus.

1630: The Spanish Jesuit missionaries in Peru were taught the healing power of the
 cinchona bark (Quinine) by natives, its use was started to cure malaria.
1776: The first anaesthetic, nitrous oxide gas (laughing gas) was discovered by Priestly.
1783: William Withering (Britain) used digitalis (foxglove) in treatment of dropsy (swelling
 at congestive heart failure).

1783-1841: Friedrich Serturner (German pharmacist) isolated a narcotic alkaloid from

opium and named it as morphine after Greek god of dream Morpheus. It was not only the first alkaloid to be extracted from opium, but the first ever alkaloid to be isolated from any plant. Thus he became the first person to isolate the active ingredient associated with a medicinal plant or herb.

1783-1855: Francois Magendie (French Physiologist) started animal experimentation. He
 studied the action of nux vomica (a strychnine-containing plant drug) on dogs, and
 showed that the spinal cord was the site of its convulsant action.

1787-1853: M.J.B. Orfila: He contributed to forensic toxicology. In his time the primary
 type of poison in use was arsenic, but there were no reliable ways of testing for its
 presence. Orfila created new techniques and refined existing techniques in his first
 treatise, Traité des poisons, greatly enhancing their accuracy.

1818: Anaesthetic effect of ether was discovered by C. W. Long.

1847: Chloroform anaesthesia was introduced by James Young Simpson. 1853: Alexander Wood discovered hypodermic syringe.

1813-1878: Claude Bernard (French Physiologist) used blind animal experiments to ensure
 the objectivity of scientific observations. He was the first to define the term milieu
 interieur (now known as homeostasis), also studied functions of the pancreas gland,
 glycogenic function of the liver and existence of vaso-motor nerves. He discovered
 that the arrow poison curare acts at the neuromuscular junction to interrupt the
 stimulation of muscle by nerve impulses.

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1820-1879: Rudolf Buchheim (German Pharmacologist) established first pharmacological
 institute/laboratory at University of Dorpat. Buchheim is remembered for his pioneer
 work in experimental pharmacology. He was instrumental in turning pharmacology
 from an empirical study of medicine into an exact science. He introduced the bioassay
 to pharmacology, and created a methodology for determining the quantative and
 medical aspects of chemical substances.

1838-1921: Oswald Schmiedeberg (German Pharmacologist) studied the pharmacology of
 chloroform and chloral hydrate. He showed that muscarine evoked the same effect on
 the heart as electrical stimulation of the vagus nerve. He also published a classic
 text, Outline of Pharmacology, and in 1885, he introduced urethane as a hypnotic.
 1857-1938: John Jacob Abel: His major works include the isolation of epinephrine
 (adrenaline) from adrenal gland extracts (1897-1898), isolation of histamine from
 pituitary extract (1919), and preparation of pure crystalline insulin (1926). Abel also
 co-founded the Journal of Biological Chemistry in 1905 and the Journal of
 Pharmacology and Experimental Therapeutics in 1909.

1872: Chloral Hydrate was the first intravenous anaesthetic used.

1906: Reid Hunt discovered acetylcholine in adrenal extracts in 1906.

1854-1915: Paul Ehrlich coined the term chemotherapy and popularized the concept of
 a magic bullet. In 1909, he and his student Sahachiro Hata developed Salvarsan
 (arsphenamine, an arsenic compound), a treatment effective against syphilis. He
 worked on serum immunology also and received the Nobel Prize for Medicine
 together with Metchnikoff in 1908.

1932-1935: Gerhard Domagk was a German pathologist and bacteriologist credited with the
 discovery of Sulfonamidochrysoidine, the first commercially available antibiotic
 (marketed under the brand name Prontosil Dye). In 1939, Domagk received the Nobel
 Prize in Medicine for this discovery, the first drug effective against bacterial
 infections.

1928-1945: Sir Alexander Fleming (Scottish Pharmacologist) His best-known discoveries
 are the discovery of the enzyme lysozyme in 1923 and the antibiotic
 substance penicillin from the mold Penicillium notatum in 1928, for which he shared
 the Nobel Prize in Physiology or Medicine in 1945 with Howard Florey and Ernst
 Chain.

1944: American microbiologist Selman Abraham Waksman and Albert Schatz isolated
 streptomycin and showed its usefulness as an antibiotic. Waksman coined the
 term antibiotics. Waksman was awarded the Nobel Prize in 1952 for "for his discovery
 of streptomycin, the first antibiotic effective against tuberculosis".

2. Microbiology

1683: Antoni van Leeuwenhoek- a Dutch glassmaker by profession devised an apparatus
 by assembling lenses at a particular distance. This enabled him to observe small
 organisms, which were not seen till then by man. He observed small living
 organisms in body fluids and called them as animalcules meaning small animals. 1865: Robert Hooke identified cells using his compound microscope. His findings were
 responsible for the theory that all living things are composed of cells.

1735: Carl Linneus developed the system of binomial naming of living organisms.

1822-95: Louis Pasteur - No other person has contributed so significantly than Louis
 Pasteur for the subject than any other in earlier days. He has contributed significantly
 to the various aspects of the subject.

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• He has studied the fermentation process in wine manufacture and identified
 certain substances which are formed only by the living organisms and laid down
 certain guidelines for clean production of wine which saved the French wine
 industry in those days. Hence he is also called saviour of French wine industry.

