Applied Zoology

Piggery

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Introduction

There are more than 12.8 million pigs in our country, out of which approximately 14.5% are graded and of exotic variety (India, 2000). There are 120 pig breeding farms in the country whereas pigs of exotic breeds are maintained. China ranks first in the world in pig rearing where number is around 300 million or 1/3 of the world pig population.

Pig production is basically an enterprise which is able to convert inedible or inferior quality food into the food rich in animal protein. Pig is considered a machine because they convert grain, pasture and other low quality feed into Pork which is used as human food. There are three main reasons by which one can be attract to pig farming-

- Pigs may be maintained with low quality feed.
- In pigs, carcass yield is highest among other food animals, and
- There is a high fertility in pigs which assures net income to the producer.

Despite the fact that pig rearing is a profitable enterprise most of the progressive farmers even today hesitate to adopt it due to prejudice sentiments in our society against pig farming. For many others there is religious taboo against pig. A majority of meat eaters also do not consume pork. Inspite of these drawbacks, the consumption of pigs has greatly increased in recent years due to nutritional awareness in people. Pig is highly prolific breeder and cheap source of protein. Pork as a source of animal protein is gaining popularity in India and pork products will be in greater demands in years to come.

Swine producers must raise pigs which are high in lean meat and low in fat if they wish to keep the consumer market. The ultimate goal in all pig production is to produce efficiently and profitably a pig that yield a carcass high in the cuts of pork desired by the consumer.

The high carcass yield attracts the farmers because of the better returns within the shortest possible time. High fertility in pigs assumes income to the rearer round the year. To bring about improvement in the productivity of pork and other piggery products extensive crossbreeding programme has been taken up to develop animals of large size, better feed conversion efficiency, high dressing percentage and better quality pork.

Related terminology:

Drove or stock or herd	Group of pigs
Boar	Male adult (Uncastrated)
Sow	Female adult (Used for breeding)
Boarling	Young male
Gilt	Young female
Piglet	Newly born one
Hog or stag or barrow	Castrated male
Spayed	Castrated female
Suckling	Female with its offspring

Farrowing	Act of parturition
Coupling	Act of mating
Grunting	Sound produced by pigs
Back Fatter	A fatty pig too heavy for bacon trade
Baconer	A Bacon pig
Barren sow	A mature female pig incapable of producing offspring due to infertility or sterility
Blue pig	Pig produced by crossing a white breed with black breed pigs.
Cad, **Rit**, **Crit** or **Criting**	Smallest piglet of a litter usually last to be farrowed
Carcass	The major portion of meat from body of pig after removal of viscera, head, skin and shanks.
Lard	Fat from the pig carcass after it has been melted down
Litter	A group of piglets born in single farrowing
Pen	A house for keeping a single pig or group of pigs
Piggery	Where pigs are reared or pig farming
Pork	Fresh, frozen or salted meat from pig carcass.
Sausage	Product prepared from fresh minced pork
Weaning	Separation of young piglets from mother sow at 8 weeks of age
Wallow	Water pool for pigs

Breeds of Pig:

i. **Indian breeds of Pig:** Pigs of Indian origin have no distinct breed features and their characteristics vary region to region. They are black, brown, grey, rusty grey or admixture of these colours. Traditionally these are reared by weaker section of the community. Indian breeds of pigs are as under:

(a) Wild Pigs: The wild boars are commonly found in jungles or forest and in Himalayan tract. The animals measure about 1.5 m in length 71 to 90 cm high at shoulder. It exceeds 136 kg in weight and males are larger than females. Color is rusty grey in young age and it becomes dark chestnut brown in adult animals. The wild pig is extremely active and when provoked may also attack human beings.

(b) Pigmy hog: Pigmy hog is found at the base of Himalayas in Sikkim, Nepal, Bhutan and Assam. They prefer to remain in high grasses and therefore are rarely seen. They live in herds of 5 to 20. The animal measures about 32 cm over the shoulder and 66 cm from the snout to rump. They have brown and black color and weighing about 7 to 8 kg.

