Pig Farming

Techniques & Technologies

ICAR-AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE
ZONE-I, PAU CAMPUS, LUDHIANA - 141 004, PUNJAB

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Citation:
Bhadauria, Pragya; Singh, Satbir; Aparna; Singh, Inderjeet and Sheoran Parvender (2023). Pig Farming: Techniques & Technologies. ICAR-Agricultural Technology Application Research Institute, Zone-1, Ludhiana, Punjab, India. PP.125.

Published by:
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ICAR-Agricultural Technology Application Research Institute, Zone-1,
PAU Campus, Ludhiana -141004, Punjab, INDIA
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Compilation & Designing assistance
Harinderjeet Singh Jassi

Year of Publication: 2023

ISBN: 978-81-958562-2-0

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No. of Copies: 100

Printed by: Vibrant Inc. B-98 Surya Nagar, Ghaziabad. Mob : 8929005198

FOREWORD

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Pig farming is a crucial aspect of the global food industry, providing a significant source of protein worldwide. It has been a part of human civilization for thousands of years, with evidence of pig domestication dating back to around 7,000 BC. Despite its long history, pig farming has continued to evolve over the years, with new technologies, management practices, and breeding techniques emerging to improve productivity and sustainability.

Today, pig farming is a complex and multifaceted industry, with a range of production systems, breeds, and management practices that farmers can adopt. It also plays a significant role in the global economy, with pork being the most widely consumed meat in the world. As such, it is essential to understand the intricacies of pig farming, its challenges, and the best practices that can ensure its sustainability.

The compiled information provides an in-depth analysis of pig farming, covering the breeding aspects, nutrition, management practices, and disease control. It also examines the economic implications of pig farming. This book ***"Pig Farming: Techniques & Technologies"*** aims to provide readers with a comprehensive understanding of pig farming, highlighting the best practices that farmers and policymakers can adopt to ensure animal welfare, reduce environmental impacts, and produce safe and nutritious pork products.

As the world population continues to grow, the demand for pork products will continue to rise, making pig farming an increasingly important aspect of the global food industry. This compilation will be a valuable resource for anyone interested in pig farming and its sustainability, including farmers, policymakers, researchers and consumers.

(Himanshu Pathak)

PREFACE

In India pig farming constitutes the livelihood of rural poor belonging to the lowest socio-economic strata and they have no means to undertake scientific farming with improved management. However, the commercial pig industry provides economic opportunities for farmers, entrepreneurs, and rural communities. It creates employment in various stages of the value chain, including rearing, processing, and marketing of pork products. Moreover, the commercial pig industry in India has witnessed technological advancements in breeding, nutrition, and management practices. As the country has tremendous potentiality of improvement of pig production through scientific management coupled with adoption of advanced technologies can improve productivity, feed efficiency, and disease management, making pig farming more profitable and sustainable.

This book *"Pig Farming: Techniques & Technologies"* provides a comprehensive guide to pig farming, covering various aspects such as breed selection, housing and infrastructure, feeding and nutrition, health management, reproduction and breeding, and overall management practices. It also includes information on record keeping, essential tools, equipment, and technology for efficient pig management. More over the case studies, real-life examples, and useful tips from experienced pig farmers can provide valuable insights and practical knowledge. However, it's important for pig farmers to assess the suitability of different techniques based on their specific farming conditions, local regulations, and market demands.

We hope this book will serve as consolidated knowledge bank in a structured and coherent manner which provides a systematic approach to understanding the basics of pig farming to the beginners or even experienced farmers.

(Authors)

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भाकृअनुप
ICAR

Chapter-1

INTRODUCTION

Pig farming is a significant component of the livestock sector worldwide and pork is considered as a major traded commodity globally. According to the Food and Agriculture Organization (FAO), global pork production reached up to 97 million metric tons in 2020. The global pork production was led by China, accounting for more than half of the global production. Other significant pig farming countries includes the European Union (EU), the United States, Brazil, Russia, Vietnam, and Canada. Nearly half the world's pig production is in Asia with a further 30% in Europe and in the USSR. Countries with surplus production often export pork to meet the demand in other regions. These exporting countries utilizes industrial-scale intensive pig production system aiming to maximize efficiency and meet the high demand for pork. The EU, the United States, and Brazil are among the largest exporters of pork products while importing countries includes China, Japan, Mexico, and South Korea.

In India, an estimated half a million people are involved in pig farming. It is more concentrated in certain states of the country, including Assam, Meghalaya, Nagaland, Manipur, and Mizoram. These states have favourable agro-climatic conditions and cultural acceptance of pork consumption. There has recently been a noticeable increase in piggery farms in states like West Bengal, Punjab, Uttar Pradesh and Rajasthan. As per the 20th livestock census, the total pig population in the country is 9.06 million which accounts for 1.7% of the total livestock population. The contribution seems to be small, but the potential of this sector yet to be explored in country like India. Here it is predominantly small-scale enterprise practiced in the form of backyard farming by marginal and small farmers.

However, in past few decades pig farming is gaining acceptance in

the country due to multiple reasons. There is a growing market demand for pork products in India, driven by changing dietary preferences, urbanization, and a rising middle class income. The opening of international restaurant chains in the country further accelerated the requirement of pork for making bacon, sausages and other pork products. This provides an opportunity for the commercial swine industry to cater to a large consumer base. Now a days, pig farming is considered as one of the most sustainable livestock-based agri-business and government is also boosting the sector as an avenue for secondary agriculture among rural masses and unemployed youths. While India is a major exporter of various agricultural products, pork exports from India is currently limited. However, the country has the potential to increase pork exports by improving infrastructure, implementing quality control measures, and complying with international standards. The major domestic market for pork is North-East India. Yet in most part of the country, piggery have plentiful of options to be adopted like independent venture, integrated fish farming along with it, feed manufacturing, value addition of pork product etc. a farmer can adopt as per the feasibility and resources available.

With regards to peculiarities and characteristic of pigs, they are also known as swine/hogs are very hardy animals and thrive well under extreme conditions. Pigs can be reared almost anywhere with minimal housing and management requirement. Domesticated pigs are commonly raised as livestock by farmers for meat (generally called pork, hams, gammon or bacon) as well as for leather. Their bristly hair is also used for brushes. Among the various livestock species, pig has the highest feed conversion efficiency and dressing percentage (60 to 80%) after the broilers. The pig's ability to digest a broad range of food sources makes it so unique. Pigs are the most prolific breeders with high fecundity and shorter generation interval. Here are some of the important facts about pigs that make them worthy of commercial rearing.

Some important facts about pigs

1. Pigs are very intelligent and learn quickly. They pick up tricks faster than dogs. Pigs rank number four in animal intelligence after

chimpanzees, dolphins and elephants. Piglets learn their names by two to three weeks of age and respond when called.

2. Pigs are very social animals. They form close bonds with each other and other species. Pigs enjoy close contact and will lie close together when resting. Pigs use their grunts to communicate with each other.
3. Pigs are highly prolific. A sow can give birth to a litter containing 7 to 18 piglets, about 2 – 3times a year. The gestation period of a sow is 114 - 115 days (3 months, 3 weeks and 3 days).
4. A piglet (baby pig), weighs about 1.5 kilograms at birth and will double its weight in just 7 days. Weaning occurs at two months of age or less.
5. Pigs are very clean animals. They keep their toilets far from their living or eating area.
6. Even piglets only a few hours old will leave the nest to relieve themselves.
7. Domestic pigs are rarely aggressive. The only exceptions are sows with a young litter and boars if provoked.
8. Pigs are much more tolerant of cold than heat. Pigs have no sweat glands, so they can't sweat. They roll around in the mud to cool their skin. The layer of dried mud protects their skin from the sun. If available, pigs, who are great swimmers, prefer water to mud.
9. Some pigs have straight while some have curly tails.
10. Pigs have a great sense of smell. Their powerful but sensitive snout is a highly developed sense organ.
11. Pigs also have a great field of vision, because their eyes are on the sides of their heads.
12. Pigs have four toes on each hoof, but only walk on two toes per foot.
13. A mature pig has 44 teeth.
14. A pig can run a mile in 7 minutes.

Potentials of the Pig

Pigs have some major potential advantages which make them suitable for use in providing quick and cheap supply of animal protein

1. Pigs produce meat without contributing to the deterioration of the natural grazing lands and are less affected by seasonal changes.
2. They are fast growing. They convert concentrate feed to meet twice as efficiently as ruminants.
3. They have high fecundity and prolificacy and short generation interval. Their output in terms of yield of meat per tonne of live-weight of breeding female per year is in the region of six times that of cattle.
4. They have a quicker turn-over rate on investment as compared to cattle.
5. Their relatively small size, when compared with cattle, provides far more flexibility in marketing and consumption.

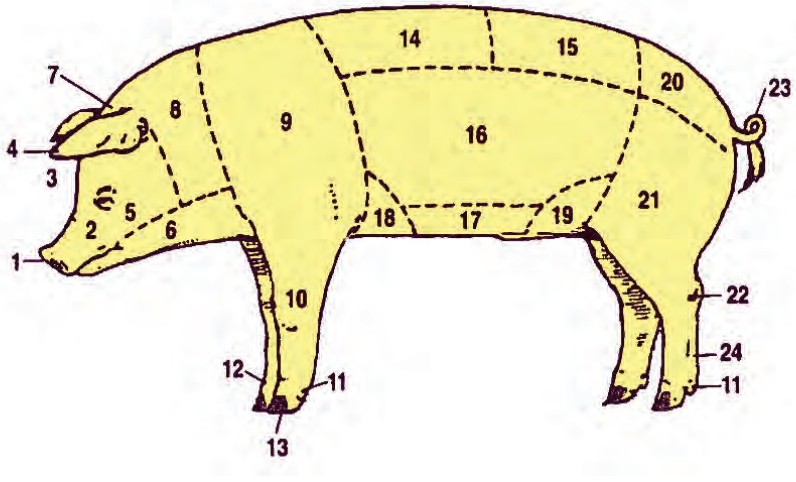
In summary, pig farming is a growing industry both worldwide and in India. Despite the promising scope and importance of commercial pig farming in India, there are challenges that need to be addressed, such as disease management, breeding and genetics improvement, access to finance and credit, market development, and skill development through training programs. While pig farming is more industrialized in some countries, India primarily relies on small-scale and backyard farming. However, with appropriate support from the government, research institutions, and private sector stakeholders, commercial pig farming can contribute significantly to India's agricultural and economic growth. Efforts are underway to improve pig breeds, genetics, and nutrition through research and development initiatives. Government and Organizations like the Indian Council of Agricultural Research (ICAR) and State Agricultural Universities are involved in such activities. Albeit, India has witnessed significant growth in recent years, driven by increasing demand for pork, improved scientific rearing practices, and government support to address challenges, and further growth and development of piggery in the country.

Chapter-2

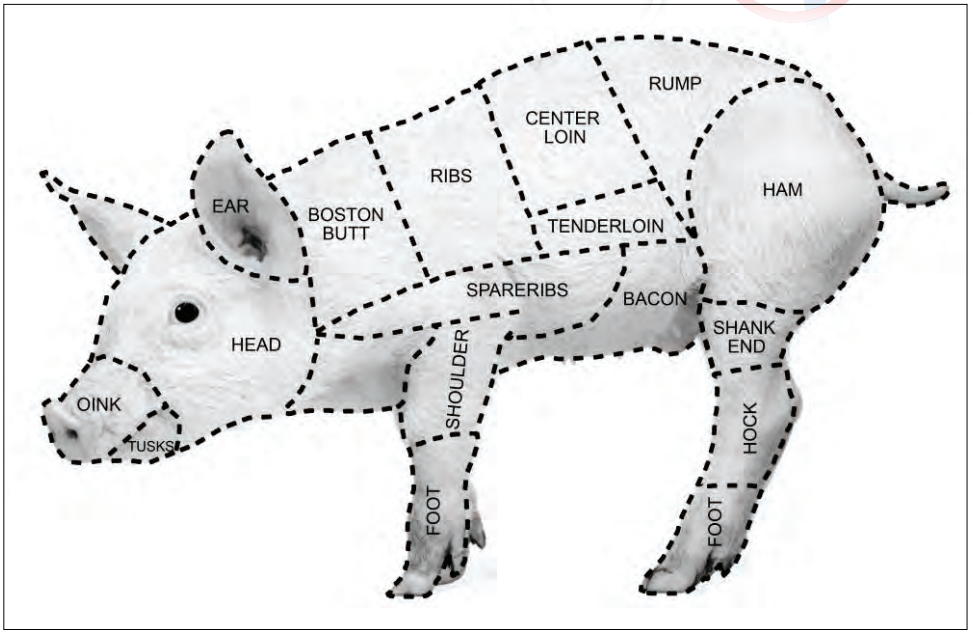
BREEDS AND BREEDING

The words pig, hog and swine are all generic terms without regard to gender, size or breed. Pigs originated from Eurasian wild boars. A pig is any of the animals in the genus Sus, within the Suidae family. A typical pig has a large head with a long snout which is strengthened by a special prenasal bone and by a disk of cartilage at the tip. The snout is used to dig into the soil to find food and is a very acute sense organ. There are four hoofed toes on each foot, with the two larger central toes bearing most of the weight, but the outer two also being used in soft ground.

1. SNOUT	6. JOWL	11. DEW CLAW	16. SIDE	21. HAM
2. FACE	7. POLL	12. PASTERN	17. BELLY	22. HOCK
3. EYE	8. NECK	13. TOES	18. FORE FLANK	23. TAIL
4. EAR	9. SHOULDER	14. BACK	19. REAR FLANK	24. REAR LEG
5.CHEEK	10. FORELEG	15. LOIN	20. RUMP	



Body parts of pigs



Butcher cuts of pigs

Success of pig farming is dependent on the selection of breed of pigs. Growth potential of the piglets depends on the nature and quality of the parent stock. The piglets that are produced must grow fast and produce quality carcasses with a high percentage of meat and a small quantity of fat.

Traits for breed selection

1. Litter size
2. Size of weaned litter
3. Strength and vigour of litter
4. Mothering and milking ability
5. Consistency of farrowing
6. Feed efficiency
7. Temperament

Boar should be selected from the litter of the sow that has high consistency of farrowing and high weaned litter.

Under traditional pig farming system, the indigenous (desi) pig has been the breed of choice, but, these are small sized animals and they do not have any definite phenotypic characteristics. They have slow growth rate, produce small litters and the meat is also of inferior quality. Nicobari, Ghungroo, Tenyi Vo and Zovawk are some of the prominent breeds reared in northeastern states.

Indigenous breeds in India

Female: Agondagoan (State: Goa)

Male: Agondagoan (State: Goa)

Female: Ghungroo (State: West Bengal)

Male: Ghungroo (State: West Bengal)

Female: Tenyi vo (State: Nagaland)

Male: Tenyi vo (State: Nagaland)

Female: Zovawk (State: Mizoram)

Male: Zovawk (State: Mizoram)

Female: Nicobari
(State: Andaman & Nicobar)

Male: Nicobari
(State: Andaman & Nicobar)

Source: NBAGR Karnal

For better economy of production, it is advisable to rear exotic or cross-breeds of pigs. Exotic breeds share most of good production characteristics of various lines which is imperative for economic production.

Exotic or cross-breeds

The most common pig breeds for commercial pig production are: Yorkshire, Landrace and Hampshire breeds and their crosses. These breeds produce lean type of meat and have efficient feed conversion ratio i.e. 1:3 (3 kg of good quality feed/concentrate mixture leads to production of 1 kg good quality animal meat i.e. pork). It is imperative to mention that owing to their high fecundity and production capability these commercial breeds are relatively less resistant to diseases and more susceptible to hot weather and low quality feeds as compared to local or desi pig breeds.

Before selection of animals or breed it is necessary to know the characteristics of different exotic/cross breeds of pigs.

Large white yorkshire

Yorkshire: This breed originated in Britain. It is well established and highly recommended exotic breed in India. This breed may be large white Yorkshire and middle white Yorkshire. Most of Indian pig farmers prefer to rear this breed for commercial pig farming. Large White Yorkshire breed is most extensively used exotic breed by the farmers of Punjab. This breed is always white/pinkish in colour, having erect ears and of appreciable body length. The pig thrives well under confinement conditions. It is best known for its large litter size and mothering ability. It is a docile tractable breed (Table 2.1).

Table 2.1: Particulars of Large White Yorkshire breed

S.No.	Particular	Specification
1	Litter (average no. of piglets per litter)	10-14
2	Weaning percent (%)	>70
3	Average market age	6-9 months
4	Average live body weight at market age	80-110 kg
5	Average maturity age	8-10 months
6	Average body weight of well matured female (Sow)	230-350 kg
7	Average body weight of well matured male (Boar)	300-450 kg
8	Good female having number of teats	14-16

Landrace breed of pigs

Landrace: This breed of pig is of North Europe and reared for meat purpose. In India, this breed is not so popular and it is reared by commercial pig farmers in limited number. It is generally white colour, long body with large drooping ears over eyes. Females have good mothering capabilities. It is known as one of the best breed for cross breeding (Table 2.2).

Hampshire: This breed of pig is popular for commercial pig farming in

Table 2.2: Particulars of Landrace breed

S.No.	Particular	Specification
1	Litter (average no. of piglets per litter)	10-14
2	Weaning percent (%)	>70
3	Average market age	6-9 months
4	Average live body weight at market age	80-100 kg
5	Average maturity age	8-10 months
6	Average body weight of well matured female (Sow)	200-320 kg
7	Average body weight of well matured male (Boar)	270-360 kg
8	Good female having number of teats	14-16

Hampshire breed of pigs

different parts of India because it is well acclimatized for different climates regions of the country. It is a breed of United States of America. This breed is reared mainly by some educational institution in India. It is medium in body size and black coloured breed with white belt around the shoulder region including the forelegs. They have high prolificacy and high survival rate of the piglets. It is good for bacon production (Table 2.3).

Table 2.3: Particulars of Hampshire breed

S.No.	Particular	Specification
1	Litter (average no. of piglets per litter)	7-9
2	Weaning percent (%)	>70
3	Average market age	6-9 month
4	Average live body weight at market age	70-90 kg
5	Average maturity age (breed at 12 month)	7-10 month
6	Average body weight of well matured female	90-200 kg
7	Average body weight of well matured male	150-250 kg
8	Good female having number of teats	14

Comparison between native and exotic breeds

Choice of pig for commercial pig farming is mainly depend on the economic parameters of the pig. Generally, the exotic breed of pig is the fore most choice of the pig farmer to start commercial pig enterprises in India. Comparison between important economical parameters of indigenous /native/desi breed of pig in India vs. exotic breed is given below in table 2.4:

Table 2.4: Comparison of economical parameters of exotic and indigenous breed

S.No.	Economic Parameter	Exotic Breed	Indigenous Breed
1	Litter size at birth	10	7.5
2	Birth weight (Kg)	1.4	0.91
3	Weaning weight (Kg)	13.5	4.1
4	Weaning percentage (%)	78.5	54
5	Dressing percentage (%)	68	66
6	Maturity age (months)	8-10	14
7	Growth rate (gm/day)	>300	70-100
8	Back fat thickness (cm)	4-5	3-7

Improvement of Native/Local Breeds

Breed improvement is an important way to obtain high yielding animals. The main purpose of breed improvement is to introduce a positive characteristic into a local breed. For example: by crossing an indigenous sow with an exotic boar, the offspring is likely to inherit the body shape and good growth rate from its father and the tolerance to environmental stress from its mother.