• He also developed technique for laboratory cultivation of bacteria.

• His accidental finding on loss of virulence by Pasteurella multocida, causing
 fowl cholera and systematic work on Bacillus anthracis causing anthrax and
 rabies virus paved the way for control of infectious diseases by a process called
 vaccination.

• He evolved the practice of heating to 120oC under pressure for sterilisation,
 which even killed spores.

1827-1912: Joseph Lister gave concept of Antisepsis (Antiseptic surgery). He developed
 anti-septic wound dressing procedure, which saved the lives of persons with,
 suspected wound contamination.

1876: John Tyndall: Established a sterilisation procedure called Tyndallisation in which the
 fluids were heated at periodical time intervals. This method was proved effective in
 killing vegetative organisms and spores also.

1843-1910: Robert Koch - A German physician who moved from the field of medicine to
 microbiology and has contributed significantly. His notable achievements were the
 two important concepts called Koch’s Postulates (which deal with the establishment of
 aetiology of infectious diseases) and Koch’s Phenomenon (which gave firm basis for
 cell mediated immune response).

• He also established the procedure for preparation, fixation and staining of smears
 for bacterial identification by aniline dyes.

• He also developed nutrient gelatin and nutrient agar for artificial cultivation of
 bacteria.

• He identified bacteria causing tuberculosis (Mycobacteium) and cholera (Vibrio)

• His visit to IVRI at Mukteshwar (1897) is note worthy to remember. 1874: Hansen - Identified the bacteria causing leprosy in man.
1882: Hess developed agar for the cultivation of bacteria.

1884: Christian Gram - Grouped bacteria into two groups based on a staining procedure
 called Grams staining.

1887: Petri developed petri-dish that is still widely used in the cultivation of bacteria. 1884: Loeffler - Identified the bacteria causing diphtheria.

1857-1914: Golden Age of Microbiology: during this period numbers of important
 discoveries were made. The two noted scientists during this period were Louis
 Pasteur and Robert Koch.

3. Vaccine Development in India

1899: Development of antirinderpest serum.

1902: Anti-anthrax serum for cattle 1905: Haemorrhagic septicaemia serum. 1906-08: Development of black quarter vaccine.

1908-11: Treatment of surra (T.evansi infection) in horses and camels. 1908: Development of polyvalent HS vaccine.

1927: Development of goat tissue vaccine (GTV) against Rinderpest.

1940: Development of vaccine (R2B) against Ranikhet disease of poultry \ Sustained R&D
 Activities.

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1946-52: Development and updating FMD vaccines including crystal violet tongue
 epithelium.

1951: Development of anthrax spore vaccine.

1960-65: Control and eradication of African horse sickness through appropriate diagnostics,
 vaccine and control strategies.

1964-65: Goat kidney cell culture for rinderpest; calf kidney tissue culture rinderpest
 (TCRP) vaccine (helped in eradication of rinderpest).

1968-70: Saponin and oil adjuvant development.

1971-78: BHK21 monolayer and cell suspension vaccines.

1973: Development of an irradiated sheep lung worm vaccine.

1976-79: Standardization of fermenter technology for large scale production of FMD
 vaccine in BHK21 (clone 13) cells in suspension.

1979: Development of Theileria schizont vaccine for bovine theileriosis. 1986-87: Development of inactivated goat pox vaccine.
1999: Development of IBD vaccine.

2000: Development of a CCPP vaccine for goats and sheep and an inactivated oil emulsified
 vaccine against IBHHPS.

2001: Development of a thermo resistant IBD vaccine for gumboro disease of poultry and
 thermoresistant Vero cellbased TCRP vaccine.

2001-2003: Development of live attenuated PPR vaccine. 2003-2005: Live attenuated (LA) goatpox vaccine.

2004-2008: Live attenuated (LA) PPR vaccine, LA goatpox vaccine, LA PPR+LA goatpox
 combined vaccine, high passage LA goatpox, new orf vaccine (Indian strain), LA
 buffalopox vaccine, LA classical swine fever vaccine, LA PPR+Vero cell based
 sheeppox (RF strain) double combined vaccine, etc.

4. Important Discovery/Inventions/Theories:

1983-1985: Dr. Kary Banks Mullis invented PCR (Polymerase Chain Reaction). He

received a Nobel Prize in chemistry in 1993.

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Pioneers Scientists/ Veterinarians

Father of Medicine:

Father of Veterinary Medicine: Father of Experimental Medicine: Father of Veterinary Anaesthesia: Father of Veterinary Radiology: Father of Immunology:

Father of Microbiology:
Father of Bacteriology:

Father of Cellular and Modern Pathology: Father of Pathological anatomy:

Father of Pharmacology/ American: Pharmacology

Father of Modern Pharmacology: Father of Chemotherapy:

Father of Toxicology:

Father of Indian Pharmacology: Father of Nutrition:

Father of Genetics:

Hippocrates

Renatius Vegatius Claude Bernard Leslie Hall

Richard Eberlein
Edward Jenner
Louis Pasteur
Robert Koch

Rudolf Virchow
Antanio Benivieni
John Jacob Abel

Oswald Schmiedeberg Paul Ehrlich

Mathieu Joseph Bonaventure Orfila Col. Ram Nath Chopra

Antoine Lavoisier
Gregor Johann Mendel

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Important days/ dates

Feb 4: World Cancer Day

Feb 28: National Science Day (India)