(c) Domesticated or Indigenous Pigs: These pigs differ in their characteristics and color from region to region within the country depending on the typography and climatic conditions. Adult pigs weigh upto 168 kg and female possesses 6 to 12 teats. Pigs have different colours viz. black brown, rusty grey and even an admixture of any two colors. Pigs possess a long face tappering towards the nostrils. Ears are small and medium sized. Head and shoulders are heavier as compared to hind quarters.

ii. **Exotic breeds of Pigs:** There are 60 well recognized breeds of pig in the world. Out of those some most common exotic breeds of pig reared in India are as under:

S.No.	Breed	Place of origin	Adult body weight	Body f eatures
1.	**Large white Yorkshire**	England	Boar 300-400 kg Sow 250-300 kg Bacon type breed Prolific breeder	Entire-white, black, pigment spots, fine skin without wrinkles & smooth
2.	**Landrace**	Switzerland, Denmark	Boar 300-350 kg Sow 200-250 kg Bacon type excellent	Short legs, lean carcass, white in colour with black skin spots, longer body, skin without wrinkles
3.	**Middle white Yorkshire**	England	Boar 275-375 kg Sow 200-290 kg Less prolific,	Cross between large and small Yorkshire, long leveled back white

			bacon type	in colour, fine skin, medium sized
4.	**Berkshire**	England	Boar 275-375 kg Sow 200-290 kg Good quality meat	Medium sized, legs of medium length, black in colour, good width and broad back
5.	**Wessex saddle back**	England	Boar 200-280 kg Sow 180-260 kg	Robust make-up, black in colour bacon type, prolific
6.	**Hampshire**	U.S.A.	Boar 250-330 kg Sow 200-300 kg Meat type	Black hog, with a belt encircling the body including front legs, short legs, smaller breed
7.	**Temworth**	U.K.	Boar 300-350 kg Sow 250-300 kg Best quality bacon	Golden brown in colour, thin shoulders, strong back
8.	**Duroc**	Jersy	Boar 350-400 kg Sow 300-350 kg Good quality meat	Red in colour, medium sized

Selection o Breed of Pigs:

Certain factors are important in selecting a breed of pigs for a prolific enterprise. The goal in pig production is to produce large litters of pigs, which can be grown out rapidly and economically, which fetch top market price to gain maximum return of profit. Pork producers must decide which breed or breeds will fit but in their breeding programs.

The following factors must be given careful consideration in the selection of breed of pigs: -

- **Availability of good breeding stock:** Breeding stock of good quality should be available in the community or nearby.
- **Prolificness:** The ability of sows to produce and nourish large litters of healthy pigs is very important in selecting breeding stock.
- **Growth ability:** There are differences among the breeds in their ability to make rapid gains.
- **Temperament:** The animals should be active but should have good physique and be easily handled.
- **Carcass quality:** Carcass produced by the animal should high in lean cuts and low in lard and fat cuts.
- **Efficient use of feed:** Some breeds are more efficient in converting feed to pork.

- **Market demand:** The extent to which the breed is in demand in the community or in market is most important.
- **Disease resistance:** Breeds should be disease resistant to the maximum extent.
- **Feeds available:** Some breeds are thought to be better rustlers than others and as a result do better on poor pastures and on limited rations.

Selection of Gilt or Sow:

In selecting gilt or sow, the primary aim is to secure a female that will produce large litter of fast growing pigs, capable of being marketable weights at an age of six months or less. Following points should be taken into consideration:

(a) **Appearance:** In selecting gilt or sow on the basis of appearance following main aspects should be considered :

- General form or types
- Size or weight for age
- Development in the regions of high priced cuts of pork
- Quality

(b) **Pedigree: T**he pedigree is the statement of an animal's ancestory. In selecting breeding stock, choose only sow from large litters, which is heritable trait.

(c) **Performance:** It is more desirable to consider actual performance or productive ability of an animal. Birth weight of pigs indicate the ability to make rapid and economical gains. The weight at weaning age is a proof of efficient growth and also an indication of the milking ability of the gilts.

(d) **Conformation:** Selecting gilts from large litters for gaining rapid growth with efficient feed conversion, importance should be given to the good conformation of the animal. A mature gilt should have a feminine appearance with smooth shoulders and an excellent hair coat. The bone should be of good size but not coarse or extensively heavy. The udder of the sow should be well developed with 12 to 14 sound teats. The teats should be prominent and well placed.

(e) **Prepotency:** Prepotency is the ability to transmit characteristics to the off spring to a marked degree. It refers to either male or female. From the genetic point of view, there are two requisites that an animal must possesses:

(i) Dominance

(ii) Homozygosity

Selection of Boar:

- The following points should be taken into consideration while selecting a boar for breeding purpose:
- Choose only boar from large litters. The ideal number is from 10 to 12 pigs per litter.
- The boar is half the herd. Each pig gets half the genetic make up from each parent. The contribution of half the genetics by the boar is more valuable than the sow.

- Feed conversion efficiency and carcass quality has considerable influence on the future performance of the progeny.
- The boar should have the specific breed characteristics and should be masculine.
- The legs should be squarely set.
- The boar should have well developed sex organ. The testicles should be prominent and of equal size.
- The pedigree of the animal should indicate good performance of its ancestors.
- Good health and a quiet disposition are factors which have to be favorably considered.

