सत्यमेव जयते

GOOD HUSBANDRY PRACTICES IN PIG FARMING

GOVERNMENT OF INDIA
MINISTRY OF FISHERIES, ANIMAL HUSBANDRY AND DAIRYING
DEPARTMENT OF ANIMAL HUSBANDRY AND DAIRYING

राजीव रंजन सिंह उर्फ ललन सिंह
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सत्यमेव जयते

पंचायती राज मंत्री
और मत्स्यपालन, पशुपालन एवं डेयरी मंत्री
भारत सरकार
Minister of Panchayati Raj and
Minister of Fisheries, Animal Husbandry and Dairying
Government of India

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MESSAGE

Pig farming holds immense potential for strengthening rural livelihoods, improving nutritional security and enhancing the livestock economy of the country. It is especially significant in the North Eastern Region, where pig rearing is closely linked with culture, food habits and income generation for small and marginal farmers.

Despite its importance, the pig sector in India has faced several challenges in recent years, including declining population trends, disease outbreaks such as African Swine Fever and the predominance of unorganised production systems. Addressing these issues requires scientific management, improved biosecurity and adoption of modern husbandry practices.

The publication *"Good Husbandry Practices in Pig Farming"* is a timely initiative of the Department of Animal Husbandry and Dairying under the Ministry of Fisheries, Animal Husbandry and Dairying. It provides practical, field-oriented guidance for farmers, entrepreneurs and extension workers on breeding, feeding, housing, health management and biosecurity. The document will help the pig farmers and entrepreneurs to carry out pig farming in a scientific and sustainable manner.

I am confident that this document will contribute towards improving productivity, reducing disease risks and promoting pig farming as a sustainable and profitable enterprise. I extend my best wishes to all stakeholders involved in strengthening this important livestock sector.

(Rajiv Ranjan Singh)

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एवं
पंचायती राज मंत्रालय
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पंचायती राज

Prof. S.P. SINGH BAGHEL
Minister of State for
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MESSAGE

Pig husbandry offers a valuable opportunity to enhance farmers' income, create rural employment and improve access to affordable animal protein. In several parts of the country, particularly in tribal and rural areas, pigs serve as an important economic asset for households.

However, the sector continues to be constrained by limited scientific management, inadequate housing and hygiene and recurring disease outbreaks. Promoting standardized husbandry practices is therefore essential for improving productivity and ensuring the health and welfare of animals.

The publication ***"Good Husbandry Practices in Pig Farming"*** provides clear and practical guidance to farmers and field officials for adopting improved methods of breeding, feeding, housing and healthcare. It will serve as a useful reference for strengthening extension services and promoting scientific pig farming across the country. The document has addressed the various issues of pig farming such as hygiene practices, biosecurity and animal welfare.

I hope this document will help farmers adopt better practices, enhance their income and contribute to the growth of the livestock sector. I congratulate all those associated with this initiative.

(Prof. S. P. Singh Baghel)

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FOREWORD

Pig farming in India plays an important role in supporting rural livelihoods, improving nutritional security and contributing to the livestock economy, particularly in the North Eastern Region where pork forms an essential component of local diets and culture. As per the official 20th Livestock Census (2019), India possesses a pig population of approximately 9.06 million, representing nearly 1.7% of the country's total livestock. With roughly 40% of this population concentrated in the North Eastern states, the regional significance of this value chain remains highly pronounced.

Since 2020, the emergence and spread of transboundary diseases such as African Swine Fever (ASF) have caused significant economic losses and exposed critical gaps in farm biosecurity, disease surveillance, and hygienic production systems. Strengthening scientific husbandry practices and preventive healthcare is therefore essential to ensure resilience, productivity, and sustainability of the pig sector.

The present publication, "Good Husbandry Practices in Pig Farming," prepared by the Department of Animal Husbandry and Dairying under the Ministry of Fisheries, Animal Husbandry and Dairying, provides practical and field-oriented guidance covering breeding, feeding, housing, health care, and farm biosecurity. The document integrates scientific knowledge to support farmers, entrepreneurs, and extension personnel across diverse production systems.

Our overarching objective is clear: optimize livestock productivity, fortify our national animal health infrastructure, and significantly scale up rural incomes. By integrating scientific frameworks with commercial scalability, the pig farming sector will play a defining role in realizing the national vision of an Atmanirbhar Bharat, ensuring sustainable income growth and a secure future for India's livestock farmers.

I express my deep gratitude to the ICAR-National Research Centre on Pig (ICAR-NRC on Pig) and all collaborating State and Union Territory administrations for their rigorous technical and field insights. I also highly commend the Joint Secretary looking after the National Livestock Mission (NLM) and his team of officers for their exceptional dedication and professionalism in delivering this benchmark publication. I am confident that this manual will serve as a foundational catalyst, driving the modernization and sustainable growth of India's pig farming ecosystem.

(Naresh Pal Gangwar)

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Message

Pig farming has long been a vital component of livelihood security for smallholders, particularly in the North Eastern Region and tribal belts of the country. Yet, the predominance of traditional and unregulated production systems has limited productivity and exposed the sector to serious animal health risks.

Pigs exhibit high reproductive efficiency and possess an exceptional ability to convert low-quality feed resources, agricultural residues, food waste, and agro-industrial by-products into high-quality animal protein. Their efficient feed conversion and comparatively lower greenhouse gas emissions contribute to reduced carbon footprints, thereby supporting the sustainability and resource efficiency of the livestock sector.

The spread of transboundary diseases, along with issues related to poor housing, feeding, and hygiene, underscores the need for structured guidance that farmers can easily adopt. Scientific husbandry practices not only improve growth and reproduction but also strengthen disease resilience and farm profitability.

This publication, "Good Husbandry Practices in Pig Farming", has been prepared to provide practical, field-level guidance on breeding, feeding, housing, healthcare, and farm biosecurity. The objective is to support farmers, entrepreneurs, and extension workers in adopting improved and sustainable pig production systems.

It is hoped that this document will help in promoting healthier herds, improving farmers' income, and strengthening the pig sector as an important contributor to the livestock economy of India.

Naveen

(Naveena B. Maheswarappa)

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Preface

Pig husbandry occupies a unique position in India's livestock sector, particularly in the North Eastern region where it serves as a dependable source of livelihood, nutrition and socio-cultural identity. Despite its importance, the sector has historically received limited technical attention, resulting in wide variations in management practices, low productivity and recurring disease risks. Recent disease incursions, changing consumption patterns and increasing market demand have underscored the need for a structured, science-based framework to guide farmers, field functionaries and entrepreneurs.

This publication on *Good Husbandry Practices in Pig Farming* has been developed in response to these emerging challenges and opportunities. The Department recognized that while several technical advisories exist, farmers and field officers required a consolidated, practical and field-oriented document that integrates animal health, welfare, productivity and biosecurity considerations into a single operational guide. The preparation of this document therefore represents a coordinated effort to translate scientific knowledge into actionable farm-level practices suitable for diverse agro-climatic and socio-economic conditions across the country.

The document has been prepared through close collaboration between this Department and technical experts from ICAR-National Research Centre on Pig. I further commend the officers of this Department, involved in the preparation of this document, for their dedication in conceptualizing, coordinating and finalizing this publication. Their sustained efforts in promoting livestock development interventions continue to strengthen the resilience and productivity of the sector.

I hope this document will serve not merely as a technical manual but as a catalyst for transforming pig farming into a modern, biosecure, welfare-oriented and income-generating enterprise. By promoting improved husbandry practices, we move closer to ensuring safer food systems, enhanced farmer incomes and a more resilient livestock economy.

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1. INTRODUCTION

1.1. Pig farming plays a vital role in the livestock economy of India. A glance through India's ancient history and mythology shows that the pig had a revered place in our ancient culture and civilization. Pigs are valued not only as a source of affordable and nutritious animal protein but also as a means of livelihood for small and marginal farmers especially in tribal and rural communities. Pigs are one of the most commonly raised animals in the world. They are the primary protein source for millions of people across numerous different cultures and geographical regions. In 2022, there were over 784 million pigs worldwide, increasing from around 750 million heads in the previous year. Pig husbandry has been an integral part of agriculture and rural livelihoods in Southeast Asia and India for centuries. Additionally, pig farming provides employment and income generation opportunities for smallholder farmers, contributing to rural livelihoods and poverty reduction.

1.2. Their biological advantages such as early maturity, high prolificacy, rapid growth, efficient feed conversion, and good dressing percentage make them an economically attractive species for meat production. Meat consumption continues to increase steadily, while the production levels are finding it difficult to cope with the increase in demand. Indigenous pigs, which constitute nearly 79% of the national pig herd are widely distributed across diverse agro climatic regions but often suffer from low productivity. At the same time, the demand for pork in the NER and other pockets of the country continues to rise, driven by increasing awareness of balanced diets and gradual acceptance of pork across different social groups.

1.3 Pig husbandry in the country remains largely unorganised. In the unorganised piggery sector, issues such as overcrowding, inadequate housing, poor hygiene, improper feeding and harsh handling are still common, leading to significant welfare concerns and reduced productivity. These conditions have repeatedly enabled outbreaks of deadly diseases, most notably African Swine Fever (ASF), which has deadly diseases, most notably African Swine Fever (ASF), which has spread to most of the States in the country since 2020 and has caused huge loss. These challenges highlight the urgent need for clear, practical guidelines that help farmers improve the living conditions, health and overall treatment of pigs.

1.4. A comprehensive package of practices is therefore essential for guiding farmers, entrepreneurs, and extension personnel in adopting improved methods of breeding, feeding, housing, healthcare, and biosecurity. By integrating science, technology, and locally adapted systems, pig farming can become a resilient and profitable enterprise capable of meeting the growing demand for quality pork in the country.

