

STANDARD OPERATING PROCEDURES FOR MANAGING PIG BREEDING FARMS

Produced under the
World Bank aided Assam Agribusiness & Rural Transformation Project (APART)

For
The Animal Husbandry & Veterinary Department, Govt. of Assam
Chenikuthi, Guwahati, Assam, India

The International Livestock Research Institute (ILRI)
Box 30709, Nairobi, Kenya

ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE



STANDARD OPERATING PROCEDURES FOR MANAGING PIG BREEDING FARMS

The Animal Husbandry & Veterinary Department, Govt. of Assam

**C.P. Gopakumar
&
Ram Pratim Deka**

Submitted by
The International Livestock Research Institute (ILRI)
Box 30709, Nairobi, Kenya

Produced in partnership with
DLG Farms Private Limited, Mysore District, Karnataka, India

Rajesh Prasad, IAS

Principal Secretary to the Government of Assam
Agriculture , Tourism Department and
Agriculture Production Commissioner, Assam



Assam Secretariat (Civil) Dispur,
3rd Floor, Block-C, Guwahati-781006
Tele : +91 361 2237006
E-mail: tsmassam@gmail.com,
agriculturedepartmentassam@gmail.com

Foreword

The Animal Husbandry and Veterinary Department (AHVD), Govt. of Assam is maintaining several pig breeding farms in different parts of the state. These breeding farms are producing piglets and supplying the same to farmers to meet the growing need of quality piglets in the state. The Department has felt the need to strengthen these breeding farms by introducing new and good quality breeding stock, improving farm management and farm biosecurity under the World Bank aided Assam Agribusiness and Rural Transformation Project (APART). As a part of the initiative, International Livestock Research Institute (ILRI), the knowledge partner for the AHVD under the APART project, has come up with a Standard Operating Procedures (SOP) for management of the pig breeding farms which was largely lacking in the department.

The SOP will provide a standard operational procedures for selection and breeding, feeding and health care and management of different categories of pigs. I am sure, this SOP will immensely help the Farm Managers in managing the govt. pig breeding farms and help the department to have a uniform procedure of management and reporting across the farms. I sincerely feel that this SOP will be equally useful for private pig breeding farms as well. I am pleased that ILRI has produced these important documents in consultation with the concerned officials of AHVD and ARIAS society which will remain as an important asset for the Department in the days to come.

(Rajesh Prasad)

Shyam Jagannathan, IAS



**Commissioner & Secretary to the Govt. of Assam
Animal Husbandry and Veterinary Department,
Block 'F', Janata Bhawan, Dispur, Guwahati-781006
Ph. No.: 0361-2237455 (O)
E-mail : jshyam@ias.nic.in**

Preface

Farm management is a critical task which requires standard process for breeding, feeding, health care, management etc. The Animal Husbandry and Veterinary Department (AHVD), Govt. of Assam is having some pig breeding farms, but till date it is lacking a standard operating procedures for management. In absence of this, all govt. pig breeding farms are basically managed based on knowledge of the Farm Managers which may vary from farm to farm. This invites problem not only on performance of the farms but also on record keeping and reporting. The Department has been taking several initiatives to strengthen the pig breeding farms in terms of infrastructure, new germplasm and knowledge and capacities of the Farm Managers and workers under different projects. One such project is World Bank aided Assam Agribusiness and Rural Transformation Project (APART). Under the project, International Livestock Research Institute (ILRI), the knowledge partner for the APART project, has produced a Standard Operating Procedures (SOP) for management of the pig breeding farms.

I sincerely hope that this SOP will significantly contribute towards improving the farm management operation and help in increasing productivity of the farms. This would certainly help the Farm Managers to follow uniform practices across the farms in the state and make the recording and reporting of farm data easier. I appreciate ILRI for making this important contribution to the department. This would remain as an important addition to the knowledge repository of the department.


Commissioner & Secretary
A.H. & Veterinary Department, Govt. of Assam

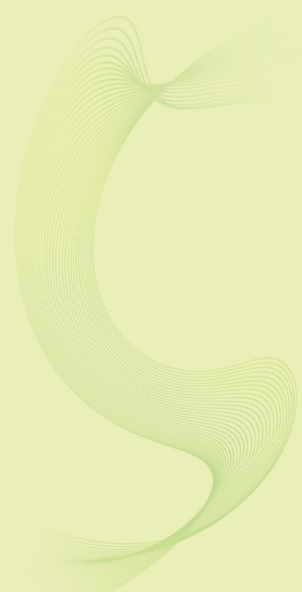
Acknowledgement

We sincerely thank and acknowledge the guidance and support that we received from the Agriculture Production Commissioner (APC) to the Govt. of Assam; Commissioner and Secretary to the Govt. of Assam, Animal Husbandry and Veterinary Department (AHVD); State Project Director, ARIAS Society; Director, AHVD and Nodal Officer and other officials of AHVD and ARIAS Society without which this Standard Operating Procedures (SOP) could not be developed.

Our sincere thanks also go to the concerned officials of the World Bank, ILRI and DLG Farms Pvt. Ltd for their continued support and encouragement in producing this important document.

At last but not the least, we express our sincere gratitude to the Farm Managers and their concerned colleague of the gov. pig breeding farms who have helped us in drafting the SOP by sharing their existing management practices.

Team Leader and Resident Consultant
ILRI-APART



List of Contents

Sl. no.	Particulars	Page no
	List of tables	III
	List of figures	IV
	Abbreviation	V
1	Background	1
2	Standard Operating Procedure (SOP) for breeders (gilts, dry and pregnant sows and boars)	2
2.1	Selection	2
2.2	Feeding of breeders	9
2.3	Reproduction	14
2.4	Other management practices of breeders	18
3	SOP for farrowing & lactating sows	20
3.1	Feeding of lactating sows	20
3.2	Managing the farrowing process	22
3.3	Managing the lactating sows	27
4	SOP for nursing piglets and weaners	29
4.1	Feeding of piglets	29
4.2	Management of new born and nursing piglets	31
4.3	Management of weaned piglets	34
5	SOP for miscellaneous activities	37
5.1	Culling of breeding stock	37
5.2	Vaccination	38
5.3	Bio-security	38
5.4	Feed analysis and storage	39
5.5	Data management	40
6	References	44

List of Tables

Sl. No.	Title	Page no
1	Basis of selecting gilts	2
2	Basis of selecting boars	5
3	Judging guidelines	6
4	Nutrient requirement of breeder pigs (gilts, dry & pregnant sows and boars)	10
5	Feeding regimen for breeder (quantity per day)	11
6	Stage when replacement stock is ready for first service	14
7	Signs of estrus/ heat in pigs	15
8	Methods for detecting estrus/ heat in pigs	16
9	Mating and pregnancy detection – methods and timing	17
10	Management practices for reducing dry period	18
11	Management practices for pregnant sows	19
12	Daily activity schedule in breeder sheds	19
13	Nutrient requirement of lactating sows	20
14	Feeding regimen for farrowed and lactating sows (quantity per day)	21
15	Common farrowing & post farrowing problems	23
16	Management practices for lactating sows	27
17	Daily activity schedule in farrowing and rearing sheds	28
18	Nutrient requirement of piglets and growing stock	29
19	Feeding regimen for piglets and weaners	30
20	Husbandry procedures for piglets with lactating sows	31
21	Husbandry procedures for rearing motherless (orphan) piglets	34
22	Guidelines for rearing weaned piglets	35
23	Daily activity schedule in weaner/nursing sheds	36
24	Culling parameters	37
25	Vaccination schedule	38
26	Guidelines for implementing an effective biosecurity plan	39
27	Quality Analysis and storage of feed	40
28	Technical figures to be calculated for monitoring the farm	41
29	Some basic facts to be recorded on a monthly basis	42
30	Reports to be generated from software designed for farm management	43

List of Figures

Sl. No.	Title	Page
1	Diagrammatic representation of teats of female pigs	3
2	External genitalia of female pig	3
3	Visual scoring of pigs	13
4	Fertility curve of female pigs in estrus	16
5	Proper positioning of pregnancy detector	18
6	Level of Immunity conferred from colostrum and active immunity of piglet	31

Abbreviation

AHVD	:	Animal Husbandry & Veterinary Department
AI	:	Artificial Insemination
APART	:	Assam Agribusiness & Rural Transformation Project
ARIASS	:	Assam Rural Infrastructure & Agricultural Services Society
CSF	:	Classical Swine Fever
FMD	:	Foot & Mouth Disease
ICAR	:	Indian Council of Agricultural Research
ILRI	:	International Livestock Research Institute
KVK	:	Krishi Vigyan Kendra
MOBC	:	More Other Backward Classes
NGO	:	Non-Governmental Organisation
NRCP	:	National Research Center on Pig
PRRS	:	Porcine Respiratory & Reproductive Syndrome
SOP	:	Standard Operating Procedures

1. Background

Currently there are 19 pig breeding farms under the Animal Husbandry & Veterinary Department (AHVD), Govt. of Assam. The department would like to strengthen some of the big breeding farms in the state with technical support from the International Livestock Research Institute (ILRI) under the World Bank aided Assam Agri-Business and Rural Transformation Project (APART). In this connection, ILRI has been assigned to assess 12 govt. pig breeding farms available in the state and to make specific recommendations for their improvement in terms of increased production of quality piglets and sustainability.

One of the major constraints identified by the ILRI team was the lack of uniform management protocol of the farms. The farms are being managed by the concerned Farm Managers based on their knowledge and practices which may differ from farm to farm and may change with the changes of the Farm Manager. Therefore, ILRI has developed this Standard Operating Procedures (SOP) for the govt. breeding farms which may equally be useful for large private farms. To make the SOP more practically doable, technical support was sought from one of the India's biggest and well maintained pig breeding Farms called "DLG Farms Limited, Mysore, Karnataka" in drafting the SOP. It is expected that if the govt. farms follow the management practices as mentioned in the SOP, the performance of the farms would significantly be improved. The SOP is stating the management practices under the following four categories:

1. SOP for Breeders (gilts, dry and pregnant sows and boars)
2. SOP for Farrowing and Lactating Sows
3. SOP for Nursing Piglets and Weaners
4. SOP for Miscellaneous Activities

2. Standard Operating Procedure (SOP) for Breeders (gilts, dry and pregnant sows and boars)

The standard operating procedures for breeder states the following activities:

- Selecting of breeders
- Feeding of breeder
- Reproduction of breeders that include
 - Heat/estrus detection
 - Mating of gilts/sows
 - Pregnancy detection
- Other management activities

2.1 Selection of pigs for breeding purpose

Selection of pigs is aimed at achieving the following objectives:

- To have pigs that produce large litter size at weaning
- To have pigs that are fast growers
- To have pigs that are highly efficient feed converters
- To have pigs that produce best quality carcass

In selecting breeders, consider number of physical traits and performance parameters of the animals. Carefully examine the animals before choosing it for breeding purposes as the performance of breeding stock depends on their quality.

2.1. 1 Selection of gilts

Important criteria that is used for selection of gilts are stated at Table 1

Table 1: Basis of selecting gilts

Parameter	Criteria for selection
Performance	<ul style="list-style-type: none"> • Gilts with faster growth rate to be selected. • Feed efficiency is favored indirectly by selecting faster growing gilts. • Gilts should be from litter size of 10 or above. • Select gilts from litter demonstrating uniform growth.
Underline and mammary glands	<ul style="list-style-type: none"> • Gilts with 6 pair of teats or more to be selected. • Females with undeveloped, blind, inverted or abnormal teats to be avoided. (refer to figure 1 below)
Reproductive soundness	<ul style="list-style-type: none"> • Gilts with infantile or abnormal vulva to be avoided. (refer to figure 2 below)
Feet and legs	<ul style="list-style-type: none"> • Select gilts with wide set of legs. • The pastern should be with slight angle (neither straight nor too much angled). • The claws of the feet should be equal and without defects. • Avoid gilts with shallow body and thigh, and extremely long legs. • Also refer judging guideline below (table 3).
Body conformation	<ul style="list-style-type: none"> • Select gilts with longer body. • Gilts selected should have uniform transition from front to rear (a body broader at the hindquarters than at the shoulders is preferable). • Also refer to judging guideline below (table 3).

Parameter	Criteria for selection
Body joints	<ul style="list-style-type: none"> • Good development of ham, loin and shoulder is required in selected breeders. • Selected gilts should have larger ham, length wise and crosswise. • Also refer to judging guideline below (table 3).
Back	<ul style="list-style-type: none"> • Back of the animal selected should be slightly arched. • Also refer to judging guideline below (table 3).
Fertility and prolificacy	<ul style="list-style-type: none"> • Selected gilts should be mated only in third heat. • Mate gilts only after 8 months of age.
Heritable diseases and abnormalities	<ul style="list-style-type: none"> • Do not select gilts from litter that had physical abnormalities.

