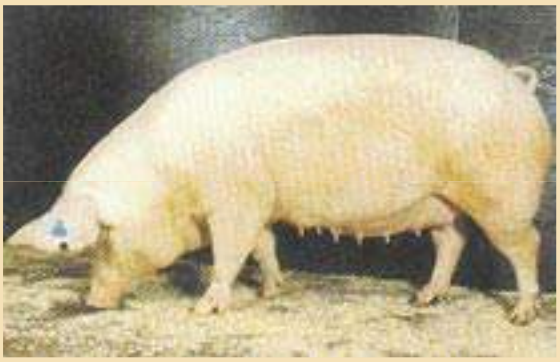
THE REPUBLIC OF UGANDA

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

PIG PRODUCTION MANUAL



THE NATIONAL AGRICULTURAL ADVISORY SERVICES (NAADS)

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Foreword

The Pig Production Manual is being produced as a short-term fulfilment of pillar four of the NAADS Information and Communication strategy; enabling service providers to become agricultural information providers. Through the NAADS programme farmers are being organised to effectively access advisory services to increase productivity and profitability of their enterprise.

Pig production as an enterprise, provides small-scale subsistence farmers with a clear opportunity for household income improvement. The high response of improved pig breeds to good management, including use of domestically constituted feeds, makes it especially appropriate and attractive to low-level investment of small-scale farmers. The pig enterprise does not require large areas of land and is suitable for those areas of Uganda where access to land is an increasing problem. The enterprise, however, does carry serious environmental implications, both in terms of smell and waste management. Pig production as an enterprise therefore requires good management for improved productivity, profitability and environment health.

The Pig Production manual is intended to provide quality assured technical information on Pig breeds, Pig husbandry, processing, marketing and profitability, that can be used by service providers, to support farmers improve the productivity and profitability of their enterprise. The manual provides guidance and advice on pig management and on how to improve the genetic potential of the stock.

Improved performance of the enterprise can be realised through reduced mortality; increased live weight gain whilst using appropriate husbandry to conserve the natural resources utilised. Good quality starts with the selection of breed that can benefit from the prevailing husbandry practices. The manual is intended for the use of District and Sub-County NAADS technical staff, especially service providers and key farmers.

The Manual is divided into eight parts:

- Starting a pig enterprise
- Pig Housing
- Record Keeping
- Pig feeds and feed management
- Practical pig management (husbandry)
- Pig waste management
- Pig health and diseases
- Economics of Pig productions and marketing

Information contained in this manual may become outdated. Service providers must be aware of any updates, for example on quality standards. Research results may also change husbandry and management practices. Service providers must therefore actively seek information from the research system on the latest research results and integrate this with the information in the manual. It is important not to forget that farmers too have information that may be useful

Dr S Nahdy,

Executive Director, NAADS

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GLOSSARY OF TERMS

Acaricide: A chemical used to control ticks, mites and other ecto-parasites

Agalactia: A partial or complete absence of milk flow from the mammary glands (teats)

Arthritis: Inflammation of the joints causing difficulty in walking.

Atresia ani: A genetic disease condition whereby a pig is born without an anal opening. Such a pig cannot pass out feaces. The condition can be corrected by surgery.

Barrow: Castrated male pig.

Boar: Mature intact male pig.

Castrate: Removing the testicles.

Colostrum: The first milk produced after farrowing (birth of piglets). It is very high in proteins, vitamin A and immunizing agents.

Constipation: Abnormality in passing out feaces. It is characterized by abnormally hard feaces.

Creep feed: Baby pig feed provided in the creep area beginning at about 2 weeks.

Creep Area: Area within a sow pen so constructed that the piglets can enter and leave but the sow does not have access.

Cryptorchidism: A genetic condition where only one testicle is descended into the scrotum

Dam: Mother or female parent of an animal.

Disinfectant: Chemical agent used to kill microorganisms.

Dock: Removing all or part of the tail.

Drenching: Oral administration of liquid medicine to animals to control diseases or parasites.

Dry sow: Sows that are not suckling piglets.

Estrus: Time during which the female is sexually receptive to the male. Also referred to as heat period.

Farrow: To give birth to a litter of piglets.

Feed conversion rate: Amount of feed required by a pig to produce a 1 kg increase in body weight.

Feeder pig: Young pigs sold after weaning for growing to reach slaughter weight.

Finishing pig: Young pig generally weighing more than 60 kg.

Flushing: Practice of increasing feed allowance around time of serving (mating with boar) to increase number of eggs produced.

Fostering: Transferring of piglets to be raised by a sow other than their own mother

Gender: A term used to describe roles of men and women and children of either sex as defined by the culture or social set up.

Gilt: Young developing female pig

Growing pig: Young pig after weaning, generally weighing less than 60 kg.

Hand-mating: Supervised mating whereby sow observed on heat is taken to boar for service.

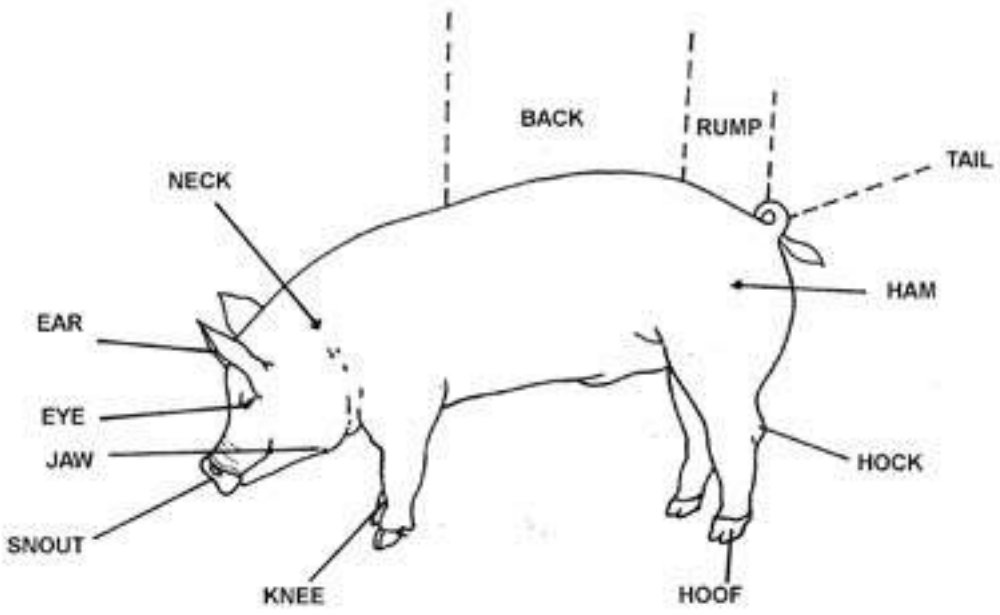
Hermaphrodite: A genetic condition where an animal bears both male and female external sex organs.

Heterosis: Phenomenon whereby the performance of offsprings from parents of two different breeds is higher than the average performance of the parents.

Lactation: Period between birth and weaning when the sow suckles her piglets.

Limit Feeding:	Weighing out a determined amount of feed to be given to each pig per day as a way of preventing them from getting too fat.
Litter:	Set of piglets born to a sow at a time
Litter number:	Number of times a sow has farrowed
Litter size:	Number of piglets in a given litter
Longevity:	Ability of a pig to remain productive in the herd
Mange:	A skin disease caused by mites leading to intense itching
Pen:	Room in a pig house to be occupied by an animal or group of animals
Pen mating:	Mating in which a group of breeding females is housed together with a boar and mates with them as and when they come on heat.
Piglet:	Young pig before weaning.
Rooting:	A habit among pigs where they dig up the ground using the ie snouts.
Runt piglets:	Small weak piglets within a litter, which are less than average in weight
Slaughter pig:	Young pig ready for slaughter, usually 90-120kg.
Sow:	Mature female pig
Tethering:	To tie a pig with a rope it can only move within a specific area.
Wean:	Remove the piglets from their dam to end suckling
Weaning pig:	Young swine at or shortly after weaning.
Withdrawal period:	Time period within which if a drug is used on the animal, the animal should not be slaughtered for meat to avoid drug resistance in humans.

Figure 1: Parts of a Pig



CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

- Compared to other sub-sectors within the livestock industry, the pig sub-sector is still very small.
- Uganda still imports some pig products especially bacon, and sausages.
- The demand for pork and other pork products is rapidly expanding.
- The rapid population growth and general improvement in incomes should create further increase in the demand for pig meat.

1.2 The Pig Industry in Uganda

- Majority of pig farmers keep 1-5 pigs tethered around the homestead.
- The main source of feed is kitchen leftovers and crop residues
- There are a few small to medium scale commercial farmers with 10-20 sows
- Some farmers let their pigs free to move around in search of feed
- Productivity is poor mainly exhibited by low reproductive performance, slow growth rates, high worm burden, and inbreeding.
- Marketing is not organized and there is an absence of slaughter houses
- Economic losses due to deaths and loss of condition caused by disease are high.
- The pig population statistical data clearly depicts an increasing trend (Table 1)

Table 1: Uganda's Estimated Pig Population by Year ('000)

1998	1999	2000	2001	2002
1,475	1,520	1,573	1,644	1,710

Source MAAIF: In UBOS. 2003. Statistical Abstract

1.2.1 The Pig Market in Uganda

- While there is no organized marketing system, there exists a high demand for pigs and their products.
- There is a local market within the rural areas, where farmers sell to:
  - Other farmers who want to keep them for breeding or raise them for slaughter
  - Local butchers who sell the pork within the community
  - Middlemen, who ferry live slaughter-pigs on trucks to urban centres
- Most pork is consumed at drinking places located in trading centres either roasted or deep-fried.
  - There are no reliable figures as to the numbers marketed through the different channels.
- The proportion of pork appearing at the family table is steadily increasing, especially in the rural areas.
- There is a small market for heavy pigs, where customers extract the fat for use in preparing other non-pork dishes.
- Whatever the type of market, current demand far outstrips supply, hence the need to increase production.

1.3 Justification for Promoting Pig Keeping

- Employment creation
- Increased incomes and poverty reduction to farmers
- Diversification of production
- Increasing meat supply in the country

1.4 Advantages of Pig Keeping

- They produce meat without contributing to deterioration of grazing land
- They convert feed to meat twice as efficiently as ruminants
- If well managed they are prolific i.e. mature early, have a short gestation period and produce large litters.
- Pig production can be based on the utilization of local feeds and by-products from food industries and households.
- Rural women are often responsible for pig and poultry keeping, they have few other possibilities to earn money.
- Most of the pigs are slaughtered and sold in the rural areas. This ensures that the valuable animal protein produced, remains in the rural areas, which have the highest protein deficiency in the people's diet.

1.5 Gender and Development of Pig Farming

- Rural livelihoods and sustainability of production systems in Uganda depend on how well natural resources are managed.
- In Uganda women are key farmers, food producers and managers of natural resources.
- Women produce the bulk of the food, provide the bulk of farm labor, and shoulder most domestic responsibilities.
- They need to be in contact with extension agents, control agricultural technologies and farm inputs in order to improve productivity.
- Pig production does not take away much time, which women need to fulfill reproductive work.
- This manual provides information in pig production in a simple and well packaged form to address information needs of men, women and children.

1.6 Challenges to Pig Production in Uganda

There is a lack of technical production knowledge in the area of:

- Feeds and feeding practices
- Control of diseases and parasites
- Appropriate housing and sanitation
- Records keeping and economics of production

1.7 Outlook of the Pig Industry In Uganda

Although it is not easy to predict the development of the pig industry in Uganda, the following factors favour the expansion of the industry

- Scarcity of dietary animal protein sources
- Improvement in the standard of living in the country
- Increase in the human population

- The expansion in the production of meats from ruminant animals will be limited by a decrease in available grazing land.

1.8 Need and Purpose of Manual

- There is a need for extension service providers to provide relevant knowledge, information and technology to farmers, where demanded
- The main objective behind developing this manual is to provide, in a simple format, advice and guidance, which if followed would contribute towards developing the skills of pig farmers.
- Service providers are advised to compliment the manual with other sources of literature (latest research findings) on pigs and pig husbandry, farm visits as well as market developments.

1.9 How to use this Manual

- This manual describes practical solutions for running pig units. The manual has been prepared for use by service providers and key farmers. School teachers and students will also find it useful.
- The manual is divided into 9 sections. Each section opens with a short introduction. Most of the notes are written in form of instructions that are easy to follow and understand.
- Numerous drawings and diagrams are provided to illustrate the important points
- It will help you to reduce mistakes as you can use it to check your methods and improve performance
- For further information please contact your NAADS Coordinator, the Animal Production Programme of NARO (Phone: 045 - 44355) or the Department of Animal Science of Makerere University (Phone: 041-235655).

CHAPTER TWO

2.0 STARTING A PIG PRODUCTION ENTERPRISE

2.1 Pig Production as a Business

Like any other enterprise, pig production is a business, which aims to:

- Provide meat and other pig products to the consumer
- Provide an income to the producer.