2. Objectives:

a. Introduce standardized, practical guidelines for feeding, housing, breeding, and healthcare.

b. Improve growth, reproduction, and meat yield of pig breeds through better breeding, feeding and management practices.

c. Ensure proper housing, hygiene, nutrition, and handling to reduce stress, improve immunity, and prevent disease in animals including zoonosis.

d. Minimize disease risk through improved farm biosecurity, Veterinary oversight and safe carcass/waste management practices.

e. Enhance income opportunities for rural and tribal communities by promoting pig farming as a sustainable and profitable enterprise.

f. Increase the availability of safe, nutritious pork to satisfy rising demand and emerging urban markets.

3. Status of Pig Population in India

3.1. According to the 20th Livestock Census (2019), India has a total pig population of 9.06 million, which represents 1.7% of the country's total livestock population. This marks a 12% decline from the previous census in 2012. The reduction is attributed to a disease outbreaks and limitations in present production system to cater the market demand which is mainly due to limited capital flow and inadequate access to modern farming technologies.

3.2. The species is reared widely across all agro-climatic zones but it holds particular significance in the North-Eastern and Eastern states. The North-Eastern Region alone accounts for nearly 45% of India's total pig population, whereas Eastern states accommodate nearly 25 %, northern states have 7.2%, central states have 10.9%, western states have 1.6% and southern states has 10% of our national swine population. Among the states, Assam leads with 2.10 million pigs, followed by Jharkhand (1.28 million), Meghalaya (0.71 million), and West Bengal (0.54 million). In terms of breed composition, indigenous and non-descript pigs dominate making up about 79% of the national population, while crossbred and exotic pigs account for only about 21%. Although indigenous pigs contribute significantly to rural livelihoods, their productivity is generally lower due to limited genetic improvement and traditional management practices.

4. Pig Production Systems in India

Pig production in India is practiced under a variety of systems that differ in their level of management, input use and scale of operation. These systems range from traditional backyard practices to highly specialized and intensive commercial units. Understanding these systems is essential for selecting the most suitable model based on available resources, production goals and local conditions. The pig production systems in are classified into backyard livestock system, semi-intensive system and intensive system assystems in are classified into backyard livestock system, semi-intensive system and intensive system as per FAO classification.

4.1 Backyard Production System

The backyard production system constitutes the historically prevalent pig rearing in India, particularly among tribal and rural communities of the northeastern, eastern and central states. The pig farming sector is highly unorganised in most parts of India, with the pig population reared under traditional smallholder, low-input, demand-driven production systems. In this system, pigs are typically maintained in small numbers around the household. Such backyard production is subsistence-driven or oriented toward local markets. Housing infrastructures are confined within bamboo enclosures or temporary shelters. Despite its low productivity, the backyard system plays a critical socioeconomic role as a source of supplementary income and animal protein for marginalized farming households.

4.2 Semi-Intensive Production System

The semi-intensive production system represents a transitional model towards a fully commercialized intensive production and is increasingly adopted by smallholder farmers seeking improved productivity while operating within limited resource con-

seeking improved productivity while operating within limited resource constraints. Indigenous animals, exotic animals and crossbreds are commonly maintained under this system. Feeding practices incorporate a combination of household waste, agro-industrial by-products and formulated concentrate feeds. Basic health management, including vaccination against common swine diseases are practiced, while breeding is often managed through natural service. It serves as an important interface between traditional practices and emerging market-oriented pig husbandry.

4.3 Intensive Production System

The intensive system represents modern, commercial pig farming aimed at maximizing productivity. Farms under this model are resource-intensive and usually house large numbers of pigs. High-yielding exotic or crossbred pigs are raised in scientifically designed buildings with proper housing, hygiene, temperature control, balanced rations and systematic health management. With strict biosecurity, planned breeding programs and efficient feeding strategies, this system ensures faster growth, improved feed conversion, and higher-quality pork. Moreover, with growing consumer demand for quality pork and policy-level support for livestock commercialization, the intensive system holds considerable potential for expansion and modernization within the Indian pig production milieu.

5. Housing Management

Housing systems and their components should be designed, constructed and regularly inspected and maintained in a manner that reduces the risk of injury, disease and stress for pigs. Facilities should allow for the safe, efficient and humane manage-

pigs. Facilities should allow for the safe, efficient and humane management and movement of pigs. Proper housing is a key requirement for efficient and profitable pig farming. Well-designed sheds, adequate equipment, proper sanitation and good management ensure healthy animals and high survival rates. In the early stages of establishing a farm, a simple shed with access to clean water and electricity is

Additional facilities can be added as the herd grows.

Small units can be managed by the farmer and their family whereas large commercial farms require trained staff for feeding, cleaning, disinfection and routine management. Good housing helps maintain optimum temperature for different categories of pigs. Piglets need warmth to prevent chilling while growers and adults must be protected from heat stress. Proper housing protects animals from extreme weather, heavy rainfall and cold drafts and enables over 85% of piglets born alive to

5.1 Site Selection for Pig Housing

A suitable location is essential to ensure good sanitation, reduced disease risk and smooth farm operations. General location criteria are given below:

a. The site should be on elevated land to prevent flooding or water logging.

b. Natural ventilation and shading from trees are desirable.

c. Road connectivity is important, especially for commercial operations.

d. Adequate space must be available for manure management and disposal.

e. Reliable access to water and uninterrupted electricity supply is essential.

f. Pig farms should be located in permanent structures with proper water and electricity arrangements. The following minimum distances must be maintained

i.

g. At least 15 meters from residential dwellings and factories

h. At least 30 meters from dairies, animal and poultry houses and food grain storage structures.

i. At least 45 m away from fire sources

j. At least 1 kilometer from garbage dumping grounds, slaughter houses, hide curing centres and tanneries

k. The boundaries of the site shall be at least 50 m away from the nearest transit roads and shall be surrounded by a fence.

5.2 Design and Construction of Pig Sheds

5.2.1 Orientation and Structural Features

a. Pig sheds should ideally be oriented longitudinally in north-south direction so that the sheds receive sufficient sunlight during morning and noon with proper ventilation..
b. Structures must be built on dry, raised ground and should avoid marshy areas.
c. Side walls should have a height of 4–5 feet, with the upper portion covered using GI pipes or wooden battens to improve airflow.
d. Roof height should be 8–10 feet to maintain cooler internal temperatures.
e. Walls must be constructed to resist moisture and dampness.

5.2.2 Ventilation Requirements

5.2.2.1. Proper ventilation is essential to prevent heat stress and respiratory ailments. Open sides, slatted partitions and adequate roof height help maintain good airflow throughout the shed. Ventilation may be natural or assisted, with the use of fans in open or naturally ventilated shelters. Roof insulation should be provided to reduce heat load and maintain a comfortable microenvironment. Where necessary, active cooling measures such as sprinklers or foggers may be used in conjunction with adequate airflow, ensuring intermittent wetting and drying to avoid excess humidity.

5.2.2.2. Flooring Standards: Floors should be made of hard, durable, non-slippery material, impervious to water, built with a slope of 1:40 to facilitate drainage. A well-designed drainage system ensures that wastewater flows out quickly, keeping the housing clean and dry.

5.2.2.3. Feeding Space and Trough Design: Trough space should be provided according to pig type and size to minimize competition and stress during feeding. Troughs, drains, and floor corners should be rounded to minimize injuries and facilitate cleaning. Recommended trough is:

- Boars: 24–30 inches per animal
- Sows with litter: 30–40 inches per animal
- Weaners: 8 inches per animal
- Growers: 10 inches per animal
- Finishers: 12 inches
- Dry sow of gilt: 12 to 15.7 inches

5.2.2.4. Water Supply and Cooling Arrangements: Constant access to clean, cool drinking water is essential, particularly during hot months. Shade structures or sprinklers may be used in summer to prevent heat stress.

5.2.2.5. Waste Disposal and Sanitation Measures: Daily removal of dung and urine is necessary to maintain hygiene. Appropriate disinfectants must be applied at recommended concentrations to prevent disease outbreaks and ensure biosecurity.

6. Space Requirements for Different Categories of Pigs

Each class of pig requires sufficient space for comfort, growth, and efficient management.

Table 1: Minimum Housing Space Requirement for Various Categories/Age Groups of Pigs

Type of animal	Weight of animal (kg)	Covered floor area per animal (m^2)	Open yard area per animal (m^2)
Boar	Up to 120	6.25	8.8
	121-199	7.00	10.5
	200 and above	7.50	12
Farrowing sow	Up to 120	7.50	8.8
	121-199	8.25	10.5
	200 and above	9.00	12
Weaner	Up to 20	0.96	0.96
Grower	21- 70	1.50	1.50
Finisher	71 and above	1.80	1.80
Dry sow or gilt	Up to 80	1.80	1.80
	81-150	2.25	2.25
	151 and above	2.70	2.70

6.1 Types of Pens in a Pig Unit

1. Boar Pen- One mature boar should be housed per pen to avoid aggression and injury.
2. Dry Sow and Gilt Pen- Each pen may house up to 10 dry sows or gilts. Adequate space should be provided to avoid overcrowding.
3. Farrowing / Nursing Pen- Designed to accommodate one sow with her litter, supporting safe farrowing and piglet growth. Should include guard rails and creep space for piglet protection.
4. Fattening Pen- Typically used for growing pigs destined for market. Each pen can house 16–32 pigs, depending on space availability.
5. Weaner Pen- Meant for pigs recently separated from the sow. Each pen should hold 10–30 weaners
6. Sick or Isolation Pen- About 5% of total farm capacity should be reserved for sick or injured pigs. It should be located separately to prevent disease spread..

6.2 Protection of Piglets:

Piglet mortality is highest during the suckling period mainly due to crushing by the sow or exposure to cold. Therefore, following measures should be taken:

6.2.1 Guard rails made of 2-inch GI pipes should be installed along the walls of farrowing pens. They must be placed 8–10 inches above the floor and at the same distance from the wall to create a safe space for piglets and prevent crushing.