Artificial Insemination

Farmers keep pig mainly for meat purpose. There is lack of interest among farmers for pig rearing for breeding purpose mainly due to non-availability of breeding boar, high cost of breeding, non-availability of field methods for pregnancy diagnosis and lack of awareness among the farmers. In NEH region, tribal farmers generally keep one boar for 4–5 villages for

breeding purpose and they have to transport female pig at the time of oestrus which further adds cost to the farmers. For all the above mentioned issues, artificial insemination is the technology to be adopted.

Technique of artificial insemination

Boar Training- Male piglets of superior pedigree are selected at weaning and kept in groups away from female animals. The finally selected boars are kept in isolation at least 50 to 100 feet away from female shed. Boar training is done in the morning hours before feeding. The young boars are introduced to the dummy and allowed to sniff and mount the dummy. Generally the boar should start mounting the dummy within 15 days and start donating ejaculates within 20 to 25 day.

Semen collection

In boar, semen is collected by the gloved hand method. The collected ejaculate is brought to laboratory within 15 min for processing and dilution. All the materials and equipment which comes into direct contact with semen must be sterile. The whole process of semen collection and processing (the temperature of the semen collection flask, extender and other materials) should be done at 37°C.

Semen evaluation

Semen is evaluated for its characters like colour, opacity, volume, sperm motility, morphological abnormalities, cell membrane integrity and acrosome etc.

Semen processing and preservation

Boar spermatozoa differ from other species in membrane composition particularly having low cholesterol to phospholipid ratio and an asymmetric al distribution of cholesterol within the membrane which make it very susceptible to cold temperatures. Due to this, cryopreserved boar semen yields very low conception rate and litter size. As a result, liquid boar semen is used globally for AI on the day of collection or in the following days. Semen is collected in pre-heated semen collection flask or in thermos

flask. The extender is dissolved in double distilled water at 35–37°C and the semen is mixed with it in single step. Packaging is done in semen pouches made of neutral non-spermicidal material. The minimum sperm concentration per AI should be at least 2–3 billion spermatozoa in 80–100 ml of insemination volume. From a single ejaculate around 10 to 15 semen doses are made. The processed semen is preserved at 16– 18°C in BOD incubators. Metabolism of spermatozoa gets reduced at this temperature which is necessary for extending the semen storage time. Different semen extenders have different storage period.

Oestrus detection and insemination

The goal of heat detection is to determine when the sow or gilt reaches standing heat. In gilts the heat lasts for 40–48 h. Two inseminations during standing oestrus at an interval of 12 h is the preferred strategy, however, in few sows a third insemination is also done if oestrus prolongs beyond 72 h. Gilts should be bred 12–24 h after heat is detected, and again 12 h later. Sows should be bred 24–36 h after detection of heat, and again 12 h after the first insemination. The procedure of AI should be performed in neat and clean environment and taking into consideration all the sanitary measures. For AI, the tip of the catheter is lubricated with non- spermicidal gel and inserted into the vagina for passage into the cervix while rotating anti-clockwise. After locking of the catheter in the cervix, the semen pouch is attached to the catheter and the semen is allowed to flow into the cervix using gravity and gentle pressure over a 3- to 4-minute period. The catheter is inserted at an angle of 30^{o} to the backbone. Simultaneously rubbing the flank and underlying region stimulate the female to suck semen into the uterus. After complete deposition of the semen, catheter is gently withdrawn by simultaneously twisting it in a clockwise direction.

Advantages of artificial insemination

1. It is the easiest way to improve the local germplasm in the shortest way with very low input costs.

2. Artificial insemination is the better way to introduce superior genes into sow herds, with a minimal risk of disease which is quite high in natural mating.
3. It helps in improving economic traits such as growth rate, higher feed conversion efficiency, carcass trait, mothering ability and litter size.
4. Artificial insemination coupled with oestrus synchronization is very useful in planned and controlled breeding.
5. Artificial insemination also helps in avoiding inbreeding due to repeated use of same boar in natural mating.
6. It will also eliminate the need of keeping boar at every farm or household for breeding purpose which will lower the cost of production .
7. AI helps in better maintenance of record at the farm.
8. Semen from a single ejaculate can be used for breeding 10 to 20 females. With the availability of long term extenders, AI in pig has been adopted on a wider scale

The technology has the potential for enhancing the profitability of pig farming in sustainable way. To reap the full potential of this technology, concerted efforts are needed from all stakeholders. Around 70-90% of sows in Western Europe and USA were bred in by AI in the year 2000. Despite the world scenario, AI in pigs in India has not yet received adequate attention due to lack of awareness among the farmers and policy makers. Secondly there is an inadequate infrastructure facility like BOD incubator at field level.

However, National Research Centre on Pigs (NRCP), Rani, Guwahati has successfully introduced AI technology at field level in Assam under IVLP project since 2009. Even in Nagaland Artificial insemination was undertaken successfully under ICAR-Mega Seed Project on Pig.

Training on AI in Pigs (*Source: GADVASU, Ludhiana)*

But it is obligatory that in order to prevent the pathogen contamination of semen, specific pathogen free boars should be selected and very strict biosecurity at AI station is mandatory. Additionally, use of antibiotics in extender for reducing contamination during semen collection, processing, and storage can also prevent contamination of semen.

Selection of Breeding Gilt

It is extremely important to select a good gilt since it contributes half the quality of the herd (Table 2.5). Points to be considered while selecting a breeding gilt:

- Gilts having at least 12 teats should be selected so as to accommodate a large litter.
- Gilt having supernumerary or inverted teats, fat deposited at the base of the teats should not be selected for breeding purpose

- Gilts should be selected from sows, which have 9 -10 or more piglets per litter at weaning time and are good mothers.
- Prefer the piglets from sows that started farrowing at one year of age.
- The farrowing interval should be 6 -7 months.
- Gilt should be selected at weaning age (32-56 days) and further selection should be done at 5-6 months of age.
- Fast growing weaner should be selected because it is likely to attain higher weight.
- The selected gilts should have good body confirmation i.e. strong legs, sound feet.
- Gilt must be at least 8-10 months old at first service (depending upon breed).

Table 2.5: Quality reproductive parameters of gilt

S.No.	Parameter	Characteristic
1.	Age to breed gilts	8-10 months
2.	Weight of breed gilts	100-120 kg
3.	Length of heat period	2-3 days
4.	Best time to breed in heat period	Gilts - first day and Sows- Second day
5.	Number of services per sow	2 services at an interval of 12-14 hours
6.	Period of oestrous cycle	18-24 days (Average 21 days)
7.	Onset of heat after weaning	2-10 days
8.	Gestation period	114 days

Selection of Breeding Boar

It is extremely important to select a good boar since it contributes half the quality of the herd. Breeding boar should be selected on the

following criteria:

- Boar should have sound feet with good, full hams, uniform curve at the back and of good length.
- Boar must be selected from sows having 8 -10 or more piglets per litter during weaning and to be a good mother.
- Boar must be selected from the herd which is having normal sex organs, active, healthy and strong.
- Male should be selected before castration i.e. at 4 weeks and select biggest one from the litter.
- Boar must be at least 8 months old at first service.

Care and Management of Breeding Sow

- Allow gilts to move from growing pen to breeding pen at the age of 160 days onwards. Gilts should be involved in exercise and also allow daily exposure to boars which will help to stimulate the onset of estrus.
- Breeding should be delayed until the second or third estrus which increase the probability of large litters and prevent dystocia.
- Gilts that do not conceive after mating for two consecutive estrous cycles should be marketed. Likewise, gilts that have not showed signs of heat by 9 months of age should also be culled and marketed.
- Selected gilts should be given restricted energy diet to prevent overweight conditions.

Heat detection in gilt or sow:

Oestrous cycle in sows/gilts completes in three stages:

- **In first stage:** early heat signs include restlessness, redness and swelling of vulva with white mucoid discharge

- **In 2nd stage (Service period signs)/ Oestrus phase:** It lasts for 40-60 hours. Redness of vulva decreases and swelling with slimy mucus discharge persists. There is tendency to mount on others. The sow or gilt will stand still when pressure is applied to its back (can accept a man's weight sitting on its back. This indicates the right stage to send her to the boar).
- **In 3rd stage:** These are post oestrus-period signs, the sow/gilt will not stand still when pressure is applied to its back and the swelling of the vulva disappears.

How to induce heat – Recommended practices

After farrowing, onset of oestrous may get delayed. Here are a few methods to induce heat:

- Gently stroke the sow's vagina with a freshly cut papaya stalk every morning for 3-5 days.
- Spray the sow's (or gilt's) pen with boar urine every morning for 3-5 days.
- Grind 1 kg of fresh or dried lotus (Semen nelumbinis) seeds. Mix with 20 kg of dry feed. Feed to the sow twice a day for 5-7 days.
- Bring the sow to the boar, or place the sow in a pen next to the boar.
- Put the sow with the boar for a short period every day when the heat is expected.
- Put the sow and boar together just before feeding.
- During her 24-hour pick heat period allow the boar to serve twice, with an interval of about 12-14 hour intervals between services. Do not mate animals during the hot hours of day.
- If the sow doesn't conceive, it will show the signs of heat again in about 3-week's time.
- Give 1-2 kg of feed extra per day 10 days before service. Continue

this for one week after service.

- Each boar should be kept in its own pen to avoid fighting.

Stimulation of heat in gilts and sows

- Early weaning of the piglets (at 4-6 weeks of age).
- Put the sow close to a boar, in a way that makes direct contact (hear, see, smell) possible.
- The sow should not be given any feed on the day of weaning.
- The next day feed about 4 kg/day. This is called flushing (providing high quality feeds, usually grains prior to the start of the breeding to increase reproductive performance) and should be done for a maximum of 10 days or until the service takes place.
- Put the sows in groups (stress stimulates heat)

If still heat onset problems persist, change the type of feed for a few days. Secondly sows should not be too fat or too thin when they are served. It is important to keep this in mind when determining the ration during the suckling period.

Pregnancy Diagnosis method in Sow

- If animal does not show the signs of heat even 21 days after serving
- Echo scan pregnancy detection test 23-35 days after service

Care and Management of breeding Boar

- In order to achieve maximum reproductive efficiency high priority should be given to the management of newly introduced animals into the breeding herd. Good reproductive and nutritional management pays dividends through an increased number of piglets live farrowed and weaned. The following boar and gilt management practices will assist in the maximization of fertility and longevity.

- Upon completion of test, boars should be fed with diet with optimum level of energy that will prevent excessive fat deposition. This practice should help ensure that they are physically adept and sexually active.
- Boars tested individually or in small groups in close confinement should be managed upon completion of the test in a manner to develop physical hardening and to stimulate sexual arousal and libido. Where possible, this should be done before delivery to their new owners and might include the following: a) Shifting boars to different locations. B) Providing fence-line contact with cycling females. This may be especially important where the aggressiveness of the boars precludes mixing them together.
- Although boars tested in large groups and in less confined settings are likely to require less physical conditioning and sexual stimulation before use. They may also get benefitted from exposure to the management procedures recommended for boars reared in close confinement.

Evaluation of breeding boar

To evaluate the reproductive soundness of boars they should be at least 7-8 months of age. The evaluation should be completed before the breeding period. If any problem, boars can be isolated and culled. Mating behavior of boar may be evaluated by bringing gilt in standing heat into the boar's pen and observing the following:

1. **Libido:** Observe the boar's aggressiveness and desire to mate. Boars may need assistance through at least one mating experience.
2. **Mounting:** Boars must have the ability to mount correctly. Sometimes boars mount the front end of gilt and then they should be gently moved to the proper position.
3. **Mating:** Observe the boar's ability to erect the penis and

properly enter the gilt. Examine the boar's penis for normal size and condition. Penis abnormalities encountered occasionally are: (1) adhered or tied penis, (2) limp penis, (3) infantile penis, and (4) coiling of the penis in the diverticulum. These conditions may be inheritable, and boars exhibiting these problems should not be used to produce breeding stock.

4. **Semen:** The simplest way to collect semen from a boar is to allow the boar to mount gilt in standing heat. First place a rubber glove (latex) on one hand and after the boar begins to extend his penis, grasp firmly the corkscrew end of his penis and bring the penis gradually forward once extended ejaculation begins. Collect the entire ejaculate into a wide-mouth container covered with a double layer of cheesecloth to separate the gel fraction. The volume of semen obtained is quite variable between boars but average generally between 200-250 ml (about 1 cup). If the sperm concentration is high, the semen will be milky in appearance. Usually 70 to 80 percent of the sperm should be motile immediately after collection. Low sperm motility is not a serious matter unless the condition persists for several months. Boars that produce semen with no sperm or only a few sperm should be rechecked several times at weekly intervals. If the condition persists, the boar should be culled. The first ejaculate of a new boar may discard and for an accurate test/ evaluation, 2nd onward ejaculation should be used.

5. **Assistance:** Young boars may need some assistance during the early stage of mating. The assistant make sure himself regarding, hands are properly cleaned and fingernails should be properly trimmed.

Allow pigs to mate slowly. The boar may take a minute or more to reach the point of ejaculation.

Culling

Culling is one of the important aspects of management. The unproductive and under productive animals in the farm should immediately be culled from the herd. Pigs suffering from such diseases which is incurable or takes longer time to cure should also be culled. Excess boars may be castrated or culled. Following conditions may warrant for culling of pig:

- Sows having vices, such as biting of piglets, carelessness for young piglets should be culled.
- Piglets having defects like Artesia ani, Prolapsed, Hernia, and Blindness etc should be culled.
- Piglets having poor stunted growth should be culled.
- Gilts having delayed sexual maturity, infertile, failure to conceive, longer farrowing interval, consistently smaller litter size at birth and at weaning should be culled.
- Sows completing fourth farrowing should be culled by maintaining replacement.
- Boars having maximum weight and unable to breed should be culled with proper replacement.
- Sows that are difficult to get in-pig (pregnant) which only manage to rear small litters should be sold.
- Boars which are infertile or moderately infertile should be culled.
- Old age sows and boars should be culled.
- Poor performers should be culled immediately.

Culled sows must be removed from the farm and sold as soon as possible. It does not pay to keep culled sows on the farm to gain weight before they are sold. As soon as the sow's udder has returned to normal after weaning it is wise to send her to the abattoir. A replacement gilt can then be brought into the herd immediately. Sows that farrow regularly and rear

large litters (nine or more piglets) and are free of other problems and diseases should rear five to six or even more litters before they have to be removed from the herd. A sow is usually removed from the herd when her litters start to become smaller (two small litters in succession) or when she does not readily come on heat after weaning

Chapter-3

HOUSING MANAGEMENT

Pig farming requires investment on buildings, equipments, protection against diseases and management care. Initially a small shed with regular water and electricity supply is needed that can be expanded later on. The labour requirement is also meagre. A small farm can be easily handled by the farmer and his family members alone without a helper. However, the actual number of employees required for commercial farming business will depend on the size of the piggery unit. Labourers may be needed for feeding the pigs, cleaning and disinfecting the pig housings, washing the pigs and other duties in a large commercial farm.

Good housing makes management easier and helps the farmer to successfully rear 85 % or more of all the live born piglets to market weight in the shortest possible time. Pigs at different stages of growth need different environments (temperatures). If they are to produce and grow to their maximum potential piglets need special protection against very low temperatures. Growing and reproducing pigs must be protected against high temperatures. The houses must therefore be built in such a way that the pigs are protected against extreme temperatures and other bad weather conditions such as cold winds and continuous rain.

Selection of housing site

- The site should be at an elevated place that keeps water logging at bay.
- The site should be protected from the sun (shade from trees) and have ample fresh air.

- It should be away from residential area (100-500 meters) to avoid any problems to the neighbours.
- In case of a large scale pig farm, the farm site should be well connected to roads.
- Suitable space for manure disposal should be available near the farm site.
- It should be connected to reliable water resources and 24hr electricity supply should also be there.

Construction plan for a good pig house/shed

The important points about the pig house are as follows:

- The floor of the house must be raised about 60 cm above the ground.
- The roof must be rain proof.
- The high side of the roof should face in a direction where some sun can shine a little way into the house on this side but there must always be shade in some part of the house.
- The house must be strongly built.

A pigsty can be constructed cheaply by using locally available materials. It needs to be constructed according to climatic conditions and according to the pig production system.

- The pigsty should be comfortable for the pigs: good ventilation

Well ventilated housing

Housing with proper drainage

and ample shade, no overheating, no smells, no draft and no dampness.

- The building should be constructed with its length axis in an East-West direction (protected from sun and rain).
- The pig building needs to be divided into different pens for each phase of the production cycle. The number and the size of the pens depend on the expected numbers of pigs to be housed in each production phase.

The costs of constructing the pigsty should fit the pig production systems. An efficient pig production is required to cover high construction costs.

Advanced Pig Housing

There are mainly four types of pens/houses in a pig sty

1) Farrowing house: This house is especially meant for sows or gilts which are near to farrowing. It is the most important pen on the farm. One farrowing house is meant is meant for sow and its followers. It has to be designed in such a way that the right temperature is provided for the sow and her piglets during the first seven to 10 days after birth, while trampling and overlying is prevented as far as possible. A creep area must be provided for the piglets. A steel or wooden box, which is large enough for the litter to creep into, can be placed next to the feed trough and the feed passage wall. The creep is important because it helps to reduce deaths as a result of crushing. It also provides a draught-free area where the piglets heat one another. In this way the creep area provides the required temperature of 27 to 32 °C for piglets during the first 10 days of life. Guard rails are provided 25-30cm away from walls and above the floor in each pen. These also avoid crushing of the piglets by the sow. The covered area should be 7.5-9.0 sqm with an open area of 8.8-12.0sqm. A creep area of 2.4m long and 0.75m width is also provided in the house.