The above objectives can be achieved through:

1) Increasing the number of healthy piglets weaned per sow per year
2) Keeping feed costs to a minimum, consistent with adequate performance
3) Employing alternative production techniques to cut down costs.

2.2 Starting a Pig Farm (see figure 2-7)

Before embarking on pig production a farmer should find answers for the following:

- What system of production to adopt?
- What breed to use? (see photo 1-5)
- What type of housing to use given the system of production? (see figure 5)
- Reliability and sufficiency of water supply? (see figure 6)
- Feed acquisition. Will it be grown or bought? (see figure 3)
- How will pig wastes be disposed of?
- Market for weaners or slaughter animals. How much can be sold, when and at what price?
    - The market will have a significant influence on the pig production system. (see figure 7)

Remember, to start on a small scale before developing a large unit.

Refer to chapter 9: Economics of pig production and marketing

2.3 What System of Production to Adopt

There are basically 4 systems to adopt. The systems are defined in terms of the product the farmer aims to put on the market.

1) Can keep sows and boars to sell weaners (farrow to wean)
2) Can keep sows and boars to grow weaners for market (farrow to finish)
3) Can purchase weaners to grow for market (wean to finish or feeder pigs)
    - This is better if near an urban centre
4) Can have a mixture of the above three systems

Whatever the system you choose first analyse the costs involved and compare them to the expected returns with the objective of maximizing profits. Try out different alternatives to determine profitability of different input combinations (See Chapter Nine).

- Regardless of the system adopted, pigs can be managed:
    - Intensively – kept housed all the time
    - Semi-intensively – partly housed and partly outdoors on pasture
    - Extensively – kept outdoors on pasture all the time

Things you need to start a Pig Farm

Figure 2: Good quality pigs with a known fertility history

Figure 3: Feedstuffs

Figure 4: Pig housing to provide shelter from rain and sun

Figure 5: Equipment

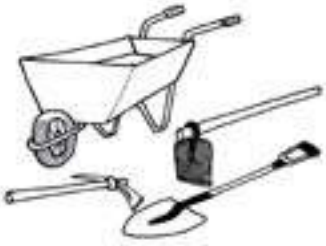


Figure 7: Market

Have you found a market?

What prices can you obtain?

What profit will be made?

Figure 6: Water either carried or piped

2.4 What Breed to Use

- A profitable pig production enterprise should be based on high quality animals of any improved breed. Photographs 1-5 show the diffferent pig breeds currently found in Uganda.
  - A high quality animal is one with a known history of production excellence (see figure 2).
- Chose a breed, which is common in your area because it will be easy to buy or sell breeding stock.

Pig breeds that can be obtained in Uganda include:

Breed	Performance traits
Large White	White, good mothering ability, large litters, fast growth
Landrace	White, lopped ears, fast growth rate, high quality carcass
Duroc	Dark brown, fast growth rate, good mothering ability
Hampshire	Black, good carcass quality and high meat yield
Local pigs	Different colours, hardiness, adaptability, large litters

All of the breeds listed can perform well under local conditions as long as proper management procedures are followed.

Photographs 1 – 5: The different Pig Breeds in Uganda

Duroc

Hampshire

Large white

Land race

Local Pig

2.5 Selection of Breeding Animals
After deciding on which breed to use, select good individual pigs to keep.

2.5.1 Boar Selection

- It is best to select a boar before 8 months of age.
- Take great care/detail in choosing a boar to buy because of the large number of offsprings to which he may transmit his characteristics.
- Ask about the history of the parents of the boar in addition to physical observation.

Before buying/selecting a boar look at its appearance and background.

Appearance (see figure 8):

Good body constitution.

- Long straight back, deep thighs, strong bones, and full heart girth.
- Sound feet and legs to be able to hold its own weight during mounting
- Good looking, non-inverted, and well placed teats – minimum of 12 teats
- No body defects like hernia (abdominal, scrotal, see figure 9 & 10), *atresia ani* (see glossary) onetesticle not descended into the scrotum (Cryptorchidism), blind or inverted nipples, hermaphrodite, small inside toe.
- Well developed testicles of equal size

Background:

- Must come from a litter of more than 10 piglets (see figure 11)
- Weighed more than 12 kg at weaning (8 weeks)
- Dam should have high reproductive performance, be docile, have good feed conversion ratio, and good mothering ability.
- Check health records to know how many times it has been attended to by a Vet and for what condition.

Figure 8: Pig Appearance

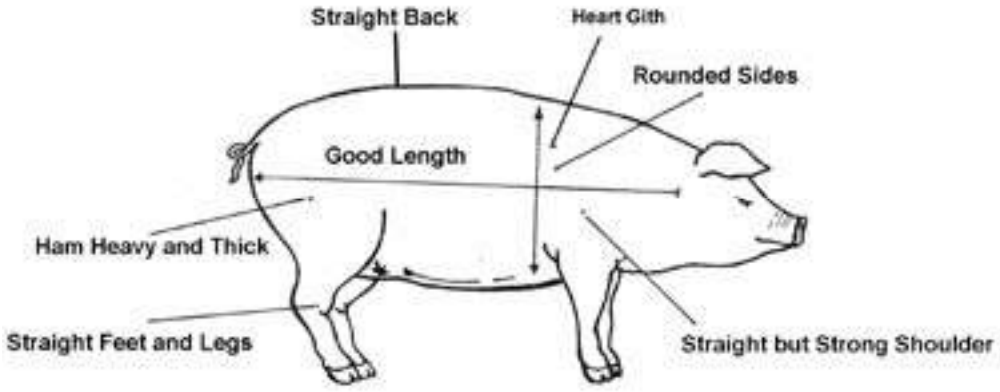


Figure 9: Scrotal Hernia

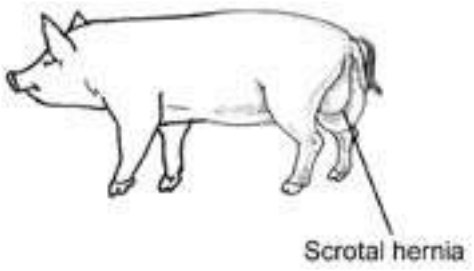
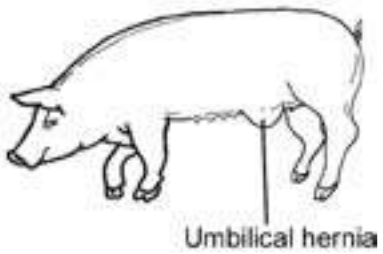


Figure 10: Umbilical Hernia



2.5.2 Selection of Gilts/Sows

- It is better to start a pig unit with gilts.
- They should be selected preferably at 4 –5 months of age.
- Crossbred gilts are better performers than purebreds.
- Look at appearance and background when selecting gilts

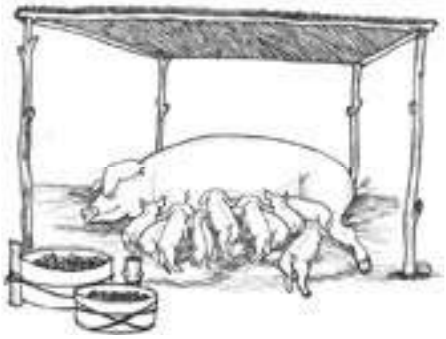
Appearance:

- Smooth shoulder, clean cut head, strong bones, full heart girth.
- Sound feet and legs to be able to withstand the weight of the mounting boar
- Seven well developed, evenly spaced nipples on each side.
- Long straight back.

Background:

- Crossbred females (Largewhite x Landrace) are preferred to take advantage of heterosis/hybrid vigour
- Gilts should come from sows with very good records on all traits, docility, maternal ability, feed efficiency, longevity.
- Must come from a litter of at least 10 (see figure 11).
- No physical abnormalities like hernia (see figure 9 & 10), lameness, *atresia ani,*

Figure 11: Sow with a large litter



CHAPTER THREE

3.0 PIG HOUSING

3.1 Why Build Houses for Pigs?

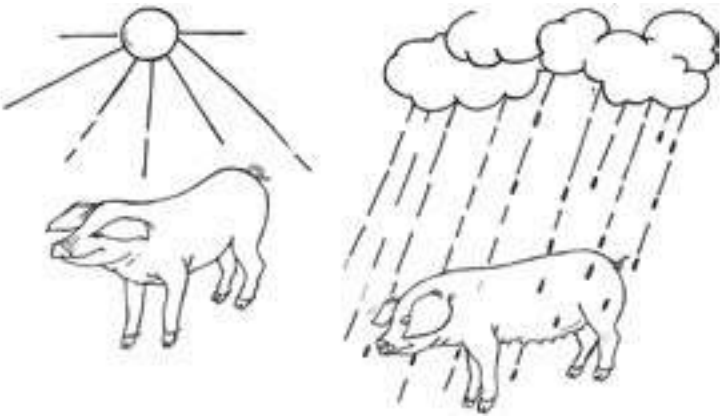
- Makes management and feeding convenient and easier
- Promotes maximum production
- Facilitates health and parasite control
- Reduces production costs as less labour is spent on feeding and cleaning.

Tethering and leaving pigs free to walk around are not recommended as methods of management

3.2 Requirements for Good Housing

- A good site
  - It should be well drained
  - Away from the domestic house and in the shade
- The house should have a store for feed and equipment
- It should be oriented in such a way that the sun can enter the building in the morning and evening
  - The long axis of the house should cross the path of the sun and not along its path i.e. the long axis should be oriented in a North-South direction.
- It should be possible for a vehicle to get close to the house to deliver supplies or take away products
- Pigs should be protected from rain and direct sunshine (See Figure 12).
- The wall to roof construction should be open to allow for maximum ventilation.
- Pig houses should be easy to clean to be able to maintain hygiene.
- Houses should be built such that the farmer can inspect all the pigs with little difficulty.
- Feed and water troughs must be provided and the pigs should not be able to push them from their positions

Figure 12: Pigs in discomfort due to direct sun and rain:



A Happy Pig **A cold wet pig, liable to contract disease**

3.3 Plan of a Pig Pen

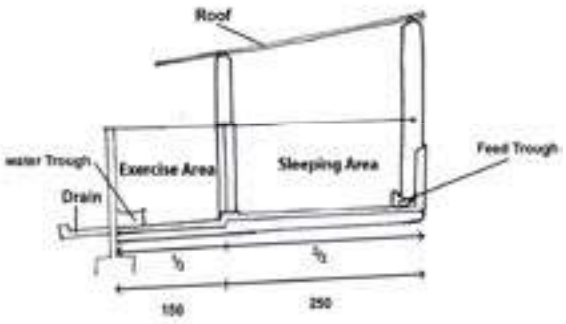
The floor area of a pig pen should be rectangular in shape and divided into 2 sections:

1) A feeding/sleeping area (See Figure 13)
   - This is normally covered with a roof
   - It should be 2/3 of the total floor area
   - Fit feed troughs in this section

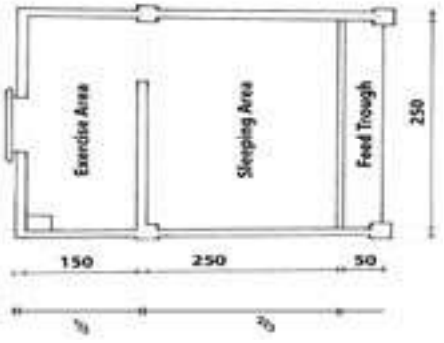
2) An exercise area
   - This also serves as the watering and dunging area
   - Pigs normally urinate and defecate away from where they eat
   - This area should not be covered with a roof to allow drying by the sun
   - It should cover 1/3 of the total floor area
   - Water troughs should be in this section

Figure 13: Side elevation and Ground plan of a pig pen:

SIDE ELEVATION



GROUND PLAN



NOTE: All measurements are in metres
W = Water trough

3.4 Components of a Pig Pen (see figure 14)

Roof

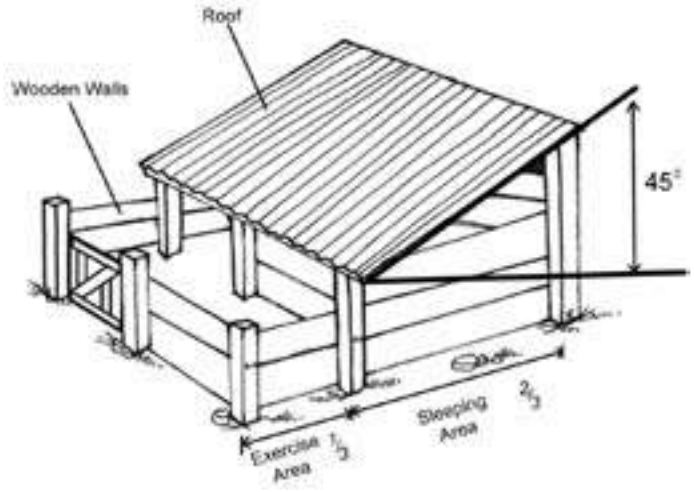
- Be of locally available materials like grass, polythene sheets, papyrus mats, banana leaf bases (ebyayi), iron sheets
- Roof should keep the inside of the house cool
- Be rain and sun proof
- Should be securely fixed to avoid destruction by wind
- If a corrugated iron roof is used, collect rain water
- The slope of a thatched roof should be steep to drain off rain water
  - The minimum slope is 45^0

NOTE: Thatch can harbor insects and snakes. It can also catch fire easily. It requires more frequent repair and maintenance.