6.2.2 Creep Area: A creep area is a small, protected enclosure accessible only to piglets. It provides warmth, safety, and a feeding space free from competition with the sow. It should contain a heating unit during cold weather. It requires about 15–20 square feet of floor space per litter

6.2.3 Loading and Unloading Infrastructure: Many farms lack proper loading ramps, leading to stress and injury during transportation. A fixed loading ramp should have a slope not exceeding 20° (15° preferable), concrete steps or grooves to prevent slipping, durable construction for long-term use. Proper infrastructure ensures safe handling of pigs and reduces stress during transport.

6.2.4 An Isolation or Sick Animal Sty: An isolation or sick animal sty must be a dedicated facility, physically separated from all other livestock buildings to prevent disease transmission. A minimum distance of three meters should be maintained from other animals, preferably secured with stock-proof double fencing. The area must be designed to contain all waste, ensuring that manure, effluent, and discharges do not come into contact with healthy livestock. After each use, the facility must be thoroughly cleaned and disinfected to maintain high biosecurity standards and protect the overall health of the herd.

6.2.5 Quarantine facility a quarantine facility is essential for isolating newly arrived animals and must be located at least 500 meters from the main farm, preferably on a separate plot with its own entrance. The shed should be well-constructed, easy to clean, and equipped with dedicated water, feed systems, storage, and equipment to prevent cross-contamination. Proper drainage and waste disposal must be ensured to contain effluents and reduce disease spread. An all-in-all-out system, along with thorough cleaning and disinfection after each animal movement, is vital for maintaining strict biosecurity.

6.2.6 Provision of Enrichment It is recommended that all pig farms should provide adequate quantities of enrichment materials that allow rooting, chewing, and exploratory behaviours.

7. Animal identification and record keeping

7.1 Animal identification: Ear tagging is presently most preferred as it suits animal welfare concerns and enables better animal tracing. Ear tags with unique identification numbers or with an RFID identification system need to be implanted before weaning. Keep the numbered part of the tag in the inner ear so that the number can be visualized by an approaching handler.

Animal registration in Bharat Pashudhan Portal (BPP) portal: Before vaccination, the animal owner is registered on Bharat Pashudhan Portal by entering his/her personal details like name, address, Aadhar number, mobile number etc. In case of pig, flock registration is followed instead of individual identification. In flock registration, a whole flock or herd of pig is identified by assigning minimum one Ear Tag bearing a unique identification number to the flock.

7.2 Record Keeping: Record keeping is vital for effective pig farm management, as monitoring of stock strength, reproductive status, health, and production levels are critical to profitable swine husbandry practice. The records may be kept in black and white or entered in softwares developed for the purpose. Accurate records of pig populations at different stages, reproductive performance, health status, feeding, daily births, mortality, and weight gain help farmers plan resources such as feed, water, and medications efficiently. By regularly reviewing these records, farmers can track progress, understand their financial position, and make informed decisions to improve overall farm performance.

a. Grower Record Card -Grower/finisher record cards track pig details; like, name or identification number, birthdate, breed, sex and performance like; weights, gain, feed intake, conversion etc.

b. Sow record card -By keeping detailed sow record cards with mating dates, health, and farrowing results, pig farmers can track individual sow performance and make informed breeding decisions to optimize their herd.

c. Boar record card -boar record cards include boar details (ID, birthdate, breed) and breeding history (sows served, dates, piglets born & weaned) to monitor effectiveness and take corrective actions when needed.

d. Breeding record -A well-maintained breeding record is the backbone of a pig farm's success. It tracks breeding performance, ensures animal health, and ultimately boosts farm productivity and profitability.

e. Farrowing records -Pig farmers who keep meticulous farrowing records can track sow performance, identify trends in litter health, and use this data for smarter breeding and farm management.

f. Animal stock register -This register tracks essential information about the pigs in the herd.

g. Feed Register -A feed register is essential for ensuring pigs receive proper nutrition, managing feed inventory efficiently, and become aware of major expenditures or costs, ultimately enhancing the farm's productivity and profitability

h. Treatment register -A treatment register for a pig farm is important for keeping track of all medical treatments given to the pigs. It helps monitor their health, follow veterinary guidelines, and manage the farm better.

i. Medicine and Vaccine register -Tracks purchase, storage, and usage of medicines and vaccines to ensure proper disease prevention and treatment.

j. Mortality register -A mortality register in a pig farm helps track and analyze pig deaths, identifying patterns or causes to improve management practices, animal welfare, and farm productivity. It includes details like date of death, pig ID, cause of death, and any relevant notes for each case.

k. Sale register -Records all animal or product sales, including date, buyer details, and amounts received.

l. Cash book -A comprehensive cash book for a pig farm should include details such as date, transaction description, amount, and category (income or expense), organized in chronological order for clarity and easy reference.

8. Pig husbandry and management:

Proper care and management of pigs at every stage of their life is very important for their health, growth, and good production. From farrowing to the early care of piglets, and the management of both sows and boars, each stage needs special attention. By following these simple scientific practices, farmers can keep their pigs healthy, improve breeding results, and run their farm more efficiently.

8.1 Care and Management of Piglets

- Immediately after birth, check that piglets can breathe properly. Wipe mucus from their nose and rub them dry. In case of difficulty in breathing, swing the piglets at arm's length to initiate breathing.
- Usually, newborn piglets do not require tying the umbilical cords. If there is bleeding, tie and clamp it. Navel cord may be cut with sterilized scissors leaving 3 cm from the body. Afterwards the navel should be soaked in a cup of iodine solution.
- Colostrum feeding within the initial 30 minutes after farrowing is very important.
- Smaller piglets have lesser opportunity to get sow's milk, hence it should either be cross fostered or provided with artificial milk. If foster dams are not available, commercially available neonatal feed formulations is an alternative option.

- Orphan Piglets: Piglets may become orphaned if the sow dies, shows scavenging behaviour, or suffers from conditions like agalactia or mastitis. In such cases nursing management as described above may be adopted.
- Provide a warm, safe creep area to prevent cold stress and crushing. Arrangement to provide temperature of 25°C to 34°C, is required in creep area to protect piglets from chilly weather. Easy access into and out of the creep area should be provided for the piglets and accordingly the opening of the farrowing pen into the creep area should be sufficiently sized.
- Sow's milk is deficient in Iron. For preventing piglet anaemia, 100 – 200 mg iron dextran injections are given in the neck on 4th and 14th day of age, by a qualified veterinarian.
- Needle teeth (wolf teeth) in newborn piglets can injure the sow's udder during nursing, causing pain and reducing her willingness to feed. The needle teeth are trimmed using clippers on the first day to prevent them from biting the udder. Only the points of the needle teeth should be removed and the procedure shall only be carried out under the supervision of a Veterinarian. However, care may be taken not to remove/uproot the entire needle teeth.
- Castration in male pigs intended for pork production is performed to prevent boar taint caused by compounds produced in the adult testes. It is typically carried out at 3–4 weeks of age using the open method, performed by a qualified veterinarian under anaesthesia, followed by proper post-procedure care. After castration, the scrotum and surrounding area should be disinfected and a fly repellent applied to promote healing and prevent infection

- Start creep feed from 7 days of age. Provide small, frequent amounts of high-protein feed. Creep feeding is essential for substituting the decreasing milk production of sow and is beneficial for early weaning
- Ear tagging should be used for pig identification. Ear tagging is presently most preferred as it suits animal welfare concerns and enables better animal tracing
- Weaning can be performed when piglets are 42 days old and 5-10 kg live weight (depending up on the breed).

8.2 Care and Management of Breeding Gilts and Sows

- Gilts can be kept in groups.
- Moving gilts to new pens, giving exercise, and exposing them to boars daily from 160–180 days helps trigger estrus.
- Breed gilts at the second or third heat increase the probability of large litters and prevent dystocia.
- Gilts that have not expressed heat by 9-10 months of age should not be kept in breeding stock.
- Detect heat twice daily using a teaser boar. Riding test/back pressure test may be performed where a female remains immobile on applying a pressure on the rump area (even when an attendant sits on its back). Riding test is confirmatory for a female in heat.
- Pen mating, hand mating and artificial insemination are the different mating systems usually practiced in organized pig farms

8.3. Care and Management of Pregnant Sow

- Record the mating date and expected farrowing date to manage feeding and move the sow to the farrowing shed on time.
- Avoid mixing pregnant sows/gilts with other animals to reduce stress and fighting; handle them gently and avoid long walks.
- Keep floors clean, dry and non-slippery; provide 8–10 cm straw bedding, especially near farrowing time.
- Feed adequately throughout pregnancy.
- Provide 1-1.5 kg of extra feed for 2-3 weeks before farrowing to increase birth weight. This is beneficial for thin sows and gilts from Day 100 of gestation to farrowing, but feed allowance for fatty sows should not be increased.

Fig: A sow in her advanced pregnancy

8.4. Care and Management of Farrowing Sow

- Move the sow to the farrowing pen 8–10 days before farrowing to accustom her in the new environment.
- Clean and wash the sow before transferring to farrowing pen.
- The farrowing pen should have non-slippery floor and provided with guard rails to protect the piglets.
- Thorough cleaning and disinfection of farrowing shed should be done one day before the transfer to ensure dry surface when the animal is brought in.
- If farrowing lasts more than 5 hours or if intervals between piglets are too long, suspect dystocia and seek veterinary support.

8.5 Care around Farrowing:

- The sow should be provided a bulky ration, which should be reduced to 1/3 on the days before farrowing and withdraw 12 hours before farrowing.
- A trained attendant should be present at every farrowing. Some sows may savage piglets due to pain; attendants can massage the udder to ease discomfort and improve milk letdown.
- Do not wash the sow and neonates on Day 1. Washing limits neonate's ability to maintain homeothermy.
- Ensure the sow has free access to clean water.
- Provide a balanced ration during lactation to support milk production.