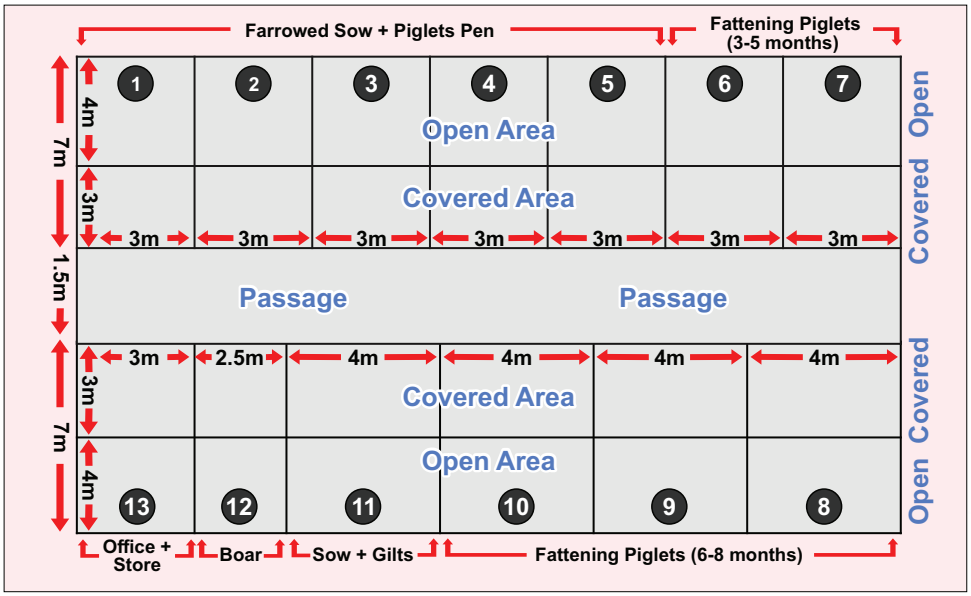
2) Grower/fattener house: A covered area of 0.6-0.8 sqm per grower and 0.8-12.0sqm is provided where a maximum of 20 growers or 15 fatteners can be accommodated. The floor should be preferably pucca/concrete. Open area should be double the covered area.

3) Dry sow: Each dry sow requires 1-1.2 sqm as covered area, with additional double space as open area. Ten dry sows can be accommodated in a pen.

4) Boar house: each boar is kept in separate pen and the space requirement is same as that of farrowing sows. The floor should be made of cement and must not be slippery. It should slope towards the sides and to the front so that urine and waste water can drain into a shallow manure channel at the front of the pen. The walls must be of solid concrete or cement plastered brick. Gates can be made of round iron pipes, with a 20 mm diameter, spaced vertically not further apart than 75 mm. The height of the

gate and also the walls should be 1 400 mm. An under-roof sleep area, about a third of the size of the pen, must be covered in bedding. Straw, grass or sawdust can be used for this purpose. A feed trough is placed in the sleeping area in such a way that it does not get filled with bedding. The trough for each boar should be 450 to 600 mm long, 150 to 200 mm high and 500 mm wide. Cool, clean water must be available at all times on the side where the gate is. The pig will also dung in this area. A small water trough with a ball valve to control the level of the water or preferably a pig-drinking nipple can be used. Make sure that the boar pen is well ventilated and draught free. It is important that the temperature does not rise higher than 22°C for long periods. If the temperature rises above 32°C the boar may become infertile for up to six weeks. On very hot days boars can be kept cool by sprinkling them with water.

A pregnant sow pen should also be constructed. Nineteen days after the gilt/sow have been served by a boar they are again brought into contact with a boar for five to seven consecutive days to make sure that they are pregnant. If the boar does not serve them again, it can be concluded that they



Outline of a pig sty (Source: GADVASU, Ludhiana)

are pregnant and they can then be placed in the pregnant sow house. So, sows are put in the pregnant sow pen about 24 days after service and are only moved to the farrowing pen seven days before they give birth. They stay in these pens for about 85 days. The pens can be similar to dry sow pens (Table 3.1).

Table 3.1: Space requirement for pigs

Pig's Category	Space requirement per animal		Remarks
	Covered area (sqm)	Open area (sqm)	
Fattening pig	0.9-1.8	0.9-1.8	A flat, solid floor is usually made from cement (but not polished to avoid slipping) or from hard soil. The floor should be sloping away to the rear to facilitate cleaning with water.
Pregnant sows	1.8-2.7	1.4-1.8	Pregnant sows need a quiet environment. Therefore individual pens are some- times used for pregnant sows. In hot climates pregnant sows are alternatively housed in small groups.
Lactating sows	7.5-9.0	8.8-12.0	Lactating sows need a quiet environment. Therefore individual pens are used. There should be provision for farrowing pan, heating and cooling arrangements, Piglet nest/ box, creep feed /starter feed for piglets
Weaner piglets	0.9-1.5	0.9-1.5	A flat, solid floor is usually made from cement (but not polished to avoid slipping) or from hard soil. The floor should be sloping away to the rear to facilitate cleaning with water
Breeding boars	6.0-7.5	8.8-12.0	Special care is required to prevent boars from escaping to the gilts and sows that are on heat




Grower/ Fattener pens

Sanitation & Hygiene

- The floor should be maintained dry.
- The feeder should be cleaned daily with clean water. The feeder could be sanitized using 5% KMnO4 (Potassium Permanganate).
- The floor & walls shall be cleaned daily with KMnO4 (Potassium Permanganate) (2.5 gm per litre of water).
- Visit of outside persons shall be strictly prohibited near the pig sty.
- The area around the pig sty (i.e. road/path) must also be sanitized regularly with KMnO4 solution.
- Keep the clothes separate while working with the animals & don't mix them with other ones.

Chapter-4

CARE AND MANAGEMENT OF DIFFERENT CATEGORIES

Almost 50 % of the pigs that die on a farm, die before they are 14 days old. Good management in the farrowing house, where the piglets are born and kept for the first 28 to 35 days of their lives, is therefore of the utmost importance. Make sure that all piglets suckle a teat as soon as possible after birth to take in colostrum. The first milk produced by the sow immediately after the piglets are born is known as colostrum. The colostrum enhances the passive immunity and protect the piglets against diseases during the first few weeks of their lives.

If a sow has more piglets than the number of teats she has, the extra piglets can be placed with another sow with a smaller number of piglets. This can only be done if the piglets of the sows are born within a few days of each other. Sometimes a sow does not accept her own piglets, usually as a result of birth shock (often seen in sows having their first litter of piglets). If this happens the piglets can be taken away from the sow for a few hours. If she still refuses to accept them they should be placed with another sow if possible. If another sow is not available to rear the rejected piglets, they can be reared artificially on cow or goat's milk. The piglets can be given additional feed of goat or cow's milk, or a mashed bean porridge to which a little sugar can be added. However, artificial rearing takes time and hard work, because the piglets do not always grow and perform well in this manner.

Care and Management of New Born Piglets

A few minutes after the birth, the umbilical cord should be cut to about 5 cm length away from navel. The navel cord of piglet should be

Suckling Piglets

soaked in iodine solution to prevent inflammation and other infections. Each piglet should be rubbed carefully and dried with a cloth.

Piglets should be kept under strict hygienic condition to protect from piglet scour. Antibiotics and fluid therapy should be given in cases of diarrhoea. Starter ration should be provided from 3rd week onwards and weaning should be done at 30 - 42 days of age. Castration of male piglets should be done 10 days before or after weaning. Castrated males grow faster and fat deposition is slightly higher than the uncastrated one. Castrated males are devoid of boar tan.

Important management practices for Piglets

1. Teeth Trimming

It is usually necessary to trim the piglets' teeth to prevent them biting the udder. The piglets are born with needle sharp teeth which may injure the sow's udder. The sow is unable to allow piglets for suckling milk and the piglets get starved. Only the points of the teeth should be removed on the same day of birth. While trimming the teeth the tongue of the piglets should

Clipping of needle teeth

be rolled back to avoid injuring it.

2. Management of Anaemia or Iron deficiency

Anaemia is caused by iron deficiency. This iron is needed for the formation of haemoglobin. This is an important problem, especially for young piglets kept indoors. At birth the piglets have about 50mg of iron in their body. They receive additional 1-2 mg/day from milk while they need 7mg during the first week. It is obvious that the quantity of iron decreases rapidly and if not supplemented. The piglets become very pale a few weeks after birth and their growth slows down. This can be prevented by:

Oral Iron Supplement: Oral Iron Supplement is an iron supplement for newborns. The manufacturing of Oral Iron Supplement uses a special chelated process that bonds the available iron, thus allowing the piglet's system to safely absorb the iron in order to raise and maintain adequate blood iron levels.

The ideal method of administering Oral Iron Supplement to the newborn piglet and it is to rub the liquid iron onto the udder of sow. As the piglets move from teat to teat they will slowly absorb the iron thus reducing the chances of any toxic reaction due to excessive amounts of iron. No injections are required when using Oral Iron Supplement thereby eliminating chance of toxic reaction due to iron dextran.

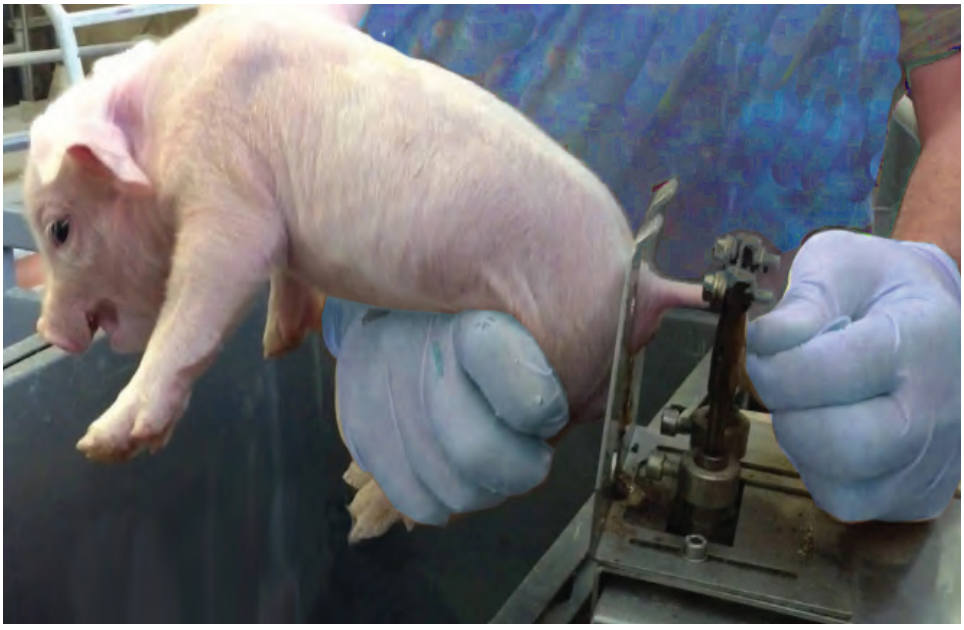
a) **Oral iron**- paste containing iron is put in the mouth of piglet within 24 hours of birth.

b) Iron Injection: Inject iron preparation to the piglet (on 3 and 13 days after birth) and iron injection (1 and 2 ml respectively) IM preferably at neck muscles.

c) Wood ash can also put into the pen. This will not provide iron, but it contains other important minerals.

3. Tail Cutting/ docking

Cut the tip of the tail within 4-7 days. This prevents tail chewing, which can lead to infections. A piece of chain can be hung down from the ceiling for the piglets to chew.



Tail cutting/docking

4. Creep Feeding

Young piglets from 7 days onwards should have high protein feed available to them. This has to be fed in a small area where the mother cannot eat the feed. The feed conversion rate of young piglets is very high and thus creep feeding is particularly economic. Creep feeding helps the piglets to get used to feeding at an early age.

5. Weaning

Successful early weaning of pigs requires skill and attention in overall all areas. Weaning is a great challenge to the young pig. Knowledge of the nutrient requirements, health status and growth patterns for modern breeds of early-weaned pigs continue to develop. Early weaning of piglets at 14-21 days increases sow productivity through the potential increase in the number of litters per sow per year.

6. Castration

All male piglets in the farm meant for fattening should be castrated. Castrated males grow faster and fat deposition is slightly higher than the uncastrated one. Castrated males are devoid of boar tan. Male piglets are castrated to prevent their meat from boar taint. Castration also makes them more manageable when they become sexually mature.

Castration should be done in the first two weeks of a piglet's life preferably 10 days before or after the date of weaning to avoid extra stress at weaning. The animals should be fit and healthy. If this is not the case it is better to postpone the operation. Two people are needed when castrating a piglet.

One person will carry out the small operation and the other person will hold the piglet. The pen should be dry and very clean to prevent infection to the wound. The knife should be thoroughly cleaned with a disinfectant. One person takes the pig by the hind legs and holds it firmly between his or her legs. The piglet's head should point towards the ground.

Castration

Winter Management of Piglets

In cold weather, a small area can be heated with an infrared lamp. This keeps the young pigs warm. It helps prevent pneumonia and crushing as the piglets tend to stay under the lamp when not feeding.

Rearing Motherless Piglets

It is very important that newly-born piglets receive colostrum straight after birth to build up their natural resistance. Colostrum is the first milk that the sow produces after farrowing. If they get no colostrum, their chance of survival is very small. If the sow dies whilst farrowing, the colostrum will have to be taken from another farrowing sow for the piglets.

Cow's or goat's milk can be given to the piglets. This is after the piglets have taken colostrum. The milk should not be diluted, as sow's milk is very concentrated. It should be warmed up to slightly above body temperature (37°-40°C) in a pan lowered into a larger pan containing boiling water. Feeding piglets whose mother does not produce enough milk all piglets should be separated as soon as introduction is done so that the foster mother doesn't recognize its own as foreigners. In case of mortality of sow the piglets, they will have to be given extra food by hand. Cow's milk can be given to the motherless or orphaned piglets.

Feeding program of Motherless Piglets

For the first two days the piglets should be fed at regular intervals 5 times a day, for about 10 minutes each time. On the third and on the fourth day they should be fed four times a day, and after that 3 times a day. After 14 days, increase the quantity of milk at each feed, but gradually decrease the number of feeds per day. Gradually change over to more solid feed, so that by the age of about three weeks they should be able to take regular feed (Table 4.1). If no nutritious feed is available they should continue on milk for a while longer. The weaker ones can be fed four times a day for a longer time. The figures in the table are maximum quantities - it is better to give too little rather than too much feed. There should be a continuous supply of water,

Table 4.1: Feeding program for orphan piglets

Age (Days)	No. of feeding times	Quantity each time (ml)
1	5	30
2	5	45
3	4	60
4	4	70
5 - 7	3	90
8 - 9	3	120
10 - 11	3	140
12 - 14	3	160

which should be boiled to avoid any contamination. As soon as possible, the orphan piglets should move onto regular food. This should be of good quality, protein-rich, and easily digestible. Note-despite the amount of care they receive, hand-reared piglets will never grow as fast as those reared by a mother sow.

Care for Pregnant Sow/Gilt

The sow/gilt should be dewormed 15 days before the expected date of farrowing. The sow/gilt should be transferred to the farrowing pen 2 weeks before the expected date of farrowing. The farrowing pen should be cleaned and disinfected properly before transferring the pregnant sow/gilt. Light bedding materials should be provided during winter season. Arrangement of heat may be made in extreme cold. Sufficient clean water should be supplied throughout the day and nights observe the sow/gilt constantly during the last 2-3 days of expected date of farrowing and allow her to farrow normally. Care at and after farrowing: Feed should not be provided to the sow before 12 hours of farrowing. Veterinary aid should be called for only when there is farrowing problems. Wipe the piglets with a clean cloth to remove the phlegm. Immediately after farrowing, teats of the sow should be cleaned with dilute Potash solution and allow new born to

suck colostrum sufficiently. The Naval cord should be tied and cut at 2.50 inches away from the body and apply Tr. Iodine. Once the farrowing is over, the placenta should be removed from the pen and the animal and pen are to be washed with a mild disinfectant solution. Weak piglets should be assisted/helped to suckle the mother Needle teeth (4 pairs) of the piglets should be clipped at least 12 hours after birth with the help of a tooth cutter (Nipper) to prevent teat injury of the mother.

Care and Management of Boar

Boar should be housed in individual pen. Boar should be put in service when it attains 8-9 months of age. Feed should be provided after service not before service. Boar sow ratio should be 1:3 in small/ medium herd. Allow the boar for outdoor exercise regularly. Periodical tests for Brucellosis and Leptospirosis should be conducted.

Care and Management of Growing and Finishing Animals

This period ranges from weaning to the age of slaughter. Males, females and castrates can be fattened for meat purpose. Growers may be grouped according to sex, size and weight. As many as 5 pigs can be housed together (80-100 sqft) for fattening. Slow growers and weak pigs should be culled as early as possible. During summer, cold water should be sprinkled over the body or animals may be allowed for wallowing. Piglets should be dewormed at weaning and repeated at 3-4 months intervals. Pigs should be given complete feed to attain maximum growth.

Selection of Replacement

- Boars must be replaced when they become too large to serve most of the sows on the farm.
- Boars usually have a maximum working life of between 18 and 24 months. This means they should be replaced when they are 30 to 36 months old. It is very important to keep record of the boars' use so that infertile ones can be detected and replaced as soon as possible.

- A low sex drive (libido) can also be a problem. Some boars are slow workers and are sometimes reluctant and only now and then willing to work. Attention must be given to these boars so that they can be replaced if necessary.
- If replacement gilts are not available when needed or if they do not comply with the requirements, the gilts should be bought. It is advisable to buy them from the same farm where the boars come from, because in this way the previous owner can advise you on the breeding policy for a small pig farm.
- Culled sows must be removed from the farm and sold as soon as possible (Table 4.2). It does not pay to keep culled sows on the farm to gain weight before they are sold. As soon as the sow's udder has returned to normal after weaning it is wise to send her to the abattoir. Replacement gilt can then be brought into the herd immediately.
- Reasons for removing sows from the herd are usually not known beforehand. Therefore, replacement gilts should always be available so that the number of breeding sows on the farm always remains the same. Some of the major reasons for culling are reported by big piggeries:

Table 4.2: Major reasons for culling of animals

S.No.	Reasons for culling	% of sows to be culled
1	Not pregnant	17
2	Failure to conceive at service	12
3	Do not come in heat	5
4	Abortions	6
5	Lameness	12
6	Poor performance (small litters, etc)	14
7	Old age	25
8	Disease	4
9	Lack of milk	5
Total		**100**

- Sow that farrows regularly and rear large litters (nine or more piglets) and are free of other problems and diseases should rear five to six or even more litters before they have to be removed from the herd. A sow is usually removed from the herd when her litters start to become smaller (two small litters in succession) or when she does not readily come on heat after weaning.

Pregnant sow in farrowing pen

Chapter-5

FEEDING MANAGEMENT

Pigs are omnivores which mean that they consume both plants and animal feed sources. Wild pigs are foraging animals, primarily eating leaves. In confinement, pigs are fed mostly concentrate diets which consist of different feed ingredients combined to provide rations. Pigs need balanced feeding which is necessary for growth, body maintenance and the production of meat and milk.

This will ensure its optimum reproductive efficiency, growth efficiency, feed utilization and better meat quality, thus maximizing the profits of the pig business. If one fails to give the proper feed to pigs then there will be substantial loss of the slaughter weight targets and the desired meat quality of the pork. This may lead to a loss in the business. It should be noted that, pigs require different types and amount of feed depending on which stage of growth they are at.

Feed such as green forage, seasonal fodder, kitchen waste, dry concentrate feed etc. can be fed to pigs. But in order to achieve high growth rate and good meat quality, pigs should be reared on concentrate feed including the pellet one. As kitchen waste, garbage or green fodder doesn't provide sufficient growth rate as well due unhygienic condition of the waste, chance of disease occurrence increases that reduces the quality and consumption of meat.