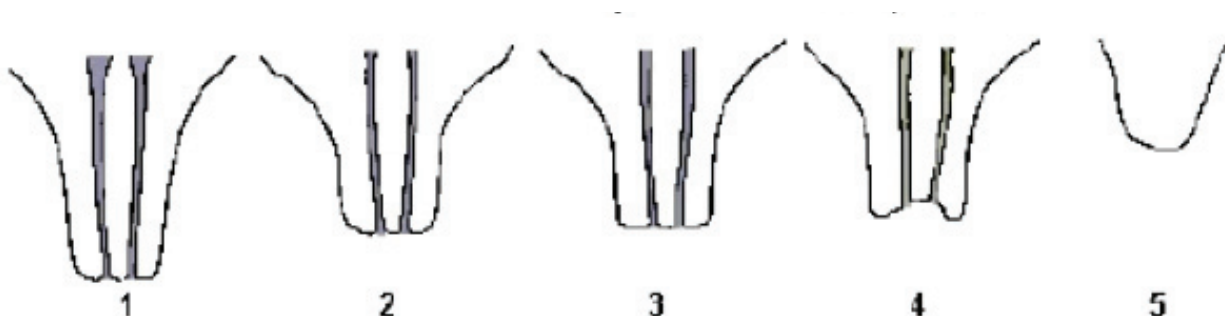


Fig. 1: Diagrammatic representation of teats of female pigs (1, 2, 3 Functional teat; 4 Inverted teat; 5 Blunt/necrotic teat)

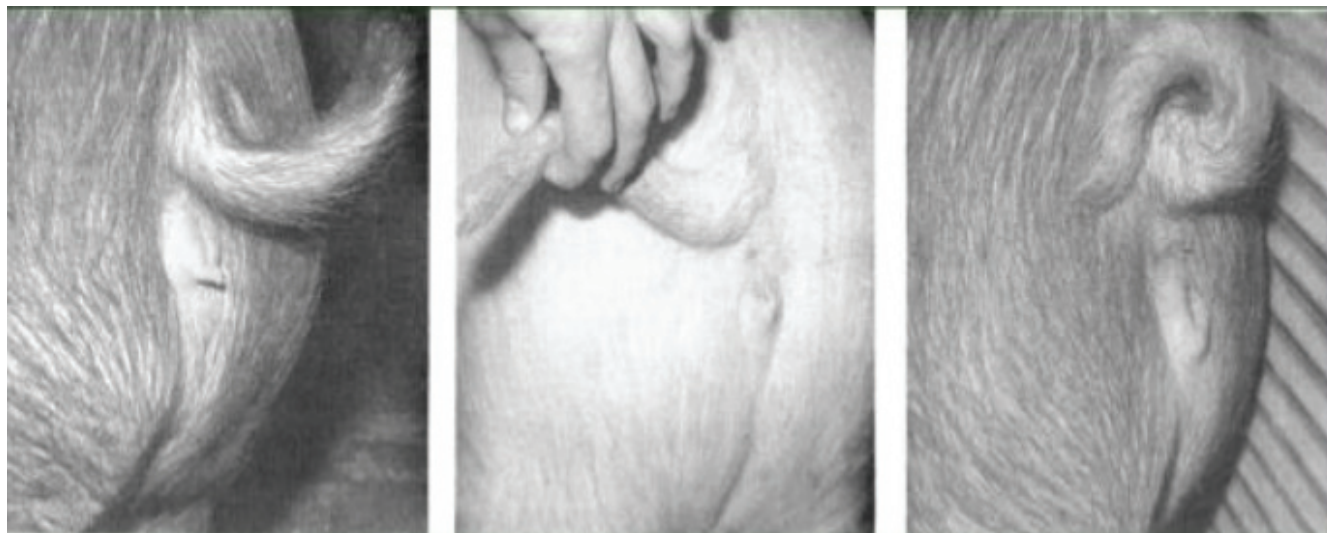


Fig.2: External genitalia of female pig – normal (left), small infantile (center), and abnormal (right)

Explanatory notes

- Post weaning rate of growth is one of the most economically important traits in pigs. It is moderately influenced by heredity such that selection for this trait will result in a reasonable improvement in the herd.
- Feed efficiency is a highly desirable trait in swine. The rate of growth and feed efficiency are closely related. The former is often used as an indirect measure for the latter. Pigs with fast rate of growth usually require less feed to produce a kilogram gain in weight, so that when selecting for growth rate, you are indirectly selecting for feed efficiency.

- Although the number of teats does not influence litter size and weight of pigs at birth, it is important that gilt should have a well-developed udder with a minimum of six pairs of properly spaced functional teats to be able to raise a healthy litter of desirable size. A sow with poor udder development is likely to have poor milking capacity. Females with undeveloped, blind, inverted or abnormal teats of any form should be avoided. If not, this defect may eventually appear in so many of the offspring. The heritability of the number and quality of teats is high.
- Most anatomical defects of the reproductive system are internal and hence not visible. However, gilts with small vulvas are likely to possess infantile reproductive tracts and should not be kept. For the gilt, the vulva should be in the downward position for easier expulsion of the piglet and natural mating.
- Gilt should have legs that are set wide out on the corners of the body and the legs should be heavy boned with a slight angle to the pasterns. Weakness in these regions will handicap the breeding animal. Long pasterns are weak and constitute a disqualification. Do not select a “rangy” pig or a pig having shallow body and thighs, and extremely long legs. Animals with medium short feet and short upright pasterns are preferable.
- A long body is highly desirable among sows because it provides more space for udder development and consequently, prevents overcrowding of piglets during suckling. Undoubtedly, pigs with long body tend to be lean with good grading measurements. The body should have a uniform width from front to rear, although a body broader at the hindquarters than at the shoulders is preferable.
- Good development of the ham, loin and shoulder is required of a breeding animal. This is important since these parts are the sources of highly-priced cuts such as pork chops, ham and bacon. The hams must be broad both lengthwise and crosswise, carry fullness on the outside, and give the appearance of being rounded. However, it is also necessary to consider the normal breed characteristics especially when selecting native breeds.
- The back of the animal should be slightly arched since this is a manifestation of a strong back which is important during pregnancy.
- The age of puberty in pigs varies from four to eight months. This rather wide range is due to difference in breeds and lines, sex and environment - especially nutrition. In general, boars do not reach puberty as early as gilts. Reasonably, early breeding has the advantages of establishing regular and reliable breeding habits and reducing the cost of the pigs at birth. Although gilts may come into heat at six months of age, the general recommendation is to breed at the third heat, primarily to take advantage of any increase in ovulation rate. Therefore, gilts are usually bred at eight months of age and farrowing at 11 - 12 months of age.
- Do not keep gilts or boars from litters that had physical abnormalities. Sporadic occurrence of abnormalities in a herd involves a few or appreciable number of animals. Most of the common abnormalities reported in swine are likely to be heritable. A few have been attributed to faulty nutrition and others to accidental developments. However, it is often difficult to determine the specific cause of an abnormality especially when it happens only in a few individuals in the herd.

Greater selection reach is possible with boars than with gilts since in most herds, one boar is selected for 15-20 gilts.

2.1.2 Selection of boar

The important criteria that are used for selection of boar is stated at Table 2.

Table 2: Basis of selecting boars

Parameter	Criteria for selection
Behavior	<ul style="list-style-type: none"> Aggressive boar to be selected.
Productivity	<ul style="list-style-type: none"> Boars with faster growth rate to be selected. Feed efficiency is favored indirectly by selecting faster growing gilts. Boars should be from litters of 10 or above. Select boars from litter demonstrating uniform growth.
Underline and mammary glands	<ul style="list-style-type: none"> Boars with 6 pair of teats or more to be selected.
Reproductive soundness	<ul style="list-style-type: none"> Boars with hernia and cryptorchidism to be avoided. Select boars which has relatively larger scrotal circumference. Check if the penis is free inside the prepuce (avoid boars with any adhesions)
Feet and legs	<ul style="list-style-type: none"> The pastern should be with slight angle (neither straight nor too much angled). The claws of the feet should be equal and without defects. Also refer judging guideline below (table 3).
Body conformation	<ul style="list-style-type: none"> Boars selected should have uniform transition from front to rear (a body broader at the hindquarters than at the shoulders is preferable). Also refer judging guideline below (table 3).
Body joints	<ul style="list-style-type: none"> Good development of ham, loin and shoulder is required in selected breeders. Selected boars should have larger ham, length wise and crosswise. Also refer judging guideline below (table 3).
Back	<ul style="list-style-type: none"> Back of the animal selected should be slightly arched. Also refer judging guideline below (table 3).
Fertility and prolificacy	<ul style="list-style-type: none"> Use boar for mating only after 8 months of age (9 months preferable).
Heritable diseases and abnormalities	<ul style="list-style-type: none"> Do not select boars from litter that had physical abnormalities.

Explanatory notes

- Behavioural traits are those characteristics that express themselves as docility, temperament, sex characteristics, maturity and aggressiveness. These are associated with reproductive potential.
- Sow productivity traits include such things as reproductive ability, litter size, milking ability, and mothering ability. The number of piglets farrowed and weaned and the average birth-weight of piglets in a litter are the most common measures. Boars should be selected only from a farrowing with litter size of 10 or more piglets farrowed and eight or more pigs weaned.
- Performance traits include growth rate measured as gain per day from weaning to market and feed conversion ratio (FCR). When selecting for these traits, one should place more emphasis on the boar's own record and less emphasis on records of relatives.
- Characteristics associated with soundness include: the spacing, number, and presentation of the teats; genetic abnormalities such as hernia and cryptorchidism; and mating ability. Boars should possess 12 or more well-spaced teats.
- Genetic abnormalities and mating ability traits have a very high economic importance. For these traits, insist that relatives of these selected boars are free of these defects and rely on the breeder's integrity.

- Physical soundness of the feet and legs, and bone size and strength, are also important. Feet and legs should demonstrate medium to large bone; wide stance of both front and rear; free in movement; good cushion to both front and rear feet; and of equal size toes.
- Conformation traits include body length, depth, height, and skeletal size; muscle size and shape; boar masculinity characteristics and testicular development. Conformation traits such as length and height have high heritability values. It is important to select boars on the basis of their own records for these characteristics.

Table 3: Judging guidelines




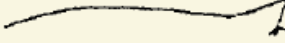
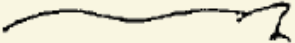
Description	Good	Fair	Poor
Front Part			
Width	Wide 		Narrow 
Transition	Smooth, head and shoulder in line		Loose shoulder clearly moving during walking
Middle Part			
Length	Long, strong		Short, weak
Width	Flat, wide back; well arched side wards as well as backwards		“Roof shaped”; narrow backed; flat deep sides
Transition	 Slightly arched		 Sway back

Table 3: Judging guidelines (continued)

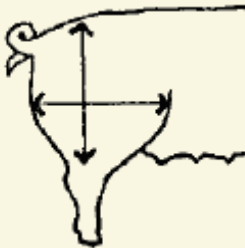

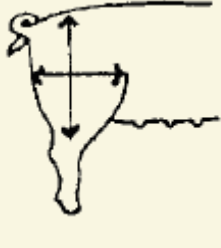
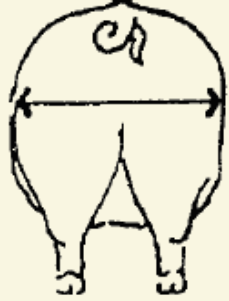
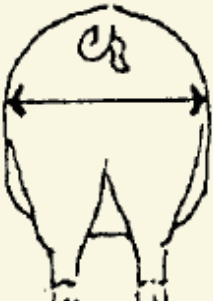
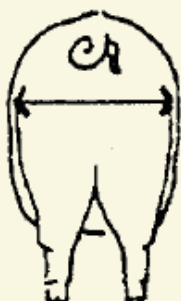





Description	Good	Fair	Poor
Rear Part			
Length and depth			
Width			
Description	Good/ Fair	Poor	
Legs			
Pastern	 Correct	 Low angle	 Steep
Claws	 Evenly developed Dry joints, without lesions and/ or swellings	 Unevenly developed Too much sub cutaneous and synovial fluid, lesions and/ or clear swelling	

Table 3: Judging guidelines (continued)

















Description	Good/ Fair	Poor	
Pastern	 <p data-bbox="406 697 716 730">No swaying during walking</p>	 <p data-bbox="987 709 1224 743">Swaying of rear part</p>	
Stance – Front leg			
Side view	 <p data-bbox="516 1066 604 1100">Correct</p>	 <p data-bbox="878 1087 997 1121">Buck knee</p>	 <p data-bbox="1307 1087 1409 1121">Forward</p>
Front view	 <p data-bbox="516 1507 604 1541">Correct</p>	 <p data-bbox="841 1507 971 1541">Knock knee</p>	 <p data-bbox="1230 1507 1370 1541">Bow-legged</p>
Stance – Hind leg			
Side view	 <p data-bbox="516 1900 604 1934">Correct</p>	 <p data-bbox="787 1900 1055 1934">Backward Sickle-shaped</p>	

Table 3: Judging guidelines (continued)

Description	Good/ Fair	Poor	
Stance – Hind leg			
Rear view	 Correct	 Narrow	 Wide
		 Cow-hocked	
Description	Good	Fair	Poor
Udder			
No. of functional teats	Above 14	12-14	Less than 12
Quality	Well developed, prominent, evenly spaced, no rudimentary/ blind or inverted teat		Inverted and/ or blind teats, small and not clearly visible, unevenly spaced
Development	Clear wedge shaped, well proportioned, proper height 		No wedge shape, short legged, poor proportion 

2.2. Feeding of breeders

In general, pigs require nutrients for different purposes, i.e. for body maintenance, growth, production and reproduction. In case of breeders, for body maintenance, growth and reproduction there is a daily requirement of energy, proteins, minerals and vitamins, and rations need to be formulated on a least-cost basis consistent with the needs of the animal.

Basically, pigs require nutrients such as carbohydrates, crude proteins (amino acids), ether extract or crude fat, crude fiber, vitamins, minerals and water. Table 4 gives the suggested minimum nutrient requirement for swine breeders (excluding the period when the sows are lactating and nursing piglets).

Table 4: Nutrient requirement of breeder pigs (gilts, dry & pregnant sows and boars)

Nutrient on Dry Matter Basis	Unit	Quantity per Kilogram Feed
Crude Protein	%	14.00
Digestible Energy	Kcal	3000.00
Calcium	%	0.90
Phosphorus	%	0.70
Lysine	%	0.68
Methionine & Cystine	%	0.45
Crude Fiber (maximum)	%	12.00
Crude Fat (maximum)	%	10.00
Add any commercially available vitamin and mineral mixture as extra ingredient to supplement minerals other than calcium and phosphorus, and vitamins. (0.2% in compounded feed).		
Add common salt at the rate of 0.5% to supplement sodium.		

Explanatory notes

- Carbohydrates are the part of the diet which is required for maintenance, and any surplus is converted into fat and stored. The quantitative requirement of energy depends on the pig's age, its activities and stage of production. A pregnant sow requires 6,600 kcal of digestible energy per day.
- A pregnant sow requires 0.28 kg of crude protein per day. To satisfy the crude protein requirement, she must be given a daily feed allowance of 2.0 kg of a ration containing 14% crude protein. However, a pregnant sow's daily ration can be reduced to as low as 1.5 kg if she has the tendency to fatten without any ill-effects on her breeding capacity and productivity.
- Fats, like carbohydrates, are excellent sources of energy. Fats contain about 2.25 times more metabolizable energy (ME) than carbohydrates but are more expensive. Generally, most of the feed ingredients used for pigs contain more fat than required, such that fat deficiency is seldom seen. It contains vitamins (A,D,E,K) and makes feeds more palatable and less dusty.
- When piglet survival rate is below the average, supplementing sows' diet with fat during late gestation may improve survival rate. This appears to be a response to fat and not to increased energy intake. The added fat increases the fat content of the colostrum and milk which is responsible for the increased survival rate.
- Pig requires at least 14 minerals which are essential for the formulation of bones and teeth, muscle contraction, osmotic balance, and many other metabolic processes. The major minerals that normally need to be added to the ration are calcium and sodium, but when the animal protein is replaced by vegetable protein, phosphorus is also required. The only trace elements normally required are copper and iron. When the animal protein is below 2.5% there may also be a need for iodine and selenium.
- Vitamins are highly important in the normal functioning of the body of the animal. Although vitamins are required in small quantities, they serve several essential functions in maintaining normal growth and reproduction. Some vitamins are found in adequate amounts in the feedstuffs used in pig diets; others must be supplemented. Most rations need to be supplemented with vitamins A, D and B.