Walls

- Should securely confine the pigs inside
- Use bricks and cement joints, but timber is sufficient (See Figure 14)
- Be well plastered and normally 1m high.
- Timber off cuts can also be used to make walls
  - Use treated poles to support the structure

Figure 14: Pig pen of timber walls:



Floor (see figure 15)

- Strong enough to prevent damage by pigs
- Slope slightly away from the sleeping area
- A concrete floor with rough finish is recommended
  - It is not slippery and it is easy to clean
- Well compacted murram can serve as the floor
  - Pigs must be ringed in the nose to avoid rooting the floor

- The floor can be of timber slats raised to some height from the ground (see figure 16)
  - Pigs do not come into contact with the soil, and they are less susceptible to infection with parasites
  - The slats should be spaced at not more than 2 cm apart.

Figure 15: Floor sloping slightly from the sleeping area:

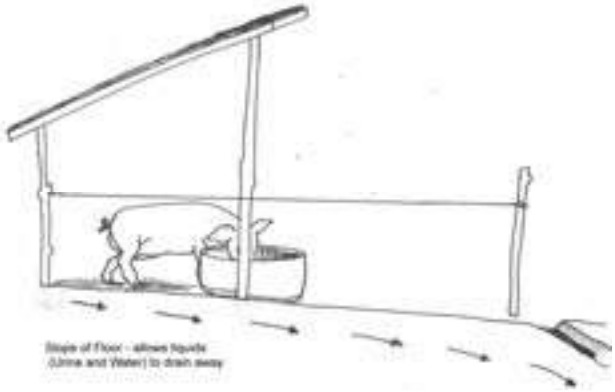
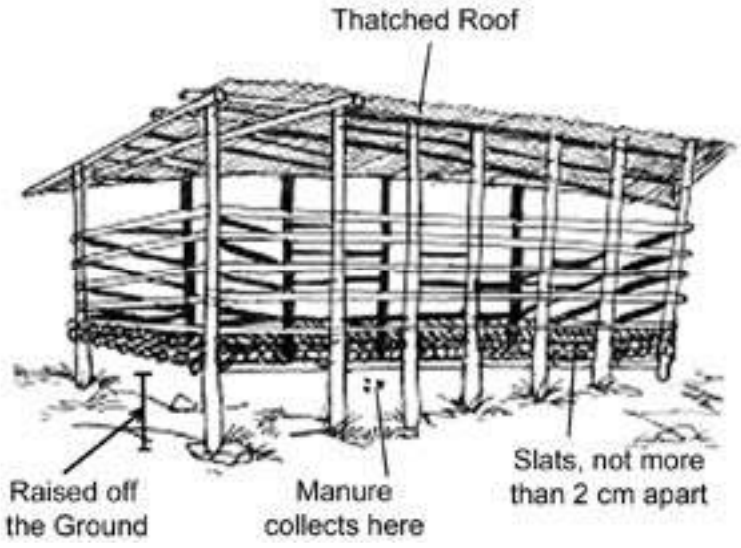


Figure 16: Pig house with raised floor



3.5 Space Requirements

- Space requirements depend on:
  - Animal size
  - System of management
- Overcrowding causes:
  - Animal discomfort
  - Poor performance
  - Increased disease susceptibility
  - Increased incidence of vices like fighting and tail biting

Table 2: Recommended floor space allowances:

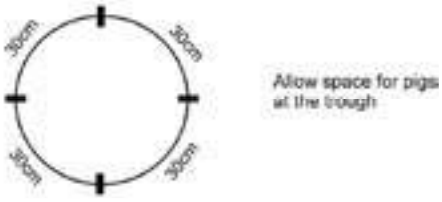
Type of pig	Floor space area (m^2)
Preweaning	0.5 (0.7 x 0.7m)
Weaners	0.7 (0.85 x 0.85m)
Growers	0.8 (0.9 x 0.9m)
Finishers	1.1 (1.05 x 1.05m)
Sows	1.7 (1.3 x 1.3m)
Sow with litter	1.9 (1.4 x 1.4m)
Boars	1.7 (1.3 x 1.3m)

3.6 Feed and Water troughs

- Feed troughs are placed in the sleeping area and water troughs in the exercise area
- All troughs must be securely fixed so that pigs cannot turn them over (See Figure 17)
- Best if they are built within the concrete structure of the floor
- At the feed trough each pig should be allowed a space of 30cm (see figure 18)
- Install a water trough of at least 30cm in length

Figure 17: Securing trough to avoid spillage

Figure 18: Pig Spacing on the trough

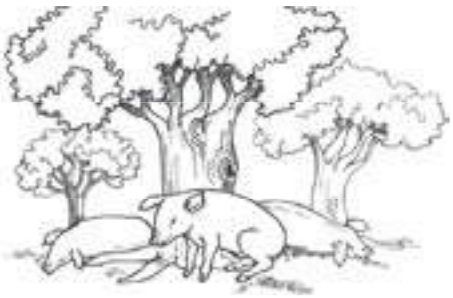


3.7 Housing Dry Sows

- Dry sows should be housed in groups.
- Dry sows can be partly or completely kept outside in paddocks. They require shade either built or trees. (see figure 19)

Figure 19: Provision of shade, and ensure from rain

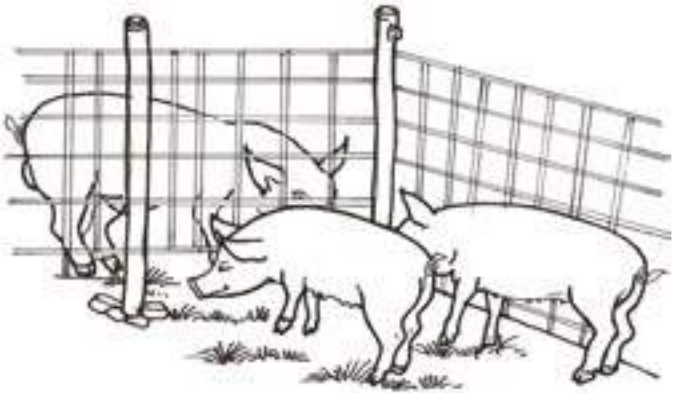
Provide shade, but does not protect from rain



3.8 Housing Boars

- Boars must be kept in individual pens to eliminate fighting, riding and competition for feed
- Longevity is normally improved by penning boars separately
- Group pens can be used if boars were brought up together
- Locate boar pens close to recently weaned sow pens. This promotes fast return to heat (Figure 20)

Figure 20: Allowing dry sows and gilts contact with a boar stimulates fast return to heat:



3.9 Housing Lactating Sows

Should be kept in a farrowing house that should have:

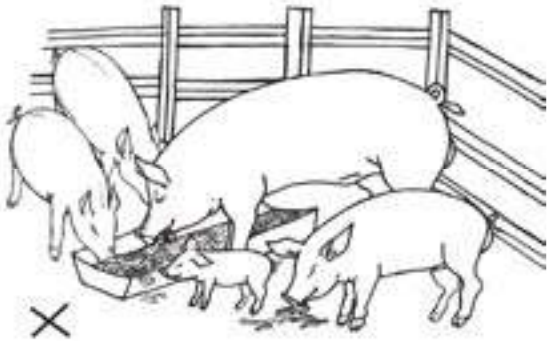
1) A separate pen for each sow

2) Guard rails fitted at a distance of about 30cm from both the wall and floor
    - This helps to minimize the risk of piglets being crushed by the sow
3) A creep area for the piglets

3.10 Grower and Finishing Pens

- Grower and finishing pigs should be kept in groups
- Group size of 10 to 12 pigs is ideal
- Pigs in the same group should be of about the same size (see figure 21)
- Buildings should be open as much as possible to allow ventilation.
- Overcrowding may lead to development of vices like tail biting.

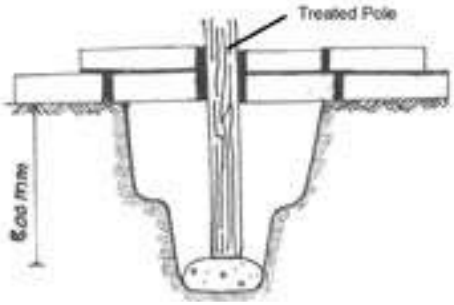
Figure 21: Do not put pigs of different size in the same pen:



3.11 Practical Construction of Pig Buildings

1) Site clearing
    - Clear the area of all grass and bush
    - Remove the topsoil
2) Foundation
    - Should be of good quality to last as long as possible
    - Should protect buildings from ants and termites
    - Can be made of concrete, stones, bricks or poles
    - Wooden Posts/Poles Structure is most appropriate because of its affordability
        - Treat the poles to avoid damage by fungi, ants and termites
        - Poles used should be as straight as possible
        - Poles should be strong enough, of about 12 – 16 cm in diameter.
        - Wrap base of the pole in plastic or old fertilizer bag to protect from termites
        - Dig holes in dry firm ground of about 60 cm deep
        - Put a stone or concrete at the base of the hole to avoid resting the pole on bare ground (Figure 22).
        - Back fill the hole and compact well

Figure 22: Resting the pole on a stone or concrete base:



3) Floor construction

- For a murram floor replace the topsoil with good clean murram
  - Water and compact the murram
- For brick structures, dig foundation trenches down to good solid ground.
  - Make a 10 - 15 cm thick bed of hard core consisting of stones (see figure 23)
  - Stones should vary in size with the largest at the bottom and the smallest at the top
  - Casting: use a 1:3:6 (cement:sand:gravel) concrete mix.
  - Use only sufficient water to produce a workable mix.
  - Compact the concrete well with a heavy beam (see figure 23 a)
  - After compacting level the floor using slats
  - The floor slab should be 5 cm thick
  - Remember to include a floor slope of 2% i.e. 1 in 50
  - Do not allow the concrete to cure too quickly. It should be covered with grass and kept wet for at least 10 days
  - The roof should be put on as soon as possible after the uprights are in position to provide shade for the rest of the work

Figure 23: Making a concrete floor:

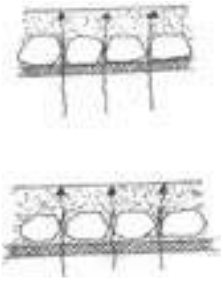
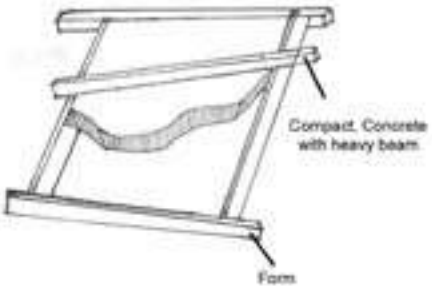


Figure 23 (a)



3) Wall construction

- Build the walls of bricks with mortar of a 1:4 (cement:sand) mix
- Plaster the walls to a smooth finish
- The walls should be at least 1 m high
- For wooden wall structures the timber should be:
    - As straight and as smooth as possible
    - Nailed on the inside of the uprights
    - Nailed to leave gaps of not more than 2 inches
    - Nails should not protrude as they may injure the pig or farmer

3.12 Maintenance of Pig Houses

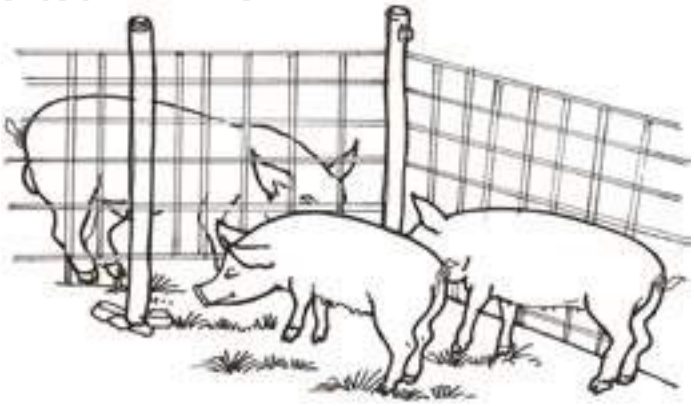
A pig house needs regular maintenance. Maintenance activities include:

1) Cleaning and disinfecting
    - Should be done whenever a pen is emptied e.g. at the end of each sow lactation or when a group of finishers is sold
    - Walls should be cleaned and checked for any cracks, otherwise they will harbor mites and other parasites
2) Repairs
    - Paint all woodwork once a year with a non - toxic preservative. Pour new termite treatment around the poles every year
    - Check roof for water leakage and termite damage
    - Repair floor and wall cracks. Use concrete or soil strengthened with cement