One has to select most economical ingredients for preparing feed. The basic ingredients of pig feed are oat, grains, maize, wheat, rice, sorghum and other millets. Supplements like oil cakes, fishmeal, meat meal, mineral supplement and vitamins can also be added to the feed for better results.

The nutritional needs of pigs can be divided into six categories or classes of nutrients: carbohydrates, fats, proteins, vitamins minerals and water. These nutrients can be supplied through various ingredients:

Rice Bran: is very suitable for pig feeding. It contains 11% protein and can be used as the main ingredient. Rice bran can be mixed with other feeds to 30 - 45%. Rice bran can be kept no longer than 1 month because after that it can become mouldy.

Broken Rice: is very suitable for pig feeding. It can be mixed with other feeds up to 15 - 20%. Broken rice contains about 8% protein.

Maize: is a very good animal feed. It contains up to 65% carbohydrates and 9% protein. It can be mixed and cooked with other feeds, but not more than 40% in the mix ration.

Soybeans: is a beans crop which has a high nutritional value and is very good for pig feeding. It contains 38% protein (very high). It should be dried, milled or well-cooked in combination with other feedstuff like rice bran, broken rice and maize.

Wheat Bran: is particularly rich in dietary fiber and contains significant quantities of carbohydrate, protein, vitamins, and minerals. Wheat Bran and is widely used as a major component animal feed. It contains; Protein 14% to 16%, Fat Max 9.5%, Crude Fiber 8.0 to 10.0% and carbohydrate up to 25%.

Root Crops: are being used for pig feeding, they can be mixed with other feeds up to around 10 - 20% (never more than 30%). First it should be peeled and washed and then sliced, dried and ground before use. It should not be fed to pigs as raw cassava with the skin, because of toxic substances.

The sliced and dried cassava can be kept longer.

Fruits: Fruits damaged during transportation, storage and handling are used as supplementary feeds for pigs by boiling and mixing with other feeds such as rice bran, broken rice and maize. They can also be given fresh.

Suitable fruits are: Banana, papaya, apple, pear, melons etc.

Vegetables: Vegetables damage during transportation, storage and handling are used as supplementary feeds for pigs by boiling and mixing with other feeds such as rice bran, broken rice and maize. They can also be given fresh. Suitable vegetables are: cabbage, lettuce, spinach, morning glory, sweet potato vine, spinach, morning glory, sweet potato vine, cola-cassia (needs boiling), pumpkin, guards, water hyacinth etc.

Types of ration for pigs:- According to the age of the animals there are four types of rations for pigs. These are known as Creep, Starter, Grower and Finisher rations (Table 5.1).

Table 5.1: Time of introduction of different types of rations

Type of ration	Ration to be fed to
Creep Ration	Introduced at 7-10 days of age upto 21 days
Starter Ration	From 22 day to 60 days
Grower Ration	From 2 months to 5 months of age
Finisher Ration	After 5 months to 8 month of age

Creep Feed

Creep feed is the baby piglets' first and most important dry feed. It contains 20% protein It is highly fortified with milk by-products and is available in small, chewable, highly palatable pellets for easy digestion. It is a combination of carbohydrate source, protein source, milk replacer, vitamins, amino acids and minerals. This makes it a complete feed and ideal start for young healthy piglets. Over all corn, soya bean meal, barley, wheat bran, vegetable protein, oilseeds extracts, fatty acids, feed phosphate, pig vitamins, and trace minerals are the main constituents of creep feed. Apart from this clean drinking water must always be available.


Feeding of concentrate mixture

Daily Feed Requirements

Dry/pregnant Sows and Gilts: Dry sows and gilts are given 2.5/kg day of sow and weaner meal. Give extra 1kg/day one week before serving gilts and sows and one week after service. Give lactating sows 2.5 kg/day of sow and weaner meal for maintenance and 0.25 kg/day extra for each piglet being suckled.

Feeding of Lactating/ nursing Sows: The requirements of the lactating sow are greater than those during gestation period. Daily 2 to 3 Kg ration for maintenance coupled with additional 200 to 500g of ration for each sucking piglet is to be given to the sow till weaning of the piglets.

Boars: Breeding boars should be kept in a thrifty condition. Protein in boar ration should be about 16 percent. Boar should not be too fat as it weakens leg and breeding ability. Boar should be given regular exercise to keep in good health. Give boars 2.0 kg/day of concentrate mixture. If the boar is regularly used increase it to 2.5 Kg.

Piglets: Give creep pellets i.e. 0.5-1.00 kg/day from day 7 up to weaning time (21 days) per piglet. The feed should be mixed with sow and weaner meal the last one week before weaning.

Growing and Finishing pigs: Pigs are weaned at 3-5 weeks of 11-13 kg body weight should continue being fed on the starter diet until they reach

Table 5.2: Ration for different categories of pigs

Ingredients	Pig weight 15-30 kg	Pig weight 30-60 kg	Pig weight over 60 kg
Soya beans (kg)	25	20	15
Rice bran (kg)	25	30	35
Maize (kg)	20	25	30
Broken rice (kg)	5	5	5
Wheat bran (kg)	20	15	10
Leucaena tree leaves (kg)	5	5	5
Total (100 Kg)	**100**	**100**	**100**
Crude protein (%)	**16**	**15**	**14**

18 kg live weight. Pigs weaned at 7 weeks or older may be switched gradually to sow and weaner diet. For growing or finishing pigs all ration changes should be made gradually. If this is not possible the feeding level of the new diet should be low until the pigs become accustomed to it. Where post-weaning scours are a major problem, restricted feeding during the first week after weaning may reduce the incidents of scours. For treatment in case of an outbreak of scouring, medication through drinking water is preferable since sick pigs go off feed (Table 5.3).

Table 5.3: Feeding Rates by Age and Expected Body Weight Gain

Age (wks)	Body weight (kg)	Feed kg/day	Feed type
8-10	12-15	0.66	weaner/starter
10-12	15-20	1.0	weaner/grower
12-16	20-40	2.0	weaner/grower
16-18	40-50	2.5	Finisher
18-24	50-84	3.0	Finisher
24-28	84-105	3.5	Finisher

NB: When feeding animals any sudden changes can lead to loss of production. Thus any changes in feed or feeding schedule should be as gradual as possible.


Concentrate mixture and roughage feeding for pigs

Other Feeding Resources

Feeds should meet the animal's needs for maintenance, growth and reproduction. Good pig feed contains sufficient energy, protein, minerals and vitamins. Rice bran, broken rice, maize, soya-beans, cassava, vegetables and distillers' residues are often used in pig feed. Distillery waste is much appreciated in the traditional pig husbandry, especially for fattening pigs. It is advisable however, not to give this high valued feed to pregnant and lactating sows and to piglets and weaners because of the alcoholic contents in the waste.

Feeder Trough Size

The feeding trough should be firmly anchored to the floor to prevent overturning and wasting feed. Size of feeding trough for different age and purpose is given in the table 5.4. Good pig appetite is important. Pigs will eat more fresh clean feed than if it is contaminated, stale or mouldy. Clean feed

Table 5.4: Feeding and watering spacing requirement

Pig categories	Length	Width	Height
Suckling piglet	15-20 cm per pig	20 cm	10 cm
Fattening pig	30-35 cm per pig	20 cm	15 - 20 cm
Pregnant sow	40-50 cm per pig	35-40 cm	15 - 20 cm
Lactating sow	40-50 cm per pig	35-40 cm	15 - 20 cm
Breeding boar	40-50 cm per pig	35-40 cm	15 - 20 cm

troughs daily. Sufficient feeder space is necessary, so each pig can eat what it wishes every day. On many farms feed waste is 15% or more that increments the cost of production, hence, feed wastage must be avoided as much as possible. On time feeding of pigs makes them familiar to the feeding regime. Pigs need to be fed according to their sizes and ages. Troughs must be anchored so they cannot be turned over

Water and Drinker

All pigs need sufficient clean drinking water. Per day requirement of water at pig farm for different categories of pig are given below as table 5.5 and 5.6. Ample clean water must be available to drink at all times. The watering system like open water trough, bowls and nipples are used for drinking water at pig farm. The feeding trough can also be used to supply water. Generally, at large pig farms automatic drinkers are used (bowls or nipples).

Table 5.5: Daily water requirement for different categories of animals

Category	Daily water requirement
Pregnant Sow	10-12 liters
Lactating Sow	20 - 30 liters
Growing Pig	6-8 liters
Boar	12-15 liters

Different types of drinking water arrangements

Table 5.6: Economical rations for weaners and fatteners

Ingredients	Grower ration 2-6 months age			Fattener ration above 6 months	
	1	2	3	1	2
Maize	25	15	-	-	-
Wheat	-	-	10	15	-
Barley	-	-	16	-	-
Rice Bran	50	36	50	60	75
Molasses	-	5	-	10	10
Wheat Bran	-	20	-	-	-
Groundnut cake	19	18	18	10	10
Fish meal	4	4	4	3	3
Mineral mixture	2	2	2	2	2
Vitamin (g)	15	15	15	15	15
Antibiotics (g)	+	+	+	+	+

Feeding During Pregnancy

- High Protein diet should be given during the pregnancy
- Dense energy diet leads to deposition of excess fat in the hind quarters resulting in painful farrowing & may lead to death of Piglets during Farrowing
- The dies must be adequately fortified with Mineral Mixture, Salts & Vitamins
- The rearers may go for increase Oil Seed Cake content & mixing more than one kind of grains & oil seed cakes
- A pregnant sow requires 8-12 ltrs. of water daily, clean potable water should be made available round the clock to the pregnant sow
- Thumb rule for water requirement is: 3.5-4 times the weight of feed consumed
- Most vitamins and minerals if markedly deficient in their diet will cause problems which can be severe as termination of

pregnancy.

- Vitamin A alone has a permanent effect on the function of the uterus. Due to deficiency of it, embryos may die before implantation because the uterine glands do not produce sufficient fluid nutrient or the so-called "uterine milk"
- High levels of feed intake during the first 3 weeks of gestation may have a negative impact on embryo survival, particularly in gilts. Therefore, feeding must be restricted especially if a high energy ration is used (Table 5.7). Limiting feed intake to 4 to 4.5 lbs. per day during the first 21days post breeding may be a safe practice.
- The development of the mammary gland reaches the critical stage between 75 to 90 days of gestation period. During this period, the proliferation of secretory cell ocdetermine cell number and ultimately milk synthesis capacity in the subsequent lactation. As excess energy intakes reduce cell numbers, high level of feeding should be avoided.
- Foetal weight gain will increase substantially during 90 to 115 days of gestation period and consequently nutrient requirements of the sows also increases
- Threats of High Weight/ Very high level of feeding: Excessively fatty sows are prone to suffer from farrowing complications such as weak uterine contractions of narrow inelastic vagina; hence stillborn or weak pigs appear more frequently during farrowing. Generally, they also have poor mothering ability because they are clumsy and tend to crush their piglets.

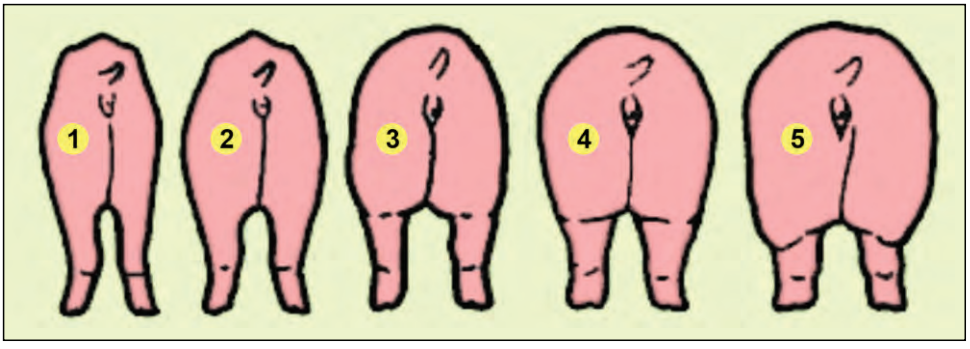
All these and other factors are suggestive of the importance of proper feeding of pregnant sows for the production of large litter. The detrimental influence observed on full-feeding pregnant gilts or sows on embryo survival is due to high energy feeding during the first three or four weeks of

Table 5.7: Level of feeding at different phases of gestation

Gestation phase	Feeding level
Wean to breeding	Ad libitum (As much as the animal could eat)
Breeding to 21 days	2-2.25 kg
21 days to 75 days	2-4 Kg
75 days to 90 days	2-2.5 kg
90 days to 115 days	2.25-3kg

gestation when most of the embryo losses usually occur .

During pregnancy, feeding must be aimed at bringing the sow to right body condition score (ideal BCS is 3), neither thin nor too fatty, enabling it to be able to start a very demanding lactation period after the pregnancy (Table 5.8). Feeding should also aim at proper growth of the foetuses as high birth weight is important for survival being the light-weight piglets having poor viability.



Body condition score in pigs

Table 5.8: Assessment of BCS

Body Condition Score	Condition	Body shape
1	Emaciated	Hips, backbone prominent to eyes
2	Thin	Hips, backbone easily felt without applying palm pressure
3	Ideal	Hips, backbone felt only with firm palm pressure
4	Fat	Hips, backbone cannot be felt
5	Overfat	Hips, backbone heavily covered

Chapter-6

DISEASE MANAGEMENT

Healthy pigs are very important for performance of pig and success of a pig farm. A pig farm can be affected with certain diseases cause a big loss to the pig owners. Sick pigs generally have the following signs:

- It may not eat or not show interest in feed / water
- It may breathe rapidly indication of a fever
- In white skin-colored pigs the skin may become reddish
- It may have diarrhea which may sometimes be bloody or blood stained
- Droopy ears or ears pointing downwards
- Dull eyes
- Dull skin and hair
- Its tail will become limp
- Separates itself from the rest

Causes of Disease in Animals

Knowledge of what causes disease, and of how animals can get a disease, helps us to know how to prevent disease and to treat sick animals.

Common diseases of pig are categorized in different heads like bacterial disease, viral disease, parasitic disease and nutritional diseases etc.

Parasites: Parasites are organisms that have to live on or in other organisms, such as animals, in order to survive. Most parasites are easy to see, although some mites and the early stages of worms can only be seen under a microscope. External parasites Mites like flies, lice, fleas, ticks and

mites can cause serious diseases in animals. Some live on the animals for their entire lives, others only spend part of their lives there, while others only visit to feed. They can result in irritation and skin damage in animals. Some parasites can also pass diseases such as three- day stiffsickness between animals.

Internal parasites: Tapeworm Internal parasites (including roundworms, flukes and tapeworms) can cause serious diseases and loss of production in animals. They usually live in the stomach and intestines but also in other parts of the body such as the lungs and liver.

Microbes (germs): Microbes (germs) are usually too small to be seen with the naked eye, and only a microscope will enable you to see what a microbe looks like. Some microbes are harmless. For example, bacteria surround animals and people, and they even live on our skin and inside our nose, mouth and stomach, but these bacteria do not normally cause problems. Some microbes are even helpful, such as the ones in our gut which help us to digest food. Many different microbes can cause disease in animals, but there are four main types

Viruses: Viruses are the smallest of all microbes They must live inside cells in order to survive and breed. Viruses cause about 60 % of disease outbreaks in animals and humans. Examples of diseases in animals caused by viruses are rabies, Newcastle disease and three-day stiffsickness. It is difficult to treat diseases caused by viruses because the viruses live inside animal cells. Therefore, any medicine that can kill the viruses will also harm the animals in which the viruses are present.

Bacteria: Bacteria can live in animals and in the environment. Not all bacteria cause disease. People and animals have bacteria living on and in them that do not cause disease. Examples of diseases in animals caused by bacteria are anthrax, blackquarter and tuberculosis Bacteria can infect wounds, and that is why wounds should be treated.

Fungi: Fungi occur widespread in the environment (soil, air and

water) and include mould on stale food and mushrooms. Fungi need to grow on organic material in order to feed, and this can include animals and people. An example of a fungal disease in animals is ringworm. Some fungi are normally harmless, but can cause disease in some situations, especially after prolonged use of antibiotics. Some fungi can also produce toxins or poisons which can be a problem when food becomes stale or wet.

Protozoa: Some protozoa can live outside cells, especially the type that causes trichomonosis, a venereal disease in cattle. Others need to live inside cells, and include those causing coccidiosis, redwater, heartwater and gallsickness. Animals can be poisoned by chemicals (such as insecticides and dips), poisonous plants and fungal toxins. They can also be poisoned when bitten by snakes, scorpions and spiders.

Poisoning: Animals can be poisoned by chemicals (such as insecticides and dips), poisonous plants and fungal toxins. They can also be bitten by snakes, scorpions and spiders.

Dietary problems: Lack of enough food or lack of a particular part of the food (such as phosphorus) can also cause disease. Malnourished animals may develop other diseases because they are weak. Metabolic diseases Metabolic diseases are an upset in the normal functioning of the animal (that is not caused by infection, poisoning or feed deficiencies) and usually result from intensive animal production. An example is milk fever in highly-productive dairy cows.

Congenital diseases: In some cases animals can be born with a disease. Some of these may be inherited (passed on from the parents). This is rare, and inherited diseases are usually seen at birth. An example is congenital hydrocephalus, which is a swelling of the brain caused by fluid, and can be clearly seen as a swelling of the head.

Environmental diseases: Environmental problems, such as littering, contribute to some diseases, for example, animals may eat plastic bags or wires and this can harm the animal's health. Allergies: Some diseases are

caused by allergies, which is when the body's own immune system attacks part of the body.

Degenerative disease: Some diseases are caused by parts of the body breaking down, particularly as an animal becomes older.

Birth Diarrhoea

Symptoms

Acute diarrhoea in piglets is watery, yellowish grey and within a very short time piglets become thin with sunken eyes due to dehydration. Death can occur within 2 - 3 days. Death in piglets can occur even within one day before any sign of diarrhoea is observed.

Prevention

- Keep pens, feed and watering troughs clean.
- Separate affected animals from healthy animals.
- Do not change abruptly an animal's ration.
- Make sure that piglets have sufficient colostrum within 36 hours of birth

Treatment

- Plenty of drinking water with electrolytes
- Antibiotics therapy
- Herbal medicine: Fresh leaves of guava or star apple. This will treat the symptoms only.

Endometritis (bacteria)

Symptoms

- Vulval discharge of virginal or uterine origin during urination.
- In case of metrititis, fever and agalactia may occur.

Prevention and treatment

- Antimicrobial by injection or locally by inigation of the uterus and vagina, oxytocin can be given to stimulate uteric contractions

once or twice a day.

- Hygiene.

Diseases and Disorders of Digestive Tract

Red Diarrhoea or Clostridial Enteritis

Symptoms

- Acute haemorrhagic or necrotic inflammation of the gut during the first and second week of birth.
- In acute cases the diarrhea is watery with an orange-red color due to blood and it is often bubbly.
- In later stages, shreds of dead tissues can be found.
- Piglets are weak and don't suckle. They get pale and die within a few days.