8.6 Care and Management of Breeding Boar

- Keep the breeding boar in a separate pen.
- Wash and scrub the boar daily to maintain hygiene.
- Keep the boar pen clean, dry, and non-slippery.
- Trim the boar's feet regularly to avoid lameness.
- Tusks can be removed with bolt cutters to prevent injuries to sows and handlers during mating. Routine tusk trimming should not be practiced. Boar aggression and handler safety should be managed primarily through appropriate husbandry practices, housing design and environmental enrichment to reduce harmful behaviours. In case of tusk trimming, the procedure shall be performed by a registered veterinarian, with adequate anaesthesia and analgesia, and strict post-procedure care to prevent infection and minimize suffering.

- Newly purchased boars must be quarantined for at least 3 weeks to prevent disease entry into the farm.
- Provide balanced nutrition; avoid overfeeding or underfeeding as it affects fertility.
- Ensure the boar has free access to clean water.
- Use the boar for breeding only after 8 months of age.
- Breed younger boars with older sows for easier mating.

Two matings 12–18 hours apart give the best results. A third mating can be done 12 hours after the second if litter size is considerably low.

9. Pig farm biosecurity

Biosecurity is a collective term of action. It may be defined as the implementation of measures that reduce the risk of disease-causing agents being introduced and spread. Maintaining a "farm-biosecurity" is a proven management intervention to restrict, reduce, and remove the infectious pathogens in a farm.

Biosecurity in scientific pig farming requires the adoption of a set of operational procedures for restricting the disease. The biosecurity measures adaptable at the field level depend on the type of production system (viz., intensive production system or backyard piggery), type of stock maintained (viz., breeder unit or finisher unit), and epidemiological factors. In addition to the practices in a conventional piggery, implementation of biosecurity measures may include infrastructural improvisations, amendments in the farm operation and imparting training to human resources.

9.1 Disease Control:

Disease-causing organism or pathogens reach an individual animal from outside the farm or from within the farm. Therefore, following measures to be undertaken in order to prevent the entry of disease into the farm:

9.1.1 From the outside, the disease may enter through the following routes:

a. Animal movement from outside: In the case of finisher farms, new stocks of weaners or growers are brought from breeder farms for rearing purposes. In breeder farms, pigs are brought as replacements for old stocks. The incoming or outgoing animal may harbour pathogens even though they are asymptomatic and act as a source of infection to other animals.

b. Anthropogenic routes: Another possibility could be through visitors, animal attendants, or veterinarians who have attended to a diseased animal or animal in carrier status, before entering the farm.

c. Fomites: Pathogens may also enter the farm through clothes, shoes, and even vehicle tyres.

d. Contaminated feedstuffs and soiled roughages: Contaminated feedstuffs and soiled roughage could be another risk factor. Swill feeding, mainly with meat products or animal slaughter wastes, is another risk.

e. Stray/Wild animals or parasites: Diseases may also enter the farm through other animals like wild boars, bovines, stray animals, rodents, and migratory birds. Ectoparasites are also a source of pathogens to farm animals.

f. Air and water: Some diseases are airborne and some are waterborne.

9.1.2 Within a farm, the disease may spread through the following routes:

a. Pig to Pig contact: Infected animals are a potent source of infection to pen mates and nearby sheds.

b. Farm staff: Attendants, who attended infected animals, may carry pathogens through their clothing and utensils.

c. Body fluids: Pathogens may be present in the secretions, excretions, semen etc., of infected animals.

d. Carcass and slaughter wastes: Improperly disposed of carcass materials and slaughterhouse wastes are a potent source of infection.

e. Poor shed design: Overcrowding, poor ventilation, insufficient space allocation, poor housing plan, and mixing of animals of different age are risk factors favouring the spread of diseases.

9.2 Implementing biosecurity in a farm: In order to prevent ingress of disease in a pig farm, it is advisable that a robust Biosecurity measures to be in place. While implementing Biosecurity measures, the following to be considered:

9.2.1 Farm layout

- A farm should ideally be located at an isolated place.
- Establishing a boundary fence will control the movement of man, animal &vectors from the "Riskzones"
- Offices, farm-houses etc., may be located in the "Buffer zone", where monitored entry is allowed
- Confine pigs to the "Core zone", where strict biosecurity is in place.
- Restriction of entry from outside

9.2.2. Restriction of entry from outside

- Display boards giving clear directions at the gate
- Control entry of stray/wild animals & birds
- Maintain visitor's records & restrict those exposed to diseased animals
- Disinfection of vehicles from outside
- Purchase replacement stock only from reliable farms with healthy vaccinated animals
- Adoption of artificial insemination for breeding purpose

9.2.3 . Biosecurity inside a farm

- Visitors should wear protective clothing
- Staff should take bath, change dress & wear gumboots before entering farm
- Hand sanitization & foot bath are indispensable
- Diseased animals should be segregated
- Prompt diagnosis & treatment are vital

9.3 Routine farm operations should include the following biosecurity considerations for the prevention of diseases.

9.3.1 Vehicle movement

The most practical approach is to have clear instructions to visitors and staff on biosecurity, right from the front gate. Display boards giving clear directions should be placed at the entry point itself. The display boards should be placed so that they should attract the attention of every person entering the campus.

It is always recommended to minimize the number of entry points. Vehicles requiring their delivery up to the farm area may be cautiously and selectively directed to the farm and that too, only after performing the required sanitization procedures. The procedures should include mandatory tyre dipping, pressure washing, etc. If the vehicle has been used for transporting other animals in recent days should be initiated. A format for the vehicle decontamination record is provided in the annexures. Decontamination procedures including washing, cleaning, and disinfection of the vehicle should be carried out outside the farm premises. If the driver or loading workers were exposed to any biosecurity risk in the preceding days, the entry of such
personnel may be restricted.

9.3.2 Checklist for vehicle entry

- Examine each vehicle entry and exit point for any risk
- Keep a visitor/vehicle register
- Disinfection logbook of animal cages entering the campus
- Source and quality declaration of vendor in case of the vehicle carrying feed
- Display biosecurity signs at all vehicle access points.

9.4 Biosecurity protocol for farm workers:

9.4.1. Farm workers: Farm workers should take bath, change their dress, and wear gumboots before entering the farm. Separate change rooms are preferred, where they can keep their belongings from home during their working hours. For veterinary
doctors visiting the farm, additionally, they need to sanitize the instruments if they

9.4.2 Visitors: Visitors to the farm area should seriously follow strict biosecurity measures. Normally visitors should not be allowed to enter the core biosecurity zone. Most of the vehicles and visitors should be restricted to the office area or farm-house area. In conditions that warrant authorization of a farm visit by a visitor, strict adherence to biosecurity protocols is required

- Foot dipping, hand washing, etc., are mandatory.
- Visitors should change dress and wear caps, masks, aprons, and gumboots.
- Visitors should record the date of the last visit to other pig farms or slaughterhouses.

9.4.3. Checklist of biosecurity accessories for staff and visitors

- Visitor record maintenance
- PPE, including gloves, masks, goggles, and protective clothing for visitors
- Change room facilities
- Farm uniform, Gumboots, Gloves for staff
- Foot dip and sanitation at each checkpoint
- Disinfection SOPs and weekly follow-up charts
- Sprayers for disinfectants
- Tyre dips and vehicle wash facility

9.4.4 Self-declaration format for visitors at the farm gate

9.5 Cleaning: Cleaning involves the removal of all organ
ic waste matter from sheds. An unhygienic premise predisposes the incidence of disease in a herd. Adherence to routine removal of excreta and adopting proper disposal methods to minimize environmental concerns is very important. In addition to the routine disposal of bedding materials, dung and urine, there should be detergent washes before introducing new batches. In the event of any unusual death of pigs, carcasses should be buried, composted or burned biosecurely.

9.6 Disinfection: Disinfectants are compounds used to kill germs (bacteria, viruses, and parasites). The application of a suitable disinfectant destroys the infectious or parasitic agents of animal diseases, including zoonoses. Application of disinfectants should be done on premises, vehicles and different objects which may have been agents of animal diseases, including zoonoses. Application of disinfectants should be done on premises, vehicles and different objects which may have been directly or indirectly contaminated. Its choice & strength depends on surfaces to be cleaned, disease-causing microbe etc. The various disinfectants and their specific uses are mentioned in table 2.0, for easy reference. Cleaning surfaces before disinfection is recommended. The following disinfectants may be used:

Table 2: List of disinfectants for using in pig farm

Sl No	Disinfectant	Strength	Suitable surface
1	Lime (Calcium hydroxide)	1% Solution	Floors, drains & ground
		As powder	Passages, pavements
2	Bleaching powder	30% available chlorine	Dusting floors, drains & ground
3	Caustic soda (Sodium hydroxide)	2% solution	Sheds, Premises
4	Quaternary Ammonium Compounds	0.1-0.2%	Sheds, feeding troughs
5	Potassium peroxy mono sulfate	1% solution	Sheds, feeding troughs, premises
6	Sodium hypochlorite	2% solution	Tyre wash, footbath, shed & premises
7	Potassium permanganate	3-5 g/Litre	Tyre wash, footbath
8	Formaldehyde	1% solution	Tyre wash, footbath
9	Phenol	2-5% solution	Vehicles, cages, premises
10	Boric acid	5-6% solution	Skin, equipment
11	Chlorine tablets	0.2-1mg/L	Chlorination of drinking water

9.7 Standard Operating Procedure (Cleaning and disinfection)

- Clean heavily soiled areas by initially softening dirt and manure with a low-pressure water spray, allowing it to soak.
- Use high-pressure sprays (preferably between 750 psi to 2,000 psi) to thoroughly remove all dirt and organic material
- Begin cleaning from the back of the pen or building, progressing towards the front.
  Start by spraying the ceiling, followed by the walls, and finally the floor.
- Utilize sprayers and nozzles capable of reaching difficult-to-access areas, including the undersides of troughs, feeders, and flooring whenever possible.
- Once the pen is clean, rinse all surfaces to remove accumulated aerosol organic material.
- Apply a surfactant or emulsifying agent to eradicate residual organic materials, then rinse all surfaces again.
- For effective disinfection, ensure surfaces are thoroughly cleaned beforehand, as disinfectants only work on clean surfaces.
- Disinfectants work best at temperatures above 18°C (65°F), but not above 43°C (110°F). Adhere to the manufacturer's application instructions for the disinfectant product being used.
- Apply the disinfectant with pressure, ideally through a pressure washer, to ensure penetration into pores, cracks, and crevices. Alternatively, fog or aerosol application can serve as a secondary method.
- When applying, proceed systematically from back to front and from top to bottom of the room.
- Provide proper time for drying.