Mar 16: National Vaccination Day

Mar 21: World Forestry Day

Mar 23: World Meteorological Day

Mar 24: World TB Day

April 7: World Health Day

April 22: World Earth Day

April 25: World Malaria Day

May 8: International Red Cross Day (b’day of founder Jean Henry Dunant)

May 31: World No Tobacco Day

June 5: World Environment Day

June 14: World Blood Donor day

July 1: Doctor's Day

July 16: ICAR Foundation Day

July 6: World Zoonoses Day

Sep 16: World Ozone Day

Sep 28: World Rabies Day

Oct 3: World Nature Day

Oct 4: World Animal Day

Oct 5: World Habitat Day

Oct 6: World Wildlife Day

Nov 12: National Bird Day (B’day of Dr. Salim Ali)

Dec 1: World AIDS Day

Dec 14: National Energy Conservation Day

World Veterinary Day (WVD) is held annually on the last Saturday of April. WVD was founded by the World Veterinary Association (WVA) in 2001 to highlight the work of the veterinary profession around the world in food safety/public health, border controls and quarantine, clinical practice, animal health, animal welfare, environmental protection, research and development and wildlife conservation.

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Important Institutes

• Indian Agricultural Research Institute (DU), New Delhi

• National Dairy Research Institute (DU), Karnal

• Indian Veterinary Research Institute (DU), Izatnagar

• Central Institute on Fisheries Education (DU), Mumbai

• Indian Grassland and Fodder Research Institute, Jhansi

• Indian Agricultural Statistical Research Institute, New Delhi

• Central Sheep and Wool Research Institute, Avikanagar, Rajasthan

• Central Institute for Research on Goats, Makhdoom, Mathura, U.P.

• Central Institute for Research on Buffaloes, Hissar

• National Institute of Animal Nutrition and Physiology, Bangalore

• Central Avian Research Institute, Izatnagar

• National Academy of Agricultural Research & Management, Hyderabad (NAARM)

• National Research Centre on Camel, Bikaner

• National Research Centre on Equines, Hisar

• National Research Centre on Meat, Hyderabad

• National Research Centre on Pig, Guwahati

• National Research Centre on Yak, Dirang, West Kemang, Arunachal Pradesh

• National Research Centre on Mithun, Medziphema, Nagaland

• National Centre for Agril. Economics & Policy Research, New Delhi

• National Bureau of Animal Genetic Resources (NBAGR), Karnal

• National Bureau of Fish Genetic Resources, Lucknow

• Project Directorate on Cattle, Meerut, U.P.

• Project Directorate on Foot & Mouth Disease, Mukteshwar

• Project Directorate on Poultry, Hyderabad

• Project Directorate on Animal Disease Monitoring and Surveillance (PD-ADMAS),
 Hebbal, Bangalore

• Directorate of Research on Women in Agriculture, Bhubaneshwar

• National Institute of Animal Health, Baghpat, Uttar Pradesh

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Diagnostic Tests

Sabin-Feldman dye test: Ames test:

Nagler test:

Ascoli’s Thermo-
precipitation test:

Dick test:
Schick test:

Kanagawa test: Hotis test:

Mallein test:
Johnin test:
Coggin's test:
Anton’s test:
Widal test:

Toxoplasmosis (T. gondii)

To assess mutagenic potency of a chemical compound in
 Salmonella tuphimurium.

To differenciate Clostridium perfringens from other
 clostridia organisms.

Anthrax (Bacillus anthracis)

Scarlet Fever (Streptococcus pyogenes) Diphtheria (Corynebacterium diphtheriae) Vibrio parahaemolyticus

Mastitis (Streptococcus agalactiae) Glanders (Burkholderia mallei)

John’s Disease (Mycobacterium paratuberculosis) Equine Infectious Anaemia

Listeria monocytogenes
Typhoid fever (Salmonella typhi)

Montoux /Tuberculin test: Tuberculosis (Mycobacterium tuberculosis)

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Important Facts:

• SAMRUPA: The world's first cloned buffalo calf, was to be India's answer to Dolly
 the sheep. But unlike Dolly, the first mammal (Sheep) cloned 13 years ago, who lived
 for seven years, Samrupa succumbed to a lung infection, five days after it was born.
 ‘GARIMA’ world’s second cloned buffalo calf, produced through advanced hand
 guided cloning technique. NDRI has produced the SAMRUPA on 6th February, 2009
 followed by GARIMA on June 6, 2009 and third cloned buffalo calf (GARIMA-II)
 on August 22, 2010. NDRI has achieved yet another feat by successfully cloning a
 male buffalo calf named ‘SHRESTH’ on 26 august 2006.

• Recognition of High Security Animal Disease Laboratory (HSADL), Bhopal as OIE
 approved 7th such Reference Laboratory for highly pathogenic avian influenza
 diagnosis in the world.

• India has declared itself free from the Notifiable Avian Influenza (H5N1) with effect
 from 2nd June, 2010 and notified same to OIE. The last outbreak was notified on 30th January, 2010 in Khargam block of Murshidabad district in West Bengal.

• There are 44 Agricultural Technology Information Centres (ATIC) and 569 Krishi
 Vigyan Kendras (KVK) established under ICAR institutes and State Agricultural
 Universities.