Prevention and treatment

- Make sure that piglets have sufficient colostrums within 36 hours of birth
- Keep the pigs warm
- Cleanliness
- Contact the veterinary

Transmissible Gastroenteritis

Transmissible gastroenteritis is a common viral disease of the small intestine that causes vomiting and profuse diarrhea in pigs of all ages. It spreads rapidly. Affected piglets less than one-week old rarely survive.

Symptoms

- Very high mortality mainly in piglets upto 14 days old.
- The piglets often vomit and have severe greenish-yellow watery diarrhoea, dehydration.
- In sows the diarrhoea is greyish, they vomit, abortion may occur.
- In fatteners the symptoms are like those in sows.

Prevention and treatment

- Give electrolytes to piglets and keep them warm.
- Antibiotics prevent secondary infection but don't provide a cure.

Fat Diarrohea

Symptoms

- Faeces are pasty and fatty, white or yellowish

Prevention and treatment

- Stop feeding creep feed for a few days.
- Use antibiotics as prescribed by a veterinary doctor.

Salmonellosis

Symptoms

- High fever, dullness, anorexia, weakness, nervous symptoms.
- Bluish-red coloring of the ears, limbs and the centre of the belly.
- Bloody spots all over the body.
- Wasting and persistent grayish diarrhea sometimes mixed with blood and shreds or necrotic material from the gut.

Prevention and treatment

- Normal hygienic measures pelleted feed, thorough cooking of the swill.
- Remove feed for two days and provide clean water.
- Use antibiotics as prescribed by a veterinary doctor.

Swine Dysentery

Known by a number of names, including bloody diarrhoea, hemorrhagic enteritis bloody scours and black scours. It affects pigs of all ages, sometimes causing death.

Symptoms

- In acute cases wasting and passing of diarrhoea containing

varying amounts of mucus, blood and necrotic material.

- Fever.
- In chronic cases, pigs have greyish or brownish faeces, rough hair coat and low growth rate.

Prevention

- Delay reusing the pens of infected animals.
- Disinfect pens.

Treatment

- Some herbal medicines (moringa tree leaves) can be used to relieve the symptoms of diarrhoea and dehydration
- Use antibiotics as prescribed by a veterinary doctor

Reproductive Disorders and Diseases:

Brucellosis

Symptoms

- Anorexia, fever, stiff legs, occasional lameness, early abortion (returns to oestrus 5 - 8 weeks after service as a result of infection of service)
- Infection later in pregnancy gives rise to litter with mummified, still born or weak piglets.
- Bloody vulva discharge and endometritis.
- Retained placenta.
- Boars usually develop orchitis (inflammation of one or both testicles) and epididymitis within seven days of infection.
- The testicles are swollen and painful and permanent sterility can be the result.

Prevention and treatment

- Prevention is based on hygienic measures and purchase of stock from clean herds only.

- Never treat by antibiotics.
- No treatment/vaccination is 100% effective
- Slaughter all animals and do restocking. Restocking should be after one month.

Mastitis

Bacterial infection causes an inflammation of the mammary organ and results in changes in milk production. These bacteria enter the wounds in the udder.

Symptoms

- Swollen, hot and painful udder.
- Absence or reduction of milk in the affected udder.
- Sow refuses to suckle her piglets. As a result, piglets squeal due to hunger.
- Sow has depression and often fever.

Prevention

- Provide adequate bedding
- Keep pig pens clean, dry and free of sharp objects, clip milk teeth of baby pigs.

Treatment

- Gently massage the affected udder with lukewarm water. Do not allow the young to suck milk from the infected sow. Remove the milk from the infected udder and discard.
- Separate sow from piglets and reduce access to teats (allow a few piglets to suckle at a time). If possible, foster piglets to lactating mothers.
- Use antibiotics. Inject penicillin-streptomycin into the muscle of hip or neck.

Diseases of the Respiratory Tract:

These include Influenza, pseudorabbies, pneumonia and pasteurellosis.

Influenza

Symptoms

- Affected animals are apathetic.
- Anorexia
- High fever, coughing and sneezing, difficulty in breathing
- Red eyes with discharge
- Loss of condition.

Prevention and treatment

- Good ventilation.
- Vaccination.
- No specific treatment. To prevent secondary infection, use antibiotics as prescribed by a veterinary doctor.

Pleural Pneumonia

Symptoms

- Acute cases show anorexia, high fever, laboured respiration, red or blue colouring of ear-tips, belly, legs and end of tail.
- Death within 4 - 6 hours of onset of clinical symptoms.
- Blood stained froth from mouth or nose.
- Abortion.
- In chronic cases, anorexia, coughing and depressed growth rate.

Prevention and treatment

- Vaccines only prevent mortality.
- Use antibiotics as prescribed by a veterinary doctor.
- Atrophic rhinitis (inflammation of the nose)

Symptoms

- Sneezing in younger pigs
- Shortening or deviation of upper jaw - poor growth

Prevention and treatment

- Hygiene
- Use antibiotics as prescribed by a veterinary doctor

Streptococcal infections

Symptoms

- Septicaemia (blood poisoning) which may cause immediate death.
- Young pigs rarely recover
- Sudden death in older pigs.
- Fever, nervous signs and arthritis mostly in weaners and fatteners.

Prevention and treatment

- Proper hygiene. Wash sow before it enters the farrowing pen.
- Use antibiotics as prescribed by a veterinary doctor.

Nutritional Disorders:

Anaemia

Symptoms

- Pale skin, weak piglets with high respiratory rate.
- Jaundice
- Blood stained faeces.
- Early death

Control and treatment

- Provide iron injection or oral iron- paste containing iron
- Feeding compost- must be of good quality and supplied daily.

Compost of poor quality may contain bacteria.

- Wood ash can also be put into the pen. This will not provide iron, but it does contain other important minerals.

Foot and Mouth Disease (FMD)

Foot-and-mouth disease is an acute, highly contagious, viral of animals with hooves, such as cattle, water buffalo, goats and pigs.

Symptoms

- Sudden onset of severe lameness, fever, formation of vesicles on coronary bands.
- Blisters can be found on thin-skinned areas like udder, teats, anal area and eyelids. These blisters rapture within one day.
- There may be frothy saliva, anorexia, sometimes hooves become loose and fall off.
- Sows may abort.

Prevention and treatment

- Vaccination (Table 6.1)
- Quarantine
- Proper cooking of swill.
- Slaughter and burial.

Classical Swine fever/ Hog cholera

Symptoms

- Lesions on the body. gummy eyelids and red or purple blotching on the ears, snout, limbs and body
- Fall in temperature before onset of clinical signs.
- Dull and depressed animal
- Reddening of skin and ears.
- Incordination of hind limbs. Constipation diarrhoea, anorexia.
- The animal dies the next day after the attack. 95 - 100% mortality.

Swine fever affected animals

Prevention and treatment

- Quarantine and biosecurity
- Boiling of swill
- Restriction of movement of meat from infected areas
- Vaccination(Table 6.1)
- Disinfection
- No specific therapy (treatment) only symptomatic relief can be given

African swine fever (ASF)

Highly contagious and deadly viral disease affecting both domestic and feral swine of all ages. ASF is not a threat to human health and cannot be transmitted from pigs to humans. It is not a food safety issue.

Symptoms

- High fever
- Decreased appetite and weakness
- Red, blotchy skin or skin lesions
- Diarrhea and vomiting
- Coughing and difficulty breathing
- High mortality

Table 6.1: Vaccination Schedule for Pigs

Name of disease	Type of vaccine	Time of vaccination	Duration of Immunity period
Hog Cholera/ swine fever	Crystal violet vaccine	After weaning	One year
Foot and mouth disease	Polyvalent tissue culture vaccine	2 months of age with booster done after 4 months	6 months
Haemorrhagic Septicaenia (HS)	Oil adjuvant vaccine	3 months of age	6 months

Warning: *Do vaccination either in morning or late evening, particularly in colder part of day.*

Liming for Biosecurity

Prevention

On-farm biosecurity is crucial to preventing ASF. All pig owners and anyone involved with pig operations should know and follow strict biosecurity practices to help protect pigs from ASF.

Parasitic diseases

Parasites are divided into external and internal parasites:

Internal parasites (worms)

Worms are one of the most serious threats to pig keeping. There are more than 30 types affecting the intestines of pigs. The most important two are the intestinal roundworm and the tape worm.

Roundworm

Roundworms live in the gut and take food from the pig. The pig can therefore become thin. Giant intestinal roundworms (Ascaris lumbricoides) are common around the world, especially in warm, moist climates. These worms are large, about the size of a pencil. The infection begins with the ingestion of eggs which are usually present in contaminated soil, or on fruits and vegetables grown in infected soil.

Symptoms

- Anorexia in advanced stages.
- Anaemia loss of condition.
- Weight loss in later stages.
- When the worms die suddenly after treatment, they can block the gut and cause sudden death
- Prevention
- Control with medicine in the food is useful and provide clean and dry pens.
- Rotational grazing and periodic disinfection of pastures.
- Separation of young ones from adults.
- Washing sows before farrowing.
- Periodic deworming
- Herbal treatment: herbs such as moringa are considered to be antihelmintic.

Tapeworm

Tapeworms are flat and long ribbon like creatures which are common in all parts of the world. Tapeworms do not have a digestive system so they receive their food through their skin as they absorb our nutrients. They especially absorb folic acid and vitamin B-12. These parasites may cause what is referred to as "verminous intoxication" as they put out and leave dangerous waste products in our bodies. These tapeworms can roll themselves into a ball and can be felt on the right side of the abdomen under the liver. Pork measles is caused by tapeworms which live in the muscles of pigs. They do not usually affect the pig, but can lead to pain and the pig may find it difficult to move around. When people eat undercooked measly pork, the worms develop inside the people, and can make them very sick.

Symptoms

- Poor growth
- Rough grey hair coat
- Swollen belly
- Emaciation
- Anaemia

Prevention

Prevent the pigs from wandering about where they can feed on human faeces. Make sure that people working with pigs use toilets (hygiene and sanitation)

External parasites:

External parasites mainly include mange, lies and myiasis.

Mange

It is caused by small parasites called mites that live in the skin. They provoke severe itching and irritation. Nowadays sarcoptic mange in pigs has been reported in all major swine producing countries and is most prevalent in Brazilian swine herds. Lesions, or scabs, on the animals may

start on any part of the body, but usually appear first on the head, around the eyes, nose, or ears; lesions may progress to hyperkeratosis and exfoliation of epidermal debris.

Symptoms

- The pig becomes itchy, and scratches and rubs against the walls of the sty and other objects with the skin between the legs, around the eyes, ears and neck being principally affected.
- The coat looks dull, and there are bare patches, heavy crusts, and lines on the body that look like ribs
- Restlessness and itching which can be very severe
- Red pimples on skin, which turn into crusts and scabs. Later the skin looks very rough, thickened and covered with flakes scratching. Skin may show red spots or bite wounds
- Thick skin and rough hair coat
- Anaemia in severe cases especially in piglets
- Death in severe cases

Prevention

- Wash the sow before farrowing at least twice at a one week interval.
- Boars should be washed at least four times a year.
- Treat gilts upon entering the farm and before serving.
- Wash all pigs at the beginning of fattening if mange is already a problem.
- Maintain proper animal nutrition and health program to reduce severity and spread of mange. Recommended products: ivermectin (1% injectable), or malathion (1% spray).
- General cleanliness.

Treatment

- Remove scales and dirt with soap and water and a stiff brush.
- Afterwards the pig should be washed with organophosphate compounds.
- Repeat this treatment several times.
- Ivermectin injection is a very effective treatment against mange and all other parasites. Spraying the animals with cattle dip also kills many parasites on the skin.
- Herbal treatment: Smearing with coconut oil can be an effective control in cases of light contamination

Lice

These are blood suckers that also cause irritation of the skin. The hog louse is the largest louse species (6,4mm) commonly associated with domestic animals. It is found most frequently in the folds of skin behind the ears and between the legs. The blood-sucking activity of hog lice results in much irritation and discomfort to swine

Symptoms

- Itching
- Skin may show red spots or bite wounds.
- Thick skin and rough hair coat.
- Anaemia in severe cases especially in piglets.

Prevention

- General cleanliness
- Treat piglets before putting them in fattening house. Fatteners don't need to be treated
- Treat gilts before first service
- Treat boars twice a year
- Treat new stock on arrival and seven days later. Piglets below

three weeks should not be treated

Treatment

- The insecticide benzene hexachloride is a very effective remedy (0.1 - 0.25% solution) against lice. Treatment should be repeated after 7 days since the insecticide only kills adults and not eggs.
- Lice can be kept away to a certain extent by planting a pole sturdily in the ground at an angle of 45° with an old sack wound around it immersed in crude oil or used motor-oil.

Myiasis

Disease caused by flies, which lay eggs in the wounds. The eggs hatch into larvae which live and feed on the flesh and developed into pupate, and fall off when they mature, creating more wounds.

Symptoms

- Infected wounds look very wet and dirty and the edges can be covered with a grey mass which are the eggs of flies.
- Later on, larva can be seen as screw-shaped pinkish worms crawling through the wound.
- The pigs show annoyance and try to find a shabby place.
- Death may occur.

Prevention and treatment

- Clean the wound daily with water and disinfectant then apply insecticide on wound to cover edges too.
- Best working insecticides are the long-acting ones e.g. diazinon or supona. Good mange control program to prevent wounds smooth walls and floors. Do not use sharp objects.
- Avoid overcrowding to reduce fighting.
- Tail docking, ears notching and castration should be handled properly and the umbilical cord disinfected.

Deworming

Ivermectin (Ivomec®), fenbendazole (Safe-Guard®), levamisole (Tramisol®, Levasole®), pyrantel (Banminth®), dichlorvos (Atgard®) and piperazine are frequently used, effective and safe dewormers. The deworming schedule should include prebreeding for all breeding stock and prefarrowing for gilts and sows, prevention of Strongyloides and roundworms in baby pigs, and one or more dewormings in weanling and growing pigs. Specific strategic schedules should be arranged with your veterinarian.

- Boars- every 6 months
- Sows - 2 weeks before farrowing and after weaning
- Piglets - 1 week after weaning
- Fatteners - 1 week after weaning and 3 months later
- Gilts - 1 week after weaning, 3 months and at 7 months of age at least 2 weeks before service

Control of Lice, Flies, Mange

- Scrub sows with Gamma BHC insecticides four days before farrowing.
- Clean and scrub the farrowing pens before use.
- Maintain proper animal nutrition and health program to reduce severity and spread. Recommended control products are: ivermectin (1% injectable), or malathion (1% spray).

Chapter-7

RECORD MANAGEMENT

To analyse a pig farm at any time to check whether farm is in profit or loss, it is very important to keep proper data of the farm in a record book. Keeping records also helps the farmer to manage his pigs effectively and to know which pigs to select for breeding. All breeding animals should be marked permanently by using an ear-number system so that records can be kept for each animal.

Importance of record:

- It helps in selection of animals on the basis of their performance data.
- It helps in following daily routine practices at pig farm.
- Daily feed allowance can be calculated on the basis of feeding record.
- It helps in estimation of daily expenditure at farm
- It helps in estimation of date of heat, conception and date of farrowing etc.
- It helps in control of diseases and treatment of diseases of pig through vaccination and deworming records
- It helps in calculation of economics of the farm.

There are different types of record can be maintained at pig farm:

- Pig/ Animal record
- Reproduction record
- Farrowing record
- Piglets record
- Feeding record

- Health record

Reproduction records for each sow for the following should be kept:

- The date that the sow is served so that it is possible to know when she must come on heat again if she is not pregnant, or to know whether she is pregnant when she does not come on heat 20 to 25 days after service.
- The expected farrowing date so that she can be brought to the farrowing house three to four days before she is due to farrow.
- The weaning date so that the piglets can be weaned on the right date and that the sow is brought to the boar again for service from three days after weaning. This will also indicate which sows to cull (those that do not come on heat or those that are on heat again within about three weeks).
- The age of the sow and how many litters she has had so that sows that get too old can be culled.
- The litter size (number of piglets) must be recorded. The total number born, the number born alive, the number born dead and the number of piglets that die between birth and weaning. These records will give an indication of problems concerning fertility or disease.
- The records kept will help to select females to be used as sows for future breeding from big litters and sows that farrow regularly. It is important that sows produce at least two litters every year
- For proper record keeping of pig farm, it is obligatory to identify the animals. Identification of pig/ animals can be done with following methods:

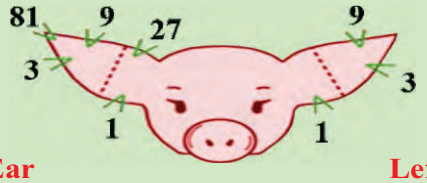
a) **Tag (plastic/ aluminium/ brass tags)**: provide a visual aid for unique identification (such as a flock or premise number) and can help to identify sex, year of birth, sire, dam and much more.

b) **Tattooing in ears**: Tattooing is an easy way to permanently identify the animals. Holes are punctured on the ear and then filled with ink.

Tag Applicator

c) **Ear notching**: It is an important method and mostly used in pig identification. A V-shaped notch can be cut out of the edge of the ear using a pair of clean scissors. Make the notch a few centimeters deep so in future you will be able to read it from a distance. It is easy and costs nothing. Upto 121 animals can be identified by this technique.

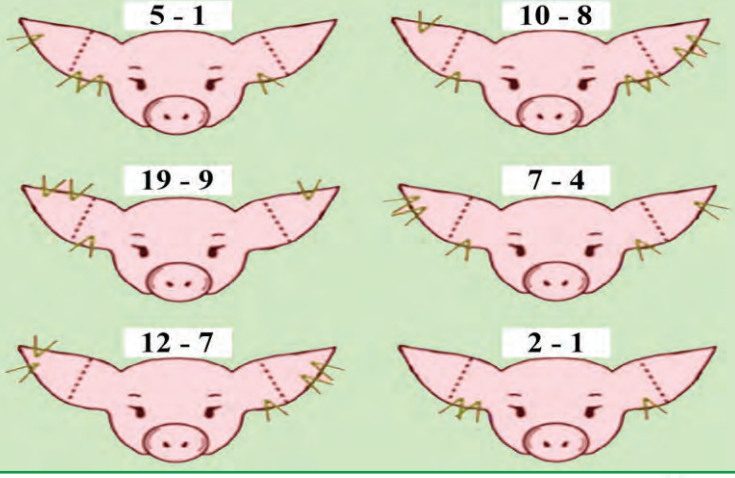
Universal Ear Notching System



Right Ear
Litter Number

Left Ear
Individual Notch

Each ear is divided into four parts; Each are representing the numbers: 1,3,9 or 27; In Each of the four area, you can have up to 2 notches. Here are a few examples to get you started:



Chapter-8

ECONOMICS OF PIG FARMING

Production costs in pig farming

Before venturing into pig farming, one should accurately determine the money needed to buy and erect fixed and movable assets (Table 8.1).