Table 5: Feeding corrected for breeder (quantity per day)

Category of breeder	Normal	Thin	Fat
Gilts - 6 months onwards	2.5 kg	3.0 kg	2.0 kg + Roughage
Gilts - Flushing 10 -14 days before service	3.0 kg	3.5 kg	3.0 kg
Sows - Stage 1 of pregnancy – Service – 21 st day	2.0 kg	2.5 kg	1.5 kg + Roughage
Sows - Stage 2 of pregnancy – 22 nd day – 84 th day	2.0 kg	2.5 kg	1.5 kg + Roughage
Sows - Stage 3 of pregnancy – 85 th day – 111 st day	2.5 kg	3.0 kg	2.5 kg
Sows - Stage 4 of pregnancy – 112 nd day – 113 rd day	2.0 kg	2.2 kg	2.0 kg
Sows- Stage 5 of pregnancy – 114 th day (farrowing day)	0 or just handful + adlib water		
Sows – Day of weaning	0 or just handful + adlib water		
Sows - Flushing 2 nd day after weaning for 10 days or till service, whichever is earlier	3.5 – 4.0 kg		
Boars - 6 months onwards	2.0 kg	2.5 kg	1.5 kg + Roughage

Explanatory notes

- The average age at puberty in gilts is about seven months (the range is five to seven months). Considerable savings in feed costs and other overhead costs can be achieved by breeding gilts at an earlier age. This is accomplished by selecting gilts at 65 - 70 kg (in case of native breeds the weight would be lesser) and managing them to induce in reaching puberty as young as possible.
- From the time of selection, gilts should be fed ad libitum on a grower diet until the time they are bred. offering more feeds to the gilts 10-14 days before mating can increase the ovulation rate. Increase their feed allowance to 3.0 - 3.5 kg per day. This is called flushing. Apparently, flushing indeed increases the rate of ovulation.
- During the dry period when the piglets have just been weaned from the dam, the sow should be flushed for a period to condition her for the coming to breeding/insemination and increasing the rate of ovulation. This practice followed for a maximum of 10 days from weaning or less if the sow is bred before 10 days.
- Immediately after service or on 11th day the amount of feed is to be decreased to the normal amount or limited feeding. Continuation of high level of feeding will result in higher embryo mortality. About 2 months after breeding, the body condition of the sow should be at its ideal stage.
- The growth rate of pig embryo increases tremendously (approximately two-thirds of the growth of the fetus) during the third month of pregnancy when the bulk of nutrients are stored. This is indicative of the need for maternal nutrition sufficient to support proper growth and development of the embryos and to help in building up the sow's body tissues for lactation. The greater need for nutrients during the last month of pregnancy will be satisfied if light and heavy sow receive at least 15 % and 10% more feed, respectively. However, it may even be necessary to increase the level of feeding in order to have a reasonable margin of safety.
- During gestation, it is also important that body reserves be stored for subsequent use during lactation. The desired gains vary according to the initial condition. It is important that the condition of dry sows be regulated so that they are neither too fat nor too thin at farrowing time. Very fat sows may have difficulty in farrowing and give birth to weak or dead piglets. Sows that are too thin at farrowing tend to become suckled down during lactation. Thus, one way or another, limited feeding is a must for gestating sows.
- In addition, the use of pasture should be considered. Where available, a leguminous pasture is the ideal way to limit-feed in gestating sows. Dry sows on good legume pasture are usually fed 200 grams less supplement and about 900 grams less corn per day. The pasture system also provides good quality protein, minerals, vitamins and exercise.

- About 7-10 days before the expected date of farrowing, the regular sow feed can be replaced by lactating feed; or this can be done as soon as the pregnant sow is transferred to the farrowing house/pen.
- During the last 3 days before the expected date of farrowing, it is recommended to decrease the daily feed allowance.
- On the day of weaning it is better to give no feed for the sows, which is to dry the milk, avoid mastitis and to provide positive stress and bring back her to heat fast.
- The feed allowance for boar depends on its condition, which is indirectly influenced by the frequency of service or semen collection. On the average, a sexually mature boar with 3 times semen collection/services per week requires 2.0 kg feed per day.
- For replacement boars weighing up to 90 kg or 6 months of age, they can be fed ad libitum. Once they have reached this weight, restricted feeding can be practiced. Maintain the mature boar in a lean, active and hard-working condition. Giving too much feed more than the boar needs lead to excessive condition resulting to obesity causing poor performance.
- On the other hand, very thin boar or poor body condition due to nutrient or feed deficiency might cause low semen quantity and quality, shorter productive period, decreased resistance to diseases and poor libido due to poor health condition.

Both excessive and insufficient feeding, are not good for breeders. Excessive feeding can lead to:

- Obesity -sow becoming fat
- More repeat breeding
- Higher embryonic mortality -smaller litter size
- More problems during farrowing
- Leg problem and more piglet crushing during lactation
- Higher feed cost

Insufficiency can lead to:

- Poor body condition
- Decreased body resistance
- Poor conception
- Fetal re-absorption, embryonic death - smaller litter size

Hence a visual scoring of pigs is useful for assessing the condition of pigs and altering the feeding practices. Visual scoring chart is presented in figure 4 below.

The breeders are expected to be in an ideal condition (score 3) as depicted in figure 4. However, to maintain the sows in score throughout its life, they should be between score 3 and 4 when going for farrowing so that they can be weaned before they are thin (score2).



Emaciated



Thin



Ideal



Fat



Over Fat

Fig.3: Visual scoring of pigs

2.3 Reproduction

One important factor that contributes to the success of any pig farm is the number of piglets produced by each sow in a year. This is largely dependent on the services or mating made which is, in turn, affected by heat detection and timing of insemination.

The puberty in boars is the age at which sperm cells or spermatozoa appear in the ejaculation. In gilts, puberty is signaled by the occurrence of the first ovulation or estrus period, which is characterized by receptivity to the male pig or acceptance of the male pig. However, it is not ideal to service or mate the pigs at the onset of puberty as this may affect the life time productivity. The time for start of service is given in table 6.

Table 6: Stage when replacement stock is ready for first service

Sex	Parameter to be achieved	Remarks
Gilt	Has reached 8 months of age	
	Has attained 100-130 kg body weight	In case of native breeds, their crosses with exotic and exotic pigs with poor performance, weight achieved at 8 months of age when fed with a good compounded ration can be taken as yard stick.
	Has cycled at least twice	
Boar	Has reached 9 months of age	
	Large enough to cover a normal sized gilt	In case of native breeds, their crosses with exotic and exotic pigs with poor performance, weight achieved at 9 months of age when fed with a good compounded ration can be taken as yard stick.
	Sufficient libido to complete ejaculation	
	Semen is sufficient in quality and quantity	Possible to analyze only if semen collection for AI is practiced at the farm. If collected, 50% sperms showing progressive motility and 300 ml of semen volume can be taken as a yard stick

Explanatory notes

- Spermatogenesis is the process in which sperm cells are formed in the testes or testicles. The whole process takes place in 35 days. It is a continuous process normally producing about 10-15 billion sperm cells each day. It cannot be altered by the frequency of ejaculation.
- Factors affecting puberty in boars are genotype, age, nutrition, environment, health and frequency of use.
- Factors affecting puberty in gilts are genotype, age, nutrition, environment, male effect, social environment and exogenous hormones.

Estrus cycle is the period intervening between two successive heat periods in the absence of pregnancy. It usually ranges from 18-24 days, with an average of 21 days. The cycle is usually characteristic of the individual, that is, a sow, which has a 21-days cycle, comes to heat in every 21 days unless interrupted by pregnancy. The estrus cycle is affected by many environmental factors.

Heat or estrus is the period when gilts or sows accept boars and it is highly important to identify pigs in heat and introduce them to boars for service in time. Hence the heat symptoms are presented in table 7.

Table 7: Signs of estrus/ heat in pigs

Signs	Pre-heat	Standing heat	Post-heat
Standing heat	Female pig will not stand if attendant tries to sit on her back. Fails “riding test”	Stand still with arched back when ridden by other sow, boar or attendant	Doesn’t stand still when being pushed
Vulva	<ul style="list-style-type: none"> • Red • Swollen • With little mucus 	<ul style="list-style-type: none"> • Pink • Less swollen • With clear and sticky mucus 	<ul style="list-style-type: none"> • Pale • No swelling • no mucus
Behavior	<ul style="list-style-type: none"> • Restlessness & nervousness • Mount other animals • Doesn’t allow to be mounted • Frequent micturition • Less feed intake 	<ul style="list-style-type: none"> • Calm • Allows to be mounted • Mount on other animals • Cocking up of ears • Stand arched back in presence of the boar 	<ul style="list-style-type: none"> • Normal
Normal Duration	2 days	1 day	1 day

Explanatory notes

- The regulation of the estrus cycle is a complex process mainly under the control of hormones released by the hypothalamic-pituitary-ovarian axis. It is essential to understand the changes in estrus cycle to effectively manage the reproduction in pigs.
- At a certain moment, the pig’s biological clock is activated by a combination of stimulus to the brain such as light, smell and touch. These external stimuli signals the hypothalamus (in the brain) to release the gonadotrophin-releasing hormone (GnRH). The GnRH stimulates the anterior pituitary gland to produce the follicle stimulating hormone (FSH). The FSH directly affects the ovaries where several of the globes develop into vesicles or Graafian follicles. In turn, the follicle walls produce estrogen. Estrogen is responsible for the manifestation of heat or estrus. When the blood to the brain carries enough estrogen, it signals the pituitary to stop the production of FSH. The pituitary gland then produces luteinizing hormone (LH) which causes the ovum within the follicular wall to emerge out (ovulation). One ovum is released from each ripe follicle within 4-6 hours.
- LH converts the ovulated follicle to corpus luteum which produce progesterone. This hormone stimulates the uterine glands of the uterus to produce nutrients to maintain the released ova. It also signals the anterior pituitary gland to stop secretions of FSH and LH. If fertilization takes place and the sow conceives, the corpus luteum is maintained until the termination of pregnancy. If no conception takes place, the uterus produces prostaglandin (PG), which causes the disintegration of the corpus luteum. With this, the “brake” on the pituitary gland is released. The FSH is produced, and the whole cycle begins again.
- If the pig conceives, gives birth and nurses the piglets, the suckling stimulates milk to let-down causing the release of prolactin from the pituitary gland. Prolactin blocks the release of FSH. When the piglets are weaned, FSH is again released, and the cycle starts again. The animal comes into heat in 4 or 5 days, on the average.

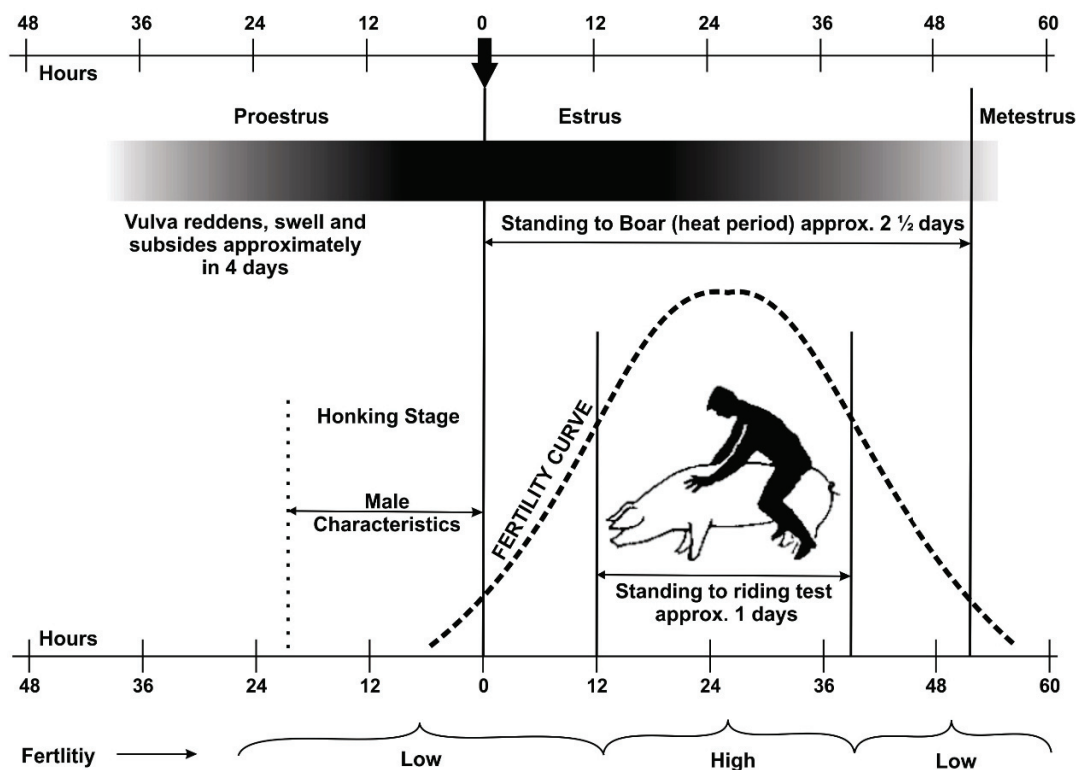


Fig. 4: Fertility curve of female pigs in estrus

It is essential to carry out regular heat check at least once a day to identify the gilts, weaned sows and mated sows to identify the latter group which return to cycle.

Table 8: Methods for detecting estrus/ heat in pigs

Method	How to do	Remarks
Back pressure test	Apply pressure on the sides of pigs with both hands	If the pig is in heat she stands rigid and firm. Without the presence of a male, the expression of heat may not be intense.
Riding – the – back test	Ride the female pig or apply pressure on the back or loin	If the pig is in heat she stands rigid and firm. Without the presence of a male, the expression of heat may not be intense.
Semen – on snout test	Semen sample collected for insemination or during natural mating and applied on the snout of the pig	If the pig is in heat she stands rigid and firm. Clubbing this with back pressure or riding test can give better results.
Teaser boar method	Use a vasectomized boar and allow to mount. Carry out back pressure or riding test with full male in the front passage	If the pig is in heat she stands rigid and firm. These methods give the maximum accurate results.
External signs of estrus	Note the changes in vulva and behaviour as mentioned in table 7.	If the attendant is not expert in detecting the signs, this method is not an accurate method and a chance of missing the heat is high.

The female pigs in heat are to be mated in its correct timing of heat for optimal conception rate and timely detection of pregnancy to be carried out to ensure that the non-pregnant sows are rebred.

Table 9: Mating and pregnancy detection – methods and timing

Activity	Timing	Remarks
Natural Mating If heat detection once a day If heat detection twice a day	0 and 24 hours after detecting in heat 12 and 24 hours after detecting in heat	Mating to be done either in morning or late evening.
Artificial Insemination If heat detection once a day If heat detection twice a day	0, 12 and 24 hours after detecting in heat 12 and 24 hours after detecting in heat	Insemination may be repeated at 12 hour interval until the female stands still when given back pressure.
Frequency of boar service or collection Boars 9 – 12 months Boars 13 months up	Once a week (optimal) Twice a week (optimal)	If natural mating, maximum twice a week for boars of 9 -12 months of age and four times if more than 12 months of age.
Pregnancy detection By regular heat detection Using ultrasound-Doppler test	18 to 24 days after mating 26 days or more after mating	Even if ultrasound devices are used, heat detection is to be continued to rebreed the pigs in the first cycle itself.