3.13 Keeping Pigs Outdoors on Pasture

- Sows and boars can be kept outdoors on pasture (see figure 24)
- The fence should be strong
    - Barbed wire should not be used, it injures the pigs.
    - Use a wire mesh
    - A thick live fence can also be used
- Plant plenty of trees to provide shade
- Construct water and feed troughs in the paddocks
    - Used tractor tires cut lengthwise can serve as feed and water troughs
    - These should be moved from time to time to avoid making the spot muddy
    - Concrete troughs should have a platform to avoid making the area muddy
- Recommended stocking rate is 15 – 20 sows per acre
- The area should be divided into at least 4 paddocks to allow rotational grazing
- A boar paddock should measure at least 5 x 10 square metres
- The feeding and watering troughs should be at opposite ends of the paddock to encourage exercise.
- Pigs on pasture should be ringed to avoid rooting

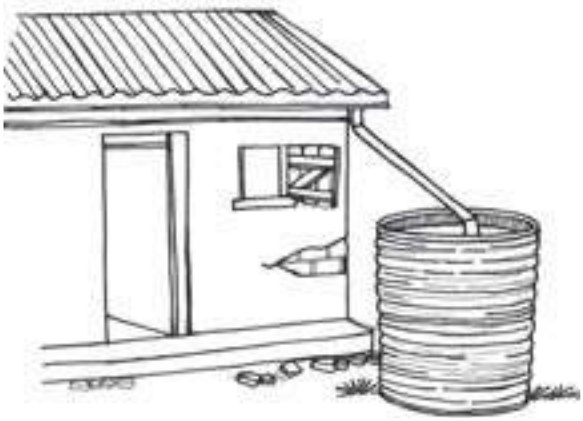
Figure 24: Keeping pigs outdoors on pasture:



3.14 Water Acquisition

- Pigs require lots of water for drinking and sanitation
- Water for use on a pig farm can be from a number of sources:
  - Rain water (Figure 25)
  - Natural springs
  - Boreholes
  - Piped water
- Rain water should be harvested from the roofs of buildings
  - Use metallic or plastic tanks for this purpose
  - Can construct concrete underground tanks for storage
  - It will reduce costs and save a lot of time and labor especially provided by women and children in collecting water

Figure 25: Rain water collection:



CHAPTER FOUR

4.0 RECORD KEEPING

4.1 Importance of Record keeping in Pig Management

Keeping good records is the essence of good management. Without records it is difficult for a farmer to know where he has been or where he is going or what his/her financial position is. Through keeping records a farmer will be able to:-

- Identify pigs, which perform well and those that have problems
- Know how much he is spending and earning
- Select animals for use as sows and boars (Breeding stock)
- Compare his/her performance with other farmers
- Identify health or fertility problems in the pig herd.
- Identify management weaknesses and correct mistakes
- Compare performance of his/her pigs with standard production goals

4.2 Standard Production Goals/Targets

A pig farmer should work to achieve the following goals:-

- 90% or more of the sows served becoming pregnant
- Producing at least 12 piglets per litter
- Piglets weighing 1.3kg or more at birth
- Piglets weighing 11kg or more at weaning
- Daily weight gain of at least 0.5 kg after weaning

4.3 How to Keep Records

- Use written records, which can be in the form of:-

1) **Record book** in which a page is assigned to each pig or litter
   - Figure 26 shows a suggested layout for a record of individual sow performance

Figure 26: A page in a book to be used as a record sheet

Sow No/Name	Makula
Date Born	
Boar Used	

Date	Description
1.2.04	*Weaned, litter size at weaning 10, Average weight of piglets 13 kg*
6.2.04	*Heat observed, served by boar 23*
27.2.04	*Observed for return to heat – no signs observed*

To photocopy this record sheet see Appendix I

2) Record cards in a file

Examples of record cards are given below:

A. Sow record (Figure 27)

This should show:

- Sow number or name
- The boar used for service
- Date of service
- Date of farrowing
- Number of piglets born (dead and alive)
- Total weight of piglets at birth, at the end of 3 weeks and at weaning
- Number of piglets that die before weaning
- Dates and nature of illness and treatment

Figure 27: A sample sow record card:

SOW RECORD CARD					
Sow Number/Name _____		**Boar Used** _____		**Date Served** _____	
Farrowing Record					
Farrowing Date _____		Number Born Alive _____ Number Born Dead _____		Female _____ Male _____	
Litter Weight and Deaths Record					
Piglet Weight Record			Piglet Deaths Record		
Growing Stage	**Date**	**Total Weight**	**Date**	**Number (F/M)**	**Cause**
At Birth					
3 Weeks					
Weaning					
Sow and Litter Health Record					
Date	**Diagnosis/Notes**				

To photocopy this record card see Appendix II

B. Growing/finishing record (Figure 28). These animals are normally kept in groups.

This record should show:

- Pen number
- Weaning date
- Name or number of grower/finisher
- Number of growers/finishers in a pen by sex

- Weekly body weights
- Total daily feed allocation
- Dates and nature of illness and treatment

Figure 28: A simple growing/finishing card:

GROWING/FINISHING CARD												
Pen Number												
Weaning Date												
Number of Growers/ Finishers												
	Pig Name/Number											
Date	**Weekly Body Weight (kg)**										**Total Weight**	**Feed Allocation**
Health Record												
Date	**Diagnosis/Notes**											

To photocopy this record card see Appendix III

C. Sow gestation table (see Table 3)

- Use the table to estimate the date a sow is to farrow
- Keep an accurate record of the date of mating
- It is based on the knowledge that pregnancy lasts 114 days
- Therefore, date of farrowing = date of mating + 114 days
- Table 3; to calculate expected date of farrowing. For example if a sow was mated on 11th May, the expected farrowing date is 3rd September.

Table 3: A sample sow gestation table:

SOW GESTATION TABLE			
Date of Mating	**Expected Farrowing Date**	**Date of Mating**	**Expected Farrowing Date**
*Jan 1	*April 26	Jul 5	Oct 28
Jan 6	May 1	Jul 10	Nov 2
Jan 11	May 6	Jul 15	Nov 7
Jan 16	May 11	Jul 20	Nov 12
Jan 21	May 16	Jul 25	Nov 17
Jan 26	May 21	Jul 30	Nov 22
Jan 31	May 26		
Feb 5	May 31	Aug 4	Nov 27
Feb 10	Jun 5	Aug 9	Dec 2
Feb 15	Jun 10	Aug 14	Dec 7
Feb 20	Jun 15	Aug 19	Dec 12
Feb 25	Jun 20	Aug 24	Dec 17
		Aug 29	Dec 22
Mar 2	Jun 25	Sep 3	Dec 27
Mar 7	Jun 30	Sep 8	Jan 1
Mar 12	Jul 5	Sep 13	Jan 6
Mar 17	Jul 10	Sep18	Jan 11
Mar 22	Jul 15	Sep 23	Jan 16
Mar 27	Jul 20	Sep 28	Jan 21
Apr 1	Jul 25	Oct 3	Jan 26
Apr 6	Jul 30	Oct 8	Jan 31
*Apr 11	*Aug 4	Oct 13	Feb 5
Apr 16	Aug 9	Oct 18	Feb 10
Apr 21	Aug 14	Oct 23	Feb 15
Apr 26	Aug 19	Oct 28	Feb 20
May 1	Aug 24	Nov 2	Feb 25
May 6	Aug 29	Nov 7	Mar 2
May 11	Sep 3	Nov 12	Mar 7
May 16	Sep 8	Nov 17	Mar 12
May 21	Sep 13	Nov 22	Mar 17
May 26	Sep 18	Nov 27	Mar 22
May 31	Sep 23		
Jun 5	Oct 3	Dec 2	Mar 27
Jun 10	Oct 8	Dec 7	Apr 1
Jun 15	Oct 8	Dec 12	Apr 6
Jun 20	Oct 13	Dec 17	Apr 11
Jun 25	Oct 18	Dec 22	Apr 16
Jun 30	Oct 23	Dec 27	Apr 21
		Dec 31	Apr 26

Examples: *If a sow was mated on January 1st expected farrowing date will be April 26th.*
If a sow was mated on April 11th the expected farrowing date will be August 4th.

D. Boar Record (Figure 29)
This should show:

- Boar number or name
- Date of birth
- Breed
- Sow number or name served by the boar
- Date when the boar served that particular sow
- Number of piglets born (dead and alive)
- Number of piglets weaned
- Dates and nature of illness and treatment

In this way the performance of the boar can be compared with other boars. Boars with a high rate of sows returning to heat should be culled.

Figure 29: A sample boar record card:

BOAR RECORD CARD			
Boar Number/Name _____ **Date of Birth** _____ **Breed** _____			
1. Sow Number/ Name Served	**Date of Service**	**Number of Piglets Born**	**Number Weaned**
Health Record			
Date	**Diagnosis/Notes**		

To photocopy this record card see Appendix IV

3) A diary with all important events relating to a pig or litter
Many farmers use memory as a method of record keeping. This is not recommended because:-

- It is only of use for a small number of animals
- Person carrying the records can die or go away
- The farmer may forget

To make the system work

- One person should be made responsible
- Write record as soon as an event has taken place
- Keep all records in one place
- Use a filing system

- Write the records on a regular basis
- Calculate the totals/averages every month

4.4 Keeping a Health Record

- Write down all dates and facts relevant to an animal's health
- It will remind you when to repeat a treatment
- It will help you remember exactly how a disease progressed as well as how the animal responded to treatment.
- It will help any veterinarian who visits the farm to know the health history of the farm.

4.5 Financial Records

- Keep records on all costs (feed and any other expenses) and all incomes
- Use a cash book (Figure 30)

Figure 30: A sample of a page in a simple cash book:

CASH BOOK					
Money received (Receipt)			Money spent (Payment)		
Date	Item	Amount	Date	Item	Amount
	5 piglets @ 10,000	*50,000*		*2 bags of Mukene*	*120,000*
	1ton Mukene	*600,000*			
	TOTAL	**650,000**			**120,000**
	BALANCE	**530,000**			

To photocopy this record sheet see Appendix V

4.6 Preparing a Summary of Records

- This should be done on a quarterly basis
- Calculate totals and averages
- Will help to identify weak areas in the production process for corrective action
- Will also help to identify price trends for future planning
- Calculate a summary of income and expenditure (*see Chapter 9; economics*)

CHAPTER FIVE

5.0 FEEDS AND FEEDING MANAGEMENT

5.1 Introduction

- Feeds account for the largest fraction (at least 70%) of the cost of producing pigs and therefore correct feeding is critical. If feeding is incorrect profit and income will suffer.
- Pig farmers should aim at minimizing feed costs if profits are to be maximized.
- The feed must contain the nutrients in the right quantities and a correct method of feeding should be used.

5.2 Theory of Feeding Pigs

- Pigs require five categories of nutrients.
- These are obtained from materials called Feedstuffs

The five categories of nutrients include:

1) **Protein:** For growth and body repair.

The sources of protein include:

- Feedstuffs of animal origin: Fish (mukene), Blood meal, Poultry and Fish processing wastes.
- Feedstuffs of plant origin: Soybean, Beans, Cottonseed cake, Sunflower cake.

2) **Energy:** For maintenance of normal body functions.

The sources of energy have a lot of carbohydrates (starch and sugars) or fat: These include:

- Cereal grains: Maize, Sorghum, Millet, wheat
- Cereal processing by products: Maize bran, Wheat bran, Rice bran
- Roots and Tubers: Cassava, Sweet potato, Yams
- Fruits: Banana, Jack fruit, Avocado
- Animal fat is also a good source of energy.

3) **Vitamins:** For maintenance of normal health.

The sources of vitamins include:

- Fresh forages: Sweet potato vines, Elephant grass, Wondering jew (Ennanda), Amaranthus (dodo), Kafumbe and many other garden weeds.
- Vitamin-mineral premix
- Sunshine – the body makes vitamin D if exposed to sunshine

4) **Minerals:** For strong bones and normal body function.

The sources include:

- Lake shells (obusonko), bone ash, common salt, soil
- Vitamin-mineral premix.

5) **Water:** Necessary for all body functions like digestion, excretion, circulation etc.

- Clean fresh water must be supplied to pigs all the time.
- A sow will need 40 litres (2 jerry cans) of water a day for drinking and cleaning.

5.3 Important Guidelines in Feeding

- No single feedstuff can supply all the nutrients required for all body functions**.**
- The different feedstuffs must be mixed in proportions to satisfy the requirements for a particular type of pig (weaner, piglet or sow).
- Feedstuffs from animal sources are better (but expensive) than feedstuffs from plant sources as they have a better balance of nutrients.

5.4 Types of Pig Feeds

Pigs need different types of feeds as they develop because their nutritional needs vary with age and stage of production.

In Uganda, 3 different feeds may be used:

1) Creep feed: This is fed to piglets before they are weaned.
   - It is fed in addition to milk, because sow milk alone may not satisfy the piglet's appetite.
   - It must be high in protein (20-22%) and, highly digestible.

2) Grower feed: This is fed to pigs after weaning.
   - It contains 14-16 % protein.