Fixed Assets

- Land
- Room or shed where feed can be mixed and stored. Equipment can be stored in the same room
- Housing for the farmer and his workers, if appropriate
- Pig housing as set out in chapter on housing
- Water facilities, including pump, pipes, taps, drinking nipples, reservoir and boreholes (if necessary)
- Self-feeders
- Feed scale
- Security fence and entrance gate
- Truck
- Roads

Movable Assets

- Truck for transporting pigs and feed
- Ten or 20 pregnant gilts between the ages of 10 and 12 months
- Two or three young boars between the ages of eight and 12 months

- Additional equipments

Production Costs

Feed is always the biggest cost factor on a pig farm and amounts to between 60 and 80 % of the total production cost. Everything possible must therefore be done to keep feed cost as low as possible. It is important to:

- Use well-balanced feed mixtures that are mixed for specific pig groups on the farm (for example creep feed for piglets and a growth mixture for growers)
- Prevent feed wastage
- Save on feed cost by mixing your own feed
- Buy feed ingredients at the lowest possible price
- Farm with good-quality pigs that have the ability to produce pig meat with a low fat content and can therefore utilise their feed efficiently.

Other Costs:

- Labour
- Transport
- Fuel
- Veterinary costs
- Medication
- Washing detergents
- Slaughter fees
- Repairs and maintenance

Table 8.1: Details of expenses in a pig unit (10 Sows + 1 Boar)

A.	Non recurring costs	Rate (Rs./unit)	Amount (Rs.)
1.	Covered Area		
i.	One pen for boar (80 sq.ft.)	450	36000
ii.	Area required for 10 dry sows (18 sq.ft./head)	450	81000

contd...

iii.	Area required for 90 growers (12 sq.ft./head)	450	486000
iv.	Five farrowing pens (100 sq. ft./pen)	450	225000
v.	Area required for store (100 sq.ft.)	450	45000
		Total	**873000**
2	**Open area**		
i.	Area required for 10 dry sows (18 sq.ft./head)	200	36000
ii.	Five farrowing pens (100 sq. ft./pen)	200	100000
A.	**Non recurring costs**	**Rate (Rs./unit)**	**Amount (Rs.)**
iii.	Area required for 90 growers (12 sq.ft./head)	200	216000
iv.	One pen for boar (80 sq.ft.)	200	16000
		Total	**368000**
3	Cost of equipments		12000
4	Cost of 11 adult animals Rs 10,000/-For Female& Rs 12,000/- for Male		112000
		Total (1 + 2 + 3 + 4)	**1365000**
B.	**Fixed Cost**		
i.	Interest on investment @ 10% per annum		98200
ii.	Depreciation on equipments @ 10% per annum		1200
iii.	Depreciation on buildings @ 5% per annum		29100
		Total	**128500**
C.	**Recurring costs**		
i.	Cost of feed for adults (96 quintal)	25/kg	240000
ii.	Cost of feed for grower (450 quintal)	30/kg	1350000
iii.	Labour charges	7000/month	84000
iv.	Miscellaneous (veterinary, electricity, water etc.)		60000
		Total	**1734000**
		Total Cost (B+C)	**1862500**
D.	**Returns**		
i.	Sale of 178 Finishers	11500/each	2047000
ii.	Sale of 2 culled animals	11250/each	22500
iii.	Sale of manure/gunny bags		40000
		Total	**2109500**
E.	**Net Income/year**		**247000**

Chapter-9

SCOPE OF INTEGRATED PIG-CUM FISH FARMING

Integrated pig-fish farming is based on the concept that 'there is no waste', and waste is only a misplaced resource which can become a valuable material for another product (FAO, 1977). Integrated pig-fish farming is a type of agropisciculture that combines animal and fish farming to increase productivity while minimizing costs. This method makes use of agricultural byproducts, leading to higher returns per unit of land area and lower production failure risk. This method increases fish production through direct consumption of the manure by fish and natural fish food from manure decomposition. Pig manure also acts as an excellent pond fertilizer, which reduces the need for supplementary feed, and lowers operating costs. Earthen ponds are typically used, with the ideal pH of 7.5-8.5, and liming is done to kill parasites and disease vectors. Piggery can be built on the pond dikes or over the pond, or pigs can be raised anywhere on the farm with pig dung stored in a storage tank, which can then be applied to the fish pond when required. Construction can be done using local materials such as bamboo or mud block to reduce costs. This is a form of aquaculture that involves combining animal husbandry with fish farming. When pig manure is added to a fish pond, it can enhance fish production in two ways: firstly, fish can directly consume the manure as a source of nutrition, and secondly, the decomposition of the manure can release nutrients that promote the growth of natural fish food in the pond.

Combining pig farming with fish farming offers several benefits such as:

- Such integrated farming increases the productivity per area and

thus, the farmers income becomes doubled or more.

- Integrated approach can significantly reduce operating costs, since the fish consume the manure, there is no need for additional feed which significantly reduces operating costs as feeding account for up to 60% of total input costs in conventional fish farming.
- The use of pig manure as a pond fertilizer enhances the pond's natural productivity and increases the yield of fish.
- The pond dikes provide additional space for animal housing units, and the pond water can be utilized for cleaning the pigsties and bathing the pigs.

The pigsty can be constructed in either of the form

- On the dikes beside the fish pond, where the manure is washed into the pond through a pipe. The floor should be made of

Construction of Pigsty under IFS

concrete or other impermeable material that can hold pig manure and urine, sloping towards the pond. A diversion canal can also be constructed to channel excess manure away into a compost pit when necessary.

- Above the pond, where the manure falls directly into the water. The floor should be made of wooden or other materials that are spaced in such a way as to prevent injury to the pigs' feet while allowing manure and urine to fall into the pond.
- At any convenient location on the farm, with the pig dung stored in a storage tank before being applied to the fish pond in the required quantity as and when necessary. The sty should have a floor area of 1-1.5 square meters per pig. Construction of the pigsty can be done using locally available materials such as bamboo, mud blocks, and dry grass to reduce the cost of the system.

Management of Pigs

Management of pigs is very much essential for optimum production of pig meat. Considering easy management and good return, it is advisable to rear only superior grower/fatteners in small scale Integrated Farming System, instead of rearing sows for piglet productions which require better care and management for profit. The exotic upgraded stock of pigs such as large- white Yorkshire, Hampshire and Landrace are most suitable for raising in comparison to the local Indian variety since they are quick growers and prolific breeders. They attain slaughter maturity size (60-70kg) within 6 months and give 9-12 piglets in every litter. Good housing with adequate feeding and proper health cover are essential requirement for pigs. The roof of pig house may be GI sheet or asbestos. For healthy growth of pig, a lying space of 1-1.5sq.m./pig and dung area of 1.5 sq.m/pig is regarded quite adequate. Pigs used in this system should be resistant to disease, exhibit good growth, early maturity, and prolific breeding. Improved pig

breeds are preferred, but local breeds or crossbreeds can also be used depending on available capital. Feeding pigs in a pig-fish system requires feed with a crude protein content of around 14%. The pigs can be given compounded feed or a combination of compounded feed, rice bran, and kitchen waste. If the pigs are stocked as piglets or weaners, low-cost supplementary feeds such as rice bran and wheat offal may be added since the pigs do not produce enough manure at this stage. The pigs can also be sold after four months, but they are typically left to attain higher weights of 8-9 months for higher market prices.

Integrating pig manure into fish farming has proven to be highly effective as pig manure is rich in nutrients that are easily digestible by fish. Pig dung, urine and spilled feed from pig sties are channelized into the pond everyday. The excreta voided by 30-40 pigs are adequate to fertilize one hectare of pond area under polyculture of fish. However one can accommodate a maximum density up to 60-100 pigs to fertilize a one-hectare fish pond. The production of manure depends upon the age and size of the pig. A piglet produces about 3.4 kg manure a day, while a one-year-old pig gives about 12.5 kg a day. The average production of faeces and urine per pig is about 7.8-8 tons per annum. Studies have shown that fresh pig manure leads to faster fish growth as the fish directly feed on the manure detritus and the nutrients that are released into the system during decomposition (Yejin et al., 1987). The nutrient composition of fresh pig manure is dependent on the type of feed the pig consumes and the degree of digestion that occurs within the animal. Fresh pig manure typically has an organic matter content of around 18%, nitrogen content of 0.8%, P_2O_5 content of approximately 0.4%, and K_2O content of about 0.4%. With an abundance of natural food available in a fish pond receiving pig manure, the fish can reach a marketable size within just a few months.

Construction of Fish Pond and Their Management

Constructing a fish pond without a sufficient source of water can be a

costly and futile endeavor. To set up a pond for integrated fish farming, it is recommended to choose a location near a river, stream, or to provide a reliable source of water supply such as a borehole. Using untreated water sources such as river or stream water is preferred over treated water. Earthen ponds, either excavation or embankment ponds, are the most commonly used types of ponds for this purpose, and the size of each pond should not exceed 1 hectare. Clay or loamy soil that can retain water well should be chosen for the pond site. The soil's optimal pH range for pond construction should be 7.5-8.5. The pond should have a rectangular or square shape and properly constructed inflow and drain lines. The newly excavated ponds should be rectangular in shape and of manageable size. Small ponds of sizes ranging from 0.01 – 0.10 ha with desired depth of 1.0 – 1.5 metre with side slopes of 1- 1.5 m can be developed. These ponds may be lined with Low density polyethylene (LDPE)/ High density polyethylene (HDPE) to restrict seepage and percolation losses that are very high in most of the region in India. Existing ponds should be drained and dried before setting up the integrated fish farming system. After preparing the pond, it should be filled with water to the desired level, and liming can be done to kill parasites and disease vectors in the pond and adjust the soil and water pH to the desired value. For small-scale farmers, it may be more convenient to place the ponds close to their house to facilitate care and protection of the fish and pigs from poaching.

Desirable Species and Stocking Density for Integration

Fish species to be used in pig-fish farming should be selected based on specific criteria, including fast growth rate, good food conversion efficiency, acceptability of pig dung and supplementary food, adaptability to crowded conditions, resistance to diseases, ability to withstand changing pond water conditions, and good market value. Polyculture is preferred over monoculture in such integrated farming to utilize variety of food that becomes available in the pond under trophic levels. The fish seeds should be procured from reputable hatcheries is recommended to ensure profitability.

Stocking density is an important factor to consider. The pond is stocked after the pond water gets properly detoxified. Due to high productivity of the ponds, fairly high rates of stocking are generally practiced. The stocking rates vary from 8000-8500 fingerlings per hectare (100m x100m) and a species ratio of 40% surface feeders, 20% column feeders, 30% bottom feeders and 10% macro vegetation feeders is preferred for high fish yields. Mixed culture of Indian Major carps can be taken up with species ratio of 40% surface feeders, 30% column feeders and 30% bottom feeders.

- Culturing of Indian Major carps alone: Catla 3 : Rohu 4 : Mrigal 3
- Culturing of Indian Major carps and common carps : Catla 3: Rohu 4 : Mrigal 1: Common carp 1
- Culturing of mixed species i.e. Indian Major carps and exotic carps : Catla 2 : Rohu 3 : Mrigal 1 : Common carp 2 : Silver carp 1

Fish Harvesting

Keeping in view the size attained, prevailing market rate and demand of fish in the local market, partial harvesting of fish is done. Fingerlings can be separated and stocked in different ponds for the next growing season, while any surplus fish can be sold. After harvesting partially, the stock is replenished with the same number of fingerlings. Final harvesting is done after 12 months of rearing. Fish yields ranging from 6000-7000kg/ ha/yr is generally obtained. It is essential to monitor the fish growth regularly, and the nutrient-rich water and organic waste/mud on the pond floor can be utilized as fertilizer for vegetable cultivation.

Water Quality

Water quality refers to the ability of water to support the survival and development of fish. In the pig-fish farming system, it is important to regularly assess the water quality parameters to avoid any detrimental effects on the fish. Given the continuous application of manure into the ponds, monitoring water quality becomes even more critical. Key water quality parameters (with optimal values in brackets) that require routine

monitoring include temperature (23-35 °C), pH (6.5-9), dissolved oxygen (≥5 mg/L), biological oxygen demand (BOD) (10 mg/L), turbidity or transparency (20-50 cm), total suspended solids (30 mg/L), nitrate content (<10 mg/L), nitrite content (<0.1 mg/L), ammonia content (<0.05 mg/L), heavy metal content, color, alkalinity, hardness, and others. Research by Dhawan and Kaur (2002) at Punjab Agricultural University in India demonstrated that even high doses of pig manure (36 t/ha/year) did not negatively impact water quality parameters in pond water, and that pond productivity was actually higher in manured ponds compared to control ponds. However, excessive growth of aquatic vegetation and phytoplankton (known as algae or phytoplankton bloom) can be harmful to fish and should be monitored and controlled.

Similarly, manure loading rate is crucial, and a maximum loading rate of 150 kg pig manure per ha of fish pond is recommended to avoid dangerous levels of pH and dissolved oxygen. Pigsty constructed over the pond can be screened off with plastic sheets or wooden planks to stop manure loading. Modern practices are to avoid direct washing of the wastes into the pond. The urine and dung of pigs are first allowed to the oxidation tanks (digestion chambers) where sedimentation and fermentation of the manure take place. The supernatant liquid, at regular intervals, are then discharged into the fish ponds. The sludge that remains is utilised as fertilisers in agriculture. Alternatively, the pig manure may be kept in a heap on the pond embankment for later use.

Algae/Phytoplankton Bloom

An overabundance of nutrients from manure can result in the growth of excessive amounts of algae or phytoplankton, known as a bloom. This can be identified by a thick mass of algae, causing the pond water to turn a deep green, blue-green, or reddish-green color. Algal bloom can lead to a severe depletion of dissolved oxygen and fish mortality. To address this issue, physical removal of the algae with a flat material net can be followed by liming to adjust the pond water pH to levels that discourage algal bloom.

Another option is to use chemicals such as copper sulphate, applied at a rate of 0.1-0.5 mg/lit of pond water, to counter algal bloom. Removing the algae-laden pond water and replacing it with fresh water is also an effective way to combat algal bloom.

Constraints to Pig-Fish Farming Integration includes

- Recently, controversy has arisen among scientists on the public health aspects of integrated farming. The risk of disease transfer from fish to humans. Studies have found harmful bacteria in fish from pig-fish systems, which could have negative implications for human health.
- Marketing problems due to consumer reluctance to eat fish produced in manure-laden ponds.
- Off-flavour taste of fish harvested from overloaded manure ponds. This can be mitigated by stopping manure loading a few days before harvesting or keeping fish in clean water for a few days before sale.
- The cost of the system, which may be prohibitive for some farmers. To make the system more affordable, farmers can use low-cost feed items instead of pig feed, or even remove fish feed altogether. Alternatively, they can form cooperatives and pool resources together for better results.
- Considerable care and management skills are required to prevent pollution. It has been found that satisfactory fish production can be obtained with much lower manuring.

Chapter- 10

FIELD EXPERIENCES OF PROGRESSIVE FARMERS

FARMER: S. DILBAGH SINGH

Personal Information

Dilbagh Singh hails from village Badali Ala Singh in district Fatehgarh Sahib. He is a Member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

S. Dilbag Singh was encouraged by his nephew Harinderjit Singh at an age of 54 to initiate pig farming. Harinderjit Singh, his nephew, a 36 year young man, is a resident of village Behbalpur, district Patiala is a graduate and was not satisfied with traditional system of farming and eager to do something promising in terms of short time and income. He explored many other enterprises like real estate and finally, after visiting pig farms of nearby villages he decided to enter in the business of pig farming.

First he discussed his idea with his family, but due to religious concern and taboos his family did not allow him to do business at their field. So, he approached his maternal uncle S. Dilbag Singh and he agreed with his idea. S. Dilbag Singh agreed to provide his land for starting the farm and with their mutual investment.

They started their first pig unit of 'Golden Hog Pig Farm' with an investment of Rs 10 lakhs for purchase of pigs, feed and construction of shed. Twelve sows and one boar of Large White Yorkshire breed were procured

from district Mohali and the unit was started in the year 2011.

Plan, Implement and Support/KVK Intervention(s)

At the start of their business, they faced the major challenges of electricity connection as two power motors were required to clean the yard, moreover the mortality rate and diseases incidence in the piglets were also high due to less expertise in this field. Therefore in 2012, Harinderjit Singh attended a specialised training of pig farming from GADVASU, Ludhiana to know the technical know-how of the pig husbandry to run their business in a modern and scientific manner.

Details of Practices followed by the farmer

Subsequently, to ensure the availability of cheap feed for pigs, they approached RIMIT College and Pagro food industry in the city and requested them for all their waste and leftover. Along with kitchen waste, they are also offering Deheus feed as concentrate feed for better growth of piglets. They are also judiciously utilizing the liquid excreta of the pig sty as manure for irrigation of crops that saves two bags of Urea and one bag of DAP per acre in their sugarcane and wheat crops. Till now, they have spent

30 lakhs on their farm having capacity of keeping 600 pigs at a time and increased their revenue from 1.5 lakhs to 35 lakhs in a span of seven years. They have made a reputation for good quality pigs

Results/Output/Impact (economical/ social/ etc.)

Both the farmers proved as a role model in this business, being delighted by their success many farmers from different districts visited their farm and 15-20 farmers started piggery unit as subsidiary occupation.

Factors contributing to success

- Proper follow up of guidelines given by KVK
- Always try to reduce the input cost on the pigs.
- Following of proper vaccination and deworming schedule.

Future plans

- Want to improve his marketing strategies
- To make more links with the pig dealers so that he could get more options of selling his pigs when they reach marketable weight

FARMER: S. JASBIR SINGH PANAG

Personal Information

Jasbir Singh Panag belongs to village Mahadiyan in district Fatehgarh Sahib. A senior secondary educated pig farmer entered this venture 4 years ago. He is a member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

When the farmer started working in the beginning, he didn't know how to raise the pigs and due to his lack of experience and due to negligence in management many pigs in his farm died. But later, with KVK interventions he learned how to raise the pigs and did not face any kind of problem. At the time of lockdown the demand of pigs decreased to great extent due to which price of pigs decreased a lot. But when the market opened afterwards the demand reach to its pre lockdown level and after that he started getting the right price.

Plan, Implement and Support/KVK Intervention(s)

- Technical guidance by KVK specialist.
- Regular visit of KVK specialist whenever required

Details of Practices followed by the farmer

- He properly follows vaccination schedule of swine fever and FMD
- He gives proper injection of iron to the newborn piglets.
- He feeds proper mineral mixture to the pigs.
- He has contacted various contractors of mess and marriage palaces for food wastage and feeds his pigs after mixing them with feed to reduce cost.

Results/Output/Impact (economical/social/etc.)

The farmer says that it is a very lucrative enterprise. If one maintains animals on scientific lines at least 30% of expenditure can be saved. At present he is earning Rs 4,50,000/- per annum from this venture and has given employment to a rural youth of nearby village.

Factors contributing to success

- Proper follow up of guidelines given by KVK.
- Always try to reduce the input cost on the pigs.
- Following of proper vaccination and deworming schedule.

Future plans

- Want to improve his marketing strategies.
- To make more links with the pig dealers so that he could get more options of selling his pigs when they reach marketable weight.