Management of Piglets:

It has been estimated that from 25 to 30% of piglets that are farrowed fail to reach weaning age of eight weeks due to certain reasons like non-availability of sufficient milk and other feeds, due to some injury or disease or other unscientific managemental practices. Therefore, the management of piglets under hygienic conditions is necessary.

***Care of piglets at birth*:**

Remove the piglets soon after they are farrowed.

Clean all piglets and make their body dry.

Make breathing passages of all baby pigs clear.

Cut the naval cord with sterilized scissor leaving 3 cm from naval and disinfect by application of tincture of iodine.

Allow piglets to suckle milk from mother sow for about 8 to 10 times in 24 hours.

Protect the baby pigs from trampling by sow.

Feeding of piglets

Age	**Daily feed**	**Cumulative feed in kg**
Birth to 1 month	Mother milk	--
1 to 2 months	0.5 kg	15
2 to 3 months	1.0 kg	30
3 to 4 months	1.2	36
4 to 5 months	2.0	60
5 to 6 months	2.5	75
Note: About 216 kg. Of total feed is expected to produce a pig of 70 kg body weight in 6 months.		

Prevention of anaemia:

It is a highly fatal disease of suckling pigs caused by a marked decrease in haemoglobin and fatty degeneration of the liver.

Causes :

Lack of iron and copper salts in the milk of sow kept in indoor pens, on concrete floor and limited milk diet from sow. Suckling pigs of about 3 to 6 weeks age are mostly affected.

Symptoms:

Pigs are dull and inactive, fatigued, lack of vigour. Pig shows dyspnea, thumps and rough coats, depression on the slight exertion. Pig may be weak and thin, and muscles are flabby. Skin over the neck and mucus membrane are pale. Pigs die suddenly and wrinkles are found over the legs. Pigs may develop diarrhoea.

Prevention and treatment:

1. Add small amount of iron and copper in pigs diet @ 25 mg of iron and 5 mg of copper/day/pig.
2. Iron sulphate - 3.6 ounces
   Water - 5 quarts
   Note: Feed 1 dram daily.

OR

3. Paint the udder of sow daily with the following mixture:

Iron sulphate	-	500 g
Copper sulphate	-	70 g
Sugar	-	500 g
Water	-	10 lit

4. Allow piglets to free access for parasite free runs with fresh soil.

OR

5. Intra-muscular injection of iron-dextrose compound.

Creep Feeding:

Start feeding piglet creep feed from 2 to 3 weeks age for proper growth and development.

Removal of needle teeth:

Baby pigs at birth have 4 pairs of sharp teeth on each jaw called needle teeth. These are of not any use to piglets and may cause injury to mothers udder. These should clipped by means of plier. Care be taken not to injure jaw or gum of piglet.

Raising orphan piglets:

Causes of orphan piglets:

- Large size litters than a sow can raise.
- Death of sow after farrowing.

- Failure of lactation
- Mastitis.

Method of raising:

Use of foster sow.

1. Use of milk replacer.

Egg yolk-1
Cow milk-1 kg } Mix thoroughly

Weaning piglets:

Wean the piglets at 8 weeks of age.

- For weaning separate the sow from piglets for few hours everyday.
- Supply creep feed with 18% crude protein.
- Deworm the weaned piglets at 10 week age.

Causes of preweaning mortality

Almost 61.33% death of piglets occurs in the first week. Hence good husbandry practices in early life will be profitable. The major causes of death were found to be agalactia, pnenmonia and gastroenteritis. Strict hygienic measures may help in reducing the mortality due to infectious diseases. Piglets with birth weight were prone to agalactia, trampling and infectious diseases. Therefore, special attention to pregnant sow nutrition may reduce preweaning mortality.

Castration of piglets:

Castration of Piglets is essential to achieve following goals**:**

To eliminate undesirable males.

- To prevent indiscriminate breeding.
- To make animals more docile.
- To prevent boar odour in cooked meat.
- To develop pork of superior quality.

Castration is done in the males which are not selected for breeding purpose and this practice is performed at the age of 3 to 4 weeks.

Method:

For this purpose operation method is adopted and following steps are taken:

- Secure the piglets and make it lie down on dorsal side and grasp feet under control.
- Make hands and castrating knife clean and sterilize with spirit soaked cotton.

- Wash the scrotum with an antiseptic solution of acriflavin.
- Make an incision on the scrotum on each side deep enough extending the cuts well down to permit proper drainage.
- Remove the testes with its membrane by pulling them backward, and bring with them as much cord possible and break it by cutting.
- Scrotum and surrounding parts must again be disinfected thoroughly with tincture iodine.
- Apply the sulphanelamide powder mixed with iodoform (fly repellent) to prevent infection or other complication.