Explanatory notes

- Ovulation occurs 36 to 40 hours after the start of standing heat when the most number of eggs are being shed. Live sperm must be in the female reproductive tract a few hours before the occurrence of ovulation; otherwise, the litter size will be reduced.
- Results indicate that an advantage in litter size and conception rate has been obtained when sows are bred twice. However, a relatively good litter size was also obtained when sows are bred only once, during the proper time of estrus.
- Based on the physiology of the female reproductive system and signs and reactions of the animal during the heat period, the best time to inseminate/ give service to the sow is 12-24 hours after the onset of standing heat. Optimal breeding is based on the number of times per day the caretaker checks the sows for standing heat.
- The frequency of collection will affect the volume and concentration of semen to a certain extent. Over-used boars have low semen concentration and volume. On the other hand, under-usage of boars will deteriorate semen quality such as semen becoming stale and presence of dead sperm cells.
- Conception rate should be in between 80 and 90% if mating has been carried out under good conditions. Figures falling towards 60% it is important to question semen quality and the physiological state of the sow.
- Sows are non-seasonal breeders, which can be bred continuously without the interruption of seasonal factors. The sow will continue to come to heat regularly unless she is pregnant, lactating, or has some physiological malfunctions.
- Pregnancy diagnosis is important from economic aspect since it affects the number of lost days, minimizes the risk of under/over occupancy, serves as guideline in culling sows, determines the fertility of boars & sows, and controls the amount of feed to be given to sows.
- The commonly used ultrasound-Doppler devices for pregnancy detection are Pregtone[®] and MEDATA[®] and a 90% plus accuracy can be expected. When using the Pregtone[®] a continuous beep means the sow is positive or pregnant. If the MEDATA[®] pregnancy tester is used, three kinds of sounds could be heard namely the middle uterine artery (25 days and up), umbilical vessels (75 days) and fetal heartbeat (85 days).

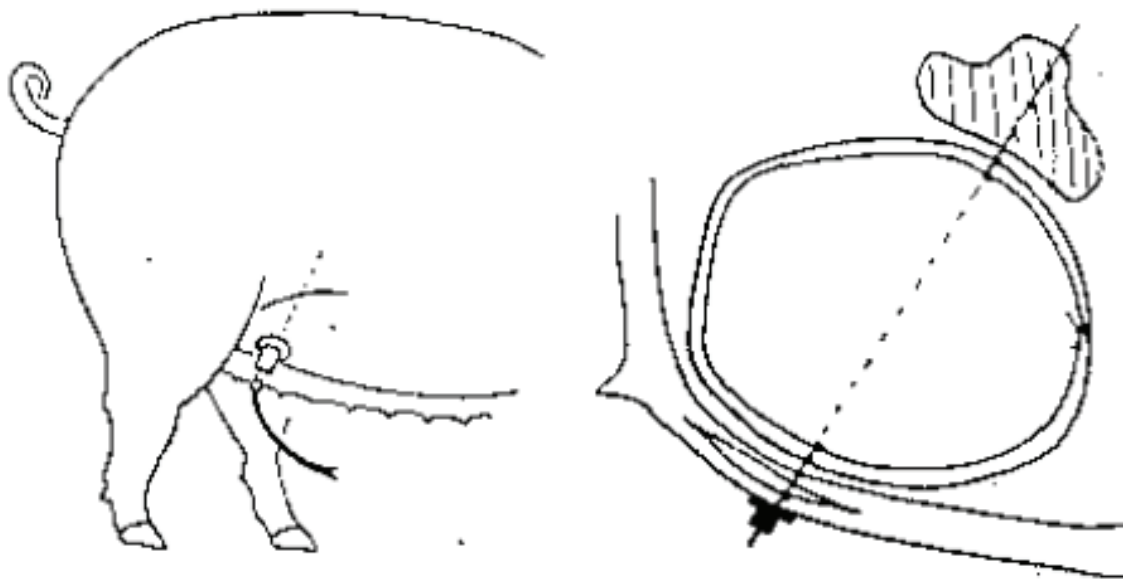


Figure 5: Proper positioning of pregnancy detector

2.4. Other management practices of breeders

If managed well, sows will farrow as scheduled, producing large litters and quickly returning to heat for breeding after weaning. The number of empty sows and culls will be reduced. A higher output and lower cost of production from the piggery is expected.

Table 10: Management practices for reducing dry period

Activity	When to do	Remarks
Wean sows	At least by 45 days after farrowing (If possible earlier)	Sows kept on lactation period longer than six weeks tend to have a longer dry period.
Do not feed sow	On the day of weaning	Withholding feeds is a form of stress to the sow which can bring early occurrence of heat.
Expose to boar	From weaning till occurrence of heat	It is advisable that pens or feeding-lying boxes/stalls of dry sows be made closer to the boar pen.
Keep sows as cool as possible	From weaning till occurrence of heat	Heat stress has a negative effect on the onset of estrus.
Check dry sows for heat occurrence	Twice a day preferable from weaning till occurrence of heat	

Explanatory notes

- Always keep the sow in good health and body condition. A sow with good health and body condition comes into heat earlier. Pay attention to the sow's condition during lactation period. It is in this period where the sow loses body weight.
- Withholding feeds is a form of stress to the sow which can bring early occurrence of heat. Withholding water in areas with high environmental temperature is not advisable. It is possible to reduce or limit water intake of the newly weaned sows.

- Old sows of parity eight and above tend to have longer dry periods.
- Observe the right timing of breeding. Most of the production related problems in sows like low conception rate and poor litter size can be attributed to incorrect timing of insemination.
- Arrange housing and feeding facilities in the way that ensure maximum exercise. Provide adequate shade during summer months for the breeding herd if the sows are penned in the paddocks.
- Intermittent spray cooling during hot weather makes the living condition more comfortable for sows.
- Results indicate that an advantage in litter size and conception rate has been obtained when sows are bred twice. However, a relatively good litter size was also obtained when sows are bred only once and, during the proper time of estrus.

Table 11: Management practices for pregnant sows (other than feeding and pregnancy detection)

Activity	When to do	Remarks
First mange/ lice treatment	100 th day of pregnancy	To protect the newly born piglets getting mange or lice infestation
Deworming	104 th days of pregnancy	To avoid trans-placental or trans-colostral transmission of <i>Ascaris suum</i>
Second mange/ lice treatment	107 th days of pregnancy	A follow-up treatment of first treatment. Not essential if injectable are used.
Shifting of sows to farrowing area	107 th days of pregnancy	To ensure better milk production of sows and healthier piglets.

Explanatory notes

- Before the mange/ lice treatment of external parasites, clean the sow thoroughly with soap, scrubber and water. Let the sow dry then apply the biologics for the treatment of mange and/or lice. These are either pour-on, sprays or injectable. The latter is more expensive.
- Deworming practice is highly essential for the health of both the sow and piglets. Application may either be through in-feed medication, which is more economical, or by injection.
- A follow-up mange treatment is done to kill the remaining eggs of the mange and lice which are still on the sow's body.

Table 12: Daily activity schedule in breeder sheds

Time	Activity	Remarks
8.00 am 8.10 am	Feeding of pregnant & dry sows, gilts and boars.	It is preferable to feed the maximum share of the pigs ration in morning. At least 75% of the day's ration. Feed the pregnant sows first.
8.11am to 8.15 am	Observe the animals.	Identify the animals showing reluctance to eat and note them for treating later.
8.16am to 9.30am	Cleaning and removing dung.	Dry cleaning preferred. Clean without disturbing the pigs that are taking feed.
9.31am to 9.45am	Heat detection. Also observe the females having leg problems and note them.	Walk a male in the front passage and check the females for heat by back pressure and riding test in the presence of a male.
9.46am to 11.00 am	Mating/ service.	Take the female in heat to male for mating. Clean the vulva and back side of female, underline and prepuce of male before mating.

Time	Activity	Remarks
11.01am to 12.30am	Treatment of pigs and pregnancy detection using ultrasound detector.	Treat pigs showing reluctance to feed, having leg problem and check pregnancy of the sows that are mated 30 day back.
12.30 pm to 2.00 pm	Recess	During summer, cooling breeder by installing and operating sprinklers can be done.
2.01 pm to 3.30 pm	Cleaning of sheds.	Wet cleaning can be opted if essential. Do not wash pigs which are sick or having leg problems.
3.31 pm to 4.00 pm	Other special activities	Shifting of pigs to farrowing area, mange/lice treatment etc.
4.01 pm to 4.10 pm	Feeding	Feeding the remaining portion of ration. Fodder if available can also be fed.
4.11 pm to 5.00 pm	Arranging feed for next day's morning.	It is preferable to measure and keep in buckets for feeding the breeders next day morning in short time with minimum stress.

3. Standard Operating Procedure (SOP) for Farrowing & Lactating Sows

3.1 Feeding of lactating sows

The nutritive requirements of a lactating sow are higher than those during gestation. The requirements are very much similar to that of a milking cow, except that they are more exacting relative to quality proteins and the B vitamins because of the absence of rumen synthesis in the pig.

The daily feed requirement of lactating sows may vary from farm to farm depending on the prevailing environmental conditions. For this reason, it is apparently difficult to recommend an absolute feed level. However, one should think of maintaining sows in good condition to eliminate milk production problems. In practical feeding, the highest efficiency of energy utilization is achieved by controlled feeding during gestation, to minimize fat reserve mobilization during lactation for milk production.

Table 13: Nutrient requirement of lactating sows

Nutrient on Dry Matter Basis	Unit	Quantity per Kilogram Feed
Crude Protein	%	15.00
Digestible Energy	Kcal	3100.00
Calcium	%	0.90
Phosphorus	%	0.70
Lysine	%	0.68
Methionine &Cystine	%	0.50
Crude Fiber (maximum)	%	10.00
Crude Fat (maximum)	%	10.00
Add any commercially available vitamin and mineral mixture as extra ingredient to supplement minerals other than calcium and phosphorus, and vitamins. (0.2% in compounded feed).		
Add common salt at the rate of 0.5% to supplement sodium.		
Ensure ad-libitum supply clean water using nipple drinkers.		

Explanatory notes

- Water is the most essential but most often neglected nutrient. Pigs need plenty of clean, fresh water at all times of the day. Milk production, rate of gain and the amount of feed consumed are all adversely affected by water restriction.

- Energy and protein requirement for lactating sows are more than pregnant sows. Hence it is essential to have a slightly higher percentage of crude protein and higher energy in lactating feed compared to feed for breeders. Often, lysine and methionine are the limiting amino acids and hence along with increase in total crude protein, a higher percentage of essential amino acids like lysine and methionine are also essential.
- Increasing the level of fiber in the ration results in reduced available energy by minimizing digestion of sugar and starch (which are ready source of energy). However, crude fiber (CF) can also be digested by pigs, though in very small quantity. Its value, therefore, as nutrient source is very much limited. Since the requirement of energy is higher in lactating sows, it is better to reduce the crude fiber percentage in lactating ration.
- Hypocalcemia may result in sudden death at farrowing, protracted farrowing, uterine prolapse and muscular weakness resulting in “dog-sitting” position. It maybe accompanied by fever and respiratory distress at this time. In heavily lactating young sows or gilts with poor skeletal calcium reserves, this poor calcium status maybe sufficient to allow pathological fractures of pelvic bones, femur, or more commonly, the vertebrae of the lumbosacral region.
- When piglet survival rate is below average, supplementing sows’ diet with fat during late gestation may improve survival rate. This appears to be a response to fat and not to increased energy intake. The added fat increases the fat content of the colostrum and milk which is responsible for the increased survival rate.

Table 14: Feeding regime for farrowed and lactating sows (quantity per day)

Stage	Amount
Day of farrowing	No feed but ad-lib water
Day 1	1.0 kg
Day 2	2.0 kg
Day 3	3.0 kg
Day 4 – 7	4.0 kg
Day 8 until weaning	2.0 kg + 0.3 kg/ piglet

Explanatory notes

- Generous feeding during lactation, with a minimal loss in weight, is more economical than saving on feed, as the nutrients in milk must come either from the feed or from the sow’s body.
- Overfeeding of the sow during the first few days after farrowing will cause overproduction of milk. More often this results to mastitis also. Proper feeding scheme indicates that there should be a gradual increase in feed ration.
- Feeding needs alteration based on the condition of sow. Additional 0.5-kg of feed should be added or subtracted in the feed ration depending on the classification as indicated in figure 3.
- Mature sows raising large litters will often consume 4.5-5.0 kg per day of a high concentrate diet at the peak of lactation. The bigger the litter size, greater the amount of feed to be supplied. Each piglet means an additional 0.3-kg feed for the sow. On the other hand, if a sow has 12 piglets or more, it can be given an additional 8 kg onwards, while sows with 6 piglets below can be given 4 kg onwards..
- Proper feeding of lactating sows means maximum number of healthy and heavy piglets weaned per sow per year with the assurance that the sow will also have a longer productive life.

Lactating pigs are designed to milk off their backs. Weight loss, particularly fat loss is normal.

Sometimes, however, when the litter is big and the climate is warm, the sow will often consume less feed than required. In such case, it is highly important that the quality of the feed is good. Roughage and voluminous feeds are not recommended for lactating sows.

Some possible ways to induce feed intake in lactating sows are:

- **Slop feeding** or wet feeding induce higher consumption by the sow than dry feeding. It must be mentioned however that wet feed easily gets spoiled.
- **Pellets** are better than meal.
- Lactating sows need permanent supply of **fresh and cool drinking water**. During summer months, lactating sows need to drink between 20-25 liters of water daily.
- **Keeping the pen cool** will induce appetite resulting to higher feed intake.
- Feed of **higher density** can be useful.
- **Frequent feeding** (3 to 4 times a day) where applicable.

3.2 Managing the farrowing process

Farrowing is said to have started when the sow exhibits restlessness, contraction and, mucus discharge with meconium. It finishes when the placenta is completely expelled. Moreover, as the time for farrowing comes closer, the sows in confinement start to show nest-building behavior (nesting). This occurs despite the lack of bedding material. As the time draws nearer, colostrum can be visible from the teats.