• Dolphin of river Ganga is declared as National Aquatic Animal.

• The Indian Veterinary Research Institute (IVRI) had been bestowed with the

prestigious Sardar Patel Outstanding ICAR (Indian Council Agricultural Research) Institution Award for the Year 2009. The Institute has also received the Rajrishi Tandon Rajbhasha Puraskar for the development of Official Language, Hindi.

• The Indian Council of Agricultural Research (ICAR) was formerly known as Imperial
 Council of Agricultural Research, it was established on 16 July, 1929.

• Wangari Muta Maathai has won Noble Peace Prize (2004). She was professor of
 Veterinary Anatomy (1977-2000) at University of Nairobi, Kenya.

• Peter Doherty (Australian vet) has won Noble Prize in Medicine. The Nobel Prize in
 Physiology or Medicine 1996 was awarded jointly to Peter C. Doherty and Rolf M.
 Zinkernagel for their discoveries concerning the specificity of the cell mediated
 immune defence".

• The occurrence of H1N1 Influenza (earlier called Swine Influenza) in Mexico, U.S.A.
 Canada, U.K., Israel and some other countries has received widespread attention
 because of its potential to turn into a pandemic. As clarified by WHO and FAO, the
 H1N1 virus is a genetic re-assortment of swine influenza, avian influenza and human
 influenza strains. The diagnosed human cases, suggest extended human-to-human
 transmission and links to swine are either weak or absent. There was also no evidence
 of illness in swine in any of the affected countries.

• The NDDB in 1969 formulated the programme of Operation Flood (OF) for the
 development of dairy industry in India. Its objective was to create a flood of rurally
 produced milk with remunerative price to the farmers and to supply milk to urban
 consumer at stable and reasonable price. It was implemented in three phases: OF-I
 (1970-80), OF-II (1980-85) and OF-III (1985-96).

• Yak is known as ‘ship of the high hills’ where as Mithun is a status symbol and a
 measure of wealth.

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To be FIRST

• Shalihotra is considered first veterinarian from India also referred as Father of
 Veterinary Science in India.

• First modern Veterinary College of world was established at Lyon, France in 1762.

• Bombay Veterinary College is first Veterinary college of India established in 1886
 and Dr. J. H. Steel was the first Principal.

• First Military Dairy Farm (MDF) in India was started in 1889 at Allahabad (UP) to
 supply the milk to the British troops and their families.

• First Agriculture University in India is GBPUAT, Pantnagar (1960).

• First Veterinary University in India/Asia is TANUVAS, Tamil Nadu.

• Dr. Sakkubai P. Ramachandran is first Lady Veterinarian of India.

• Jean-Marie Camille Guérin (France) is the first veterinarian having name of a vaccine
 (BCG: Bacille de Calmette et Guérin) named after him.

• Dr. C. M. Singh was first president of VCI (established in 1989).

• First Embryo transfer (E.T.) cattle calf in India was produced at 1986 at APAU,
 Tirupati.

• First cloned buffaloin world: Samrupa (India); first cloned camel: Injaz (female

dromedary camel, Dubai, U.A.E.).

• World’s first IVF buffalo calf ‘PRATHAM’ was born through in vitro maturation
 and in vitro fertilization of buffalo oocytes developed at NDRI.

Statistics/ Ranks in Livestock Product Production

Economics:

• Livestock sector contributes 25.63% of total GDP (Gross Domestic Product)

contributed by Agriculture & allied sectors which contributes 16.34% of total GDP of

India (2007-08).

• Milk & milk products (dairy) alone contributes 66.5% of GDP contributed by

Livestock sector.

• Annual Growth Rate during 10th Five Year Plan (2003-07): Milk = +3.64%, Egg =
 +5.61, Wool = - 1.77%.

MilK:

• In world, India ranks first in milk production (104.8 million tonnes in 2007-08, 15.6%
 of world).

• Per Capita Availability of milk in India (2007-08) is 252 g/d (Highest:

NZL>Ireland>Denmark).

• In India, U.P. ranks first in Total Milk production (15943 thousand tonne).

• Buffaloes are contributing about 55% of total milk production in country

(Cattle=40%, Goat=5%).

• Highest Milk Producer states: U.P.>RAJ.>Punjab>A.P.>GUJ.>MHS.

• In India (2007), Maharashtra has highest no. of organised Dairy Cooperative Societies
 (DCS).

Eggs:

• In world, India ranks third in egg production (3.94% of world, FAO, 2007).

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• Egg Production Rank in India (2007-08): A.P.>T.N.>Haryana.

• Per Capita Availability of Eggs (no./head/annum) in India is 47 (2007-08).

Wool:

• Wool Producer States: RAJ.>J&K>Karnatak

Statistics/ Ranks in Livestock Population

• India rank among world in Livestock population (FAO, 2007): Buffaloes: 1st , Cattle
 & Goat: 2nd , Sheep & Duck: 3rd , Chicken: 5th , Camel: 8th

• India is home to more than 56% of world buffalo population.

• Population in India (2003 census; in millions): Cattle - 185.18, Buffalo - 97.92, Goat -
 124.36, Sheep - 61.47, Pig - 13.52, horses & ponies - 0.75, Camel - 0.63, (Total
 Livestock - 485) and Poultry - 489.01

• Out of around 100 million milch cattle and buffaloes in the country, 47 million are
 buffaloes, 11 million are crossbred cows and 45 million belong to indigenous cattle
 breeds.