Identification:

Identification of pigs is essential:

- To maintain proper record of pigs.
- To ensure proper care in feeding of pigs.
- To have better managemental practices wherever needed.
- To designate animals properly.

Procedure:

Ear notching is the common method used for marking and identification of pigs which is done as under:

- Procure and hold the piglet.
- Sterilize the side ear punch and central ear punch or pair of sharp scissors or pincers.
- Clean the ear with the help of cotton sprit.
- Side ear notches be made by punch.
- In case of hole if needed make use of sterilized central ear punch.

Brood Management:

For perfect farrowing and proper rearing of newly born piglets pig brooders should be made available at pig farm.

Bedding:

Coarse ground corncobs, wood shavings, fine straw or sawdust may be used for bedding in pig house. Too much bredding or coarse hay and straw bedding may result in the loss of pigs. The bedding should be kept clean, dry and well distributed. Removing the sow from the pen each morning and evening, for brief exercise, helps to keep the pen clean and dry.

Guard Rails:

A number of devices have been developed to keep sows from lying on the pigs. A simple device is the guard rail which is placed on the three back sides of the pen, about 8 to 10 ” from the wall and 8 to 10’’ from the floor. These may be made of metal pipe or wooden poles. These should be installed few days before the sow is due to farrow, so that she will be used to them.

Maintenance of temperature:

The temperature in the farrowing house should range from 50 to 60 ˚ F. When the temperature below 50 ˚ F, the little pigs chill and may get cold. The use of electric bulbs in the farrowing house is recommended for the first week or so after farrowing when the weather conditions are unfavorable. The heat lamp or brooder not only provides heat but also attracts the pigs away from sow. In wiring a building for pig brooders, provide a permanent and separate electric circuit with a maximum of 1500 Watts on each circuit protected by a 15 ampere fuse.

Sanitation :

For proper cleaning the farrowing pen , all dust and dirt should be removed and the floors and walls from 1.5 to 2 ” from the floor should be scrubbed with boiling lime water or disinfected by use of a steam cleaner. Equipments used in the pen should also be cleaned and sprayed. The sides, underline, feet and legs of the sow should be brushed and washed with soap and warm water before she is placed in the farrowing pan.

Characteristics of a good broody sow:

A mature good broody sow should have the following characteristics:

- Sow should possess medium long body and a strong well - arched back.
- Body should be deep sided and has the capacity of the chest and middle which ensures good feeding quality and vigor.
- Sow should have well developed deep and full hams and good on her feet and legs.
- She has prominent eyes and good feminine characters.
- Broody sow should have smooth shoulders, wide and well developed loin and excellent hair coat.
- The refinement of the head and ear, shoulder and hair coat are important items in selecting female herd material.
- The udder of sow should be well developed with twelve or fourteen teats which should be sound, prominent and well spaced.
- Most farmers select gilts which should possess many of the characteristics desired in future broody sow.

Management of Pig Farm:

For the proper management of a pig farm and to earn maximum profit following points should be taken into consideration.

(1) Management practices involved:

Age determination:

Age of pig or piglets is determined with the help of teeth in his mouth. An adult pig has a sum of 44 teeth as below:

$2(I\ ^{3}/_{3}, C\ ^{1}/_{1}, PM\ ^{4}/_{4}, M\ ^{3}/_{3}) = 44$

Eruption of all temporary teeth is completed by the age of 5 months.
In case of permanent teeth-

1st pair (corner) at 6 months age, 2nd pair lateral at 10 months age, 3rd pair middle at 12 months age and 4th pair central is erupted at the age of 1.5 years.

Handling of pigs:

For handling the pig, pig catcher or short ropes are used. Nose ring is used for controlling notorious pigs.

Castration:

To eliminate undesirable males and to develop pork of superior quality piglets are castrated at 3 to 4 weeks age with the help of double blade knife.

Identification:

To ensure proper care in feeding and better management practices wherever needed and to maintain proper records of the animal, individual pig is identified. For this purpose, ear notching is the common method used for marking the pigs.

Pig exercising:

To keep animals fit, exercise limited but it is essential each day. Exercise of pigs is performed usually by providing run – out in uncovered area and free access to pasture.

Hog wallows:

Pig needs a wallow during summer because they have relatively few sweat glands. Wallowing means a water pool where pigs enter into water and cool their body in summer. This pool is specially needed for fattening and breeding animals. Wallow made of concrete and cement with proper drainage system be made. Mud wallow is not desirable because it causes insanitary conditions. Size of wallow depends upon size and number of animals. A wallow of 3 meters length, 2 meters width and 45cm depth will easily hold a herd of 20 hogs of various ages.