Farrowing may last for as low as an hour to several hours together. Interval between two piglets in coming out should be no longer than 15 minutes. At farrowing time, special attention should be given to the sow while allowing it to farrow by itself if the condition permits

Table 15: Common farrowing & post farrowing problems

Anticipated Problem	Symptoms	Action to be taken
Difficulty in farrowing	<ul style="list-style-type: none"> • Sow shows restless, excessive straining and the time interval between two piglets is 45 minutes • Sows stops straining and contracting before the farrowing is complete 	<ul style="list-style-type: none"> • Clean sow’s external genitalia. • Carefully enter and search the reproductive tract using lubricated, gloved hand. Make sure the nails of hand used are clipped and the lubricant is non-irritating • Once hand can palpate a piglet’s head or hind legs, grasp the head or leg and slowly pull the piglet out. • Synchronize the pulling of the piglet with the contraction of the sow. • Ensure that you are not pulling the after birth along with. • If two piglets are stuck at the junction, push one back and grasp the other. • If in case you cannot palpate a piglet, THEN AND ONLY THEN, that you can give oxytocin. • Piglets from other litter can be tried to stimulate natural oxytocin release.
More stillbirth	Stillbirth more than 7 %	<ul style="list-style-type: none"> • Confirm if that they are genuine stillbirth –lung of piglets died due to improper assistance float when placed in water. • Try not to keep the sows beyond 7th litter. • Identify sows with history of more stillbirth and cull. • Check the condition of sows. If the sows are weak, correct feeding regime of sows especially in last trimester of pregnancy. • Check the quality of feed, especially minerals. • Check the water quality and intake by sows. • Ensure that sows are transferred to farrowing pens 7 days before farrowing. • Interfere early in prolonged farrowing and ensure monitoring of all farrowing (trained labour to be present) • Check any defects in housing. • If all the above are satisfactory, subject the sow for tests to detect specific infections if any.
Hemorrhage in reproductive tract	Excessive bleeding	<ul style="list-style-type: none"> • Use anti-hemorrhage drugs (vitamin K or adrenaline) • Stick bundle of cotton inside the vagina to plug bleeding. • Ice pack may also be tried.

Table 15: Common farrowing & post farrowing problems(continued)

Anticipated Problem	Symptoms	Action to be taken
Delay in farrowing	Not farrowing after 118 days of mating	<ul style="list-style-type: none"> • Confirm that the sow is pregnant. • Administer prostaglandin or its derivatives. • Farrowing should happen between 12 to 33 hours after administration. • Ensure that the sow is monitored during the expected period after administration.
Sow mortality due to excessive heat	Elevated body temperature, and body become reddish	<ul style="list-style-type: none"> • Correct the ventilation or drip cooling if not functioning properly. • Swab the jowl and udder of sow with cool water. • Don't pour water on head or overheated surface. • Use portable fan to cool the sow. • Large amount of ice inserted into rectum provide rapid cooling in emergency.
Retained placenta	Reduced appetite and/ or elevated temperature	<ul style="list-style-type: none"> • Make sure that the placenta has been expelled • Oxytocin or prostaglandin can help in expulsion of retained placenta. • Administer antibiotic and supportive therapy. • Other drugs used for expulsion of placenta can be tried.
Mastitis – metritis –agalactia syndrome (MMA)	Foul smelling discharge from vulva, hot and hard udder, in appetence and depression, elevated body temperature, weak piglets and mortality of piglets	<ul style="list-style-type: none"> • Injection with oxytocin. • Flushing or uterine lavage with weak antiseptic or herbal decoction (eg. Guava leaves). • Provide plenty of fresh water to sow. • Reduce stress before farrowing • Broad spectrum antibiotic administration to sows and piglets if latter has diarrhea.
Vaginal prolapse/ eversion of uterus	Vagina protruding from vulva or uterus coming inside out in latter case	<ul style="list-style-type: none"> • Use magnesium sulphate or common sugar to reduce the swelling if it is edematous. • Clean the prolapsed part with weak antiseptic. • Reduce the prolapse with clean and disinfected hands. • Use of cold running water at the lumber area can reduce the straining by sow. • Use of oxytocin on prolapsed part can reduce the mass due to uterine contractions and help in reduction. • Suture the vulva lip (running a thick string subcutaneous around the lip using Buhner needle – purse string suturing - is effective). • Cull the sow in case of vaginal prolapse, after lactation is completed, as it recurs in next cycle during farrowing and sometimes during estrus also.

Explanatory notes

- Sows seldom require assistance while farrowing, unless they are observed with restlessness, excessive straining and the time between piglet interval is 45 minutes. These actions indicate that farrowing is not proceeding normally. If this is the case you must consider manually assisting the sow. Signs for difficult farrowing and procedures for intervention should possibly be discussed with a veterinarian. Older, overweight or nervous sows may have more farrowing problems.

- There are reasons why piglets are slow to be born. In some cases, there is a very large piglet stuck in the birth canal, or there are two piglets trying to come out at the same time. Other reasons may include an exhausted sow because she has been farrowing for a long time, or simply, the farrowing house is too warm. It is important to assess each situation.
- When manually removing piglets in delayed farrowing, it must be done very gently and carefully when palpating the sow and pulling piglets. If not carefully done, vagina, cervix or uterus may tear, resulting in metritis. It would be helpful if someone would massage gently the abdominal part of the sow while doing the palpation. Gently massaging the abdomen would enhance contraction to facilitate expulsion of the piglet.
- Stillbirths account for 5-7 percent of all piglets born or about one in every two litters. It is inaccurate to record piglets as being stillborn when they died of other causes. About 10% of all stillborn piglets are actually dead when farrowing begins; the remaining 90% die between the start of farrowing and actual birth. The main cause of such deaths is suffocation. This is likely to occur if oxytocin is given prior to doing a careful clean vaginal exam. In such cases, the placenta becomes prematurely detached or the umbilical cord breaks before delivery, thus depriving the piglet of its source of oxygen.
- With an increased farrowing time, there is often an increase in the number of stillborn piglets. A very warm farrowing room will prolong farrowing and therefore increase the incidence of stillborn piglets. Piglets born towards the end of the farrowing process are more likely to be stillborn.
- To ensure more or all the piglets born alive, and thus weaned, it is essential to be able to accurately differentiate stillborn from piglets that die after birth, otherwise the wrong management procedures will be adopted. Using a scalpel, remove the lungs from the dead piglet. Place the lungs in a bucket of water. If they float, the piglet was born alive since there was oxygen in its lungs. If the lungs sink, the piglet was stillborn. Another region of the piglet worth assessment is the umbilical cord that should be long and wet. The presence of “slippers” or thimbles can also be indicative of stillborn. This is a cartilaginous extension of the feet covering in a piglet.
- Excessive bleeding of the sow may also occur at farrowing time. It is advisable to keep anti-hemorrhagic drugs (Vitamin K, adrenaline may stop minor bleeding if given topically) and suturing materials on hand. A bundle of clean cotton or a cotton material stuck inside the vagina will help control bleeding. Ice pack may also stop minor bleeding.
- The time between conception and farrowing can vary from 110 to 118 days. The average gestation length in most herds is 114 days. Every sow herd, however, has its own gestation length. Knowing the gestation length for your herd is extremely important particularly if interested in implementing a farrowing induction program. If sows are induced too early, piglets will be born small and weak and stillborn, and the sow may take a long time to farrow, if she farrows at all.
- Loss of one or more pigs during farrowing is unfortunate, but loss of the sow is serious and puts the survival of all her pigs in doubt. Sows may die during farrowing due to internal bleeding from hemorrhaging blood vessels in the uterus. Prevent sow mortality due to excessive heat by making certain that ventilation and/or drip cooling equipment is operating correctly.
- This final stage of the farrowing process generally passes without much notice. However, failure to expel the placenta may result in severe complications: infections, possible lactation failure, rebreeding problems and death of the sow. Some placenta passed during delivery of the pigs is normal, but most will pass immediately after farrowing or within several hours. Reduced appetite or elevated rectal temperatures may be the first clue of a retained placenta.
- Metritis is part of the agalactia syndrome so frequently encountered as a clinical entity in swine practice. Gilts and sows having this condition will show inappetence and depression. The signs of the disease appear in 1-3 days post-farrowing. They will be found lying in their beds, shivering or trembling. The temperature ranges from 40°C 41°C. The udder is hot and milk flow is inhibited. A thick, whitish to yellowish discharge from vulva is seen by the end of the first or second day. Metritis resulting from retained fetuses, laceration and infections following dystocia is accompanied by a more watery, foul-smelling discharge from the vulva.
- The mastitis in the sows caused by organisms like Streptococci, Staphylococci, Actinomyces bovis,

Actinobacillus lignierensi, Corynebacterium pyogenes, Mycobacterium tuberculosis. The skin over the affected area is purple, swollen and edematous. The litter will die of starvation unless separated from the sow or supplemented with milk substitute. Recovered sows are poor milkers for future lactation.

- There are several factors that can lead to MMA in a herd, including infection, stress, lack of good nutrition and toxicity from constipation and uterus infection. Toxicity can result from constipation brought about by a lack of exercise and poor diet.
- Vaginal prolapse before or after farrowing can occur. However, it commonly occurs in late pregnancy. Predisposing factors include: unfit condition of the sow (too fat, too thin); steep slope of the farrowing pens consequently pushing the weight of the abdominal contents back into the pelvis. Straining may occur before or after the prolapse starts. The reddened vagina can be seen bulging through the vulva, the surface can become damaged and contaminated. The inconvenience will cause further straining of the sow and further prolapse. Sometimes the urinary bladder can also prolapse.
- Uterine prolapse can be caused by excessive straining after farrowing due to irritation. Rough, hurried or unhygienic manipulation (or internal examination) during farrowing can contribute to this irritation. Low calcium levels or prolonged farrowing may reduce the tone of the uterine muscles rendering it more prone to prolapse.

3.3 Managing lactating sows

Farrowed sows needs management practices to ensure good performance in terms of lactation or milk production, which is essential for successful rearing of piglets and profitability of breeding farm.

Table 16: Management practices for lactating sows

Activity	Remarks
Identify and treat ill sows as soon as possible	Uterine infections, gastric disorders and lameness will reduce the feed intake, so be sure to implement the treatment prescribed by veterinarian. Ill sows result in decreased milk production and poor quality piglets.
Watch body temperature	Increased body temperature the first 2 days post-farrowing is indicator of infection. A body temperature of 103 °F (39.3°C) calls for treatment with antibiotics.
Keep the macro-environment of sows as cool as possible	Ideally the macro-environment should be 21°C to 23° C during first 3 days and at cooler after that.
Ensure ad-lib clean water	Ideally use nipple drinkers which can provide 2 liter of water per minute.
Don't leave sows hungry at night	Best scenario is use of self-feeders or ad-lib feeders. Or else have attendants as shift in night and feed once in night hours. If there is no night attendants, be aggressive with the final feeding of the day
Ensure final mammary gland development in first parity sows	Load 12 or more heavier piglets in the first farrowed sows by cross fostering within 24 hours. Change the runt piglets to sows in 2 nd or 3 rd parity.
Do cross-fostering in limited way	At least 2/3rd of litter in a sow should be its on piglets while doing fostering. Minimize fostering after 24 hours of farrowing. Frequent disruptions have a negative effect by making the sows nervous, which interrupts milk let-down.
Avoid loss of piglets due to scavenging	If the sow is showing tendency of scavenging piglets, remove the piglets to a warm box until farrowing is complete. Hand stimulation of udder in such pigs can help farrowing by natural release of oxytocin. Return the piglets after end of farrowing. In severe cases, where sows continue to bite, the sow may have to dried and culled.
Prevent constipation in sows	Constipation can be prevented by adding laxative in farrowing house feed. Sows which are not able to put dung in 24 to 48 hours of farrowing have to be treated with injectable or oral veterinary laxative.
Avoid lameness in sows	Check the floor, rough floor damages the hoof while too smooth floor make it slippery and sows will be reluctant to stand and consume feed or water. Provide correct vitamin and mineral through food to avoid “downer sow” syndrome caused by fracture of pelvic bones.
Cleaning and disinfecting pens	After weaning of sows, clean thoroughly, disinfect and leave the farrowing pen without any animals for at least 3 days before reoccupation to break the cycle of parasites and other microorganisms.

Explanatory notes

- Lactation is a function the sow must perform well to successfully rear the farrowed pigs. Ideally, the teats should be evenly spaced so the milk produced is divided equally among all teats. However, front teats are spaced more widely than hind teats. Front teats are usually presented more fully to the pigs when the sow lays down to be nursed. Piglets establish a teat order soon after birth. Weaker piglets will be forced to get the teats with lesser milk. Judicious fostering of piglets at day one in farms with larger herd size and multiple farrowing in a day can reduce the uneven growth of piglets during nursing.
- The peak yield of milk production in sows happens at 21 days after farrowing and hence the management

practices in early lactation are highly important. Good quality piglets can gain 1 kg weight by drinking 4 to 4.5 kg milk and a well-managed exotic sow can yield around 7 kg milk per day in peak lactation.

- Complete lack of milk production (agalactia) is not often in sows. However, hypogalactia can be caused due to infectious diseases, hormonal imbalance, poor nutrition, mycotoxins, and heat stress. Failure to produce sufficient milk is more frequent in fat sows & gilts, in extreme hot climate, and farrowing pens with concrete floor.
- Ideally feed three to four times a day for sows if self-feeding systems are not available and do the same in cooler hours of a day especially in summer.
- Judicious fostering can improve the growth of piglets, uniform growth in a litter and less runts. However, very frequent fostering can make the sow nervous, which can hinder with normal letting down of milk.
- Occasionally, a sow or gilt will bite and possibly kill first born piglet when they come around her head searching for a teat to nurse. Savaging occurs more often in overly fat sows or gilts and in certain breeds and family lines. Although tranquilizers may be needed for extreme cases, removal of newborn pigs to a warm box until farrowing is complete may solve the problem.
- Sows seldom require assistance while farrowing, unless you observe restlessness, excessive straining and the time between piglet interval is 45 minutes. If this is the case manually assisting the sow must be considered. Signs for difficult farrowing and procedures for intervention should as much as possible be discussed with a veterinarian. Older, overweight or nervous sows may have more farrowing problems.
- Sow lameness is another post-farrowing problem caused by different factors. Too rough or slippery floors are both predisposing factors. The “downer sow” syndrome is caused by breaks in bones (especially in the pelvic area) weakened by poor mineral or vitamin nutrition. In rare cases, lameness or complete rear leg paralysis is caused by injuries received in delivery of extremely large pigs.

Table 17: Daily activity schedule in farrowing and rearing sheds

Activity	Timing		Remarks
	With 1 shift	With 2 shift (preferred)	
Feeding sows	7.00 am (30%) 12.00 noon (20%) 5.00 pm (50%)	6.00 am (25%) 10.00 am (20%) 5.00 pm (30%) 12.00 midnight (25%)	With single shift it is better to start the activities earlier and increase the midday recess to make up for the same.
Observe sows	8.00 am to 9.00 am	7.00 am to 8.00 am	Check the sows for any illness like hyperthermia, udder problems, leg problem etc. and treat them. Also do fostering as and when required.
Piglet activities	9.00 am to 11.30 am	9.00 am to 11.30 am	All activities as described in SOP for piglets below to be carried out other than those mentioned elsewhere in this table.
General cleaning	2.00 pm to 4.00 pm		Dry cleaning preferred. If not using farrowing crate, wet clean after shifting the piglets into brooder box (to be installed in all farms). When wet cleaning done, complete fast and pens to be dried up within one hour to replace the piglets.
Attending to farrowing	As and when the farrowing starts		It is better to have a separate person to attend the farrowing. He/ she can be used for dung removal, and cleaning and disinfecting pens after weaning.
Removing dry dung	As many time as possible		
Weaning	Do weekly once by altering the other activities suitably		Do weaning on Thursday or Friday so that the sows come back to heat in week days.