FARMER: S. RANDHIR SINGH

Personal Information

S. Randhir Singh of village Bhinder nagar, Block Nurpur bedi of district Ropar got retired from job in 2015. BA by qualification he is a hardworking farmer with farming experience of around 30 years. He is member of Scientific Advisory Committee of KVK Ropar. His experience in pig farming is 1.5 years.

Situation analysis/Problem statement

(problems faced by the farmer before and while running the enterprise(s)) Earlier the farmer was doing conventional farming with wheat paddy in 5-acre land holding. He was facing problem of low and irregular income.

Plan, Implement and Support/KVK Intervention(s)

The beneficiary farmer attended a KVK camp in his nearby village Garh Bagga in March 2021 and got to know about prospects of pig farming. He was highly impressed with high fecundity, proliferation and lucrative economics of the enterprise quoted by KVK scientists. S Randhir Singh acquired technical guidelines from KVK and started the pig farming unit in Oct. 2021.

KVK facilitated purchase of sows from fellow farmers and piglets from piggery farm of Department of Animal Husbandry. KVK guided the farmer about constitution of concentrate mixture too. S Bhinder Singh acquired formal training from KVK Ropar in July, 2022 and got well versed with techniques of regular vaccination, deworming, breeding and other management practices.

Details of Practices followed by the farmer

Close housing system with defined spacing, facilities of drinking nipples, heating equipment in creep area, biosecurity, vaccination, feeding

concentrate mix as guided by KVK.

Results/Output/Impact (economical/social/etc.)

Started with one male 5 sows and 20 piglets 3 months of age that costed him a meager investment of Rs 1.6 lakh. 5 females gave birth to 53 piglets. 20 pigs were sold in September, 2022 and he earned a gross income of Rs. 3,00,000/- in just one year. Apart from this net worth of his stock also increased to approx. 6 lakhs (53 piglets born during this one year). Net income during the first year was 1,95000/-. S Bhinder Singh has hired a villager for taking care of his farm.

Factors contributing to success

Good breed Large White Yorkshire, capacity building by KVK Ropar, good feeding management, regular vaccination, deworming, biosecurity and easy assured marketing are the major factors that made his journey a smooth sail.

Future plans

- Extend the unit to 50 females and integration with Fish farming

FARMER: S. GURDIT SINGH

Personal Information

S. Gurdit Singh of village Rasidpur, Block Chamkaur Sahib of district Ropar. A septuagenarian Gurdit Singh is a very hardworking and innovative farmer. Decorated with awards of honour from KVK and RRS Ballowal saunkheri he is running a very humble yet profitable units of backyard poultry and piggery. His experience in pig farming is 4 years.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Till 2018 the farmer was doing diversified agriculture farming with wheat paddy, vegetables, sugarcane, pulses, oilseeds and dairy farming in 5 acre land holding. He was facing problem of irregular income.

Plan, Implement and Support/KVK Intervention(s)

The farmer is associated with KVK since its inception i.e.2005. Attending of a lecture on animal sciences gave him an insight to the prospects of other livestock based enterprises like piggery and backyard poultry farming. S Gurdit Singh acquired technical guidelines and formal training from KVK in 2019 and started the pig farming unit in 2019 itself. KVK facilitated the purchase of stock and aided in feeding management as well.

Details of Practices followed by the farmer

Regular vaccination, deworming, facilities of drinking nipples, heating equipment in creep area, good feeding management, regular vaccination, deworming, piglet management, biosecurity without fail. Apart from this capacity building by KVK Ropar, and easy assured marketing make this enterprise a lucrative venture.

Results/ Output/Impact (economical/ social/ etc.)

He started the unit with one male, 2 sows and 10 piglets 3 months

age. He earned a gross income of Rs. 90,000/- in just one year. Apart from this net worth of his stock also increased to approximately 6 lakh.

Factors contributing to success

S Gurdit Singh takes care of the unit by himself and follows all recommended practices like good feeding management, regular vaccination, deworming, piglet management, biosecurity without fail. Apart from this capacity building by KVK Ropar, and easy assured marketing make this enterprise a lucrative venture.

Future plans

- Extend the unit to 50 sows and start with processing too

FARMER: S. SUKWINDER SINGH GREWAL

Personal Information:

Sukwinder Singh Grewal is a farmer from village Kotli of district Ludhiana. 42 years in age he has farming experience of around 20 years.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Sukhwinder Singh was a peasant having a small chunk of land around one acre in Kotli village of Ludhiana. He used to get only twenty thousand rupees per year by giving his land on lease which was hardly enough for making a satisfied livelihood. He was desparate enough to do something different in farming, from what his forefathers did.

He tried his luck in many new enterprises such as vermicomposting, dairy farming, dog breeding etc, but hardly got any success. But his inner motivation to do something profitable that could make a difference to his household income and challenging the status quo. Finally at age of 22 year, he entered in the business of piggery, knowing too well that pigs were and are still not welcome in many Indian households.

Plan, Implement and Support/KVK Intervention(s)

Although, the venture was not a cake walk, but luckily, he got support from experts of Punjab Agriculture University, Ludhiana who not only gave him initial lessons on pig farming, but also suggested him to attend a five days specialised training programme on pig husbandry at PAU, Ludhiana where he got clear understanding that small and marginal farmer can only be successful, if they utilize their land and capital judiciously in an enterprise that gives them a quick return. This training served as milestone for his never-ending journey towards success.

Details of Practices followed by the farmer

He was advised to import semen of improved swine breed like Large

White Yorkshire and Landrace for genetic improvement of his present stock. So he tied up with the company and imported semen from Canada for Artificial Insemination (AI) in his stock for the first in Punjab with the help of PAU Kisan Club in the year 2011. Sukwinder says, through adoption of AI, he has observed a significant improvement in the growth, muscle yield, lean meat and other meat characteristics of the finishers.

Simultaneously, he improved his farm to semi-automatic Indo-Canadian type with fogger system and modern animal shed. He was even invited by this company to attend 15 days training programme on AI in pigs to Holland in the year 2010 and also visited Livestock Fair at Germany, which exposed him to good pig farming practices w.r.t feeding, breeding, cleanliness, disease management and vaccination.. In addition, he is updating his knowledge continuously by attending and giving expert lectures in various trainings programmes at GADVASU and other institutions.

Results/Output/Impact (economical/social/etc.)

Sukwinder, started his transit only with three pigs in the year 1999, now with more than 300 pigs he is a successful entrepreneur. Fortunately, the demand for pork and its products is increasing all over the country including local demands due to lesser profit margin in other farming enterprise compare to piggery.

This boosted him to go for processing of meat in form of pickle, belly, ham, pork chop, kabab and other pork stuff to be supplied in various outlets and companies in Ludhiana, Chandigarh, Delhi and Hyderabad. Traders from various districts as well states began to approach him for the purchase of animals. Now he is also getting demand from other countries and he has started exporting the same, but still long way to go for this due to absence of local processing plant.

Factors contributing to success

- Breed improvement through artificial insemination

- Self-marketing and processing
- For him fattening units is more profitable than breeding pigs, so he is mostly engaged in selling finisher for meat and their products

Future plans

- Now he is also getting demand from other countries and has started exporting the same and intends to set up a local processing plant.

Economic Information

- He is selling piglets, breeding pigs, live adult pigs and pregnant sows to Punjab, Delhi and North East and able to fetch a turnover of more than 50 lakhs out of the business.

FARMER: S. GURLAL SINGH

Personal Information

Gurlal Singh belongs to village Bhuchon Kalan, in district Bathinda. He is a member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Gurlal Singh hails from Bhuchon Kalan village of Bathinda district of Punjab. After doing B.A. along with ETT course he failed to get any job. As he already possessed two acres of land but it was hardly sufficient to meet his family needs. Being inspired and motivated by the scientist's of KVK Bathinda, in 2016 he decided to start his own business in pig farming. For the same, he also realized the need to up skill himself and therefore decided to attend a specialised training on pig farming from KVK Bathinda to learn the scientific methods of running a piggery farm.

Plan, Implement and Support/KVK Intervention(s)

Apart from training KVK also facilitated him to procure the piglets of Large White Yorkshire from the Pig Breeding Farm, Ferozepur.

Details of Practices followed by the farmer

Initially, he established a shed in an area of 60'× 30'. He started getting encouraging monetary returns from the business hence expanded his shed to 70'× 35'area with fifteen different compartments for accommodating more number of animals according to their ages. Presently he owns a stock of 120 animals and rearing pigs for both breeding and meat purpose. He decided to reduce the feed cost by incorporating feed and vegetables waste. For this he made a tie up with Military canteen for regular supply of kitchen waste @Rs. 500 for a drum of 200kg of waste. Now he is feeding his stock both on concentrate and kitchen waste after attaining a

body weight of 30-40 kg to save input cost. He sells the pigs to the farmers who want to start this occupation @ Rs 125/kg of weight of animal and also, he made a tie up with Nagaland importer/enterpreneours @ Rs 125/kg of weight of animal.

Encouraged by the income from pig husbandry he was motivated by KVK personnel to integrate his farm with fish farming. So he dug a fish pond in an acre area whose initial cost was Rs 35,000 and planned to further expand it. He had started pisciculture activities under the proper guidance and scientific advisory of KVK, Bathinda which helped him a lot in improving his knowledge and skill. He has also channelised the liquid waste of pig farm to the pond to save the input cost for fish farming.

Results/Output/Impact (economical/social/etc.)

He generated an income of 1.30 lakhs, 2.5 lakhs and 4.5 lakhs during 2016, 2017 and 2018, respectively from piggery. The enthusiasm of the young farmer encourages other rural youth of his village to adopt pig farming as an entrepreneurial activity. He has already motivated 10-15 families to start piggery as occupation after acquiring training in KVK. In this way, this energetic Malwa son of Punjab has become an inspiration for small farmers in the area of piggery.

Factors contributing to success

- Proper following up of guidelines given by KVK scientists.
- Always try to reduce the input costs by judicious use of resources.
- Following up of proper vaccination and deworming schedule.

Future plans

- Want to improve his marketing strategies
- To make more links with the people so that he could get more options of selling his pigs when they reach marketable weight

FARMER: S. DHARMINDER SINGH

Personal Information

Dharminder Singh belongs to village Sanhera of district Barnala. Accompanied by his brother Dharminder Singh is member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana. For his interventions under pig farming he has received many accolades; State Level Chief Minister Award for Best Pig Farmer in 2015 by GADVASU, Ludhiana, District Level Progressive Pig Farmer Award by KVK, Barnala, Progressive Pig Farmer Award by Vets Club 2017, Ludhiana

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Dharminder Singh and his brother Balwant Singh, owners of B.T. piggery farm from village Sanghera (Barnala), Punjab was adamant enough to try this endeavour and today the farmers are well known in the region as an experts in piggery and their pig rearing unit draws a number of visitors. They owns two pig farms, one is for breeding purpose and the other for finishers, a large two-storey house in Sanghera and a car but it wasn't like this always. Initially, they owned a small business in which couldn't make success, so they decided that to go for pig farming after realising its potential from their relatives who are already engaged in this business.

Plan, Implement and Support/KVK Intervention(s)

In the year 2013, Dharminder Singh underwent a five days training programme on pig farming at Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana. During the same year they procured thirteen female and seven male pigs from the Government Pig Farm, Nabha, Patiala by his own saving and now raised their animal stock to 300.

Initially they faced some difficulties of pig mortality and their

marketing. Dharminder, again attended one more training programme on pig management from KVK Barnala and remained in regular touch with animal science experts of the KVK. The advisory services from KVK helped them in the effective management of animal health, production and marketing of their stock. They are now following timely vaccination, deworming, scientific feeding and breeding management practices under the supervision of KVK experts.

Details of Practices followed by the farmer

- Their family members also provide them helping hands in routine farm works, thus reducing the labour cost at their farm.
- To maintain the healthy pigs, they prefers to make pig's feed on their own by buying the raw materials (rice police, maize, cakes and mineral mixture etc.) from the market and processing it .
- They keep the pigs and surrounding clean by washing the area twice with water and disinfectant. According to them, it is the most crucial factor in pig farming.
- Play music at their farm to increase the sleeping time of the pigs for better weight gain.
- They have designed and fabricated the housing pens and furrowing crates of the pig sties.
- Large White Yorkshire (LWY) and crosses of Yorkshire with Hampshire Pigs are the breeds reared by them at their farm

Results/Output/Impact (economical/social/etc.)

According to them, there is huge consumption of pork in Ludhiana itself; therefore, they started selling pork to Ludhiana market and occasionally to Nagaland when the demand is low in local market. They have also started processing of pork in the form of pickle which has a huge demand in their area. In this way, from selling of all age groups of animals including piglets, young, adult animals, finishers and their product providing them a gross income of 30-35 lakhs/annum with a net profit of Rs.

12.25 lakh from their business while the cost benefit ratio is 1.55. They believe that for matriculate persons like them, a small enterprise like piggery contributed significantly in socio-economical upliftment of the family.

Both the brothers advise and guide other fellow farmers of their area as well farmers from other state through WhatsApp group. Many entrepreneurs are making regular visit to their farm to learn from their vast practical experience in the field of piggery. Dharminder, served as a guest speaker for motivational and technical lectures on piggery at KVK Barnala and other line department's programmes, trainings, seminars and Krishi Melas for the benefit of others interested in taking this up as a vocation.

Factors contributing to success

- Family support.
- Self computation of ration
- Self marketing
- Maintaining good breed

Future plans

- Want to pursue with processing

FARMER: S. SAPINDER SINGH DHALIWAL

Personal Information

Sapinder Singh Dhaliwal belongs to Village Kila Hakiman in district Sangrur. Member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana he is an enthusiastic pig farmer.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Sh. Sapinder Singh Dhaliwal is an ex-serviceman of village Kila Hakiman of district Sangrur. After attaining superannuation and eagerness to work on something passionate, he intended to start an enterprise for living a self-satisfied post retired life. After, discussing his idea with his family members, experts of Krishi Vigyan Kendra, Sangrur and Department of Animal Husbandry, he decided to start pig farm in January, 2013. By investing his own savings, he purchased 20 pigs of Large White Yorkshire breed from Mansa. After running his piggery unit successfully, this farmer started fishery in three acres area during the same year. Now, he is practicing integrated pig and fish farming with 30 pigs.

Plan, Implement and Support/KVK Intervention(s)

He is undertaking this enterprise very well with regular guidance from experts of KVK, Sangrur and GADVASU, Ludhiana.

Details of Practices followed by the farmer

Usually, he rears pigs till the animals attain a weight of more than 80 kg. Presently, from 30 sows with 5 boars he was able to produce 500 piglets which generated an income of Rs. 17,50,000/-. He is also producing more than 90 quintal of fish annually which he sells @ Rs. 9500-9600/q. He does marketing of piglets himself by selling it in eastern states like Nagaland and Kolkata and fetches a handsome price. He is also preparing pork pickle and selling it @ Rs. 400/- per kg.

Sapinder feels that efficient use of good and cheaper ration based on locally available materials and agricultural by-products is essential for profitable pig production as feeding in pig production accounts more than 80 per cent of the total expenditure. In order to enhance the profit margins he reduces the feed cost by feeding the waste material with supplementary feeding of mineral mixture and common salt.

Results/Output/Impact (economical/social/etc.)

He purchases the food waste material from Army Canteen, Sangrur. The feeding of waste material reduces the cost of production, thereby, increases the net profit from this enterprise. He is also saving Rs. 1.5 lakh annually on use of fertilizers by using fish pond water for irrigation purpose

The model piggery unit developed by S. Dhaliwal has not only been proven beneficial for him in terms of livelihood but it has also influenced other unemployed young professionals of the neighbouring areas to seriously think about this profitable proposition. Many dignitaries have visited his farm including Former Chief Minister, Punjab S. Prakash Singh Badal and Ex-Finance Minister S. Parminder Singh Dhindsa. For his outstanding work he was selected by Punjab Government as member of delegation to visit Israel and England in 2016 being pioneer farmer to boost up his knowledge for piggery management. He was also awarded by Chief Minister of Punjab with Rs. 1.50 lakh cash prize.

Factors contributing to success

- Self marketing
- Integration with fish farm
- Low input feeding system

Future plans

- Wants to further expand his marketing channel

FARMER: S. YADWINDER SINGH

Personal Information

S. Yadwinder Singh belongs to Village Naraingarh, District Sangrur. A school dropout Yadwinder Singh is a Member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Sh. Yadwinder Singh of village Naraingarh, district Sangrur, hails from an agricultural family. After completing his schooling, he joined his family entreprise of agriculture and got dissatisfied with the meagre earnings. Being resource poor and marginal famer he was aware of non-availability of farm workers, costly inputs. His life was in 'miserable conditions' says Yadwinder Singh. Therefore employing himself in a profitable enterprise that requires minimum investment was a challenging task for him. But his poor financial condition and his burning desire to start his own business could not deter his entrepreneurial spirit and motivated him to search internet.. After detailed discussion about the opportunities of piggery sector with KVK expert, exposure visit to farmers of neighbouring state and market survey he decided to switch to commercial pig farming which is not so labour intensive.

Later, in the year 2015 he underwent specialised training of pig farming at KVK Sangrur where he got a good exposure of pig keeping, hands on experience and preparation of feed and vaccination.

Plan, Implement and Support/KVK Intervention(s)

Technical guidance and regular monitoring visits by KVK specialist whenever required

Details of Practices followed by the farmer

He started his farm with just 15 piglets, three pregnant sows and one

boar of Large White Yorkshire in a shed area of 32'x40' with a mere investment of Rs.2.50 lakh only. His skill started sharpening over the years and he learnt the tricks of pig farming with schedules of vaccination, feeding, and other managements. Very soon he achieved the desirable outcomes which encouraged him to expand his stock to 51 pigs. He started preparing his own feed in consultation with other experienced pig farmers of his area. To keep the production cost in control he opts to procure food waste from marriage halls/ hotels/ restaurants/resorts. Before feeding the food waste is segregated meticulously then it is mixed with lemon and salt to avoid infections. This is a cost effective method. The piglets are weaned at one month age till then he allows the piglets to suckle milk. When piglets start eating well by themselves means are ready for sale. He prefers to sell piglets at around three month age @ Rs. 2500-3000/piglets. He also sells pregnant sow and gilt to the traders.

Results/Output/Impact (economical/social/etc.)

- His net income is around 2.5 lakh per annum.

Factors contributing to success

- Now he maintains the farm as per the guidance of experts from KVK in an organized manner and performs the entire management tasks like feeding, cleaning, treatment, castration etc by himself.

Future plans

- His future plans are to expand his stock to 200 or more pigs.
- He has also plans to pursue with processing of pork in the form of pickles.

FARMER: SH. ROSHAN LAL NAIN

Personal Information

Mr. Roshan Lal Nain belongs to Village Bullan, of district Sangrur. He is a member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Roshan Lal Nain, who is M.P.Ed and M.Phil and working as a Physical Instructor in a private school in Bullan, Sangrur. Unfortunately, even after being a qualified professional he was not getting handsome income from his job, this pushed him to do something in order to restore the economic liberty for himself and for his two younger siblings who are uneducated and unemployed. He belongs to a peasant family with an ancestral land of 23 acres. Once during a public discourse, he came across the knowledge about the opportunities in pig farming; from there he got an idea to go for this enterprise. At the inception, he inspected many pig farms of nearby areas and finally in 2016 laid down his own piggery unit with 34 sows and 5 boars of Large White Yorkshire (LWY) procured from Mansa and TaranTaran in a shed area of 40' x 100'. Presently he is holding a capacity of 130 pigs at his farm.