Disposal of manure:

Manure produced by pigs should be removed twice daily by means of wheel barrow and shovel and disposed into a pit for decomposition. Such manure will return 75 per cent of its fertilizing value to soil. The production of manure from each adult hog is about 2kg per day. Manure pits should be about 200 meters away from the pig house.

Disinfection of pig houses:

Following procedure must be adopted for disinfection of pig houses:

- Scraping floor and walls to remove manure completely.
- Sweep well manger and feed troughs with the help of brush and hot water.
- Burn all scrapings and sweepings.
- Wash drinking water trough with disinfectant solution.
- Dispose off all bedding and manure frequently.
- In case of earthen floor remove 15cm top soil and replace it by new soil.
- White wash all walls, partitions etc.
- Expose floor to sunlight.

Schedule of daily operations:

To give better care to the animals, to get high returns and to utilize labour efficiently, each operation should be completed properly on time every day. For example: -

Time	**Routine operations on the farm**
7.30 to 10 AM	**Daily operations**
	Put breeding stock on pasture
	Cleaning of pig houses
	Segregation of sick animals
	Isolation of sows and gilts 'in-heat'
	Feeding free choice ration to grower
	Feeding half of the daily feed to breeders and finishers
	Periodical operations
	Weighing of stock
	Treatment of sick animals
	Marking of piglets for identification
	Removal of needle teeth in baby pigs
	Vaccination of pigs
10 to 12	**Daily operations**
	Bringing breeding stock from pasture
	Removal of manure
	Wallowing hogs
	Periodical operations
	Preparation of concentrate mixture
	Castration of animals, if needed
	Treatment of ectoparasites, if any

	Sale of animals
13.30 to 17.00	**Daily operations**
	Supply remaining half of daily feed to the breeders
	Entries in farm records
	Cleaning the houses
	Wallowing hogs
	Transfer gilts and sows to farrowing pen approaching
	Parturition
Periodical operations	
	Taking care of farm purchases Deworming of hogs Weaning of piglets

(ii) Houses, waterers and feeders requirements: -

Housing requirement: -

For providing shelter and protection from such heat, hot and cold winds and other enemies, pigs also require a clean, comfortable and well house with the fallowing parameters;

Category	**Covered area m^2**	**Open yard (m^2)**
Boar	6.0 to 7.5	9.0-12.0
Farrowing Pigs	7.5 to 9.0	9.0 to 12.0
Fattening Pigs	1.0 to 1.8	1.0 to 1.2
Dry Sow/gilt	1.8 to 2.7	1.4 to 1.8

Floor should be made of conventional masonry type with cement mortar. Proper drains be provided for disposal of effluents. It should not be dampness in houses and hogs feel maximum comfort for better growth.

Waterers and feeders requirements:

S.No.	Particulars	Adult pig	Growing pig
1	Length of manger/pig (cm)	60-75	25-35
2	Length of water trough/pig (cm)	6-8	3-4
3	Width of manger trough (cm)	50	30
4	Depth of manger and water trough (cm)	20	15
5	Height of manger and water trough (cm)	25	20

Waterers and feeders should be kept inside the shed. The amount of water for boar, farrowing sow, fattening pigs and dry sow will be about 40 to 50, 18 to 20, 3.5 to 4 and 4 to 5 litres, respectively. Water needed by the hogs will depend upon following factors:

~Age and body size ~Humidity

~Ambient temperature ~Dry matter in feed

~Breed ~ Number of suckling pigs

~Season/weather ~ Frequency of water supply

~Adaptation ~Quality of feed

Clean, odourless, pure, colourless, tasteless, free from toxic substances, free from germs and parasite ova/larva water should be provided.

(iii) Equipments requirement:

1. Feeding troughs
2. Feed guards
3. Automatic trough covers
4. Hog waterers
5. Hog wallows (medicated)
6. Dipping vats
7. Electric pig brooders
8. Breeding crate
9. Combination crate for ringing, leading, vaccination, ear notching / tagging, etc.
10. Hot crate.
11. Fences.
12. Guard rails.
13. Pig catcher.

14. Creep feeder.
15. Farrowing crate.
16. Tattooing machine.
17. Castrating knife / scalpel, scissors.
18. Casting rope.
19. Bolt clipper.
20. Ear notcher.

(iv) Maintenance of records:

For evaluation of individual animal and for determining cost of production the maintenance of record of each item is very essential.