4. Standard Operating Procedure (SOP) for Nursing Piglets and Weaners

One of the most abrupt and major changes for any animal is its birth. The fetus goes from a parasitic existence, where its environmental and nutritional needs are provided by the dam in a sterile environment, to one in which piglet must find for itself.

Similarly at weaning, the piglets and sows are separated. The piglet's diet changes from an all-milk ration to dry feed. This drastic change in diet, coupled with a change in environment and mixing strange pen mates, is very stressful to the weaned piglet

Hence it is essential that proper feeding and management practices are provided to the piglets till they are strong and independent to be grown or fattened by the farmers.

4.1 Feeding of piglets

It must be emphasized that newborn piglets must receive colostrum. In addition to the sow's milk, it is as important that piglets receive solid feed early in their life. The minimum nutritive requirement of different feeds to be given to piglets till they are sold is presented in table 18.

Table 18: Nutrient requirement of piglets and growing stock

Nutrient on dry matter basis	Unit	Quantity per kilogram feed			
		Pre-starter	Starter	Grower*	Finisher*
Crude Protein	%	22.00	18.00	16.00	14.00
Digestible Energy	Kcal	3350	3250	3200	3200
Calcium	%	0.95	0.80	0.70	0.60
Phosphorus	%	0.75	0.65	0.60	0.50
Lysine	%	1.15	1.00	0.85	0.65
Methionine & Cystine	%	0.70	0.65	0.55	0.50
Crude Fiber (maximum)	%	5.00	8.00	10.00	10.00
Crude Fat (maximum)	%	5.00	5.00	8.00	8.00
Add any commercially available vitamins and mineral mixture as extra ingredient to supplement minerals other than calcium and phosphorus, and vitamins. (0.2% in compounded feed).					
Add common salt at the rate of 0.5% to supplement sodium.					
* These types of feeds are required only if replacement stock is grown in the unit.					

Explanatory notes

- Protein is essential for the growth and maintenance of organs and muscle tissues. Proteins are also essential in the formation of hormones, enzymes and antibodies. In spite of these, protein is frequently the limiting factor in the diet. This is because grains and their by-products are deficient in both quantity and quality protein.
- Since the pigs are in the growth phase the requirement of protein and limiting amino acids, lysine and methionine, are more compared to the adults animals. As the feed intake is less, the percentages of these in the feed have to be on higher levels depending on age of piglets.
- Similarly the feed density in terms of energy, calcium and phosphorus needed in piglet feed is also higher and inversely proportional to the age. Higher crude fiber can reduce the availability of energy for piglets and growers.

Table 19: Feeding regime for piglets and weaners

Age	Amount	Type of feed
1st Week	Adlib	Sow milk
2 nd Week	Start with handful and then Ad-lib	Pre-starter (milk replacers preferred if available)
3 rd Week	Ad-lib	Pre-starter (Plus milk replacer if given in week 1)
4 th Week	Ad-lib	Pre-starter
5 th Week	Ad-lib (minimum 100 g per day)	Pre-starter
6 th Week	Ad-lib (minimum 200 g per day)	Pre-starter
7 th Week	Ad-lib (minimum 300 g per day)	Pre-starter
8 th Week	Ad-lib (minimum 425 g per day)	Pre-starter
9 th Week	Ad-lib (minimum 550 g per day)	Pre-starter + Starter
10 th Week	Ad-lib (minimum 675 g per day)	Starter
11 th Week	Ad-lib (minimum 825 g per day)	Starter
12 th Week	Ad-lib (minimum 1000 g per day)	Starter

Explanatory notes

- Suckling piglets can be given creep feed as early as 5-7 days of age (kept of reach by the sow). A good quality creep feed contains 35-45% milk products, which is 92-94% digestible. It contains soft oils only and uses heat-treated starches for easier and more efficient digestion.
- It is better to start feeding piglets at around 7-10 days of age when the passive immunity received from colostrum is at its peak (refer to figure 6).
- When the piglets are 2 weeks old, they can be given pre-starter feed. If milk-replacer was provided, the transition from milk replacer to pre-starter must be gradual. Likewise, the amount of pre-starter given should be increased gradually until ad libitum level, to avoid digestive problems. When there is diarrhea, restrict or withdraw the feeds. Making the stomach acidic (acidification) tends to reduce if not avoided this problem.
- Begin feeding by giving the baby pigs a mere handful of creep feed. The feed should be given on a clean, dry, solid floor or in a heavy, shallow, circular pan or trough. Ensure that unfinished feeds should be replaced daily. It is recommended to feed at least 4 times a day.
- When it is obvious that the piglets are eating the feed, introduce a creep feeder wherein piglets have access to the feed at all times. It is also suggested that creep feeder be located near or close to the drinking water source for maximum consumption of creep feed. Make clean, fresh water available to the young pigs. Increase the amount of feed gradually to reach ad libitum feeding level by providing self-feeders.
- The weaned piglets and its digestive system have to adapt to solid feeds, while also the nutrient composition requires different enzymes for digestion. The digestive tract of young animals has a well-developed enzyme system for the degradation of lactose, but enzymes for digestion of fat, proteins and starch are produced in low quantities. Hence, a newly-weaned animal may have a poor digestion of ingested feed if the latter is of suboptimal quality. This will result in relatively high amounts of undigested feed in the gastrointestinal system. These undigested nutrients then serve as ideal substrate for pathogenic bacteria including E. coli and Salmonella.
- The development of low pH (about 4) in the pig's stomach will help ensure efficient digestion of the feed. It will also help in controlling the proliferation of potentially harmful bacteria. The ability to secrete hydrochloric acid in the stomach is not well-developed in a three-to four- week old pig. It is, therefore, recommended that ingredients with a high acid-binding capacity be kept to a desirable minimum. The addition of 1 to 2% organic acids, such as fumaric, lactic, citric, or propionic acid, may result in a 4 to 5% improvement in feed efficiency, but they may not be economical.

- Addition of antibiotics to the starter diet will generally improve pig growth rate by 10 to 20% and increased feed efficiency is obtained with the addition of copper sulfate to the diet. A combination of an antibiotic plus copper sulfate at 125 ppm (parts per million) gives better pig performance than given as either one of these.

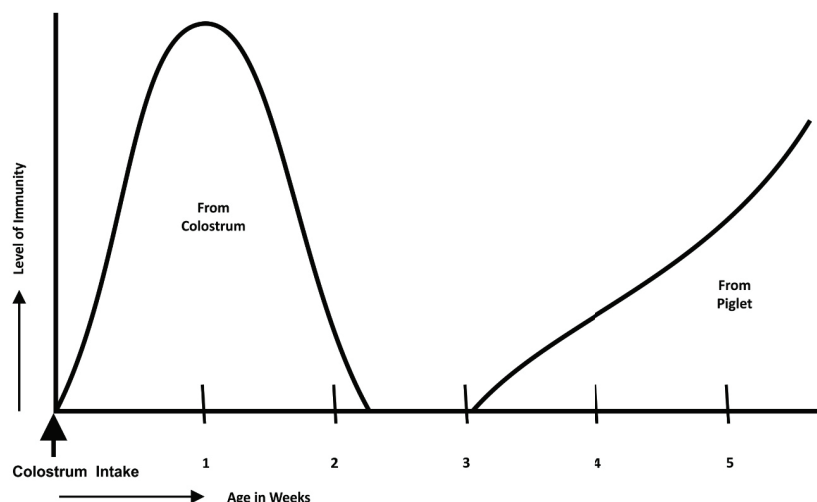


Fig. 6: Level of Immunity conferred from colostrum and active immunity of piglet

4.2 Management of new born and nursing piglets

There are various activities that need to be carried out in piglets for having effective performance in the breeding farms. Some of the practices are elective while others are mandatory.

Table 20: Husbandry procedures for piglets with lactating sows

Activity	When to do	How to do
Navel cord care	Immediately after birth	Do not clip the umbilical cord immediately birth. If bleeding is more tying of cord with a string maybe done about 1-2 inch from the body. Dip the end in a cup with iodine solution.
Drying the piglet	Immediately after birth	Rub with a clean cloth to dry the piglet. Possibility of procuring dusting powder specific for the purpose may be considered.
Colostrum feeding	Within 1-2 hours for week piglets which has not consumed	Hold the piglets to the udder and insert the teat inside the mouth. Possibility of procuring colostrum substitute may be considered, especially to feed in sows with poor milk letdown or not allowing to nurse.
Needle teeth clipping	Day 1 of age	Use sharp bone cutter to teeth cutter specifically designed for the purpose and cut the pointed end of 8 canine teeth (4 in upper and 4 in lower jaw) parallel to the palate. Do not cut in an angle or close to base.
Tail docking	Day 1 of age	Use a side-cutter, docking scissors or preferably electric tail-docker. Cut the tail so that it is till the tip of vulva in female or middle of scrotum in male.
Piglet identification	Day 1 or as early as possible	In white pigs tattoo the number on the ear using ink, tattoo numbers and applicator specifically designed for the purpose. Ear notching by using notching scissor with "V" or "U" shaped cutting edge. Ear notch code to be developed considering the number of piglet produced from different farms.

Activity	When to do	How to do
Brooding	Day 1 till weaning	Design brooder boxes which can house the entire litter (floor space of 0.5 sq.m or more) and place in an area easily visible to attendants in front passage and accessible to the sow. Provide electric bulb or other heating device to maintain the temperature at 30°C to 32°C round the clock. Train the piglets to stay in the box after each suckling (a cover can be used to keep the piglet inside but remember to let them out at least in every hour).
Fostering	Preferably within 24 hours of birth	Change the bigger piglets from sows with higher litter size and with less milk to the ones with lower litter size and having sufficient milk. Ensure that there are sufficient functional teats in the foster mother. Preferably foster the piglets to sows in 2 nd , 3 rd or 4 th parity. Try to keep maximum piglets of a sow with her itself.
Splay leg correction	Within 24 hours of birth	In piglets with splay leg, tape the legs together to support movement. If the condition is not corrected within 2-3 days dispose the piglet
Avoid crushing loss of piglets	Especially in first 10 days of life	Use of brooder box and train the piglets to stay inside while not suckling can help. Check and treat the legs of sows if there are any problems. Ensure that the sow is not fat and sluggish by correcting the feeding regime.

Table 20: Husbandry procedures for piglets with lactating sows (continued)

Activity	When to do	How to do
Iron injection	1 st -3 rd day and on 7 th to 10 th day of age	Inject 200 mg of iron dextran (Imferon or similar products) as divided dose, intramuscular injection in neck region (dorsal half) 1 inch deep.
Castration (elective)	Within 14 days of age (earlier the better for easier handling and reduced chances of bleeding)	Wash and wipe scrotum with disinfectant Press testicle against scrotal skin to tighten the skin. Make a cut large enough to pull testicle out. Pull testicle out and twist the attached cord at least two times. Cut the cord by scraping with knife. One stroke cutting can lead to more bleeding. Wash the wound with disinfectant. Remove the other testicle in similar fashion. It is better to castrate without removing the tunica the membrane covering testes, cord and bled vessels (open – closed technique)
Weaning	30 – 45 days of age	Check that the piglets have started consuming feed and the dung is dark brown with solid consistency. Ensure that the weight of piglet is 8 kg (in exotic breeds). The piglets with lesser weight can be weaned later by fostering the runts from different sows to one sow, which is not weak, having good milk and had more piglets ready to wean.

Explanatory notes

- Do not clip the umbilical cord on newborn piglets immediately after expulsion. Such a procedure may create an avenue for disease organisms to enter the piglet's body. It will dry and fall off on its own. This usually happens about six hours after birth, although it may take longer for weak piglets. If a piglet is bleeding from the navel, stop the bleeding by tying clean string around the cord approximately 1-2 inch from the body. Disinfection of the base of the navel cord should be a routine practice to prevent, if not minimize problems later on (navel ill, greasy pig, arthritis).

- Make sure the piglets are able to suck from the udder as soon as possible after birth. Their sucking will encourage the sow to let down her milk. Weak piglets may need to be assisted.
- The pig placenta does not allow the transfer of maternal antibodies. When piglets consume colostrum, these specialized proteins by-pass the stomach and are absorbed, through the intestinal lining, directly into the blood stream. All of a newborn piglet's immunity comes from the sow after birth. This is also called "passive immunity". The ability to passively absorb this immunoglobulin, intact without digestion, is lost after 36 hours of age.
- The piglets are born with needle sharp teeth which may injure the sow's udder and prevent the sow from letting the piglets suckle. The piglets would then be let to starve. The needle teeth are often clipped to prevent damage to the udder of the sow and also to avoid fighting wounds among piglets. This can be done by cutting the sharp points of the teeth (8 teeth, 4 each in the upper and lower jaw) using a tooth clipper or an electric wire cutter. Do not clip the teeth too close from the base to avoid hitting the gums as this may cause bleeding with subsequent infection.
- In some farms, tails are routinely cut (tail-docked). This minimizes tail-biting problems later on during the weaning or fattening stages. Optionally some objects may be hung from top in the weaner sheds to distract the piglets and pigs from developing tail-biting vice.
- Identification of piglets should be done within 24 hours after birth so that the performance of the sows and farms can be done more accurately. The coding for ear notching or tattooing can be devised for the farms based on the herd size and breeds used, objective being to make the number as unique as possible.
- Piglets are more comfortable at a higher environmental temperature compared to sows. The ideal brooder temperature for piglets is from 30°C to 32°C. Two 60-watts or a three 50-watts electric bulb could be used as heaters, especially during late night and early morning. Other types of heaters are also available in the market.
- If sows do not produce enough milk or have given birth to a large litter it is wise to transfer the whole litter or few of the piglets to a foster sow, as the case maybe. Fostering is best done to sows which have farrowed 1 or 2 days earlier or later, if not on the same day. As a rule of thumb, always transfer or foster bigger piglets so they would have the advantage of fighting off new littermates.
- Piglets are sometimes born with weak leg muscles and are not able to stand and walk properly. Splay-legged piglets can be still be corrected by a special leg taping or tying technique. Slippery floor and piglets exposed to very low temperature predispose occurrence of splay legs.
- Piglets crushed by the sow are commonly seen in most farms. Factors that may contribute to this are: (1) weak-legged sows, specially the hind legs, tend to fall abruptly when lying down; (2) weak piglets that may not be able to get away quickly; (3) poor pen construction resulting to slippery flooring and improperly made farrowing hurdles; (4) inadequate heating resulting to huddling near the sow; (5) poor water supply of the sows resulting to frequent standing and lying down to drink and (6) disturbance in the farrowing unit causing excitement on the part of the sow.
- At birth, the piglets have about 50 milligrams (mg) of iron reserves in the body. This amount of iron is not adequate to allow the piglet to grow at its maximum potential for about 2 weeks after birth. The piglet requires about 7 mg of iron per day during the first week and about 10 mg at 3 weeks. From the sow's milk, the piglets get only 1 - 2 mg of iron. Therefore, if piglets are confined with no other source of iron except via the milk, serious losses due to from anemia may arise.
- Castration or the removal of the testicle is a simple operation. Complications are uncommon provided sanitary precautions were observed. Whether the operator uses a single or double incision, both produce satisfactory results. It can be done at any age but stress and ease of handling should be considered. It is the best time when the animal is not too big and still have a good level of antibodies from the sow (refer figure 6).
- Castration reduces if not totally eliminate the noxious boar odor of the animals. Theoretically, if you dispose your animals at 5.5 months, you need not worry about boar odor. On the other hand, it must also be remembered that 2% will still show the boar odor. It avoids accidental breeding and is useful for having a sound breeding program. Also it is easier to group the pigs during fattening operation; male grouped

together tend to start mounting each other on attaining puberty and have less interest in feeding which result in slower growth, and if male and female are grouped they mate before reaching sexual maturity retarding the growth of females.