• Annual population growth rate for cattle in India is - 1.18% but of Buffalo is + 1.43%

• Ranks of Indian states in different Livestock Population (Census, 2003):

Livestock 1st Rank 2nd Rank 3rd Rank

Buffalo U.P. A.P. RAJ.

Total Cattle M.P. W.B. U.P.

Crossbred Cattle T.N. MHS. Kerala

Sheep A.P. RAJ. Karnataka

Goat W.B. RAJ. U.P.

Pig U.P. Assam W.B.

Horses & Ponies J&K U.P. Bihar

Camel RAJ. (78.8%) GUJ. Haryana

Poultry A.P. T.N. W.B.

Yak J&K Arunachal P. Sikkim

Mithun Arunachal P. Nagaland J&K

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International Organizations

OIE: New Name: The World Organisation for Animal Health (OIE)

The need to fight animal diseases at global level led to the creation of the Office
International des Epizooties through the international Agreement signed on January 25th1924. Its head quarter is in Paris, France. It was founded with 28 founding members as a
response to Rinderpest outbreak in Europe (Belgium) arising from cattle undergoing
international shipment.

In May 2003 the Office became the World Organisation for Animal Health but kept
its historical acronym OIE. The OIE is the intergovernmental organisation responsible for
improving animal health worldwide. It is recognised as a reference organisation by the World
Trade Organization (WTO) and in 2010, had a total of 177 Member Countries and
Territories. The OIE maintains permanent relations with 36 other international and regional
organisations and has Regional and sub-regional Offices on every continent. Dr Bernard
Vallat (France) is elected Director General of OIE for third five year term since May 2000.

The organization provides a vehicle for rapid disease information exchange between countries, which continue to promote and coordinate international research efforts into infectious diseases and which sets international animal health standards for trade in animals and animal products and for diagnostic laboratory tests and vaccines.

FAO - Food and Agricultural Organization of the United Nation:

Founded in 1945, headquarters is in Rome, Italy. FAO's mandate is to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy. The current Director-General, Dr Jacques Diouf of Senegal, was elected on 8 November 1993 and began his third six-year term in January 2006. Mr. Gavin Linday Wall is FAO Representative in India.

W.H.O. - The World Health Organization (WHO) is a specialized agency of the United
 Nations (UN) with193 members that acts as a coordinating authority on
 international public health established on April 7, 1948, with headquarters
 in Geneva, Switzerland.

CGAIR - Consultative Group on International Agricultural Research (1971):
 Washington: India is one of the 64 members.

IFPRI - International Food Policy Research Institute, 1975, Washington

ICARDA - International Center for Agricultural Research in the Dry Areas:

ICARDA was founded in 1975. Headquqrter is at Tel Hadya, Syria. With agriculture researches, it also serves developing world for improvement of nutrition and productivity of small ruminants (sheep and goats).

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ILRI - International Livestock Research Institute (1995):

ILRI is a non-profit-making and non-governmental organization with headquarters in
Nairobi, Kenya, and a second principal campus in Addis Ababa, Ethiopia. ILRI has a global
mandate for livestock research to: (i) improve animal performance through technological
research and conservation of animal genetic diversity in developing regions; (ii) improve and
sustain the productivity of major livestock and crop/livestock systems; (iii) improve the
technical and economic performance of the livestock sector; and (iv) improve the
development, transfer and utilization of research-based technology by national programmes
and their client farmers.

Climate change and its effects on animals and relationship

One of the most dramatic and immediate impacts of climate variation is that on disease, especially the vector-borne diseases, for example, an El Nino event triggers Rift Valley Fever epidemics in Africa. Particular areas are vulnerable and this will change in coming decades, since climate change is likely to cause entirely new global disease distributions. This applies to most vector-borne diseases.

The agricultural sector is a driving force in the gas emissions and land use effects thought to cause climate change. Livestock and livestock-related activities such as deforestation and increasingly fuel-intensive farming practices are responsible for over 18% of human-made greenhouse gas emissions, including:

• 9% of global carbon dioxide emissions

• 35-40% of global methane emissions (chiefly due to enteric fermentation and manure)

• 64% of global nitrous oxide emissions (chiefly due to fertilizer use.)

Livestock activities also contribute disproportionately to land-use effects, since crops such
as corn and alfalfa are cultivated in order to feed the animals. Worldwide, livestock
production occupies 70% of all land used for agriculture, or 30% of the land surface of the
Earth.

Who’s who?

Secretary DARE & Director General, ICAR: Dr. S. Ayyappan

Deputy Director General (Animal Sciences): Dr. K. M. L Pathak

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Important Acts & Laws

• THE PREVENTION AND CONTROL OF INFECTIOUS AND CONTAGIOUS
 DISEASES IN ANIMALS ACT, 2009 (NO. 27 OF 2009): An Act to provide for the
 prevention, control and eradication of infectious and contagious diseases affecting
 animals, for prevention of outbreak or spreading of such diseases from one State to
 another, and to meet the international obligations of India for facilitating import and
 export of animals and animal products and for matters connected therewith or
 incidental thereto. On the commencement of this Act- (i) The Glanders and Farcy Act,
 1899; (ii) The Dourine Act, 1910; and (iii) any other corresponding law of any State,
 so far as it is inconsistent with the provisions of this Act, shall stand repealed.