1. Litter record
2. Individual pig register
3. Breeding register
4. Farrowing register
5. Daily feeding register
6. Health register
7. Ledger
8. Cash book
9. Purchase book
10. Store stock book
11. Bill payable book
12. Inventory register
13. Attendance/ pay register
14. Weight register
15. Feed and other book

Feeds and Feeding of Pigs

Pig is a simple stomach animal, therefore, it can not utilize fibrous fodder and requires more amount of concentrate mixture in his ration. Pig is an efficient converter of concentrate into meat and feed cost accounts about 75% of total cost of rearing. Feed conversion ratio in pigs is most efficient (1:3) and hence needs less feed per kg gain in body weight. Because pigs are meat producing animals, therefore, they require sufficient amount of energetic feeds like Maize, Barley, Bajra, Sorghum, Molasses, Wheat, Pulse, Chuni etc. Pig suffers more from nutritional deficiency as compared to ruminant animal, therefore, their feeding programme must be efficient but economical also. For this purpose, most economical feed ingredient should be selected and small pasture providing succulent green forages is good for raising the pigs. For providing required amount of vitamins and minerals their supplements must be added to pig ration. Common salt @ 30-40 g/pig and antibiotics 20 g/100 kg feed should be provided. Pigs need proteins to develop muscles, body tissues and offspring. They need carbohydrates and fats to provide

heat and energy and to produce lard. Minerals are needed to develop bones, muscles, teeth and in blood. Vitamins and antibiotics are needed for the pigs to use feed effectively.

The nutritional needs of pig vary with age and stage of production. Sows need ration containing 15 to 16 percent protein and fairly high in minerals and vitamins. Prestarter ration of pig should contain about 20 percent protein, 0.70 percent calcium and 0.55 percent phosphorous. Pig starter should contain 16 to 18 percent protein. The protein content of rations for pigs over 25 kg in weight is decreased gradually as the pigs grow heavier from 12 to 14 percent at 25 kg to 10 to 12 percent for 65 to 100 kg pigs.

In selecting feeds to include in pig rations it is necessary to consider the following factors :

- Availability
- Cost
- Nutritive Value
- Palatability
- Ease of feeding

Nutrients requirement of growing swine (amount per kg diet)

	Weaning	**Growing**	**Finishing**
Live weight (kg)	5-12	12-50	50-100
Daily gain (kg)	0.30	0.50	0.60
Nutrients	**Required for different class of pigs**		
ME (M Cal / Kg .)	3 ,360	3, 360	3 , 170
Crude protein (%)	22	18	14
Calcium %	0 . 80	0 . 65	0 .50
Phosphorus %	0 .60	0 .50	0 .40
Sodium %	--	0 . 10	--
Chlorine %	--	0 .13	--
B – Carotene (mg)	4 .4	3 . 5	2 .6
Vit . A (IU)	2.200	1,750	1.300
Vit. D (IU)	220	200	125
Vit . E (mg)	11	11	11
Thiamin (mg)	1 .3	1 .1	1 .1
Riboflavin (mg)	3.0	3.0	2.2

Niacin (mg)	22	18	10
Pantothenic acid (mg)	13	11	11
Vit . B6 (mg)	1.5	1.5	--
Choline (mg)	1,100	900	--
Vit . B12 (mg)	22	15	11
Amino Acids (per cent)			
Arginine	0.28	0.20	0.16
Histidine	0.25	0.18	0.15
Isoleucine	0.69	0.50	0.41
Leucine	0.83	0.60	0.48
Lysine	0.96	0.70	0.57
Methionine + cystine	0.69	0.50	0.41
Theronine	0.62	0.45	0.37
Tryptophan	0.18	0.13	0.11
Valine	0.69	0.50	0.41
Phenylalanine + Tyrosine	0.69	0.50	0.41

Recommended rations for different class of pigs.

Ingredient %	**Weaning pigs (5-15kg) creep feed**	**Weaners/ Growers (15-50kg) body wt.**	**Finishers ration (50-90 kg) body wt.**	**Pregnant sow/gilts**	**Nursing sow**	**Boar**
Maize	55	50	45	50	55	60
Ground nut cake	20	20	20	18	15	20
Wheat bran	10	18	25	20	18	13
Molasses	5	5	5	5	5	--
Fish meal/meat meal	8.5	5	3	5	5	5
Mineral mixture	1	1.5	1.5	1.5	1.5	1.5
Common salt	0.5	0.5	0.5	0.5	0.5	0.5

Antibiotic supplement(g/q)	30	20	15	--	10	--
Rovimix ($A+B_2+D_3$)	25 g	20 g	15 g	20 g	20 g	15 g
Crude protein %	22	18	14	16	15	14
Nutritive ratio	1:4	1:5	1:6	1:5	1:5	1:5