9.8 Biosecurity protocol for Disposal of manure and effluents

9.8.1 Manure Storage Area: Establish a designated area for storing manure and effluents, located away from water sources, residential areas, and animal housing facilities. Ensure the storage area is properly constructed with impermeable surfaces, such as concrete or lined pits, to prevent seepage into the soil or groundwater. Implement measures to control odours and minimize fly breeding, such as covering the stored manure or using effective odour management techniques. Monitor the manure storage area regularly to ensure it is not overfilled and has proper ventilation. Prevent the accumulation of stagnant water in the storage area to minimize the risk of disease transmission and breeding sites for pests.

9.8.2. Manure Handling and Collection: Regularly collect manure from the animal housing areas and transfer it to the designated storage area using appropriate equipment and containers. Minimize the risk of cross-contamination by using dedicated tools for manure collection.

9.8.3. Safe Disposal Methods: Consider implementing anaerobic digestion or composting techniques to effectively treat and manage the manure. If spreading the manure on agricultural land then, avoid spreading manure on areas prone to runoff, steep slopes, or environmentally sensitive areas.

9.9 Biosecurity protocol for Animal movement:

9.9.1 Procurement of replacement stock

Live pigs represent the greatest risk for disease introduction to a pig farm. Current production systems necessitate the periodic replacement of breeders to maintain optimal productivity thresholds. In most cases, a renewal of the whole breeding population every 2–2.5 years may be required. Replacement stocks can be produced internally or purchased from reputed breeder farms.

In farms practicing external replacements, especially the finisher farms, the higher the frequency of new entries increases the probability of pathogen entry. Similarly, if breeding using a male from other farms or using semen doses from outside is practiced, there can be a risk for the introduction of new pathogens as well. Internal replacements may be convenient for farms maintaining a closed breeding system and relying on their own males (semen). However, internal replacement has limitations in genetic improvement and eradication of endemic diseases. In this case, the most efficient way of organizing production is by adopting batch mating/ farrowing (usually by planning breeding in a period of 3 weeks).

For procurement of replacements, the biosecurity measure should invariably include disease testing based on a list that classifies diseases based on the risk they pose to the farm. This will enable discarding the stock at the supplier's end itself.

Checklist for procurement of replacement stock

- All purchases should be made from a reliable, quality-assured source.
- Perform disease testing.
- Procure vaccinated stock, if possible.
- All the new pigs may be purchased from the same source rather than from multiple or unknown sources.
- A health certification by an authorized veterinarian at the source will reduce risks.
- Transportation should ensure animal comfort and abide by the state rules.
- Request a record of treatments including medications, vaccines, and other chemicals administered

9.9.2. Quarantine:

In all instances, a meticulously devised and vigilantly executed quarantine regimen represents the most efficacious strategy for mitigating risks associated with external pathogen introductions. The quarantine involves the isolation and acclimatization of incoming stock from other animals on the farm. This is important because an animal may not exhibit symptoms of a disease for a period, termed the incubation period, even after the entry of the pathogen. So, following an observation period under veterinary supervision, at an intermediate station, will minimize the risk due to asymptomatic animals and animals in the incubation period. Vaccination against endemic diseases, deworming, and testing for diseases like such as brucellosis, PRRS, PCV2,ASF and PPV infections, etc may be performed during the period.

Quarantines must be designed as bio-contention units, to avoid the spillover of any undesired pathogen brought by the incoming animals. Typically, this entails constructing the quarantine at a considerable distance from the principal farm units and treating it as an autonomous entity, akin to an external facility.

Ideally, a quarantine shed should be located at least 500 meters away from the core zone or main farm unit. The quarantine facility should be equipped with separate clothes and equipment for the staff. A minimum quarantine period of 21 days is recommended. Stocks in quarantine sheds should follow an all-in, all-out strategy, where the new animals are brought together and moved out together. Proper disinfection should be followed during each cycle

- Labour management in a quarantine facility:
- Establish a controlled access point for the quarantine shed, preferably with a footbath and hand-washing facilities.
- Restrict entry to authorized personnel only and maintain records.
- Implement a strict biosecurity protocol, including wearing protective clothing, such as coveralls, boots, and gloves, when entering the shed.
- Ensure that visitors and vehicles are disinfected before entering the premises.
- Cleaning and disinfection of quarantine facility:
- Develop a regular cleaning and disinfection schedule for the quarantine shed.
- Detergent wash is preferred to remove all organic material, including manure and bedding, from the shed before cleaning.
- Use appropriate disinfectants effective against common pathogens, following recommended dilution rates.
- Pay special attention to areas, such as feeders, waterers, and walls, during cleaning and disinfection.
- Animal management in quarantine facility:
- Keep animals in the quarantine shed separate from the main herd to prevent disease transmission.
- Ensure All-In-All-Out strategy
- Retain for a minimum of 21 days
- Perform disease testing.
- Perform vaccinations and deworming.
- Monitor for any signs of illness or abnormal behaviour during the quarantine period.
- Waste Management in quarantine facility:
- Implement proper waste management practices, including the safe disposal of manure and other organic waste from the quarantine shed.
- Ensure that waste disposal areas are located away from water sources to prevent contamination.
- Record keeping in quarantine facility:

- Maintain accurate and up-to-date records of animal movements, health status, treatments, vaccinations, and any other relevant information.
- Regularly review and update records to facilitate traceability and disease management.

10. Pig nutrition

Feed accounts for nearly 70% of the total cost in pig farming, making proper nutrition essential for profitability. As pigs are monogastric and have limited ability to digest fibre, they require a balanced diet rich in energy, protein, minerals, and vitamins. With the shift from traditional scavenging systems to intensive farming, the need for scientifically formulated feed has increased. Nutrient requirements change with age, weight, and physiological stage, so feed must be adjusted accordingly to ensure better growth, efficiency, and overall productivity.

10.1 Nutritional Care of Newborn Piglets

Newborn piglets must receive colostrum immediately after birth, as it provides essential energy, immunity, and warmth. If the sow is unavailable, a milk replacer containing 24–28% protein and 8–10% fat can be used. Milk replacer can be prepared by using 60% skim milk powder, 30% oat flour, and 10% whey protein powder, combined with 100 ml water and 5 ml soybean oil to create a nutritious substitute. This mixture is warmed to body temperature to mimic the sow's milk. Because sow milk is low in iron, piglets need iron supplementation about 200 mg within the first week, either in a single dose or split into two doses.

10.2 Creep Feed / Starter Feed

Creep feed can be fed from 7 days of age onwards. It must be soft, palatable, and easy to digest, helping them adapt to solid feed and enabling early weaning. Creep feeds may include animal proteins and added iron to support rapid growth. Proteins derived from animal sources, such as skim milk, fishmeal, or meat meal, are preferred due to their higher relative biological value compared to plant-based proteins. To address potential iron deficiency, creep feed can be fortified with ferrous sulphate salt, usually in a ratio of 9:1 Crude protein levels are 20% and metabolizable energy (ME) of 3360 KCal/Kg are recommended.

10.3 Grower Feed

After weaning (12–15 kg), pigs move to grower feed with higher fibre to about 8%. To enhance feed utilization efficiency, crude protein levels are 18% and metabolizable energy (ME) of 3170KCal/Kg are recommended. Supplementing amino acid lysine at a rate of 0.8% improves lean growth as pigs' digestion becomes more efficient.

10.4 Finisher Feed

From 35–50 kg onward, pigs require a finisher ration with, crude protein levels are 18% and metabolizable energy (ME) of 3170KCal/Kg need to be provided as growth slows and excess nutrients may cause fat deposition and environmental waste. Proper nutrient balance ensures efficient finishing performance.

10.5 Feeding of Pregnant and Lactating Sows

Before breeding, gilts and sows are given extra feed for 1–2 weeks, a practice called flushing, which helps increase the number of eggs released and improves litter size. This method involves feeding a diet containing 16% protein, 3,000 kcal DE/kg, and 0.7% lysine. During pregnancy period of 114 days, sows should receive a balanced diet but not too much energy to avoid becoming too fat. Over-fat sows may have weak piglets or pregnancy problems. Pregnant sows usually need enough protein, minerals, and vitamins to support the growing fetuses. Pregnant sows are typically fed 6000 kcal ME per head per day, with feed quantity limited to 2 kg per head per day. The nutritional composition of the diet should include 14% crude protein, along with 9 g lysine, 16 g calcium, and 14.5 g phosphorus daily.

Lactating sows need good-quality feed to produce milk and regain the weight lost during farrowing. They generally need 3–4 kg feed per day plus 200 g extra feed for each piglet. Feed is given twice daily, and laxatives like bran or green fodder can prevent constipation. Feed is reduced at the end of the weaning period to help dry off the sow.

10.6. Feeding Boars

Breeding boars should not become overweight, so their feed must be controlled. They can be fed a finisher diet containing 16% crude protein, 3,000 kcal DE/kg diet, and 0.7% lysine. However, their daily intake should be limited to 2.5 kg per head to prevent excessive weight gain. Providing 4–5 kg of green fodder such as berseem or lucerne improves digestion and overall health. Boars also need enough calcium, phosphorus, and vitamin D to maintain strong bones and good breeding performance. Nutrient requirements for pigs at different stages have been elaborated at Table 3. Daily feed requirements of different classes of pigs are at Table 4. The composition of key ingredient for feed formulation at different stages of pigs are at Table 5.