• THE CATTLE-TRESPASS (AMENDMENT) ACT 1921

• THE PREVENTION OF CRUELTY TO ANIMALS ACT, 1960

• THE INDIAN WILDLIFE (PROTECTION) ACT, 1972: The Wild Life (Protection)
 Amendment Act, 2006 (No. 39 of 2006) has come into force on 4 September 2006.
 The Act provides for creating the National Tiger Conservation Authority and the
 Tiger and Other Endangered Species Crime Control Bureau (Wildlife Crime Control
 Bureau).

List of Indian Regulations on Livestock Products:

• The Prevention of Food Adulteration Act, 1954

• Water (Prevention and Control of Pollution) Act, 1974

• Air (prevention and control of pollution) act, 1981

• Environment (Protection) act, 1986

• Export (Quality Control and Inspection) Act, 1963

• Export (Quality Control and Inspection) Rules, 1964

• Export of Raw meat (chilled/Frozen) (Quality Control and Inspection) Rules, 1992

• Export of Processed meat (Quality Control and Inspection) Rules, 1995

• Foreign Trade (Development & Regulation) Act, 1992

• Food Safety and Standards Act, 2006(Act No. 34 of 2006). The promulgation of Food
 safety and Standards Act, 2006 repeals the Prevention of Food Adulteration Act, 1954
 and the following orders mentioned in the Second Schedule to the Act.

• The Fruit Products Order, 1955

• The Meat Food Products Order, 1973

• The Vegetable Oil Products (Control) Order, 1998

• The Solvent Extracted Oil, De-oiled Meal and Edible Flour (Control) Order,
 1967

• The Milk and Milk Products Order,1992

• The Essential Commodities Act, 1955 (10 of 1955) relating to food (Section 97(1) of
 the Act).

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National Regulations on Slaughter

Table 1: Status of legislation on cow slaughter

A. States/UT’s enacted legislation for banning cow slaughter and restricted slaughter of bull/
bullock.

States:

1. Andhra Pradesh 2. Manipur 3. Bihar 4. Goa

5. Gujarat\* 6. Haryana 7. Himachal Pradesh\* 8.J & K\*

9. Karnataka 10. Madhya Pradesh 11. Maharashtra 12. Orissa

13. Punjab 14. Rajasthan 15. Sikkim 16.Tamil Nadu

17. Uttar Pradesh\*

Union Territories:

1. Andaman & Nicobar Islands 2. National Capital Territory of Delhi \*

3. Chandigarh 4. Dadra and Nagar Haveli

5. Daman-Diu 6. Pondicherry

\* Total ban on slaughter of cow and progeny.

B. States/UT’s where Cow slaughter is not banned but restricted or no legislation made:

1. Kerala 2. West-Bengal 3. Assam 4. Arunachal Pradesh

5. Meghalaya 6. Mizoram 7. Nagaland 8. Tripura

9. Lakshadweep

Cow slaughter is permitted with/without restriction in these States/ UTs.

Table 2: Status of legislation on slaughter of buffaloes

Status of Buffalo calves Adult buffaloes

Slaughter

Banned Andhra Pradesh, Bihar

Jammu & Kashmir

Karnataka, Madhya Pradesh

Not banned, Assam, Gujarat, Goa

But Maharashtra, Dadra & Nagar

Restrictions Imposed Haveli, West Bengal

Jammu & Kashmir

Andhra Pradesh, Assam Gujarat, Goa, Karnataka Maharashtra, M.P.,

Sikkim, Bihar, West
Bengal, Dadra & Nagar
Haveli

Not banned, No restrictions imposed : Other remaining states.

Meat food products in the country are regulated by:

• Water (Prevention and Control of Pollution) Act, 1974

• Air (Prevention and Control of Pollution) Act, 1981

• Environment (Protection) Act, 1986 stipulate requirements for abattoirs.

• Motor Vehicles Transport Act

• The Prevention of Cruelty to Animals Act, 1960

• Meat Food Products Order, 1973 regulates.

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• Meat export is regulated as per Export (Quality Control and Inspection) Act, 1963 and
 the Export (Quality Control and Inspection) Rules, 1964.

• Export of fresh and frozen meat is regulated as per Raw Meat (chilled/frozen)
 (Quality Control and Inspection) Rules 1992 and meat products under Processed Meat
 (Quality control and Inspection) Rules, 1995.

• Export of animal casings is regulated as per Plant Registration and Animal Casings
 Rules, 1995.

Food Safety and Standards Act, 2006

An Act to consolidate the laws relating to food and to establish the Food Safety and
Standards Authority of India for laying down science based standards for articles of food
and to regulate their manufacture, storage, distribution, sale and import, to ensure availability
of safe and wholesome food for human consumption and for matters connected therewith or
incidental thereto. The Act is described under 101 sections with 12 chapters and two
schedules.

Bureau of Indian Standards

During the pre independence period, standardization activity was sporadic and
confined mainly to a few Government purchasing organization. However, immediately after
independence, economic development through coordinated utilization of resources was called
for and the government recognized the role for standardization in gearing industry to
competitive efficiency and quality production. The Indian Standards Institution (ISI) was,
therefore, set up in 1947 as a registered society, under a Government of India resolution.