Required amount of ration /pig/day

Class of pig	**Live wt. (kg)**	**Feed (kg)**
Grower	25 26 to 45 46 to 100 above 100	1 2 3 4
Pregnant sow	150	3.5
Lactating sow	150	5
Boar	150	3.5
Sow	150 to 225	4.5

Mineral mixture for pigs:

Mineral ingredient	**Per cent**
Ground limestone	57.7
Bone meal (steamed)	20.0
Iodized common salt	20.0
Iron sulphate	2.0
Manganese sulphate	0.2
Copper sulphate	0.1

Salient Points related to pig production:

- Aug.- Sep. and Feb.- March months are the breeding seasons of the pigs.
- Gestation period of Sow is 112-114 days and heat period is 2-3 days.
- Oestrus cycle is repeated in sows at 6-10 days interval.
- In India, maximum number of pigs are found in Uttar Pradesh.

- Age of puberty in pigs is 6-7 months and breeding age of gilts is 10-12 months.
- A Sow can birth 10-12 piglets at one farrowing.
- Piglets should be castrated at the age of 4-6 weeks.
- Market age of fattening pigs is about 6 months.
- First day of heat and second day of onset of heat in sows is proper time of mating.
- Farrowing interval in sow is about 7-8 months.
- Generally sows are known to breed for 8-10 years and she can perform farrowing about 6 times during this period.
- Average body temperature of pig is 102^0 F, Pulse rate 60 to 80/ minute and respiration rate 8-18/minute.
- Extra allowance of grains should be provided for meat, milk production and pregnancy also.
- Green leguminous fodder atleast 1-2 Kg/ day/about animal should be fed.
- Pig feed incorporated with vegetable wastes, refuse from hostels and restaurants, damaged food grains unsuitable for human consumption and left over feed will minimize the cost of ration and fetch maximum profit

Health and Diseases:

It is important for the farmer/ animal keeper to know the common signs of apparently healthy pigs so that the diseased conditions of the pigs can be easily identified. The general signs of healthy pigs are given as below:

- The pigs remain alert and active.
- The head is moderately stretched forward and upright parallel to dorsal line.
- The faeces are semi-solid.
- Ears are alert and eyes are bright.
- Tail movement is also frequent.
- Pig consumes normal amount of ration and water.
- Respiration, pulse and temperature of the body remain normal.
- There should not be any abnormal discharge from the natural opening of the body.
- There should not be any reduction in body weight.
- Milk yield should not be reduced in sows.

Some common diseases of pigs

S.No.	Name of disease	Cause	Symptoms	Prevention & Treatment
1.	Hog cholera (swine fever)	Virus	Fever, loss of appetite dullness, body temp. 106^0F,and later it fall below normal.	Anti-HC-Vaccine, No effective treatment.
2.	Swine paratyphoid	Solmonella choleraesuis bacteria	Fever, purple spots on skin, diarrhoea.	Same as swine fever.
3.	Swine dysentery (colitis)	Hamorrhogic, evteritis,swine typhus bacteria	Bloody diarrhoea, temp.103-104^0F, off the feed.	Sanitation, use of sulphamezathene or streptomycine.
4.	Swine pox	Virus	Fever, lack of appetite, eruption on skin, ear and thighs.	Segregation and sanitation.
5.	Swine plague (H.S)	Pasturella suiseptica bacteria	High fever, loss of appetite, difficult respiration, swelling on throat, dysentery.	Segregation, inj.of 'Dexona'.
6.	Foot and mouth disease	Virus	High fever, secretion and ulterations on mucus membrane of mouth, Foot lesions are painful, hardly to walk.	Isolation, wash foot and mouth with KMno4 solution, no effective treatment.
7.	Bruecellosis	Brucella suis	Abortion, sterility	Testing of pigs
8.	Swine influenza	Homophilus influenza suis	High fever, loss of appetite, cough and discharge from eyes and nose, difficult movement.	Provide dry, clean and warm atmosphere to the affected pig.

Precautions for disease control:

- Segregation
- Erection of physical barriers 50 metres around pig endosures to keep off visitors, cars, advisors equipments and surgeons, farm attendants etc.
- Discouraging casual callers, visitors, use of protection clothings, disinfecting feet and hands.
- Check the quality feed and water, ensure feed is steam pelleted and is packed in paper sacks.
- Liming of pasture and keeping it parasite free.
- Rotation of pastures.
- Proper sanitation in house (dry floor, well ventilated and with good lighting arrangement).