3) Sow and weaner meal: This is fed to breeding animals i.e. gilts, sows and boars.
   - It contains 11-13 % protein.

5.5 How Can a Pig Farmer Obtain these Feeds?

1) Buy from a feed manufacturer
   - These feeds are highly priced and may entail transport to the farm.
   - Some feeds may not contain the nutrients in the correct proportions.
     - It is advised to buy from a trusted manufacturer

2) Make your own (Home made feed)
   - The feedstuffs can be bought or produced on the farm
   - It requires knowledge of what feedstuffs to use and their nutrient composition
   - Table 4 outlines the nutrient composition of commonly used foodstuffs in Uganda.

Table 4. Nutrient Composition of commonly used feedstuffs in Uganda

	Dry Matter (%)	Crude Protein (%)	Crude Fibre (%)	Calcium (%)	Phosphorus (%)	Metabolizable Energy (Kcal/kg)
Maize	88	8.0	12	0.17	0.55	3000
Maize bran	88	9.4	13	0.04	1.03	2200
Rice bran	88	13.5	6.5	0.06	1.43	3000
Cassava	88	2.8	4.0	0.30	0.05	3000
Molasses	75	3.0	-	0.75	0.08	2330
Millet	88	10.5	2.0	0.05	0.40	1392
Sorghum	88	9.0	2.1	0.03	0.20	3250
Fish meal	88	60.0	1.0	4.37	2.53	2310
Blood meal	88	80.0	1.0	0.28	0.22	1177
Cottonseed cake	88	40.0	14	0.20	1.20	968
Soya bean meal	88	43.0	6	0.53	0.64	2800
Bone ash	89	-	-	32.00	18.00	-
Lake shell	98	-	-	35.00	-	-

Source: Faculty of Agriculture, Department of Animal Science Laboratory, Makerere University

5.6 Limits to the Use of Some Feedstuffs

- Cereal grains are costly due to the high demand by human beings
- Cereals are deficient in some nutrients
- Protein from feedstuffs of plant origin is of poor quality (except soybean)
- Some feedstuffs contain substances that inhibit proper digestion/utilization

5.7 Processing of Feedstuffs

Processing some feedstuffs before feeding to pigs is essential for:

1) Removing factors that inhibit proper digestion/utilization by pigs.
   - Processing can render such feedstuffs good for use in pig feeding.
     - Soybeans must be roasted before they are used (see figure 31).
     - Do not burn the soybean because this spoils the useful nutrients and will not be of value to the pig.
     - Beans must also be boiled before feeding to pigs.
     - Feedstuffs in the cabbage family should be boiled
     - Drying removes factors that inhibit proper digestion/utilization of feedstuffs e.g. cassava

Figure 31: Roasting of soy bean:

Make foodstuffs more digestible by:

- Grinding reduces particle size of feedstuffs, which makes them more digestible. Grinding also enables easy mixing of feedstuffs
- Cooking improves digestibility

2) Drying feedstuffs
   - Dry feedstuffs will not become moldy in storage (moldy feed is toxic to pigs)
   - Drying makes feedstuffs more palatable and more digestible

5.8 Home Made Feeds

To make a complete pig diet a farmer should know:-

- The nutrient content of the feedstuffs available
- How to remove factors that inhibit proper digestion/utilization if they exist
- Nutrient requirements of the type of pigs for which feed is to be made
- Prices of the different feedstuffs to be able to use the cheapest
- Table 5 gives a worked example of the different feedstuffs to use for different types of pigs (unweaned piglets - creep; growers, sows and weaners).

Table 5. Example of feedstuff proportions to make complete diets

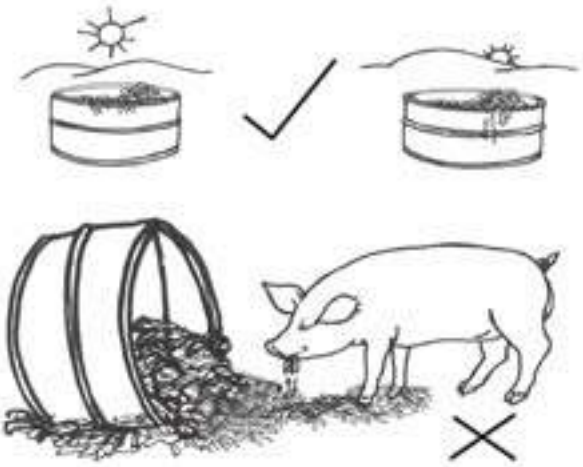
Ingredients (%)	Creep	Grower	Sow and Weaner
Maize bran	70.5	69.7	67.6
Fish meal	10.5	7	5.4
Cottonseed cake	14	17.5	20.3
Lake shells	3.5	4.5	5.4
Bone ash	0.7	0.7	0.7
Salt	0.4	0.3	0.3
Vitamin mineral mix	0.4	0.3	0.3
Total	**100**	**100**	**100**

5.9 Practical Feeding Basics

1) Boars, Dry sows and Gilts

- The objective is to keep the animal in good body condition i.e. neither too fat nor too thin.
- If they are too thin increase the amount of feed offered; if too fat the feed should be decreased.
- Give the gilt or sow 3 kg of feed per day of sow and weaner meal.
- On average a boar should be given between 3 and 4 kg of sow and weaner meal daily.
- Divide the feed into two equal parts, one for the morning and the other for the afternoon (Figure 32).
- Water requirements range from 10 – 20 litres per day depending on size and weather.
- Fresh water should be supplied at all times.

Figure 32: Divide the daily ration into two parts:



2) Feeding During Pregnancy

- For the first two and half months of pregnancy the daily allowance for the sow is the same as the dry animals.
- In the last month feed intake should be increased gradually by 0.25 kg in the 11th week of pregnancy through to 0.75 kg in the last week of pregnancy. This is called **Steaming up**
- However, do not overfeed because over fat sows tend have problems at farrowing.
- One day before farrowing cut the feed down by a half to avoid constipation.
- Use the sow gestation table to calculate 'steaming up period' (see Table 3)

3) Lactating Sow and Her Piglets

- Amount of feed given to the sow depends on the number of piglets in the litter.

- Give 3 kg of sow and weaner meal. This is the basic maintainance ration.
- In addition to the 3 kg, give 0.25 kg of the feed for every piglet in her litter.
    - For example if her ration is 3 kg and she has 8 piglets in her litter, her daily allowance will be 3 + (8 x 0.25) = 5 kg per day.
- Feed in two equal meals; one in the morning and the other in the afternoon (see figure 32).
- From the 6th until the 8th week of lactation, reduce the daily allowance gradually, so that by weaning she is getting just 3 kg.
- The gradual reduction helps to dry up the sow in preparation for weaning.
- Inject piglets with iron on the second or third day after birth.
- Provide creep feed to the piglets 10 days after birth (if justified by the price for piglets)

4) Growing and Finishing Stages

- Piglets should average 12 kg at weaning.
- Weaners may continue with creep feed for 2 more weeks.
- Growing stage is defined as the stage from weaning to about 5 months (60 kg). Such a pig is called a porker when slaughtered.
- The finishing stage is from 60 to 100kg at about 6.5 months. Such a pig is called a baconer when slaughtered.
- The aim is to maximize lean muscle production and minimize fat deposition.
- During the finishing stage the amount of feed should be restricted to avoid the production of too much fat in the carcass.
- Over feeding will increase the proportion of fat. This may be unacceptable to the market.
- The amount of feed will depend on body weight of the pig.
  - Table 6 gives guidance on the feeding regime as a function of weight. For example if your pig weighs 55 kg, the pig should receive 1.5 kg of feed per day.
  - For example if your pig weighs 80 kg, the pig should receive 2.8 kg of feed per day.

Table 6: The guidelines in the table below should be followed:

Weight of Pig (kg)	Feed per pig per day (kg)
Grower stage	
20	1.0
30	1.3
40	1.6
50	1.8
60	2.0
Finishing stage	
60	2.0
70	2.4
80	2.8
90	3.0
100	3.2

- Since growing animals are kept in groups the daily feed is obtained by multiplying the feed per pig by the number of animals in a pen.
    - For example a pen holding 20 pigs of 40 kg body weight on average will require 32 kg (which is the equivalent of 1.6 x 20)
- Divide the feed in two meals to be given in the morning and the afternoon.

5.10 Alternative Feeding Strategies

1) Use of left over food from kitchens

Some farmers have access to left over food from schools, hospitals and hotels.

- For safety left over food should only be fed after boiling for at least 30 minutes.
- To improve performance, feed a limited quantity of complete meal in addition to the kitchen leftovers

2) Pasture/Forage Feeding

- If properly maintained pasture/forage can be a good source of nutrients for pigs.
- They can be harvested or pigs may be allowed to graze
- Pigs however grow slowly and may get heavy worm infestation.
- It is therefore better suited for mature breeding animals
- The forage should be young.
- Reduce the level of complete feed given by 1 kg
- Rotate the animals on pasture. Provide shelter in the pasture or plant many trees in the grazing field.
- Ring the pigs to avoid rooting (see figure 33)

Figure 33: A pig with a nose ring

3) Animal processing wastes

- Fish processing wastes can be boiled and mixed with an energy source for feeding.
- Chickens slaughtered wastes (intestines, heads and legs) can be boiled and mixed with an energy source for feeding.
- Raw blood and rumen contents from slaughter-houses can be boiled and fed together with an energy source.

4) Integrating Pig Production with other Farm Enterprises

Offers a possibility of reducing costs of buying protein supplements.

- Layer Birds (chicken)

- Plan so that droppings are collected from below the night patches.
- Dry and roast the droppings before mixing them with an energy source.
- Poultry litter mixed with maize bran in a 3:1 ratio can be used for feeding to breeding sows.

- Crops
  - Crops grown for human food can be used as pig feed
  - Feed undersized sweet potatoes, bananas, yams, cassava and their peels
  - Cook to destroy toxic substances and improve digestibility
  - Supplement them with a good quality protein source like soybean or fish
  - Peels and roots should be dried before feeding if possible

CHAPTER SIX

6.0 PRACTICAL MANAGEMENT OF PIGS

6.1 General Management of Pigs

Pigs should be managed in such a way that allows then to:

- Perform to the maximum of their genetic potential
- Produce meat at the least possible cost

To be able to provide the most appropriate attention, pigs can be categorized into:

1) Sows and gilts
2) Boars
3) Piglets
4) Growing and finishing pigs (market pigs)

6.2 Management of the Boar

6.2.1 Developing boars

To develop normal sexual behaviour, young boars need to be reared in groups so that they have the opportunity

- For physical contact
- To interaction with other pigs during development.

6.2.2 Feeding

- Young boars are still growing and should not be underfed
  - Underfeeding reduces libido and fertility
- Sow and weaner meal is adequate.
- Depending on age and condition, the boar should eat between 2 and 3 kg per day

6.2.3 How to use a boar for service

There are two methods:

1) Pen mating
   - In pen mating a boar is left to run with a group of sows.
   - He mates with sows as and when they come on heat
   - Pen mating requires less labour
   - When using pen mating sows or gilts should be divided into groups of 8 to 10 and one boar be put with each group.

2) Hand mating
   - A boar is kept in a pen to which sows in heat are brought for service
   - With hand mating it is easier to know the exact breeding date
   - You can ensure that each sow or gilt is mated twice
   - A farmer needs to observe sows for signs of heat

6.2.4 Mating Ratio

- A young boar can pen-mate 8 or 10 gilts
- A mature boar up to 10 to 12 sows.

6.2.5 Mating pens/Paddock

- Provide an adequate breeding area.
- Remove any wire, boards or other objects, which may cause injury.
- Good footing is a must to avoid injury and reluctance to mate.
- Avoid wet slippery floors.