Table 3: Nutrient Requirements of Pigs at Different Stages (BIS, 1987)

Parameters	Starter Feed	Grower Feed	Finisher Feed
Moisture (% by mass, Max)	11	11	11
Crude Protein (% by mass, Min)	20	18	18
Crude Fat (% by mass, Min)	2	2	2
Crude Fibre (% by mass, Max)	6	8	12
Total Ash (% by mass, Max)	8	8	8
Acid Insoluble Ash (% by mass, Max)	4	4	4
Metabolizable Energy (kcal/kg, Min)	3360	3170	3170
Aflatoxin B1 (ppb, Max)	20	20	20

Table 4: Daily Feed Requirement of Different Classes of Pigs

Stage of Pig	Days	Body Weight (kg)	Feed Requirement (kg/pig/day)
Weaner	56–120	12–15	0.25 – 0.75
Grower	121–180	15–35	0.75 – 1.50
Finisher	181–300	35–80	1.50 – 2.50
Pregnant gilt	2 – 2.5 kg feed/day		
Lactating sow	3 – 4 kg feed + 200 g feed per piglet		
Boar	2.5 kg feed + 4–5 kg succulent green fodder		

Table 5: Example of Feed Formulation for Different Stages of Pigs

Ingredients	Starter (%)	Grower (%)	Finisher (%)
Maize	60	64	60
Wheat bran	6.5	6.5	14.5
Soyabean meal	13	12	10
Groundnut cake	12	10	10
Fish meal	6	5	3
Mineral mixture	2	2	2
Salt	0.5	0.5	0.5
Lysine	1.25	0.8	0.7

10.7. General guidelines for pig feeding:

Pig feed can be provided in various forms such as meal, pellets, cubes, or crumbs, either in dry form or wet form (mixed with water at the time of feeding to make a slurry).

- Quality Standards: Feed should be free from rancid odor, high moisture (>11%), dust, visible foreign materials, adulterants, fungus, or insects.
- Additives and Supplements: Feed should be free from urea or other non-protein nitrogenous substances. However, pure amino acids may be added to balance the dietary protein. Feed additives such as probiotics, prebiotics, enzymes, etc., can be added to improve the feed utilization efficiency of animals.
- Antibiotics: No antibiotics are recommended for use as growth promoters in feed to prevent the accumulation of antibiotic residues in pork and the development of antibiotic resistance in pathogenic bacteria.
- Regulatory Compliance: Feed manufacturers should follow the guidelines of the Bureau of Indian Standards (BIS) for the composition of feed tailored to the nutrient requirements of different age groups of animals (FSSAI).
- Nutritional Balance: Prepared feed should be balanced with essential minerals and vitamins.
- Storage: Feed with no more than 11% moisture should be stored in clean and dry places. Packaging materials may include polyethylene-lined jute bags, laminated paper bags, or HDPE bags with sealed mouths
- Water Quality: Water used for livestock should contain no more than 5,000 coliforms per 100 mL, with a maximum total dissolved solids (TDS) level of 3,000 ppm.

11. Reproductive management

The profit of a pig farm depends largely on how much litter each sow produces in a year. This requires accurate heat detection and proper timing of mating or insemination.

11.1 Puberty and Age for Breeding

Gilts should only be bred after reaching at least 8 months of age, 100–130 kg body weight and having completed at least two full estrus cycles; boars should be 9 months or older, of sufficient size and libido, and produce at least 300 ml of ejaculate with ≥50% progressively motile sperm.

11.2. Estrus Cycle

The normal estrus cycle in pigs lasts 18–24 days, with an average of 21 days. Detecting standing heat at the right time is very important, as it greatly improves the chances of successful conception. The detailed sign of estrus in sow is at Table 6.

Table 6: Signs of Estrus / Heat in Pigs

Signs	Pre-heat	Standing heat	Post-heat
Standing test	Does not stand still when pressure is applied	Stands still with arched back when mounted or pressed	Does not stand still
Vulva	Red, swollen, little mucus	Pink, less swollen, clear sticky mucus	Pale, no swelling, no mucus
Behaviour	Restless, nervous, mounts others, reduced feeding	Calm, allows mounting, erect ears, arched back near boar	Normal behaviour
Duration	About 2 days	About 1 day	About 1 day

11.3 Correct Timing of Mating / Insemination: The Pig Farmer may go for natural service or may contact the veterinary department in the local area for artificial insemination if required.

11.4 Pregnancy Detection: Check the sow for return to heat after 18–24 days of mating. If she shows heat, she is not pregnant and should be re-bred immediately. Ultrasound (Doppler) can detect pregnancy from 26 days after mating.

12. Health Management

Keeping pigs healthy and maintaining proper farm hygiene not only improves growth and body weight but also ensures better profits and safe pork for consumers.

12.1 Management of pig diseases: Pigs may be affected by many diseases caused by virus, bacteria, parasites and microbes. Swine Fever, FMD, Porcine Respiratory and Reproductive Syndrome, Bacterial Diarrhea, Pneumonia, abortions, and stillbirths are important diseases which are affecting pigs. Therefore, preventive care should be taken in consultation with the local veterinarians either through preventive vaccinations or treatment. The pig farm owners, after noticing any sign of illness involving more than one pig, take following initial actions:

a. At any sign of illness, isolate the sick pig immediately and consult a veterinarian.

b. Clean affected skin or wound areas using clean water followed by a mild, veterinary-approved antiseptic suitable for use on animal skin, as advised by a veterinarian

c. For FMD, clean mouth and foot lesions with potassium permanganate, then apply antiseptic and fly-repellent ointment twice a day.

12.2 Preventing Injuries: Broken floors, damaged pipes, or sharp iron grills can injure pigs' knees, hocks, and hooves. These should be repaired immediately. Piglets may get knee wounds while suckling. Treat these with Betadine or iodine, followed by fly-repellent antiseptic ointment. For maggot-infested wounds, apply a turpentine plug, dress with Betadine, then apply fly-repellent ointment the next day.

12.3 Handling Abortions: Abortions in pigs are caused by many reasons including PRRS and Brucellosis. Therefore, the handling of aborted piglets and pigs may be carefully done. In this regard, it is suggested that the measures as follows may be taken immediately after noticing of abortion cases:

a. Send aborted fetuses and placenta for laboratory testing, especially to check for Brucella.

b. Any pig that tests positive for Brucella must be removed permanently, as the disease spreads to humans (zoonotic).

c. Such animals must not be sold. They should be humanely euthanised and buried deeply with lime to prevent disease spread.

12.4 Hygiene and sanitation

a. The farm and pig houses must always be kept clean, dry, and free from waterlogging.

b. Use mosquito-proof nets at night to protect pigs from mosquito bites.

c. A footbath with 2% potassium permanganate should be maintained properly at the farm entrance; anyone entering must dip their feet.

d. Regular washing of pigs with clean water helps reduce infections and keeps animals comfortable.

e. Feeders must be washed daily with clean water, and periodically sanitized using a 5% Potassium Permanganate ($KMnO_4$) solution.

f. Entry of outsiders near the pig sheds must be strictly restricted to prevent disease introduction.

g. Separate work clothes should be used inside the piggery and must not be mixed with household clothing to avoid contamination.

13. Vaccination and Deworming schedule

13.1 General guidelines for vaccination

- The gap of 28 days may be kept between vaccinations.
- Vaccines should not be mixed at any stage.
- Animal should be stress free at the time of vaccination.
- Ensure proper care and nourishment to the vaccinated animals until 2 weeks post-vaccination.
- Do not vaccinate animals which are already in stress (like bad weather, scarcity of fodder & water, disease outbreaks, after transportation etc.)
- Animals should be dewormed with removal of ecto-parasites one to two weeks prior to vaccination.
- Avoid administration of antibiotics and immunosuppressant until 2 weeks post vaccination.

- Vaccines shall be injected at proper sites.
- New/fresh/sterilized syringes and needles shall be used for each animal.

The vaccination schedule is at **Table 7**

Table 7: Vaccination Program

Vaccine	**Dose and Routine of Administration**	**Age of Primary Vaccination**	**1st Booster**	**Revaccination**
Classical Swine Fever Vaccine	1ml, I/M	Post weaning (Weaning is usually done at 45 days)	After 30 days of 1st vaccination	6-month interval
FMD Vaccine (Oil adjuvanted trivalent)	2ml, I/M	2 Months	-	6-month interval
Porcine Cysticercosis (in high risk areas)	1 ml by deep Intramuscular injection behind the ear area.	2 months	After 3-4 weeks of primary vaccination	6-month interval

13.2 General guidelines for Deworming

- Deworm at the start of the summer season and before winter.
- Treat young ones/piglets separately, as they are more vulnerable.
- Select proper dewormers that target roundworms, tapeworms, and flukes.
- Rotate dewormers to prevent resistance development.
- Use oral drenches, injectables, or pour-on formulations as per veterinary recommendations.
- Dose according to body weight to avoid under dosing or overdosing.
- Conduct fecal egg counts to assess deworming effectiveness.

- If resistance is detected, switch to a different class of dewormer.
- Begin piglet deworming at 6-8 weeks of age.
- Deworm every 45-60 days for growing pigs and every 2-3 months for adult pigs.
- Deworm sows 2 weeks before farrowing.
- Deworm breeding boars every 2-3 months
- Always consult Veterinarian.
- Deworming as per the schedule at Table 8.