The Indian Standards Institution gave the nation the standards it needed for
nationalization, orderly industrial and commercial growth, quality production and
competitive efficiency. However, in 1986 the government recognized the need for
strengthening this National Standards Body due to fast changing socio-economic scenario
and according it a statutory status. Thus came the Bureau of Indian Standards (BIS) Act
1986 and on 1 April 1987, newly formed BIS took over staff assets, liabilities and functions
of erstwhile ISI. Through this change over, the Government envisaged building of the climate
of quality culture and consciousness and greater participation of consumers in formulation
and implementation of National Standards.

The Bureau is a Body Corporate consisting of 25 members representing both Central and State governments, Members of Parliament, industry, scientific and research institutions, consumer organizations and professional bodies with Union Minister of Consumer Affairs, Food and Public Distribution as its President and with Minister of State for Consumer Affairs, Food and Public Distribution as its Vice-President.

Objectives:

• Harmonious development of standardization, marking and quality certification

• To provide new thrust to standardization and quality control

• To evolve a national strategy for according recognition to standards and integrating
 them with growth and development of production and exports BIS is engaged in
 formulation of Indian Standards for the different sectors including food and
 agricultural sectors.

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Apart from Indian Standards, BIS is also working with international organizations. BIS as a founder member of International Organization for Standardization (ISO) continue to take part in international standardization activities.

Hazard Analysis Critical Control Point (HACCP) Certification

BIS offers two Certification schemes to the food industry.

i) HACCP Stand-alone Certification against IS 15000:1998

ii) HACCP based Quality System Certification provides for two Certification through one
 audit Certification of Quality System against IS/ISO 9000 and Certification of HACCP
 against IS 15000:1998

APEDA

The Agricultural and Processed Food Products Export Development Authority
(APEDA) was established by the Government of India under the Agricultural and Processed
Food Products Export Development Authority Act passed by the Parliament in December,
1985. The Act (2 of 1986) came into effect from 13th February, 1986 by a notification issued
in the Gazette of India: Extraordinary: Part-II [Sec. 3 (ii): 13.2.1986). The Authority replaced
the Processed Food Export Promotion Council (PFEPC). Its one of the function is to carrying
out inspection of meat and meat products in slaughter houses, processing plants, storage
premises, conveyances or other places where such products are kept or handled for the
purpose of ensuring the quality of such products. APEDA has head quarters at New Delhi and
regional offices at Bombay, Bangalore, Kolkata, Hyderabad and Guwahati.

APEDA is mandated with the responsibility of export promotion and development of its scheduled products like Fruits, Vegetables and their Products, Meat and Meat Products, Poultry and Poultry Products, Dairy Products and others.

MPEDA

The Marine Products Export Development Authority (MPEDA) was constituted in 1972 under the Marine Products Export Development Authority Act 1972 (No.13 of 1972). The role envisaged for the MPEDA under the statute is comprehensive: covering fisheries of all kinds, increasing exports, specifying standards, processing, marketing, extension and training in various aspects of the industry

Quarantine measures

Animal quarantine applies to all kinds of animals and animal products including
insects, reptiles, birds and mammals. Animals coming into India must spend prescribed time
determined by Quarantine Officer for necessary tests and examinations at specially equipped
quarantine stations to ensure they are free of disease before being released. The primary
purpose of quarantine of imported animals is to prevent the introduction and spread of animal
diseases by these animals. This is necessary to safeguard the animal population in India.
Although all animals imported into India have to be certified as healthy and free from
infectious and contagious diseases by the Veterinary Authority in the exporting country, at
the time of export, quarantine measures are still necessary. This is to ensure that any animal
incubating a disease, and therefore not showing any signs of the disease, is examined further
during the quarantine period.

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Animal Quarantine & Certification Services (AQIS) is under the direct control of Department of Animal Husbandry and Dairying, Ministry of Agriculture, Govt. of India. There are four quarantine stations located at Delhi, Kolkata, Mumbai and Chennai.

Substances to be investigated

Group A: Substances having anabolic effect and unauthorized substances viz., i) Stilbenes and its derivatives / salts ii) Anti-thyroid agents iii) Steroids iv) Resorcyclic acid lactones (including Zerenol) and v) Beta agonists These substances are not being used in India and hence are not being included in the investigation and monitoring plan.

Group B: Of the compounds of this group, as mentioned in Annex - IV to 2377/90 of

EEC regulation, Chloramphenicol is the only product that is relevant in the Indian context, and residue of this item will be monitored.

Group C: Antibacterial substances i) Oxytetracyclines ii) Tetracyclines iii) Benzyl penicillin iv) Sulphonamide

Group D: Other Veterinary Drugs i) Anthelmintics ii) Anticoccidials including nitroimidazoles iii) Carbamates and pyrethroids iv) Sedatives - not in common use and hence not considered for monitoring. V) Non steroidal anti inflammatory drugs (NSAID) vi) Other pharmacological substances - no substance under this has been considered.

Group E Other substances and environmental contaminants i) Organochlorine compounds including HCB ii) Organophosphorus compounds iii) Chemical elements (lead and cadmium) iv) Mycotoxins v) Dyes.

Since some of the substances under Groups C, D, and E are being used though to a varying extent in different parts of the country, samples are tested for these substances.