- Proper disposal of infected litter and carcass.
- Quarantine
- Vaccination of healthy animals.
- Timely visit and treatment.
- Periodical spray of insecticides in houses.
- Providing balanced ration with low in fibre but with more succulent.
- Provide facility of medicated wallow.
- Keeping proper records for conception rates, farrowing index, number born, numbers weaned and reared, mortality, etc. to identify.

Economics of swine production

Pigs are considered efficient convertors of feed into meat. They grow fast and five sows and one boar can produce 80 to 100 young ones in a year that can be sold when they have around 65 kg weight. The dressing percentage in pigs is 65 to 70%.

To work out the economics of pig farm is very essential for efficient production and for getting maximum margin of profit. Following factors affect the economy of pig farming: -

- Marketing facilities
- Live birth and growth rate
- Expenditure on feed, water, labour etc.
- Choice of breed
- Diseases and mortality.

For minimizing the cost of pig production few points must be taken into consideration:

- There will be a good for getting maximum profit.
- Reduce recurring expenditure to maximum extent.
- Regular marketing should be available
- Maximum utilization of locally available feeds and other materials.
- Recycling of feed and finance.

Example: Economics of a pig farm having a herd of 30 sows and 3 boars.

FIRST YEAR

1. Expenditure:

A. Fixed expenditure:	Rs.
(a) Building	2,50,000
(b) Animals	
30 sows (@ Rs.5000 each)	1,50,000
3 Boars (@ Rs.6000 each)	18,000
(c) Incidental Charges	2,000
Total	***4,20,000***

B. Recurring expenditure:

(a) Feed

Feeding cost for 33 animals for 12 months 1,68,630
@ 2 kg / day @ Rs. 7 per kg (33 x 365 x 2 x 7)

250 piglets upto 6 months age 3,15,000
@ 1kg /day @ Rs 7 per kg (250 x 180 x 1 x 7)

(b) Labourers 2@ Rs. 1500 per month 36,000
(2 x 12 x 1500)

(c) Vaccines, Medicines etc. 5,000

(d) Water, electricity and other charges 5,000

Total ***5,29,630***

Grand Total ***9, 49,630***

2. Income:

(a) Sale of 225 pigs at 6 months age 12,60,000
(assuming mortality rate @10%)
@ Rs. 80/kg (80 x 225 x 70)

(b) Sale of 50 tons manure @ Rs. 250/ton 12,500

Total Income ***12, 72, 500***

Deduct expenditure of recurring = 12,72,500 – 9, 49,630

Gross income in first year = 3, 22, 870

Deduct bank interest @12% on fixed cost = 50, 400

Net profit = 2,72,470

Recycle the first year profit for second year maintenance.

SECOND YEAR

1. Expenditure	Rs.
A. Maintenance of building	6,000
B. Recurring expenditure	
(a) Feed for 33 animals	1,68,630
(b) Feed for piglets (Farrow twice/year) @Rs. 7/kg/animal To be sold every 6 months i.e. 600 piglets/year (600 x 180 x 1 x 6)	6,48,000
(c) Labourers	36,000
(d) Vaccines and medicines etc.	6,000
(e) Equipments and miscellaneous	6,000
(f) Depreciation of building etc (@10%)	25,000

(g) Interest (@12%	50,400	
(h) Hire of land and other expenditure	50,000	
Total expenditure II year =	**9,99,630**	

2. Income

(A)600 pigs sold a year (600 x 70 x 80)	33,60,000
(B)Manure 150 tons (@Rs 250/ton)	37,500
Total returns	**33,97,500**
Gross income in 2nd year	**23,97,870**
Deduct other expenses:	
Farmers remuneration	96,000
Return bank loan taken	4,20,000
during first year for building etc.	
Other expenses	54,000
Net income= 23,97,870 – 5,70,000	= **Rs. 18,27,870**
Seed stock worth (+) Rs. 1,50,000	

Note: - Seed Stock worth **Rs. 1,50,000** will still be available for another 3 years.

Suggested Readings:

1. Swine Production: Bundy and Diggims (1963), Prentice – Hall ,Inc. ,Englewood Cliffs, N.J.
2. A Text Book of Livestock Production Management in Tropics: D.N. Verma (Ist Ed. 1999) Kalyani Publishers, Ludhiana (Punjab).
3. Goat, Sheep and Pig Production and Management: J. Prasad (IInd Ed., 2000), Kalyani Publishers, Ludhiana (Punjab).
4. Handbook of Animal Husbandry: (IInd Ed., 1900), ICAR Publication, New Delhi.
5. Domestic Animals: Harbans Singh (1966) National Book Trust, New Delhi.