Table 8: Deworming Schedule:

Deworming of the animals should be done for both end and ecto parasites as per the recommendation For Control of Endo parasite				
Name of dewormer	Dose rate	First dose	Second dose	Repeat
Piperazine liquid (45 % w/v)	@100-300 mg/kg body weight	at 3 weeks of age	at 21 days of first deworming	at 2 months interval
Albendazole			@5- 7.5 mg/Kg. body weight orally	
Fenbendazole			@5-7.5 mg/Kg. body weight orally	
For Control of Ecto-parasite				
Ivermectin		@ 0.3-0.6mg/kg. body weight subcutaneously		

14. COMMON DISEASES AND THEIR PREVENTION AND CONTROL MEASURE

14.1 Classical swine fever

Definition and causative agent

Classical swine fever (CSF), or hog cholera, is a highly infectious viral disease of pigs. CSF is caused by a virus belonging to the family Flaviviridae and the genus pestivirus. CSF is a notifiable and economically important disease of swine. The disease was first reported from the United States of America in 1810 and spread worldwide after 1960. It is endemic to many countries, though there are some which have been declared CSF-free territories. In India, the State of Uttar Pradesh reported the first case in 1944, and the disease is now prevalent in all the pig rearing states. The north-eastern states have the highest pig population in India and, hence, CSF is endemic and among the most economically important diseases of pigs in this region.

Transmission

The CSF virus (CSFV) can be transmitted directly or indirectly. Direct contact between healthy and infected pigs is the most common method of transmission. The virus is excreted in nasal secretions, saliva, urine and faeces. The most common route of transmission is oronasal through direct or indirect contact with infected pigs and wild boars (which are carriers), consumption of virus contaminated feed or swill, infected raw pork and pork products, and artificial insemination. There can be vertical transmission from infected sows to foetuses throughout the period of gestation.

Clinical signs Treatment and control

The incubation period of the disease ranges from 3–10 days. The acute form is characterized by fever, lethargy, general weakness, anorexia, conjunctivitis, respiratory distress, diarrhoea, neurological signs such paresis, incoordination, paralysis and convulsions. Skin haemorrhages or cyanosis can be seen at the ears, limbs, tails, extremities and ventral abdomen. In the chronic form, intermittent fever, chronic enteritis, anorexia, depression, cough, diarrhoea, staggering gait, purple discolouration of the skin and wasting is commonly encountered.

Abortion, stillbirth, foetal mummification, malformations and congenital tremors are observed in prenatal infection.

Treatment

There is no specific treatment for CSF. In a majority of cases, the affected animals are treated with supportive medication – non-steroidal antiinflammatory drugs (NSAIDs) like meloxicam @ 0.5 milligram (mg)/kilogram (kg) body weight (BW) single dose or repeated after 24 hours, antihistaminics like Chlorpheniramine maleate @ 0.5mg/kg BW IM every 24 hours for three to five days, multivitamin injection @ 1–2 millilitres (ml) IM for three to five days. If secondary bacterial infection is suspected, antibiotics like Enrofloxacin @ 5mg/kg BW IM every 24 hours for three to five days or Ceftriaxone @ 3–5 mg/kg, IM, every 24 hours for three consecutive days should be given.

Control

Live attenuated vaccines are used globally as they have the capability to prevent CSF. Different strains of CSFV are used to prepare the live attenuated vaccines. In endemic areas, the primary dose is given just after weaning and a booster is given 30 days after the primary vaccination. Revaccination is done at six-month intervals.

Biosecurity measures

The pig farms should have fences, good hygiene practices should be followed in the farm premises and there should be dedicated decontamination tanks for footwear. Newly purchased animals should be quarantined for at least 15 days. Farm equipment, utensils, clothes and shoes of workers should be disinfected, and the entry of visitors should be restricted. Virucidal agents containing active ingredient potassium monopersulfate can be used for the disinfection of pig sheds, including equipment.

14.2 African swine fever

Definition and causative agent

African swine fever (ASF) is a highly contagious, fatal haemorrhagic viral disease of domestic and wild pigs, which can cause mortality approaching 100 percent. ASF is a transboundary disease and a major threat to the global swine industry. It is caused by the African swine fever virus (ASFV) belonging to Asfivirus genus under the family Asfarviridae. ASF was first reported from Kenya in 1921 and remained confined to the African countries for a long period. In due course, it has spread to Europe and Asia. In India, the first report of ASF was from two north-eastern states of Assam and Arunachal Pradesh in early 2020. However, within two years it spread to other north-eastern states as well as to several states of southern and northern India.

Transmission

The disease can be transmitted to healthy pigs by direct contact with the oral and nasal fluids, blood, faeces and urine of infected pigs through various routes. Soft ticks of the genus Ornithodorus are the natural reservoir of the virus and help in spreading the disease in certain geographical locations. Indirectly, the disease can be transmitted through contaminated feed, pork and pork products, and fomites (clothes, shoes, vehicles, farm equipment and the like).

Clinical signs

The incubation period of the disease usually ranges from 4–19 days. Depending on the virulence of the virus, a wide range of clinical manifestations are encountered which includes per-acute, acute, sub-acute, chronic and sub-clinical. In the peracute or acute form of the disease, there is high fever, respiratory distress, oozing of blood, nasal and conjunctival discharge, anorexia, lethargy, diarrhoea, vomiting, abdominal pain, abortion, haemorrhages in the skin and internal organs and death (mortality 100 percent). In per-acute cases, there may be sudden death without any clinical signs being exhibited. In the sub-acute form, while the clinical symptoms are similar to the acute cases - the severity is low and mortality ranges from 30–70 percent. The chronic cases may be marked by intermittent or low fever, respiratory distress, emaciation, growth retardation, arthritis, multifocal necrosis in the skin, abortion and stillbirth.

Treatment

There is no specific treatment for ASF.

Control

Presently, no vaccine for ASF is available in India. Enforcement of strict biosecurity measures is the main method of control

Biosecurity measures

Adoption of biosecurity measures is essential for preventing the spread of ASF to nearby farms or healthy pigs. Zoning and compartmentalization are very helpful approaches and should be followed as per national guidelines for control of the disease. Besides biosecurity, bio-exclusion and biocontainment measures are also necessary. Swill feeding should be avoided to the extent possible. There should be restrictions on the movement of pigs, pork and pork products across intra-national and international boundaries. Vehicles, clothes, shoes and equipment should be disinfected. Quarantine is essential before introduction of new pigs or piglets to a farm. Infected carcasses and culled animals should be disposed of properly.

14.3 Tuberculosis (TB)

Pigs are susceptible to Mycobacterium tuberculosis, Mycobacterium bovis, and Mycobacterium avium complex. M avium avium and M avium hominissuis are the most frequently isolated

Clinical signs

Infected animals may remain asymptomatic for a long period. Generally, they display progressive emaciation, dyspnea, intermittent hacking cough, lethargy, weakness, anorexia, a low-grade fluctuating fever and pneumonia, and enlargement of lymph nodes.

Transmission

The disease may be transmitted by contact of infected animals, inhalation of infected aerosol and consumptionof infected materials including the milk from infected animals.

Diagnosis

The intradermal tuberculin skin test is generally recommended to detect the positive reactors in a herd. Animals which are doubtful should be retested. Further, gamma interferon release assay, bacterial culture, and pathogen isolation are recommended for disease confirmation.

Treatment

Treatment is not recommended due to high treatment cost, low cure rate and chance of spread of infection among other healthy animals of the herd.

Control

Disease can be eradicated by test and elimination policy.

Prevention and Control

Important considerations include adopting "Test and Segregation" strategies, farm sanitation and disinfection, If an infected herd is found, the reactors are removed, and the herd is quarantined until all animals test negative. Isolation of the sick and weak animals showing marked symptoms. Tuberculin testing-segregation of tuberculin positive animals.

Biosecurity Measures

The infected animals should immediately be isolated and separated from herd with proper biosecurity measures like quarantine of new animals for at least three weeks, restrictions of visitors and vehicles in the farm, and periodic disinfection of footwear, farm equipment, utensils, and clothes. Animals should be bi-annually tested with intradermal test and all the positive reactors should be segregated.

Samples to be collected

Lung, spleen, liver, kidneys and regional lymphnodes along with broncho-alveolar lavage, oro-nasaldischarges.

Public Health Risk

TB in humans occurs through direct contact with infected animal, infected aerosol inhalation or consumption of unpasteurized milk and milk products. Immuno compromised individuals are particularly at risk. Public health measures, including pasteurization of milk, animal testing, and culling of infected animal (if allowed officially), are essential to mitigate this risk.

Do's

- Always use pasteurised/boiled milk
- Segregate sick animals from healthy ones
- Maintain hygiene in animal shed
- Avoid overcrowding of animals
- Veterinary advices

Don'ts

- Do not make curd, paneer and cream from rawmilk
- Do not skip medications if diagnosed with TB (humans)

14.4 BRUCELLOSIS

Brucellosis is one of the most prevalent zoonoses affecting animals and humans, causing significant socio-economic losses. Currently, there are 12 species of Brucella, of which the four commonly occurring species with zoonotic potential include B. melitensis, B. abortus, B. suis and B. canis.

Transmission

Transmission of brucellosis in animal occurs mainly through ingestion of contaminated food and water, infected semen and tail splashing of urine leading to aerosolization of bacteria and subsequent transmission through conjunctival route.

Clinical Signs

The reproductive system is most commonly affected in animal leading to abortion along with retention of placenta. Birth of still bornor weak piglets can also occur.

Treatment

Detection of positive animals and subsequent elimination from the herd is the best option because no practical treatment option is available.

Prevention and Control

Good management practices, management of abortion cases, cleaning of animal sheds with disinfectants like phenol, segregation of infected animals, proper disposal of aborted foetus, personal protection using gloves and masks during handling of infected animals and aborted material, education and awareness of public

.

Biosecurity Measures

Proper biosecurity measures should be followed at the farms along with regular herd screening. Test- positive animals must be removed from the herd following the test and segregate policy. Proper screening of breeding bulls meant for natural service or for production and use of disease-free animals for breeding to avoid sexual transmission.

Important biosecurity considerations include a surveillance programme for monitoring of Brucella status in animal herd, scientific disposal of contaminated materials including aborted foetal contents, and thorough disinfection of the infected premises till the lochial discharge ceases.