International Regulations

The International regulations include WTO, OIE, Codex, EU regulations and many other individual country regulations such as USDA regulations, Australian, Canadian etc regulations. All these regulations are important in the international trade in food products and ensuring food safety.

ISO Standards

ISO is the world largest standards developing NON-GOVERNMENTAL organization. ISO was born from the union of two organizations - the ISA (International Federation of the National Standardizing Associations), established in New York in 1926, and the UNSCC (United Nations Standards Coordinating Committee), established in 1944. The new organization, ISO, officially began operations on 23 February 1947.

The Standards

ISO has developed over 17000 International Standards on a variety of subjects and 1100 new ISO standards are published every year. A brief description of ISO standards related to food safety is given below:

67.120.1 Meat, meat products and other animal produce including frozen products.

67.120.10.1 Meat and meat products

65.120 Animal feeding stuffs Microbiology of animal feeding stuffs.

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ISO 9000 and ISO 14000 importance

The ISO 9000 family addresses "quality management". This means what the

organization does to fulfill:

• the customer's quality requirements, and

• applicable regulatory requirements, while aiming to enhance customer satisfaction,
 and achieve continual improvement of its performance in pursuit of these objectives.

The ISO 14000 family addresses "environmental management". This means what the organization does to:

• minimize harmful effects on the environment caused by its activities, and to

• achieve continual improvement of its environmental performance

WTO

World Trade Organization (WTO) is the international organization dealing with the global rules of trade between nations. It is the successor to General Agreement on Trade and Tariffs (GATT) and came into being in 1995. The WTO has more than 130 members.

The mandate of WTO covers trade in goods, trade in services, trade-related investment measures and trade related intellectual property rights.

Among several WTO agreements, those that are relevant to agricultural products including livestock sector, dairying and animal products are:

• Agreement on Agriculture (AOA)

• Sanitary and Phytosanitary (SPS) Agreement

• Technical Barriers to Trade(TBT) agreement

Some of the important provisions of these agreements are:

• Quantitative restriction on imports should be eliminated.

• Imported products and domestically produced products should be treated alike.

• Minimum access opportunity for imports should be 3% of average consumption in
 1986-88 increasing to 5% by the end of the implementation period (2004-05 for
 developing countries).

• All tariff rates are bound and cannot be raised without the agreement of trading
 partners.

• To use international standards, guidelines and codes such as those of Codex, as
 reference points for global trade and for resolving trade disputes.

• Reaffirms right to countries to set their own health and safety standards, higher than
 those of international ones, provided they are justified on scientific grounds.

• Livestock products are subsidized to the extent of 40-60% in the developed countries.

Codex and Codex standards

The term Codex Alimentarius is taken from Latin and means food code: a code of
food standards for all nations. It was established in 1962 when the FAO and WHO of the
United Nations recognized the need for international standards to guide the World’s growing
food industry and to protect the health of consumers. One of the principal purposes of the
Codex Commission is the preparation of food standards and their publication in the Codex

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Alimentarius. Codex develops commodity standards which are product specific and general standards which have across the board application to all foods and are not product specific. A number of codex standards have dealt with safety aspects of animal products. Some important standards with a brief mention of scope and content are as follows:

List of some codex standards

• General principles of food hygiene (CAC/RCP 1-1969, Rev. 4-20031)

• Code of Hygienic Practice for Meat (CAC/RCP 58-2005)

• Codex Standard for Luncheon Meat (CODEX STAN 89-1981)

• Codex Standard for Cooked Cured Chopped Meat (CODEX STAN 98-1981)

• Recommended International Code of Hygienic Practice for Processed Meat and
 Poultry Products (CAC/RCP 13-1976, Rev 1 (1985)

• Code of practice on good animal feeding (CAC/RCP 54-2000)

• Principles for the establishment and application of microbiological criteria for foods
 (CAC/GL 21-1997)

• General principles for the use of food additives 1 (CAC/ MISC I-1972)

• Recommended international code of practice for control of the use of veterinary drugs
 (CAC/RCP 38-1993)

• Codex general standard for contaminants and toxins in food (Codex Stan 193- 1995
 (Rev.1-1997)

Ethics for International trade in foods

The ‘Code of Ethics for International Trade in Food’ was developed in the light of the consideration that many countries - particularly developing countries do not yet have adequate food control infrastructures to protect consumers against possible health hazards in food and against fraud. Specific requirements of the code include:

Food standards, Food Hygiene, Labelling, Food additives, Pesticide residues, Microbiological contaminants, other contaminants, Irradiated food, Foods for infants, children and other vulnerable groups, and Nutritional aspects concerning in particular vulnerable groups and regions where malnutrition exists.

USDA Regulations

In the US Department of Agriculture implements regulations related to Animal
products safety through Food safety and Inspection Service (FSIS). In 1862, President
Abraham Lincoln founded the U.S. Department of Agriculture. In 1865, USDA Secretary
Isaac Newton urged Congress to enact legislation providing for the quarantine of imported
animals. Several acts and regulations were made from time to time depending on the
developments and requirements of animal products industry. FSIS stepped up its research
studies to apply the Hazard Analysis and Critical Control Point (HACCP) system to meat and
poultry inspection, setting the stage for the most significant change in regulatory philosophy
in the history of the inspection programs. On July 25, 1996, FSIS issued its landmark rule,
Pathogen Reduction/Hazard Analysis and Critical Control Point (HACCP) Systems.

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