6.2.6 Common Problems that may Limit Productivity of a Boar

1) Bleeding penis

- This may be due to an injury incurred:
  - During copulation
  - From fighting
  - From other causes
- Infections of the urinogenital system may also cause bleeding from the penis
- Seek the advice of a vet to determine if:
  - The problem can be surgically corrected
  - The boar should be culled

2) Abnormal penis

- There are 2 common abnormalities:
  - Tied penis: A small piece of tissue ties the penis to the skin sheath surrounding it (penis)
  - Small limp penis
- Such boars cannot enter the sow
- The best option is to cull such boars

3) Degeneration of testicles

- Observe for clear differences in size or shape of the testes
- This may lead to a reduction in boar fertility
- Such a boar should be culled

4) Decreased libido (sex desire)

- This may be caused by:
  - Injury to the feet or reproductive system
  - Prior painful mating experience
  - Bullying by large sows
  - Hormonal deficiencies
  - Housing with a very dominant boar
  - Other causes
- Cull such a boar

5) Lameness

- Lameness may be caused by:
  - Bone fractures
  - Illness of the joints or **Arthritis**
  - Poorly maintained hooves
  - Other causes
- Cull such boars

6.3 Management of Sows and Gilts

- Sow and gilts are the basic units in pig production
- Sows that are efficient in reproduction make a profitable pig herd
- Ensure proper feeding

6.3.1 Developing Gilts

Gilts should be managed so as to:

- Reach puberty at an early age
- Continue showing signs of heat (estrus cycles) regularly until they are served
- Conceive readily at first service

6.3.2 Attainment of Puberty

- Most well managed gilts reach puberty between 4.5 and 6 months of age
- It is advised to delay serving such gilts until 7 to 8 months of age
    - Serving gilts too young impairs their development and productivity
- Cull gilts that do not attain puberty by 7.5 months

6.3.3 How to Ensure that Gilts Reach Puberty Early.

- Use crossbred gilts
    - Crossbred gilts generally express first estrus signs earlier.
- Feed adequate quantities of a well balanced diet
- Ensure a good body condition
    - Excessively thin gilts tend to have delayed estrus
- Gilts should be able to see or smell a boar (boar contact)
    - Exposure to a boar should start at about 4 months
    - Boar smell and noise is known to induce puberty

6.3.4 Care Before a Gilt is Served

Prior to serving:

- Allow her a lot of exercise
- Keep them in small groups of less than 10
- Increase feed allowance to maximize the number of eggs released. This is referred to as **Flushing**
- Return them to the normal ration after mating
- Allow them to see a boar at least twice a day
- Observe for signs of heat at least twice a day

6.3.5 Signs of Heat

Gilts in estrus exhibit certain behaviors and physical signs, which include:

- Aggressively seeking out a boar
- Restlessness
- Vulva swells and reddens
- Frequent urination and vaginal mucus discharge
- Mounting others or when mounted it stands still
- When pressed on the back by the farmer they stand still (standing reflex). See figure 34

Figure 34: Picture showing standing reflex:

6.3.6 When to Serve

- Gilts observed on heat in the morning (AM) should be mated in the evening of the same day (PM)
- Gilts detected in the evening (PM) should be mated in the morning of the following day (AM). This is what is called the AM – PM rule.
- A gilt once mated should be brought back for a second mating twelve hours after the first mating.

Note:

- Keep an accurate record of the date when the sow/gilt was served
- From day 20 to 21 after service, observe the pig for signs of heat, if no signs are observed the animal is most likely to be pregnant

6.3.7 Management During Pregnancy

- Ensure good health
- Keep the pregnant pig in a well ventilated clean building without a lot of direct wind blowing onto it
- Keep the bedding dry all the time
- Provide enough space
- If they are kept in groups make sure they are not more than 10 pigs per pen
- Avoid long distance travel by pregnant pigs

- If kept outside on pasture make simple structures to protect them from intense heat or heavy rainfall
- Rotate them in the paddocks to avoid build up of diseases
- Regularly deworm
- Avoid excessive feeding which makes them too fat. Such pigs experience difficulties during farrowing.

6.3.8 Management of the Sow Before Farrowing

- Farrowing is expected 114 ± 3 days from when the sow was mated (use sow gestation table - Table 3 to calculate).
- In the last week of pregnancy prepare both the sow and her farrowing pen
- Clean and disinfect the farrowing pen
- Put bedding of dry grass in the area where the pig sleeps. This will help the sow and piglets to feel warm.
- Wash the sow with water and soap to remove dirt, and excrement which may contain disease causing organisms or infective larvae of internal parasites
- Spray against external parasites e.g. lice, mange, jiggers (See figure 35)
- Place the sow in her pen

6.3.9 Procedure of Washing the Sow

- Confine the sow (see figure 35).
- Wet the animal's entire body first starting with the feet, legs, head and then the rest of the body.
- After the animal is wet apply soap, liquid detergent. Then use a long bristled brush to scrub the entire body
- Be sure to clean the feet and legs thoroughly. Pay attention to the area between the hooves
- Clean the area around the vulva and the underline with attention to the concave surface on the end of the teat
- Remove soap and dirt by rinsing the animal with clean water

Figure 35: Washing of a sow:

6.3.10 Signs of Farrowing

Observe the sow for the following signs which show that the sow is about to give birth:

- The sow becomes restless about 24 hours before farrowing.
- There is a distinct swelling of the vulva
- The teats are turgid and small amounts of milk come out when you press the teats
- The sow builds a nest if bedding is available.
- It lies down and abdominal contractions may be noticed
- A bloody fluid will come out from the vulva

6.3.11 Management During and Immediately after Farrowing

- Most times the sow will farrow on its own without any problems
- The sow should not be disturbed unless it is necessary
- However, the farmer is advised to be present and observe the sow during farrowing in case it becomes necessary to give assistance to the sow or the piglets.
  - A vet may be required for difficult farrowings

6.3.12 When may Assistance Become Necessary?

- Some sows especially gilts injure their piglets during farrowing
  - Remove the piglets until farrowing is completed
  - Return the piglets after the sow has settled down.
- Piglets may be born when they are all covered in membranes.
  - Such piglets will not start breathing
  - If breathing does not start, follow the procedure outlined in Figure 36.

Figure 36: What to do if the piglet is not breathing:

Clear the membranes away for the piglet to begin breathing

Figure 36 a

Massage the chest area

Figure 36 b

Hold it by the hind legs and swing it gently

Figure 36 c

- Sows may kill the piglets by lying on them.
  - Remove the piglets to safety
- Some piglets may be too weak to suckle or fail to locate a teat
  - Show and guide such piglets to a teat

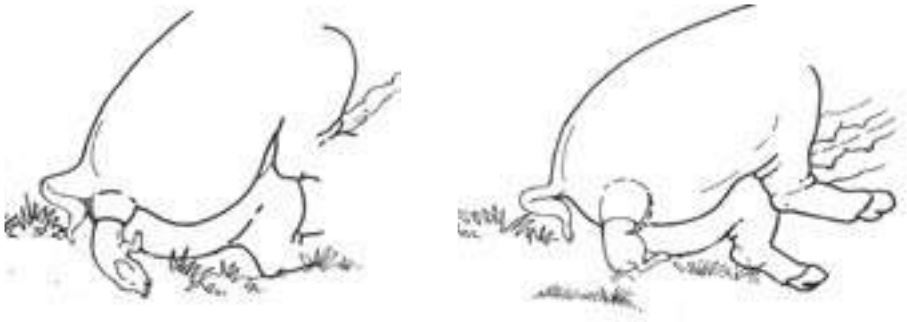
- The length of the navel cord may be excessively long
  - Shorten such navels by cutting off a piece, and dip the end attached to the piglet in an iodine solution to prevent infection

6.3.13 The Farrowing Process

Farrowing takes 4 - 5 hours on average, but may be shorter or longer than this.

- When farrowing the sow usually lies down and pushes out piglets.
- Piglets come out with their front feet first or hind legs first. Either is normal (see figure 37).
- Ensure that each piglet has access to a teat to take colostrum (the first milk). Colostrum contains antibodies that give the piglets immunity. Colostrum is essential for piglet survival.
- Remove the afterbirth shortly after it is dropped
- After farrowing the sow should be left alone as much as possible.

Figure 37: Farrowing process (Head first or hind feet first are all normal)



6.3.14 Problems Related to Farrowing

1) Lack of contractions of the uterus (uterine motility)
2) Failure to expel the afterbirth (Retained placenta)
3) Abnormal presentation of the piglet within the birth canal (Mal-presentation of piglets).
   - Farmer should reposition such piglets using a clean disinfected arm with gloves
4) Nervous or hysterical sows/gilts
   - Such sows/gilts stand up and lie down during farrowing and may injure the piglets.
   - Piglets should be taken away as they are born and returned later when the mother has calmed down.
5) Partial or complete absence of milk flow from the mammary glands. This condition is referred to as **Agalactia**, and may be caused by:
   - Painful conditions of the teats
   - Anything, which disturbs milk ejection from the udder.
   - Some form of poison from a non specific infection

   Treat with antibiotics and hormones (e.g. Oxytocin and Prolactin)
6) Inflammation of the udder due to infection by bacteria. A condition called **Mastitis**:
   - The udder is congested, hot and painful when touched.
   - Sow may not allow piglets to suckle due to pain

- There may be no milk secretion or milk let down
- Control by keeping the pen dry and clean
- If the animal has a fever it requires an antibiotic injection

7) Inflammation of the uterus due to non-specific infection.
   - This condition is referred to as **Metritis** and it occurs especially in cases of:
     - Retained placentas, abortion and dead piglets within the uterus
   - The signs which are usually observed 2 – 5 days after farrowing include:
     - Fever
     - Sticky, white-yellow discharges from vulva with foul smell.
     - Arched back due to pain when walking.
     - Slow and uncoordinated movement.
   - Seek assistance of a veterinarian to:
     - Remove placentas or dead fetus
     - Flush the genitalia with mild antiseptic
     - Insertion of uterine tablets of antibiotics (pessaries)
     - Injection with antibiotics

6.3.15 Schedule of Important Events in Sow Management

- First week after weaning breed the sow (Put the sow to the boar)
- 2 weeks before farrowing treat for internal and external parasites
- At 110 days after breeding, thoroughly wash sow and move to farrowing pen begin feeding high fibre ration
- From 111 days to farrowing observe the sow for signs of parturition (farrowing).
- Provide special care for weak or small pigs and for large litters
- Cull sows at weaning on basis of productivity, temperament and other economic factors
- Use a calendar to show these events.

6.4 Management of Piglets

Before weaning the aim is to:

- Reduce mortality to the minimum acceptable
- Achieve fast growth rate to weaning

6.4.1 Navel Cord Care

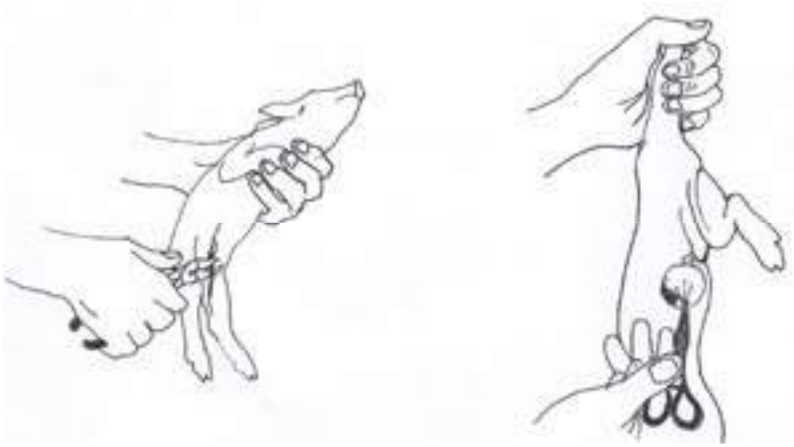
- The area where the umbilical cord is broken can be a passageway for disease causing organisms to enter the body of the newborn piglet.
- Treat the navel cord by wetting with iodine solution. May apply using cotton wool.

Procedure (see figure 38):

- Restrain the piglet by grasping it over the shoulder or back.
- Cut off the navel cord leaving about 1 inch.

Note: Sometimes newborn piglets bleed excessively immediately after the umbilical cord breaks as the piglet is born. Tie off the navel cord immediately when this is observed. Use clean string.

Figure 38: Navel cord care:



Cutting off the naval cord

Treating the cut end wit Iodine solution

6.4.2 Iron Supplementation

- Piglets are born with low reserves of Iron in the body and the sow's milk is low in Iron
- Iron is required for normal blood formation and transportation of oxygen
- Piglets need iron supplementation to prevent anaemia (Piglet anaemia)

Iron can be supplied from several sources:

- Place clods of red soil in the pen. Take care to get soil from an area that is not contaminated with worms
- Buy iron tablets and give to the piglets. **Caution:** piglets can cough them out
- Buy an iron solution and rub it on the sow teats
- Use iron injections. An experienced person should administer the injection.

Procedure for injection (see figure 39)

- Read the label and instruction for the iron product you are using.
- Select a clean syringe and needle and fill the syringe
- Grasp and hold the pig by one of its rear legs
- Clean the injection site with a cotton swab containing a disinfectant
- Push the needle with a little jab through skin at the cleaned site.
- Inject the proper dosage slowly into the muscle (See manufacturer's instructions for dosage)

If you are to inject into the neck muscle

- Put the piglet between your knees
- Stretch its head to one side
- Inject the iron into the muscle on the side of the piglet just off the top line

Figure 39: Procedure for injection:

Injection into thigh

Injection into neck muscle

Note: Dispose of used needles every after each litter

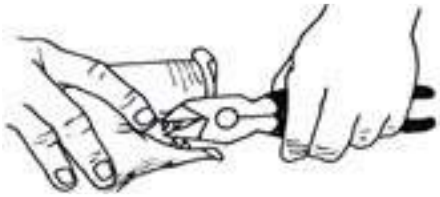
6.4.3 Clipping of Needle Teeth

- Piglets are born with 4 pairs of sharp teeth called Needle teeth
- In the process of fighting for teats the piglets use the teeth to bite each other
- The biting creates cuts, which can be entry points for infections.
- They also injure the sow's teats. This irritates her forcing it to lie on her stomach and refuse to nurse the piglets.
- To prevent injury to the teats and other piglets these teeth need to be removed on the first day after birth.