- Early weaning is economical because it reduces the farrowing interval and hence the profitability and productivity in a breeding farm. However, it is to be considered that the sow reach peak yield only by 21 days. Piglets are commonly weaned at 4-5 weeks; it is recommended that they be weaned by weight not by age. A stronger, heavier piglet has: better immunity levels, a digestive system that is more mature and better able to withstand pen temperature that is less than optimal (refer figure 6).
- On the other hand, there may be piglets that are not heavy enough to be weaned. For economic and / or problem of under spacing, you may have to wean even smaller piglets early. If this is the case, it is advised to give specialized nutrition, warmth, cleanliness and care to these piglets. Otherwise, if one spare lactating sow is available, nurse back these piglets by fostering till the required weight is obtained.

Table 21: Husbandry procedures for rearing motherless (orphan) piglets

Activity	How to do
Colostrum feeding	Collect colostrum from any other newly farrowed sow. Feed the piglet using feeding bottle, spoon or syringe. Ensure that the head is held high with body hanging to avoid milk entering digestive tract.
Milk feeding	Feed cow or goat milk without diluting. Boil and cool to slightly above body temperature (37°C to 40°C) and feed using feeding bottle. Commercially available powder for human baby could be tried in dilution mentioned by manufacturer.
Milk feeding schedule	Day 1 30 ml milk x 5 times Day 2 45 ml milk x 5 times Day 3 60 ml milk x 4 times Day 4 70 ml milk x 4 times Day 5-7 100 ml milk x 3 times Day 8-9 120 ml milk x 3 times Day 10-11 140 ml milk x 3 times Day 12-14 160 ml milk x 3 times
Feeding solid feed	Start with feed having higher protein and which is highly digestible. Start by around 8-10 days when milk feeding is done and slowly switch from day 15. If piglets have not started consuming feed in sufficient quantity, continue milk feeding along with feed.
Fostering if possible	If possible, it is always better to foster orphan piglets to other lactating mother which gives better growth and performance in them rather than milk feeding with bottle. Try to move orphan piglets to normal diet as early as possible.

4.3 Management of weaned piglets

At weaning, the piglets and sows are separated. The change from an all-milk ration to dry feed and a change in environment are very stressful to the weaned piglet. It is very important that the piglets be provided with a micro-environment that has a temperature of 30°C to reduce stresses. It is also important to reduce the change in feed and management practices. Hence the breeding farms have to have weaner or nursing sheds, where the piglets are housed until the piglets are acclimatized to stay without dam and in a group which are not litter mates. This ensures that the piglets sold/ distributed to farmers for fattening/ rearing as breeders will perform well.

Various operating procedures should be implemented before weaned piglets arrive nursing pens, include washing and disinfection of pens and setting ventilation controls to dry it before occupation. The room should also be warmed up before pigs arrive and supplemental heat sources should be in place. Nipple drinkers should also be installed at appropriate height to provide clean drinking water for the piglets.

Table 22: Guidelines for rearing weaned piglets

- Be sure that the piglets are habituated to solid feed at weaning age by way of giving them creep feed from 7-10 days after birth.
- Reduce the amount of feed on the day of weaning and make sure the feed trough is sufficient for all piglets.
- Divide the feed to be given over more feeding times so that they get only a small amount of feed per feeding time.
- It is better to provide mash than pellets, the intake is slower and the meal gets mixed better with the digestive fluids.
- Remove the sow from the pen and not the piglets. Let the piglets remain in the farrowing-rearing pen for at least one day.
- Avoid mixing litters for at least the first week after weaning. While mixing try to put the stronger piglets together and the same is to be practiced for weaker piglets as well.
- Provide a micro-environment that has a temperature of 30°C to reduce stresses.
- Clean and fresh drinking water should be available during the whole day.
- Deworm the piglets after 4-5 days of weaning or few days before vaccination.
- Separate any piglets showing reluctance to take feed or getting weak to a room designated for the purpose (sick room) and treat them.
- Remove the sick piglets recovering to a room designated for the purpose (recovery room) and group them with healthy piglets only after they are strong. Group the recovered piglets with healthy piglets of smaller size.

Explanatory notes

- Sudden change in feed, feeding more quantities at one time, and providing faster digesting feed like pellets can lead to undigested feed in the intestinal tract which can result in health problems.
- When pigs are grouped by size at weaning there is an increased incidence of fighting while the group establishes a pecking order. Despite the increased fighting frequency, grouping by size far outweighs leaving litters intact at weaning. This also reduces the need to sort and mix pigs later on.
- A rule of thumb is that each weaner pig requires approximately 0.23 (raised deck) 0.33 (concrete floor pen) square meters. Dominant animals in a group are the first to eat, drink and choose a preferred lying area. Design your facilities to meet the needs of the subordinate pig. This ensures that all pigs in the pen perform well. A pen that has a large group size or is overcrowded does not cater well to the subordinate pig and will result in uneven growth rates.
- At weaning, some pigs may not have become accustomed to the nipple drinker if not provided in farrowing pens. It is important that these pigs find the water nipple quickly since they can become easily dehydrated in their warm environments. To ensure that the pigs find the nipple quickly, adjust the drinker so that it drips water for the first day or so.
- Before housing weaned piglets make sure that the pen is scraped down to remove manure, The pen is then washed down with water and detergents, The pen is disinfected and dried, Feeders are cleaned and disinfected, Feeders are adjusted for proper feed flow (if applicable), Water nipples are checked for proper functioning and Heat lamps are turned on when necessary.
- Any pigs that do not start on feed should be offered gruel as soon as they are detected. Gruel should be made fresh twice daily. Gruel is a mixture of starter diet and water, with a ratio of 60% feed, 40% water. If a pig does not voluntarily eat gruel, gruel should be placed in the pig's mouth. A 12cc syringe with the end removed can be used for this purpose. Just a few cc of gruel can prevent starvation, giving the pig a chance to start on feed.

Table 23: Daily activity schedule in weaner/nursing sheds

Activity	Timing	Remarks
Feeding piglets	8.00 am 12.00 pm 5.00 pm	It is better to do feeding as four or more time if possible. Try to feed quantities that can be finished between two feedings and give the remaining ration (more) in the last trip so that the piglets are not hungry in night.
Check the temperature and the foul smell	8.30 am to 9.00 am	In night hours and on cooler days try to cover open area in walls with tarpaulin or suitable material. Open the cover in hot periods of the day to remove foul smell and also after wet cleaning to allow drying of pens.
Shifting of piglets	9.01 am to 10.00 am	Piglets showing reluctance to take feed or other defects should be shifted to sick pen. Sick piglets showing recovery should be shifted to recovery pen and recovered piglets to pen with healthy piglets
Treating sick piglets, Deworming, vaccinations etc.	10.01 am to 11.59 am	These activities are preferred in morning so that the piglets can be observed in the afternoon and suitable action taken if required.
Recess	12.30 pm to 1.59 pm	
Wet cleaning	2.00 pm to 3.30 pm	Dry cleaning preferred. If wet cleaning is required, complete the activity fast and pens to be dried up within one hour. Avoid washing piglets especially in first week as much as possible.
Removing dung	As many time as possible	Try to remove dung by dry cleaning before each feeding.
Sale/ change to rearing pens	3.31 pm to 4.59 pm	It is better to transport the piglets sold/ distributed from breeding farms to the new farm in evening.

5. Standard Operating Procedure (SOP) for Miscellaneous Activities

5.1 Culling of breeding stock

Culling is the removal of unwanted animals in the herd. It requires intelligent and careful evaluation of every individual's merit of performance. The more rigid the culling, the more rapid will be the improvement in the performance of the herd. In a herd, it is common to cull at a rate of 30 to 40 percent. Culling should be planned to give a properly regulated herd age and standards adopted, so that pigs of below average performance or difficult temperament are removed. However, culling must never be considered independently of gilt replacement availability.

Table 24: Culling parameters

Parameter	Which animals to be culled
Reproductive failure	<ul style="list-style-type: none"> • Gilts not serviced beyond 270 days even when managed properly. • Gilts not getting pregnant after 3 repeated breeding. • Sows not getting pregnant after 2 repeated breeding. • Sows giving litter size below the herd or expected breed average. • Sows having reproductive cycle (inter-farrowing interval) of 165 days or more in farm with average weaning age of 35 days. • Sows not coming to heat after 10 days of weaning. • Sows scavenging piglets beyond the first cycle. • Sows with bad temperament (may crush of piglets when attendant is around) • Sows not having milk to nurse at least 8 piglets. • Sows giving birth to abnormal piglets like hernias, atresia ani, and cryptorchidism. • Boars not interested in mounting or not able to mate properly beyond 300 days. • Too aggressive boars.
Feet and leg problem	Sows and boars having defect in leg or feet, which cannot be cured in short period.
Udder problem	<ul style="list-style-type: none"> • Sows with damaged teats. • Sows with recurrent mastitis and/ oragalactia.
Age	Sows above 6 th cycle. (Sows with excellent performance may be retained beyond 6 th cycle).
Health problem	Sows and boars with health problems which cannot be fully recovered in a week time.
Pseudo pregnancy	Sows exhibiting pseudo pregnancy.

Explanatory notes

- Although it is a common practice of farms to keep boars and sows as long as they are productive, culling them on the basis of their physical and reproductive capabilities for improving the production efficiency of the herd is more realistic.
- In commercial farms, sows are kept as long as they produce large number of rapid growing pigs. A fast turnover of sows will, however, increase the rate of genetic changes which then provide potential improvement.
- Some gilts or sows do not come in heat despite proper feeding and management. Others simply do not conceive even after two or more mating with proven boars of unquestionable fertility. Although the causes of these problems are not exactly known, report indicated that more than 50% of all reproductive failures in females are due to anatomical abnormalities of the reproductive tract.
- Occasionally, there are boars without sex desires or who cannot impregnate even the proven sows. This may also be due to endocrine or anatomic defects like bilateral or unilateral occlusion or missing segments of the duct system.
- Sows may be culled due to failure to produce sufficient pigs, to rear sufficient pigs, or to reproduce regularly

enough. The setting of standards for these factors cannot be absolute and rigid within a herd. A useful guide is to compare the performance of the individual sow with the herd average. Thus, ignoring the first-litter sows, those which fail to give birth, rear as many pigs, but with as good farrowing rate as the herd average, should have their future carefully reviewed. Again, “doubtful” sows as far as performance is concerned, would be retained rather than lead to a shortfall in herd size.

- Although litter size is influenced by the environment than heredity, it is important that a sow farrows and weans a desirable number of piglets. But since heritability of litter size is low and 1st litter sows usually farrow fewer pigs than “old” sows, first litter performance is often not a good indication of what the next litter will be like. Therefore, first farrowed sows with small litter size should be given another chance to prove.
- Sows must come in heat 3-7 days to a maximum of 10 days, after weaning. A sow is most profitable if she produces two or more litters per year. A sow with long dry periods and does not reproduce regularly is a “profit-eater”. Therefore, she should be culled.
- Some sows have cannibalistic tendencies during and after farrowing especially the first-farrowed sows. A sow that cannot be comforted and remains vicious to its piglets every time it farrows should be culled.
- Temperament is very important for both the male and female animals because this trait is reported to be highly heritable. A sow with a poor disposition will likely crush her litter during nursing when approached by the caretaker. A pig will also become mean if mistreated.
- Leptospirosis and Brucellosis are diseases commonly associated with abortion and usually transmitted by an infected boar to sows during mating. Although affected animals can be treated, it is safer and more practical to replace them with healthy individuals. Remember that the diseases do not affect reproductive performance of pigs but they also endanger the health of the animal caretaker.
- The udder is a vital source of nourishment for the piglets. It is highly susceptible to infection especially during lactation because of the presence of milk which is a very good medium for the multiplication of infectious microorganisms. Usually, injured sections become gangrenous and are difficult to treat. If left unchecked, the infection spreads rapidly to other sections of the udder leaving only a few functional teats for the next lactation.

5.2 Vaccination

There are many diseases of importance in pigs which can be controlled by vaccination. However, based on the prevalence and availability of vaccine in India, swine fever and FMD are essential. Vaccination for pasteurellosis can also be useful to prevent losses from stress. Herd prevalence of other diseases is to be conducted before implementing usage of other available vaccines in India. PRRS is a fast spreading disease in North Eastern region and once the vaccine is available in the country it has to be used in all farms

Table 25: Vaccination schedule

Category	Vaccination schedule for:		
	Classical Swine fever (CSF)	Foot & Mouth disease (FMD)	Pasteurellosis
Sows	7 days after farrowing	22days after farrowing	Once in six months during gestation
Boars	Once in 6 months with at least 15 days interval between two vaccinations (Don't use the boar for service at least 10 days after vaccinating for CSF or FMD)		
Piglets	45 days of age	60 days of age	
Replacement stock	180 days of age (booster)	195 days of age (booster)	210 days of age

5.3 Bio-security

Measures are to be implemented to reduce the risk of introduction and spread of diseases in the breeding farms. It is of utmost importance to implement bio-security measures especially in nucleus herds keeping pure line and priced pig breeds. It is also important in other breeding farms also where larger herd size are maintained, because if a disease enters the agent will last for long periods due to larger availability of susceptible pigs.