Sample Collection for Diagnosis

Aborted foetus (stomach contents, spleen, and lungs), foetal membranes, lochial discharge, colostrum, milk and fluid collected from arthritic areas/hygroma, and blood/serum sample/FTA Card for routine screening.

Public Health Risk

Humans get infected through direct contact with infected animal, tissues, or fluids, particularly during calving, handling, or slaughter. Ingesting unpasteurized dairy products (milk, cheese, cream) or undercooked meat from infected animal can lead to human brucellosis. Farmers, veterinarians, abattoir workers and dairy workers are at higher risk.

Do's

- Segregate the infected animal(s)
- Maintain cleanliness in animal shed.
- Drink pasteurized/boiled milk only.
- Calf-hood vaccination of cow/buffalo with nationally recommended Brucella vaccine.

Don'ts

- Do not handle infected animals and aborted material without gloves.
- Do not drink raw milk and do not eat uncooked meat

The Department of Animal Husbandry and Dairying has issued a comprehensive Standard Veterinary Treatment Guideline for Livestock and Poultry. The Chapter 6 of the document has got a detailed list of all pig diseases with their Etiology and Causative agent, Transmission, Clinical Signs, Lesions, Diagnosis, Differential Diagnosis and Prevention Treatment and Control including diseases like JE, Swine Influenza and Nipah (which are of concern for public health importance). Many pig diseases may be zoonotic in nature and may infect human being. Therefore, it is advisable, in case of any disease, to consult the veterinarian.

15. Disposal of Wastes

Waste management has become a key priority in pig farming. Poor handling of waste can create odour problems, public discomfort, health risks, and biosecurity concerns, making proper systems essential for farm licensing and pollution control approvals. For Indian conditions, waste management approaches must be practical, cost-effective, and environmentally responsible. Proper pollution control measures as per pollution control norms should be adopted for gases, liquid and solid waste disposal

15.1 Solid Manure Handling

- Pit system: Manure is collected by using pit system, scrapers or flushing systems. Solid and liquid components can be separated through mechanical or gravity-based methods.
- Mechanical drying: Manure can be dried either under the sun or using mechanical dryers. The dried material may be used directly or further processed.
- Compost manure:. Pig manure is mixed with dry leaves, grass, and kitchen waste, keeping the pile moist, not wet, to support decomposition.
- Vermicomposting: Similar to composting but with earthworms added to speed up the process. Layers of manure and organic waste are combined, often with 4% calcium sulphate(gypsum).
- Deep burial: A traditional method suitable for small farms with ample land, where manure is placed in deep pits and covered. It is not recommended for intensive operations due to risks of groundwater contamination and environmental harm.

15.2 Liquid Waste Handling

- Wastewater treatment: Common waste water treatment methods in pig farms include soak pits, septic tanks, and biogas units. Large farms, especially those on sloping land or near water bodies may require effluent treatment plants (ETPs) to prevent contamination.
- Anaerobic digestion: Biogas plants convert manure into methane-rich gas (50–75% methane)), reducing odour and producing nutrient-dense slurry for fields.

15.3 Disposal of Animal Carcasses

Carcass disposal is a major concern in pig farming, alongside routine manure management. Common methods include burial, composting, and rendering. In cases of infectious or contagious diseases, carcass disposal must follow the provisions of the Prevention and Control of Infectious and Contagious Diseases in Animals Act, 2009, and its corresponding 2010 Rules, which outline the required procedures for safe handling and destruction of carcasses and other contaminated materials. The various of methods for carcass disposal are as follows:

a. Pit Burial - Pit burial is the most common method for carcass disposal. It should be done in areas with deep groundwater and low-permeability, clay-rich soils. Pits must be stable, fenced, and located far from water sources. Carcasses should be placed with at least 30 cm of soil around them, treated with lime, and fully covered with 2 m of soil. Dimensions generally range around around 3 m deep and around 2.3 m wide, with size adjusted to the number and weight of carcasses (not exceeding 2500 kg). No entry into deep, unstabilized pits is allowed. Sites must be monitored for sinking or waterlogging, and no crops should be grown on the area for at least one year.

b. Composting - Composting is a controlled and hygienic method for disposing of carcasses, where bacteria break down organic material to produce an almost odourless, humus-like soil amendment. Proper composting of cattle and pig carcasses generally requires 9–10 months. When temperatures reach about 130°F for at least three days, most tissues are fully decomposed, except for some resistant spores.

c. Rendering- Rendering involves cooking carcasses to destroy pathogens while producing usable by-products such as meat meal, bone meal, and blood meal for animal feed. It is considered a safe and environmentally responsible disposal method. Freezing carcasses before rendering helps preserve them and slows decomposition, preventing loss of protein quality.

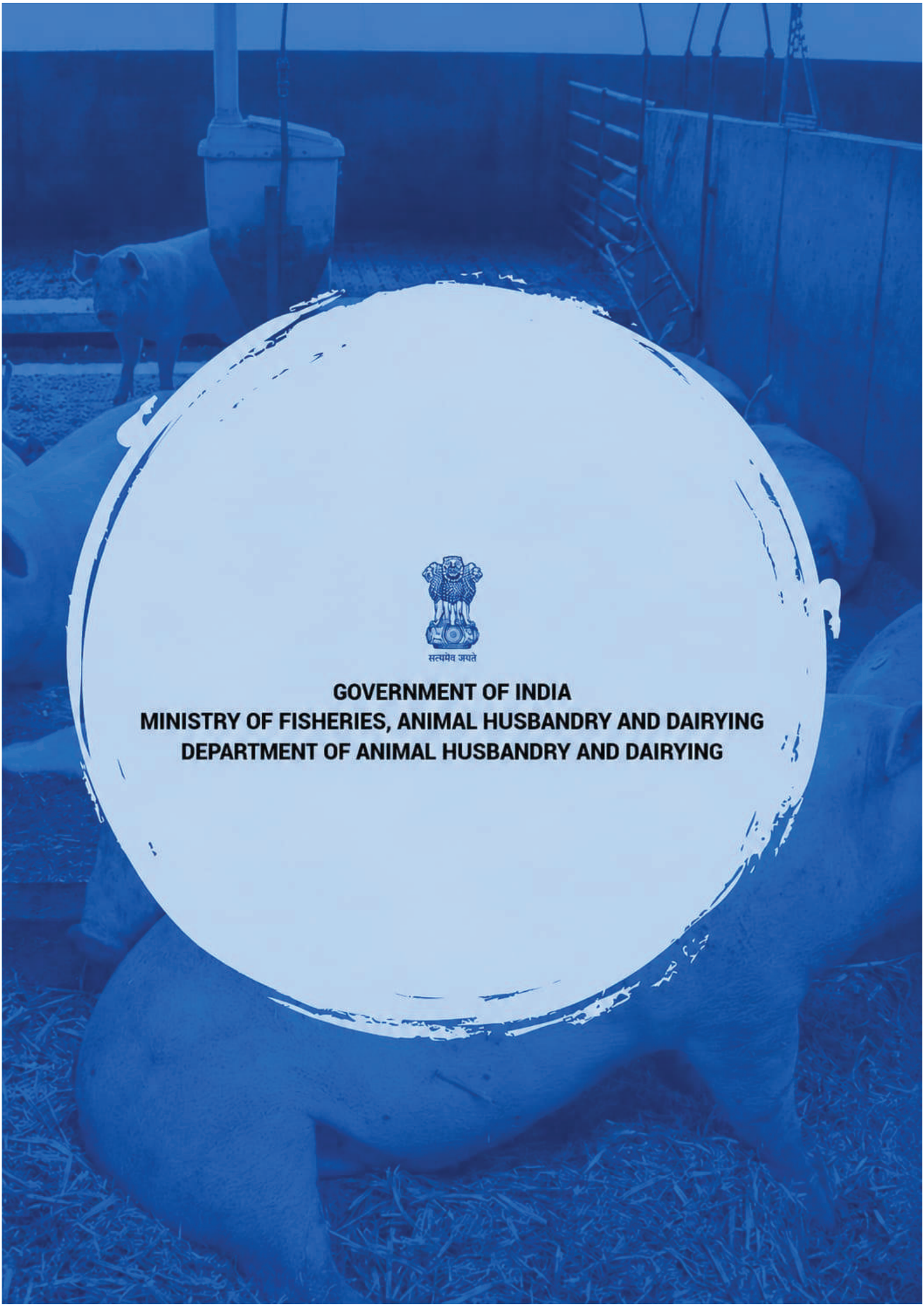
d. Incineration-Proper incineration is difficult to carry out on farms, as it requires expensive, specialized equipment capable of safely and completely burning carcass waste.

16. Training of Personnel

Training of personnel is essential to ensure pig welfare and health. Caretakers must be sufficient in number and competent through formal training or practical experience. They should understand proper handling, nutrition, reproduction, behaviour, biosecurity, and signs of disease or poor welfare—including stress, pain and discomfort and know how to address them. Key animal-based indicators include handling response, physical appearance, behaviour, body weight and condition, reproductive efficiency, lameness, morbidity and mortality rates, culling rates, and complications from routine procedures.

17. Disaster management

This consists of strategies to reduce vulnerabilities before and after a disaster occurs, to act with those at risk, and to increase the capacity and coping mechanisms of affected populations. Disasters can be sudden (floods, earthquakes, hurricanes) or slow onset (drought, prolonged cold weather). Each type of disaster has a different kind of impact and requires special survival and recovery strategies. In disaster, specific livestock-targeted interventions are required to help animal owners survive the immediate crisis and to support in rebuilding their livelihoods. Livestock interventions typically cover provision of animal health services like emergency feeding and water supplies, shelter provision, destocking, and restocking. The need for a particular intervention depends on the nature of the disaster, the local context, and the phase of the disaster (i.e., ongoing, immediate aftermath, recovery, or rehabilitation). Disaster management should be proactive and preventative. The advisories related to Monsoon, Cold, Heat, Thunderstorm are in place.



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