Procedure (see figure 40):

- Restrain the piglet by grasping the head with one hand.
- Force the mouth open using fingers on the same hand near the back edges of the mouth. Be careful that you do not choke the piglet.
- Use sharp pliers taking care not to injure the gums. Hold the clippers as perpendicular as possible to the teeth
- Completely cut off the teeth as close to the gum as possible
- After clipping the teeth on one side turn the pig to give access to the teeth on the other side of the head.
- Clean the pliers with a disinfectant after working with each litter of piglets

Figure 40: Procedure of clipping of the needle teeth:



6.4.4 Tail Docking

- It involves cutting off the tail to leave a small piece about ½ inch
- It helps to prevent tail biting
- Tail biting can lead to injury and infection
- Tail docking should be done within the first 3 days after birth because:
  - The piglet is small and easy to hold
  - At this age other piglets are less likely to bite a newly docked tail
  - The pig is well protected with antibodies obtained from colostrum

Procedure (Figure 41):

- Hold the piglet suspended by the rear legs with one hand
- Using a sharp sterile knife cut off the tail to leave ½ inch from the place where the tail joins the body
- Disinfect the wound.
- Disinfect the knife after working with each litter of piglets.

Figure 41: Procedure of Tail docking

6.4.5 Identification

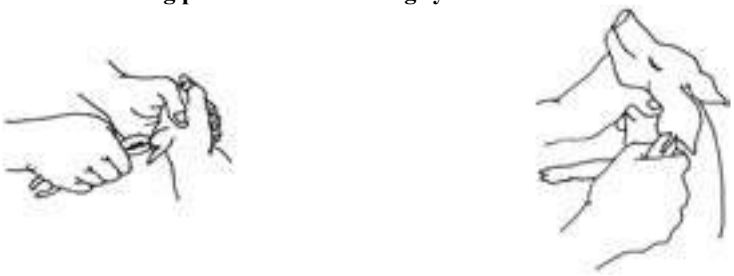
- Piglets can be identified by:
  1) Giving them names e.g. Makula, Dawudi, Joseph
  2) Giving them numbers using tattoos, ear tags and ear notching
- The names or numbers are used in keeping records
- In Uganda, the most appropriate method is giving numbers by ear notching
- This should be done within the first 3 days after birth
- Cut notches or dents on the ears to represent numbers
- A simple system of notching that can used is described below (see figure 42):
- A notch on the:
  - Bottom of the left ear represents the number 1
  - Top of the left ear represents 5

- Tip or end of the left ear represents 3
- Bottom of the right ear represents 10
- Tip or end of the right ear represents 30
- Top of the right ear represents 50

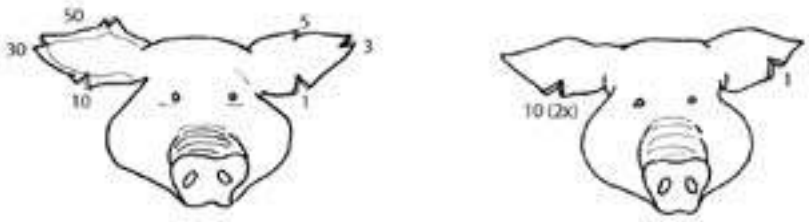
Notching should be done as follows.

- Hold the piglet by the head and use a sharp knife or razor blade to remove a V shaped amount of tissue from the edge of the ear.
  - Remember to notch the correct position of the ear.
- The method will cause some bleeding.
- Treat the wound created with iodine or some other antiseptic.
- Disinfect the knife or use a new razorblade after working with each litter

Figure 42: Ear notching procedure and coding system:



Ear notch coding system:



6.4.6 Castration

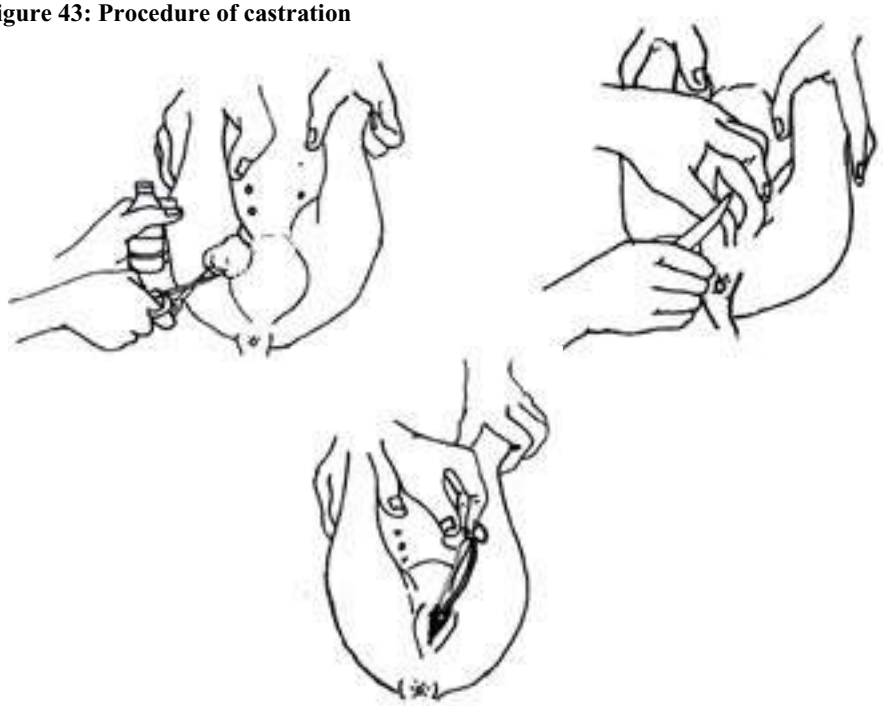
- Male piglets are castrated:
  - When they are not to be used as boars
  - To make docile for easy handling
  - To remove the male smell from their meat
- Castration should be done early before the piglets grow to 3 weeks of age because:
  - The piglet is small and easy to hold
  - At this age piglets recover faster with minimal effect on growth
  - The piglet is well protected with antibodies obtained from colostrum

Procedure (see figure 43):

- Hold the piglet by the hind legs as shown

- Clean the scrotal area with a detergent or any disinfectant
- Grasp the testicles and push them upwards to tighten the skin
- Make a cut down the length of each testicle.
- Cut only through the skin and white membrane.
- The cut must be at the lower end of the scrotum to allow easy drainage of the blood
- Pull the testicle through the opening, twist and scrape the cord
- Treat the wound with an antiseptic e.g. iodine to prevent infection

Figure 43: Procedure of castration



6.4.7 Recording of Events Between Farrowing and Weaning

This is a very important management operation.

- After farrowing record the number of piglets born alive and those born dead. (use sow record card - appendix 2 or sow record - appendix I).
- Record the number of female and male piglets
- After identification weigh the piglets and record the weight of the litter at birth.
- At 3 weeks of age weigh the piglets again.
  Weight at three weeks gives an indication of the milk producing ability of the sow and her mothering ability.

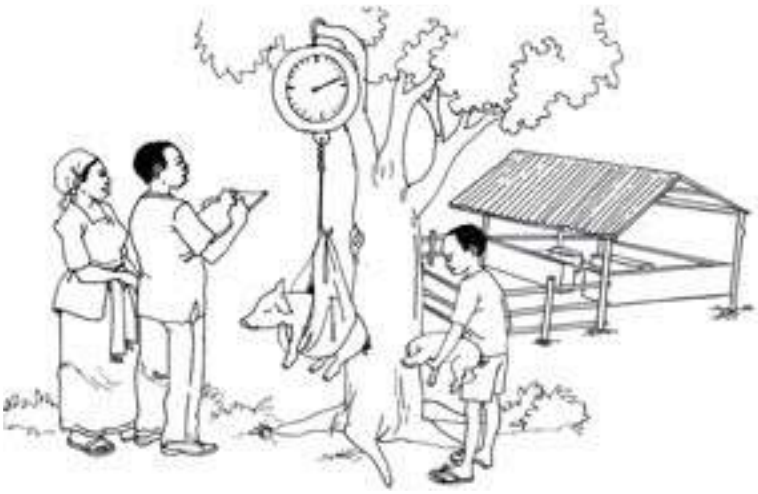
6.4.8 Weighing piglets

- The first step is to have record forms ready to record the litter information (use growing/ finishing card - appendix III).

- Check the scale for zero adjustment and adjust it if necessary (see figure 44).
- Pick up the piglet with your hands by gently grasping it around the back and belly and set it on the scale
- Record the weight to the first decimal point.

Cleanliness throughout the operation is essential if infection is to be prevented

Figure 44: Recording the weight of piglets



6.4.9 Fostering

- Involves giving piglets to a sow other than its own mother
- May become necessary in the event that:
  - A sow dies during or soon after farrowing
  - A sow falls sick at farrowing and cannot produce milk
  - A sow produces more piglets than the number of teats she has
  - A sow produces an excessively large litter and has poor milking ability
- If there is a sow which has farrowed within 3 days
  - Adjust litter size for the number of functioning teats or milking ability of the sow
  - Move the larger piglets to a the foster sow
  - Move piglets before they are three days old
  - Make sure they have received colostrum from their mother before you transfer them
- To ensure that the foster sow does not recognise and reject the fostered piglets cover the smell of the piglets so that it cannot recognise its young by smell by:
  - Smearing all the piglets including her own piglets with a strong smelling substance like iodine
  - Soaking all the piglets thoroughly in a salt solution
- Observe the foster sow as you go through this process to ensure that it is not battering the fostered piglets

6.4.10 Weaning

- This is the process of separating the sow from the piglets or removing the piglets from suckling the sow's milk
- It can be done:
  - Early i.e. 3 – 5 weeks
  - Late i.e. 6 - 8 weeks
- Under production conditions in Uganda weaning should not be done early because it requires:
  - An expensive diet for the weaners
  - High management standards
- To avoid exposing the weaners to undue stress remove the sow from the farrowing pen and leave the piglets in the pen they are used to for sometime.
- Weaning should be done gradually probably over a four-day period:
  - Cut back the daily feed allowance to just 3 kg
  - This helps to dry the sow off conveniently
- Alternatively practice **Split Weaning**:
  - At the end of the 5^{th} week remove the piglets that are above average in size from the litter
  - Allow the small piglets to suckle for an extra 4 to 5 days
  - This gives them a chance to take more milk and add on extra weight
  - In any case they should not be allowed to suckle beyond 8 weeks of age.
  - Split weaning reduces the intensity of suckling and allows a sow to come back to heat early after weaning.

6.4.11 Rebreeding the Sow after Weaning

A healthy well-fed sow will come to heat within 4 to 7 days after weaning.

- A farmer should observe such a sow at least twice a day for signs of heat.
- When signs are observed follow the AM – PM rule (see section 6.3.6)

CHAPTER SEVEN

7.0 PIG WASTE MANAGEMENT

7.1 Background

- In pig production there is a need to prevent waste emissions to the environment in order to:
  - Reduce nuisance from odours and flies
  - Reduce pollution of water resources
  - Deny disease causing agents an environment where they can multiply
- Wastes on a pig farm are constituted by:
  - Waste feed and water
  - Feaces and urine

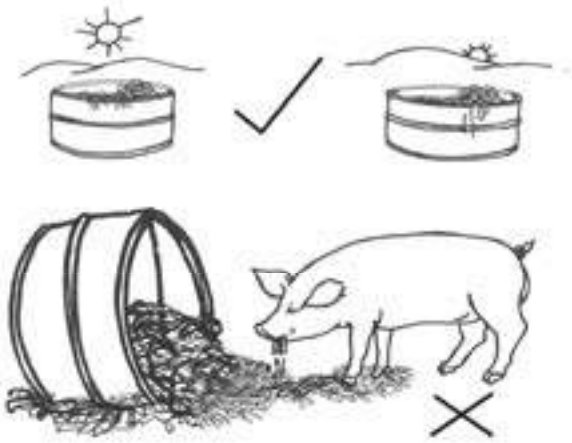
Note: These constitute an important source of crop nutrients if recycled to land.

7.2 Waste Feed and Water

- Wastage of feed from feeding troughs is undesirable because:
  - It leads to greater waste to be disposed of than necessary
  - It necessitates large quantities of water for cleaning the pig house
- Feed and water waste can be prevented by good management practices:
  - Install properly designed and constructed feeding troughs to reduce spillage of feed and water as much as possible (see figure 45).
  - Provide quantities of feed according to the requirements, and split it into 2 times per day (see figure 46).
  - If creep feeding is practiced, ensure that the creep area is properly designed, because creep feeding can lead to a very high wastage and contamination.