Plan, Implement and Support/KVK Intervention(s)

He underwent a specialised training from KVK Sangur where he learnt the art of formulating pig ration (corn, soybean, rice polish, wheat bran, salt & minerals) by his own, thus making a saving on feed cost which account for more than 70% of his input cost. He carried out all other scientific practices under the guidance of experts.

Details of Practices followed by the farmer

Initially, Roshan Lal did not get much returns from his investment,

but his determination for increasing the productivity and profitability from the business, propelled him to mingle the piggery unit with fishery. He developed 2.5 acres as pond area during the same year by further investing of Rs. 1.0 lakh by his own pocket. Now he started rearing Rohu, Mrigal and Katla species procured from the Government Fish Seed Farm, Benra (Sangrur) and nurseries of fellow farmers. He has now sensibly using the manure enriched water of the pig houses in the pond as well as for irrigation in his crop fields.

Results/Output/Impact (economical/social/etc.)

He is selling piglets, adult pigs and fish locally. Due to his tremendous work in integrating fish farming with piggery he enhanced the profit to an annual cash flow of Rs 10 lakh from piggery and 3.5 lakhs from fishery, respectively. The cost benefit ratio from integration of both the enterprises is 1:1.99. He says "I am a part-time teacher and a full-time farmer" as he earns more from farming than from his job.

Factors contributing to success

- Integrated farming system has effectively improved his output.

Future plans

- He wants to augment his pig farm from 130 animals to 500 animals and pond area from 2.5 acres to 10.0 acres.
- He also wants to initiate value addition by processing of his products at his farm so that he can increase his profit margin.

FARMER: S. SUKHMINDER SINGH

Personal Information

Sukhminder Singh belongs to village Uppali in district Barnala. For his vigorous progress in pig-fish farming KVK Barnala honoured him as Progressive Integrated Fish Farmer Award in the year 2016. Vets Club, Ludhiana also felicitated him in 2017

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Sukhminder Singh has 50 acres of lands, where he has been growing paddy wheat. But he was not much satisfied with the profit he is getting from conventional farming system. Meanwhile his tube-well got stopped functioning and to resolve this, he constructed a pond spreading in an area of four acres of land for irrigation purpose. Ever since then things changed forever. He got a clue to get involved in fishery and piggery together to get maximum profit out of his recourses.

Before starting the piggery venture he thought of taking an expert advice and training from the experienced person of this field. From then onwards, he became a regular visitor to his relative Shri Sapinder Singh Dahliwal's Integrated Fish cum Pig farm at Sangrur to gain practical field experience of the enterprise. Initially got trained from State Department Sangrur. At last with all the experience and lessons he gained, he brought few pigs from Sapinder's farm and started rearing in an area of 3000 sqft. area over the dikes of the fish pond. Concurrently, he procured fingerlings of Indian Major Carps from the Government hatchery, Sangrur. In the beginning of his first year of fish culture, he has released satisfactory numbers of fingerlings. No supplementary feeding was required for his fishery pond as the waste from the pig houses served as feed for fish and manure as well and the pond water is also used for irrigation purpose.

Plan, Implement and Support/KVK Intervention(s)

He came in contact with KVK, Barnala where he acquired the modern techniques of pig and fish farming and established a good market linkage under their guidance and raised his animal stock to 150 numbers of pigs.

On advice of the fishery expert he has constructed a nursery pond in half acre area and now he is getting multiple harvest of Rohu, Catla Mrigal and Silver Carp round the year and also supplying to other farmers.

Once a while, he was not getting good harvest from his pond, after discussion with fisheries expert from KVK, he constructed a small bund to regulate the quantity of pig waste channelizing in the pond.

To encourage him and other small farmers and as a part of frontline demonstration (FLD), KVK Barnala also demonstrated the integrated pig-fish farming technology with some improved varieties of fishes like Jayanti Rohu and Ammu Carp procured from CIFA, Bhubneswar under NFDB assisted project at his pond along with provision of the necessary inputs (Fish seed, Nylon threads, Lime, CIFAX) and technical support.

Details of Practices followed by the farmer

Sukhminder installed an underground pipeline in the pond connecting with the fields so as to irrigate the crop fields without using electricity and recycle fresh water in to the pond through his tube-well in order to maintain the proper water quality parameters for carp growth.

Results/Output/Impact (economical/social/etc.)

His income got immensely raised under the integrated system as compare to traditional practices of paddy-wheat cropping system. He is getting a net return of 1.5 lakhs per acres from his fish pond and a gross income 12 lakh/annum/4 acre. Integrated farming assured him a continuous income at one end and on the other hand it offered opportunity for taking up various farming activities with optimum utilization of land space for food production, thus increasing household income of small

farmers. Sukhminder Singh is a hardworking and optimistic farmer; his entrepreneurial behaviour and methods have become an inspiration. He is most sought after to share his rich experiences at KVKs and among new entrepreurs of his field.

Many dignitaries and farmers from nearby areas visit his farm and various exposure visits and Farmer Field School has been organised at his farm. There are also more than 20 farmers from different villages of the district that are eager to adopt the technology and seek technical guidance from the KVK Barnala as well Sukhminder Singh. Being the member of Pig Farmer's Association, GADVASU, Ludhiana and Sangrur Pig Farmers Association, he is horizontally spreading the technology among many farmers due to its economic stability and sustainability.

Factors contributing to success

- Routine visits of KVK scientists, timely guidance and scientific practices including feeding and health management introduced by the KVK resulted in boosting his profit from both the enterprises.

Future plans

- He is also planning to enter in the field of value addition of pork and fish meat.

FARMER: S. HARPREET SINGH

Personal Information

Harpreet Singh of village Lal Bhai in district Muktsar started the enterprise of pig farming around 3 years back. An MA, B.ED by qualification and at 34 years age he is carrying out the practices in a very scientific manner.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

The farmer faced the problems related to sale purchase in the beginning especially during COVID -19 phase but now the issue is resolved .

Diagnostic testing of contagious diseases is another problem that farmer faces.

Plan, Implement and Support/KVK Intervention(s)

KVK guides the farmer about the market trends and provides timely Vet support to the farmer.

Details of Practices followed by the farmer

Proper sanitation and management,

Market awareness, good selection of sows and boars are technologies that aid to his success. The farmer has also installed guard rails on the farms to avoid piglet crushing by sow.

Results/ Output/Impact (economical/ social/ etc.)

At present the farmer is earning Rs 2,40,000/- per annum and has generated employment for a youth of his village.

Factors contributing to success

- Market awareness
- Proper selection of germplasm

Future plans

- To expand the farm to 400 pigs capacity in coming three years.

FARMER: S. KULDEEP SINGH BASSI

Personal Information

S. Kuldeep Singh Bassi belongs to Village Bundala, in district Jalandhar. A member of PFWA (Piggery Farmer Welfare Association) of GADVASU, Ludhiana he is also serving KVK Jalandhar and GADVASU, Ludhiana in the form of expert lectures and exposure visits to the trainees at his farm.

Details of Practices followed by the farmer

Presently, Kuldeep Singh is maintaining an integration of Piggery, Poultry, Dairy, Fishery along with Fodder and crop cultivation altogether on a single piece of his land. In the year 2013, he started fish farming in a small size pond to develop his farm in the form of Integrated Farming System. Later in 2016, by financial support from Punjab Fisheries Development Board, he constructed one more fish pond beside the piggery unit in one acre land to rear Common carp, Indian Major Carp and Grass carp altogether to use the different strata of the pond. Further, he has adopted crop diversification via pulses like Gram, Lentil and oilseeds mainly mustard on his field instead of rice -wheat crop rotation in his 25 acre of land and grows fodder on 1.5 acre of his land. He is also maintaining a kitchen garden to get fresh vegetable for house hold consumption. The irrigation water for these crop fields comes from the pond along with poultry excreta as manure to reduce the cost of cultivation of various crops. He also uses pig excreta in the crop field @ one trolley per acre in every two year to enhance soil nutrition and reduce the fertilizer burden on the land.

Results/Output/Impact (economical/social/etc.)

He is earning a lucrative income round the year from all his enterprises. He is selling the pigs at the stage of piglet, finisher for meat and breeding stock by his self-developed marketing channel to get income round the year. In the first year of business, he earned about Rs. 40000/- only

and currently raised his income to Rs. 15,64000/-/ annum by selling pigs. Out of this he earns net profit of Rs. 580000/-. He gets a net revenue of about Rs. 1,70,000/- from dairy and Rs. 2,25,000/- from poultry. As fishery is recently introduced a couple of year ago, he is getting 3.5 quintal of fish annually and earning a net profit of Rs. 40,000/-. Simultaneously, in crop farming he is reducing cost of cultivation by reduced use of fertilizer to 40 % which is an added advantage to him. Mr. Bassi become synonyms of success in nearby area and is treated as a role model in developing an integrated model of farming at his field. His initiatives have generated direct rural employment to seven people on his farm and indirectly promoted 14 small pig farms in and outside the district to take piggery as employment.

Factors contributing to success

- Integrated farming system

Future plans

- He is planning to extend his farm in the field of value addition especially in piggery and poultry.
- Proper processing will add some value in the meat and sell them out as a ready to eat product.

FARMER: S. BALWINDER SINGH

Personal Information

S. Balwinder Singh hails from village Dikh in district Bathinda. A bachelor in arts by qualification he entered this profession 3 years ago at the age of 34 years.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Being a resource poor and marginal farmer he was aware about costly machinery and inputs. It was not feasible for him & arrange costly agricultural machinery as his land holding was very small. After graduation he also tried to get job at several places but could not succeed. All these constraints led him to adopt allied occupation to enhance his income.

He thought of starting his own agri-business. He came in contact with PAU scientists during farmer fair at Bathinda who encouraged him to adopt subsidiary occupation. After detailed discussion and assessing the opportunity of piggery during the year, he decided to switch to commercial pig farming.

Plan, Implement and Support/KVK Intervention(s)

To ensure his success in the pig rearing profession, he got training from Krishi Vigyan Kendra Bathinda. During the training program he acquired in-depth knowledge about shed construction, breed selection, concentrated feed formulation, disease management and market linkage in the field of pig farming. After training, he started rearing of pigs on small scale basis. Balwinder Singh had full support from his family members who encourged him to start piggery unit. KVK scientists suggested him to focus on pig breeding due to demand of piglets.

Details of Practices followed by the farmer

During year 2020, he started his business with 8 pigs (7 females and 1

male). He gradually expanded his business and constructed a 65 feet long and 28 feet wide shed with an expenditure of about Rs. 5.6 Lakh. Due to good management and high quality feed, the number of pigs increased rapidly at his pig farm. At present he has total 75 pigs which include 11 females, 1 male about 63 small piglets. Based on knowledge gained during trainings he reared 'Large White Yorkshire' breed which is the most popular breed in the world and is fast growing breed and weighs about 350 kg and the adult female weighs upto 300 kg. According to his experience if the pig is to be reared for meat, then for within 7-8 months it should have weight of more than one quintal and it may be sold as live weight for Rs. 120-130/kg. There is no difficulty in marketing the pigs as the traders themselves visit at the farm to buy pigs.Nowadays, many farmers approach him for practical knowledge and technical guidance regarding pig rearing. This encouraged him to produce quality piglets for new comers in the piggery enterprise. Keeping in view the increased interest of farmers in piggery he switched to the production of quality piglets. The piglets are separated at the age of one month till then he allows the piglets to feed milk from mother pig. When piglets start eating well by itself, is ready for sale. He prefers to sell more than two months old piglets @ Rs 3500-4000/piglets to the interested farmers. At this time, they have a body weight of about 22-25 kg / piglet and the selling price ranges from RS. 180-220 / kg.

Results/Output/Impact (economical/social/etc.)

In last two years he sold more than 237 piglets worth a total value of about Rs. 9.5 lakh, out of which he earned net income of Rs. 2.5 lakh. 2022. At present he has 70 more piglets which are ready for sale.

Factors contributing to success

- Knowledge, Hard work, Minimum dependency on labour, good management& skills and use of high quality feed etc.

Future plans

- Distant marketing to earn more profit

FARMER: LATE S. DALWINDER SINGH

Personal Information

Sh Dalwinder Singh belonged to Krishanpura, Kurali of district Mohali and was an eminent pig farmer of the region. He had farming experience of around 35 years He was Member of PFWA (Piggery Farmer Welfare Association) and had been felicitated by various agencies. He won State Award in 2014 for running the most successful piggery. KVK Mohali conferred him with **"Best Progressive Pig Farmer Award"** in April 2016.

He was also the member of the State Pig Advisory Board. He was also being invited in vocational training courses organized by KVK on Pig farming as guest lecturer for sharing his field experience with other farmers. After his sudden demise, now his farm is being run by his son.

Situation analysis/Problem statement (problems faced by the farmer before and while running the enterprise(s)

Left with only two and a half acres of land following generations of division, growing wheat and paddy barely sufficient for his own consumption. So he moved to dairy in the 1980s, later encouraged by the scientists of the Punjab Agricultural University (PAU) for pigs rearing as subsidiary occupation he entered in this business in 2010. Initially Dalwinder had a mindset that pigs are dirty by nature, smell bad and most important of all, who will buy them? But everything changed, once Dalwinder started rearing the first set of 10 pigs on the corner of the two kanal area of his field. He procured the initial pig stock from Government Pig Farm, Chhajju Majra, Mohali and invested Rs. 12000/- of his own. Later on he took loan of Rs. 6 lakh from UCO Bank, Kurali with Rs 1.5 lakh as subsidy. and expanded the land area under piggery to six kanal of 350 ft x17 ft size pig sty, having sixty compartments for accommodating 15 pregnant sows (12ft x 5 ft), 39 for boar and finisher pigs (10ft x 5ft), 6 for piglets (50ft x 12ft) at present and can able to housed 200 pigs at a time. Initially, he has

faced few hurdles like incidence of diseases including timely availability of swine fever vaccine at his farm. Apart from this he has noticed mange problem in his stock.

Plan, Implement and Support/KVK Intervention(s)

He approached to scientist of KVK Mohali to sort out his problems. Apart from this, they have also provided the routine diagnostic and treatment services not only to Dalwinder but also to other pig farmers of the district along with distribution of "Pig Specific Mineral Mixture" to them. He was also advised to go for Artificially Insemination (AI) in pigs in order to improve the genetic stock of their animals. He was also trained at a Government Pig Breeding Farm, (Kharar), Mohali, at Punjab Agriculture University, (PAU) Ludhiana, and also from other ICAR-Institutes such as NRC Pig, Guwahati and IVRI, Izatnagar.

Details of Practices followed by the farmer

Now under the guidance of KVK Mohali, Dalwinder is running his business profitably and planning to integrate it with fishery by utilizing the village pond after necessary interventions. He has hired two labourers and two family members for routine farm activities. He is following all the scientific practices under the guidance of KVK Mohali including feeding, vaccination (Swine Fever and FMD), AI, biosecurity and health. Although, he prefer to main its finishers unit solely on concentrate feed but time to time to reduce the feed cost he offers seasonal green fodder, vegetable leftover and kitchen waste to his stock.

Results/Output/Impact (economical/social/etc.)

Presently he is a proud owner of 200 pigs who have proved to be his piggy bank to him. He is able to sell around 1000 piglets in a year along with temporarily renting pregnant sows to other farmers for some months and earns around 28 to 30 lakhs. Now he is developing and strengthening linkages with the small/traditional pig farmers of the area for taking up piggery in a big way. After watching his huge progress and success in

piggery sector, lots of nearby villagers get inspired and subsequently started the pig farming as their livelihood. Being the Secretary of the Piggery Farmer's Association, he promotes other marginal farmers to shift to piggery. Dalwinder, emphasises the farmers to technically train themselves before one begins to deal with pigs.

Factors contributing to success

Training has helped him to develop a food chain system involving his animals and land, which reduces his input cost substantially. He grows cattle fodder on 1.5 acre area of land for the 14 crossbreed cows he have. By selling average 100 litres of milk daily he brings enough money to buy the feed for the pig stock. In return, the pig waste is channelised back into the fields as fertilizer for the fodder crop production without using any chemical fertilizer.

Future plans

- Want to improve his marketing strategies
- To make more links with the people so that he could get more options of selling his pigs when they reach marketable weight

GLOSSARY

AI	Artificial insemination.
Anthelmintic drug	Remedy against worms Anaemic animals with a shortage of blood
Baconer	A pig ready for slaughter at 90 kg live weight Capital items items with money value
Barrow	Male pig castrated before reaching sexual maturity.
Boar	Male hog or pig with intact testicles.
Cannibalism	Pigs bite other pigs
Castrate	Remove testicles by surgery.
Colostrum	First milk produced by the sow; it provides immunity to the baby pigs for the first few weeks.
Congenital inherited	Creep area where baby piglets lie and eat away from the sow
Creep feeder	Area accessible to small pigs but not their dams, in which a high protein supplement is provided.
Cull sow	Full-grown female sold for slaughter.
Culling	Reduction of animal population by selective slaughter/removal of unproductive/sick
Deficiency	Shortage
Diarrhoea	Watery manure
Dressing percent	Percentage of the carcass usable, compared to liveweight.
Dung	Manure
Environment	Temperature, wind, rain in a specific area
Farrow	To give birth to pigs.
Finisher	Growing pig during the period before slaughter at 90 kg live weight
Flush feed	feed being used to stimulate ovulation in females.
Flushing	Management term for providing high quality feeds, usually grains prior to the start of the breeding to increase reproductive performance.

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Full-(self)-feed	Animals are allowed to eat as much as they will clean up; feed is available at all times.
Gastrointestinal tract	Food channel
Gestation period	Pregnancy, lasting about 114 days in swine.
Gilt	Young female that has not yet produced a litter
Growing-finishing pig	Animal weighing between 40 and 220 lbs. that is being fed for slaughter.
Hernia	Rupture
Lactating sow	A sow suckling a litter of piglets
Nutritional value-	Value of feed for production
Pigsty	An enclosed area where pigs are kept on a farm
Placenta	Afterbirth fluids and membranes
Porker	A pig ready for slaughter at 60 kg live weight
Postmortem	After death
Runt	Small or weak pig in a litter
Scours	Watery manure
Shrink	Weight loss, usually temporary.
Sow	Female which has farrowed at least once.
Umbilical cord	The cord that attaches a newborn piglet to its mother
Unpalatable feed	That pigs do not like
Utilisation of feed	Use of feed by a pig to grow
Wallow	Water-filled depression or container large enough for pigs to lay in to cool off during warm weather.
Weaner	Apiglet that has been taken away from its mother
Weaning	Removing young from their mother.
Yield	Percentage of the carcass in the four lean cuts: ham, loin, picnic, and Boston butt

SUMMARY OF TABLES

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