Table 26: Guidelines for implementing an effective bio-security plan

1.	The farm should be protected with two layer of fence/ boundary wall. Outer fence is to prevent entry of stray animals, while inner fence is to restrict free movement of personals and animals to the area housing the breeding stock and piglets.
2.	The entry to the area fenced by inner fence should be after wearing separate uniform and foot wear, preferably after removing the clothing used outside and after showering in a change room provided for the purpose.
3.	Entry to the farm to be restricted to only essential personals and the movement to be recorded. Avoid visitors, especially farmers and veterinary/ para-veterinary staff having exposure to other animals.
4.	Visitors to be provided with coverall and boots and insisted to go through shower-in protocol. Ensure that the visitors had no contact with any other livestock for more than 48 hours.
5.	Avoid entry of dogs, cats, birds, rats and other wild animals into the pig houses.
6.	Entry of equipment and other material to be minimized and if essential make sure to remove the shipping cover and disinfect the materials.
7.	Replacement stock to be quarantined for sufficient period (at least 15 days) away from the pig houses and outside the inner fence. They should be screened and observed for any diseases, before introduction.
8.	Regular vaccination program to be followed.
9.	Semen if used from outside source should be from a known source, where the boars are regulary screen for infectious diseases.
10.	The feed and water used within the farm should be from a source free of infectious diseases.

Explanatory notes

- The North Eastern Region has a very porous international boundary and hence strict bio-security protocols are essential in all the breeding farms. There are outbreaks of emerging disease like PRRS. The vaccine for protecting pigs from this disease is not available in the country.
- Semen can be a source for transmission of many pathogens like Actinobacillus suis, Adenovirus virus, Brucella suis, Circovirus ,Classical swine fever virus, Congenital tremor virus, Enterovirus, Foot-and-mouth disease virus, Japanese encephalitis virus, Leptospira, Porcine parvovirus, Porcine reproductive respiratory syndrome virus, Reovirus, Swine vesicular disease virus, Transmissible gastroenteritis virus etc.
- Airborne transmission cannot be checked by simply following the bio-security measures as indicated. This can be controlled only by selecting remote location for breeding farms especially those keeping nucleus herds.
- People can transport pathogens on footwear, clothing, hands, etc. People can carry viruses on their nasal mucosae without being infected, and can also be infected by and shed pathogens when they are sick or may remain as carriers with no clinical signs.
- Equipment used for farm can be potential source to bring disease causing agents into the farm. Similarly vehicle can transmit diseases. This is a potential source when the equipment or vehicle has a chance to be in contact with people or vehicle from other pig farms where there are diseases or have no bio-security protocols.
- The feed or ingredients can also carry disease agent. Similarly fodder grazed by other animals can also be a potential threat.
- Birds (especially migratory bird), rodents, feral, wild pigs, stray domestic animals, including many insects can be mechanical carrier of disease into the farm and hence to be restricted from entry into the pig houses.

5.4 Feed analysis and storage

Feed is a major input in breeding farms, which accounts for the major expenses and also has a major role in the productivity of the farm. Since the breeding farms have to depend on feed coming from outside source it is essential to have a periodic quality analysis. Proper storage and usage of feed is also very important.

Table 27: Guidelines for feed analysis and storage

Feed Analysis Guidelines	
1.	Draw samples from each fresh load coming to the farm. Separate samples for different type of feed have to be drawn and analyzed separately.
2.	The feed samples have to analyzed for following parameters as percentages (Other than moisture the other parameter should be on dry matter basis) <ul style="list-style-type: none"> • Moisture • Crude protein • Crude fiber • Crude fat • Calcium • Phosphorus • Lysine • Methionine &Cystine
3.	Also analyze for presence of toxins, especially aflatoxin and percentage of sand & silica in the feed
Storage Guidelines	
1.	Store feed in cool, dry and well-ventilated area. Separate feed store preferable.
2.	Rotate the stock (First in, first out principle). Always finish the old bags first.
3.	Keep feed bags stacked on pallets to prevent feed from coming to contact with damp floors.
4.	Stack different type of feed separately. Clearly mark the different feeds with easily distinguishable mark and maintain the inflow and outflow using register kept in the store for the purpose.
5.	Leave a distance of around 1 ½ feet between feed stack and walls of the feed store. This is to allow cleaning and placing traps.
6.	Implement rodent/ insect control: <ul style="list-style-type: none"> • Keep exterior doors closed • Position bait boxes/traps around interior and exterior walls. Glue boards or automatic traps are effective for preventing entry of rodents. • Clean up spilled feed and remove torn bags. • Regularly fog the warehouse area with approved insecticide. • Fumigate the feed store periodically. • Remove weeds and bushes around the store. • Clear possible breeding areas of insects.
7.	Do not store or handle too much bags of feed. Store only required quantities for a fortnight or month. Animal feed is a semi-perishable item. <ul style="list-style-type: none"> • As feed ages essential vitamins begins to degrade. • If the feed has to be stored longer, make sure that the vendor adds extra vitamins. • Storage can result in rancidity of fat. • If the feed has to be stored longer, ensure that the vendor adds anti-oxidants. • Storage can also promote mold growth. Restacking of bags to be done when stored for longer period. • Ensure that the moisture content of feed is below 10%.

5.5 Data management

The most important technical figure in farrow – to – wean operation is the number of reared piglets per sow per year. Prerequisite to a good management is having an accurate and proper recording system in the farm. However, before making records of the animals, identification of the animals is very important. Some possibilities are:

- Tattoo
- Plastic ear tags
- Ear notching

- Collar with a number
- RFID tags/chips

The best option is to develop a software and have a computer aided data management system that makes the data recording and report generation easier and effective. However, in absence of software the recording system should be simple and precise and directed towards improving performance. Sometimes data collected are never utilized or in themselves of no value due to some being objectively not collected. Hence only those data which can be processed and interpreted and which are relevant to the production process should be collected. The choice of a recording system depends on the information we want to have and the existing situation in the farm.

Table 28: Technical figures to be calculated for monitoring the farm

Report to be generated	How to calculate	Data to be collected and/or recorded
For Individual sow		
Litter index	Number of litters / productive life (Productive life = number of years from the date the sow was first served)	<ul style="list-style-type: none"> • Service dates • Farrowing dates
Number of lost days	365/ Actual litter index – theoretical production cycle (Theoretical production cycle = 7 days dry period + 114 pregnancy period + 30 days lactation period)	<ul style="list-style-type: none"> • Litter index
Number of piglets born alive per litter	Total piglets born alive/ total number of litters	<ul style="list-style-type: none"> • Farrowing dates • Live births in each farrowing
Number of still born piglets per litter	Total still born/ total number of litters	<ul style="list-style-type: none"> • Farrowing dates • Still born in each farrowing
Number of mummies per litter	Total mummies/ total number of litters	<ul style="list-style-type: none"> • Farrowing dates • mummies in each farrowing
Total piglets born per litter	Number of piglets born alive+ stillborn + mummies per litter	<ul style="list-style-type: none"> • Number of piglets born alive per litter • Number of still born piglets per litter • Number of mummies per litter
Pre-weaning mortality %	Total piglets at weaning/ (total piglets born alive ±fosterings)	<ul style="list-style-type: none"> • Number of piglets born alive per litter • Fostering of piglets • Piglet mortality
Number of piglets weaned per litter	[(Total piglets born alive ±fosterings) – total dead piglets before weaning]/ total number of litters	<ul style="list-style-type: none"> • Farrowing dates • Number of piglets born alive per litter • Fostering of piglets • Piglet mortality
Number of piglets weaned per sow per year	Number of piglets weaned per litter X Litter index	<ul style="list-style-type: none"> • Number of piglets weaned per litter • Litter index

Table 28: Technical figures to be calculated for monitoring the farm (continued)

Report to be generated	How to calculate	Data to be collected and/or recorded
For herd (annual)		
Average number of sows present	(Sum of number of sow + served gilts in each month) /12	<ul style="list-style-type: none"> • Number of sows + served gilts at start of each month
Number of piglets born alive per litter	Total number of piglets born alive / total number of litters	<ul style="list-style-type: none"> • Farrowing dates • Live births in each farrowing
Stillbirth %	Total piglets born dead/ total number of litters X 100	<ul style="list-style-type: none"> • Farrowing dates • Stillbirths in each farrowing
Mummies %	Total mummies/ total number of litters X 100	<ul style="list-style-type: none"> • Farrowing dates • Mummies in each farrowing
Mortality %	Total piglet dead/ total number of piglets born alive X 100	<ul style="list-style-type: none"> • Mortalities • Live births in each farrowing
Number of piglets weaned per litter	(Total piglets born alive – total piglets dead before weaning) / total number of litters	<ul style="list-style-type: none"> • Farrowing dates • Live births in each farrowing • Mortalities
Litter index	Total number of litters/ average number of sows present	<ul style="list-style-type: none"> • Farrowing dates • Average number of sows present
Number or piglets weaned per sow per year	(Total number of piglets born alive - total mortality)/ average number of sows present	<ul style="list-style-type: none"> • Live births in each farrowing • Mortalities • Average number of sows present
Lost days	365/ Litter index – theoretical production cycle	<ul style="list-style-type: none"> • Litter index

Table 29: Some basic facts to be recorded on a monthly basis

Number of stock	Sows and served gilts
	Un-served gilts
	Boars
	Nursing & weaned piglets
	Culls and mortalities
Service details	Number of 1st services
	Number of 2nd services
	Number of 3rd services
Farrowing details	Number of farrowings
	Number of pigs born alive
	Number of pigs born dead
	Number of sows weaned
	Number of piglets weaned
	Mortalities (sucklings, weanings)
Feed	Different feeds (inflow and outflow) in kg

While developing sow are for data management, it is essential to obtain maximum results for analysis of the farm. The reports should be useful not only for the administrative body, but also for the farm manager and supervisors for effective management with precision.

Table 30: Reports to be generated from software designed for farm management

Report	Details to be obtained in the report
Administrative reports	
Production report of the herd - for any period requested (for assessing the performance of farm)	<ul style="list-style-type: none"> • Total farrowing, piglets born alive (number and %), stillbirth (number and %), mummified piglets (number and %), Average weight at birth. • Total sows weaned, piglets weaned, average weaned piglets per litter, average age at weaning, average weaned weight. • Mortality under 2 days, 2-8 days, 9 days to weaning, weaning to 90 days, and other (pre-weaning mortality to be also displayed).
Culling proposal (for sanctioning the culled animal sale)	<ul style="list-style-type: none"> • Animals culled by farm staff with details like sex, age, reasons etc. in prescribed format.
Breeding stock analysis (For third party culling)	<ul style="list-style-type: none"> • Sow wise analysis report showing the technical figures. • Boar wise analysis report showing the technical figures of sows it has mated.
Animal census- as on any date (For assessing infrastructure utilization)	<ul style="list-style-type: none"> • Stock of animals of different category.
Farm level reports	
Served but not farrowed (for planning various management activities to be carried out)	<ul style="list-style-type: none"> • Sows due for farrowing showing date of mating, due date for farrowing, location, breed group etc.
Animal List (for identifying the animals)	<ul style="list-style-type: none"> • List of animals showing age and status. • List sortable age wise, sex wise, breed group wise and location wise.
Weaning List (for weaning the sows)	<ul style="list-style-type: none"> • List of sows with piglets currently nursed. • List sortable location wise.
Warning List (for taking corrective step)	<ul style="list-style-type: none"> • List of gilts not mated with age. • List of served females whose pregnancy is not confirmed. • List of farrowed sows that are not weaned. • List of weaned sows that are not mated. • List of boars not used. • List of culled sows not disposed.
Pedigree (for planning mating)	<ul style="list-style-type: none"> • Who the parents and grandparents are of any pigs typed into report.
Sow card (for display in farm)	<ul style="list-style-type: none"> • All previous performance (technical figures) parity wise. • Current status with list of piglets in case of farrowed sows and due date in case of served females.

Table 30: Reports to be generated from software designed for farm management (continued)

Report	Details to be obtained in the report
Animal history (for assessing any animal and tracing its history)	<ul style="list-style-type: none"> • Pedigree, date of birth location and under which sow if it is a nursing piglet. • All history of sow date wise like when selected, services done with boar used, farrowing details, fostering details, piglet mortality details, weaning details, culling details, sale/ mortality details etc. • All history of boar date wise like when selected, service details with sow mated, semen collection details if AI is practiced in farm, culling details, sale/ mortality details etc. • All history of saleable pigs date wise like culling details, sale/ mortality details etc.
Daily events (for tracing events date wise)	<ul style="list-style-type: none"> • Events done date wise with details pertaining to that event when clicked on the event.
Feed related reports	
Supplier & Purchase register	<ul style="list-style-type: none"> • Ledger of purchases supplier wise, and ingredient wise or type of feed wise.
Feed stock register	<ul style="list-style-type: none"> • Ledger of feed stock category/ type wise showing inflow and outflow to different sheds.
Sale related reports	
Saleable animal list (for planning sale)	<ul style="list-style-type: none"> • List of saleable piglets showing age and breed group
Sale register (for accounting and planning sale)	<ul style="list-style-type: none"> • Sale details bill wise and customer wise.
Graphic reports	
<p>Graphic reports may be designed for easy and quick visual analysis of the farm. Some common graphic reports that can be generated with assistance of experts are:</p> <ul style="list-style-type: none"> • Farrowing control chart • Mortality histogram • Boar work load chart • Sow herd structure 	

6. References

1. Code of Practice for the Care and Handling of Pigs (2014), Canadian Pork Council and the National Farm Animal Care Council. Available at: <https://www.nfacc.ca/codes-of-practice/pig-code#section4>
2. Software used by DLG Farms Private Limited for farm management.
3. Farmer’s Hand Book on Pig Production (2009), Food and Agriculture Organization of the United Nations.
4. Fundamentals of Gilt and Sow Management (2008), PIC, USA
5. Hiroki I. and Yuzo K. (2012), Standard Operating Procedures for Sows and Piglets in Farrowing and Lactation in Japanese Commercial Herds, Journal of Veterinary Medical Science 74(11): 1423 – 1428.
6. PIC Wean-to-Finish Management Guide (2008), PIC, USA.
7. Pigs - Standard Operating Procedures (July 2018), Queensland Schools Animal Ethics Committee, Independent Committee formed by Queensland Catholic Education Commission and Independent Schools, Queensland. Available at: <https://education.qld.gov.au/curriculums/Documents/sop-pigs.pdf>
8. Rick Jones (1986), Farrowing and Lactation in the Sow and Gilt , Bulletin 872, The University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture cooperating. Available at: https://www.animalgenome.org/edu/PIH/prod_nursing.html
9. Timothy A. M., Storage Guidelines, Zeigler Bros., Inc., USA. Available at: <http://www.zeiglerfeed.com/Literature/Storage.pdf>
10. Training Notes (1995 & 2000), International Training Center on Pig Husbandry (ITCPH), Philippines.



ILRI

INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE

INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE (ILRI)