Figure 45: Fix troughs firmly to avoid spillage:

Figure 46: Divide daily ration into 2 equal meals to avoid wastage:



7.3 Faeces and Urine

- Of the wastes produced by pigs 60% are faeces and 40% are urine
- The factors that determining the quantity of manure produced by pigs include:
    1) Amount of feed the pig receives – the more the feed the more faeces (wastes)
    2) Stage of growth – older pigs produce more waste
    3) Type of diet – poorly digested feeds lead to more waste
- The quantity produced determines:
    - Storage and equipment size
    - The time and labour required for handling the waste

7.4 Waste Disposal, Handling and Treatment

- Remove the waste from the vicinity of pigs on a daily basis
- Disposal of waste can be done by:

1) Applying directly on to the garden. Cover with a layer of soil to avoid loss of nutrients, bad odours and gathering of breeding flies
2) Making a pit into which the wastes are emptied on a daily basis
    - It should be close to the pig house to reduce labour requirement
    - It can be a concrete or a simple earth pit
    - The pit should be covered
    - The pit is emptied at variable intervals depending on the capacity
3) Utilizing pig waste in biogas production

CHAPTER EIGHT

8.0 PIG HEALTH AND DISEASE CONTROL

8.1 Introduction

Deaths and loss of condition due to disease and parasites is a major problem in pig production.

- A pig farmer must regard disease as a potential economic threat
- Observe animals on a daily basis for signs of disease
- Keep close contact with the veterinary personnel for guidance
- Report disease conditions as early as possible for quick diagnosis and application of appropriate control measures.

8.2 How Does a Healthy Pig Look like/Behave?

It should have the following characteristics (see figure 47):-

- It moves about steadily
- It breathes steadily and easily
- It eats well
- It has a loose shiny skin
- It has bright eyes and a moist nose

8.3 Common Signs of Disease

Some of the common signs of illness are (see figure 48):

- The animal loses appetite
- Breathing becomes difficult and abnormal
- The animal appears dull
- The animal passes excessively hard or watery feaces
- The feaces may be blood stained or contaminated with worms
- High temperature (fever) and heart beat becomes abnormal
- Loss of condition, and rough hair coat

However various disease conditions have additional specific signs such as:

- Coughing, lameness, diarrhea, nasal discharge, abortion and skin discoloration
- Rubbing against hard objects (indicating irritation/itching)

Figure 47: Healthy pig

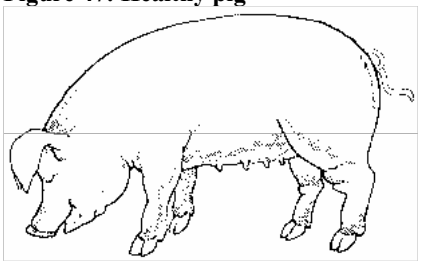
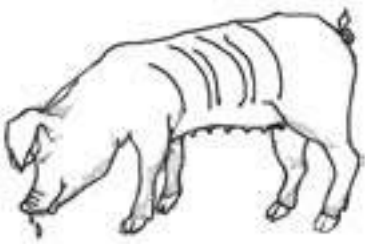


Figure 48: Sick pig



8.4 Disease Prevention
It is cheaper to prevent than cure.

Inexpensive control measures or preventative for pig diseases, which farmers must adopt, are:

- Keep animals of your herd isolated from others as they can act as source of infection
- Keep rats, cats and dogs away from the pig houses
- Restrict visitors
- Avoid employing workers having pigs at their homes
- Keep the pigs clean.
- Clean the pens at least once a day (see figure 49)
- Keep the environment clean and well drained.
- Ensure maximum colostrum intake for the newborn piglets.
- Give the pigs sufficient and balanced feed.
- Ensure free access to clean and fresh water
- Isolate sick animals (during their illness) and newcomers (for at least 4 weeks) from the rest of the animals.

Figure 49: Cleaning a pig pen and equipment:

8.5 What to do when a Disease Occurs?

In case of any signs of disease do the following:

- Isolate the sick animals from the healthy ones
- Treat the sick animals.
- Dispose of dead animals by burial or burning (do not eat or sell for consumption)
- Clean and disinfect the premises and equipment.

8.6 Causes of Disease
Agents which cause disease in pigs can be divided into two groups:

- Living causes
- Non-living causes

8.7 Living Causes of Disease

These causes can be classified into two groups:

- Parasites
- Infectious causes

8.7.1 Parasitic Diseases

- Parasites are organisms, which live on other living things (hosts) and obtain food and shelter from the host. In so doing they harm the host by either:
  1) Transmitting diseases
  2) Sucking blood or
  3) Eating the food of the host.

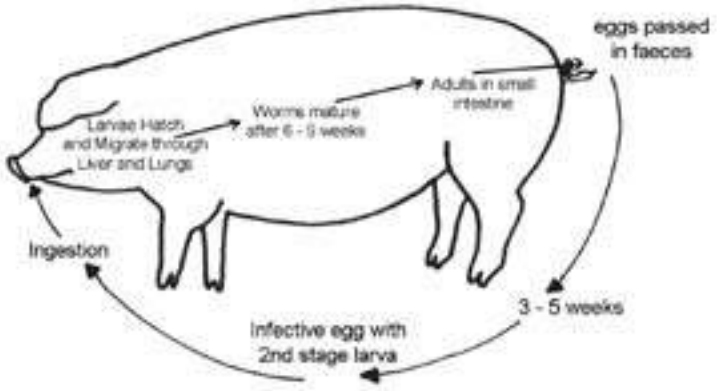
- Pigs have two types of parasites
  1) Endo-parasites - found on the inside of the animal (see figure 51) eg. tape worm
  2) Ecto-parasites -found on the outside of the animal (see figure 53) eg mites / ticks

8.7.1.1 Endo-parasites and their control

Worms are a major problem in that they (see figure 50):

- Deny the animal its food
- Cause reduced feed consumption
- Reduced growth rate
- They make the animal to lose weight**.**
- Decrease carcass value due to tissue and organ damage.
- Predispose animals to other diseases.

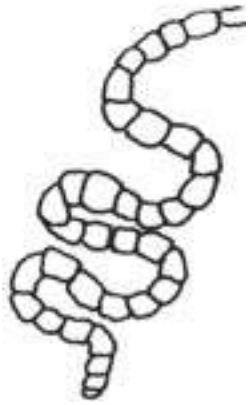
Figure 50: Life of an endo-parasite (intestinal worms - round worms):



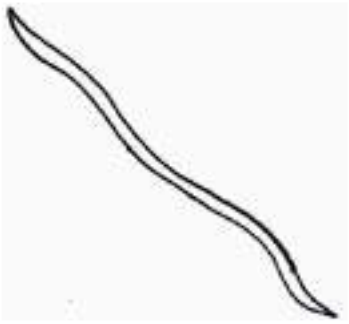
Sign for worm infestation include:

- Stunted growth, rough coat and potbelly.
- Diarrhea
- Erratic appetite
- Coughing in case of lungworms.
- Worms in the feaces

Figure 51: Common endo-parasites of pigs:



Tape worm



Round Worm

Control and Treatment of Endo-parasites:

Select a recommended dewormer (anti-helmintic), which is effective against the parasite. Examples on the market include Nilvam, Wormicid, Bimectin.

De-worm routinely as follows:

- Boars and sows – every 6 months
- Piglets – one week after weaning
- Growers/finishing – every 4 months

8.7.1.2 Ecto-parasites and their control

Parasites that live outside or on the body of the animal

1) **Mange mites**
   - Cause a highly contagious skin condition.
   - Infestation starts around eyes, nose and ears
   - The mite burrows into the skin causing intense itching

Animals affected with mites show signs, which include:

- Rubbing against hard objects
- Scabs on the skin
- Wrinkling and hardening of skin
- Loss of hair.

2) **Lice**
   - Large parasite, which bites to suckle blood.
   - They are seen on the skin in folds especially around the neck and below the ear base.
   - Females glue their eggs in the hair.

3) **Jiggers and Fleas**
   - These mainly live in dirty dusty environments

- Jiggers burrow into the skin around the **Coronary band** (are where the hoof is attached to the skin) and in the space between the toes (see figure 52).
- Can lead to poor mobility or lameness

Figure 52: Coronary band and interdigital space:

Figure 53: Common ecto-parasites of pigs:

Louse **Mite** **Flea**

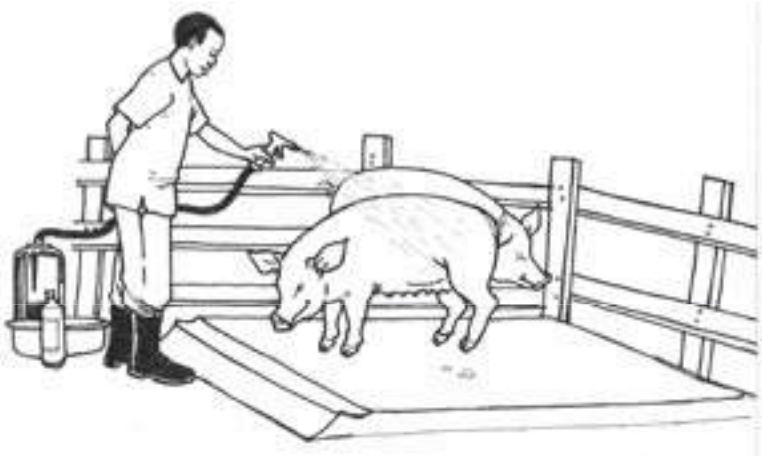
- Fleas are found all over the body causing irritation and rubbing against hard objects (see figure 53)
- Fleas suck blood and may lead to anaemia

Control and Treatment of Ecto-parasites

To control mange and lice a farmer should:

- Avoid cracks in the floors and walls of pig pens
- Thoroughly clean the pens and remove all manure followed by disinfection with chemicals, steam, or boiling water.
- Spray the walls and floor with an acaricide
- Disinfect pens and spray the sow before farrowing and after the piglets are weaned (see figure 54).
- The affected pigs can be injected with systemic drugs (e.g. Ivomectin). This is more effective in eliminating the mites which burrow deep in the skin.

Figure 54: Spraying pigs to control ecto-parasites



8.7.2 Infectious Diseases

- These are caused by tiny living organisms, which may be viruses, protozoa or bacteria
- They produce toxins that destroy body tissues.

8.7.2.1 Diseases Caused by Viruses

Those of importance in pigs are:

- African Swine Fever
- Gastroenteritis

1) African Swine Fever (ASF)

A fatal and highly contagious viral disease that has no known treatment or vaccine. This disease must be reported immediately to the Veterinary Authorities, as it is a "Notifiable disease".

Pigs infected with ASF show the following signs:

- High fever for about 4 days, which subsides, followed by marked reddish-bluish marks on the skin.
- Vomiting, inability to walk properly and huddling together.

Transmission

- Direct contact with sick pig, contaminated workers and visitors
- Contact with contaminated equipment, vehicles, other domestic animals and rats.
- From wild pigs, warthogs and soft ticks
- Feeding on garbage containing meat of infected pig

Control

To avoid introduction of the disease into a herd:

- Keep all your pigs enclosed in pens

- Place a foot-bath at the entrance of the pig pen/farm to disinfect the foot wear of those who enter or leave
- Avoid feeding pigs on garbage containing pig products
- Boil garbage with meat products before it is fed to the pigs (or not feed at all)
- Bury or burn dead pigs
- Ideally slaughter the pigs, which have had contact with the dead pig(s).
- Disinfect the pens where the infected animals were
- Do not re-stock before 3 months have elapsed

2) Gastroenteritis (inflammation of the stomach and intestines)

- Affects all ages but causes very high mortality in piglets in the first week.
- Signs are basically vomiting and diarrhea leading to dehydration and emaciation.
- Controlled by observing strict hygiene
- Isolate the sick

3) Foot and Mouth Disease

- It affects all two-hoofed (cloven hooved) livestock, leading to loss of condition and death.
- It spreads fast within a herd. Foot and mouth outbreaks have to be reported to the Veterinary authority as it is a "Notifiable disease".
- It is characterized by lesions on the mouth leading to salivation and lesions on the feet leading to lameness.

Transmission

Through contact with

- Sick animals and their products
- Contaminated materials or objects

Clinical Signs

- Fever
- Vesicles (blisters), which develop into ulcers on the gums and tongue and between the digits of the hooves (inter-digital space).
- The animal salivates excessively and may fail to eat. The animal is lame on the affected leg(s).

Treatment

- There is no effective treatment, however, symptomatic treatment for wounds can be applied.

Control

- Vaccination
- Control of movement of livestock and livestock products (Quarantine restrictions)
- Destroy all affected animals

8.7.2.2 Diseases Caused by Bacteria

The major ones are:

- Swine dysentery
- Swine erysipelas

1) Swine dysentery

- It affects all ages but there is high mortality in the young.
- Transmitted through contamination of feed with fecal matter.
- Clinical Signs: Bloody diarrhea.
- Treat with antibiotics (such as Streptomycin)
- Controlled by hygiene, isolation of the sick, quarantine of new entrants.

2) Swine erysipelas

Transmitted by:

- Contact with sick animals
- Contact with soil contaminated by faeces from other animals.

There are two types of signs:

- Acute signs, which include high fever, develops skin lesions (diamond shaped plaques on the skin).
- Chronic signs are characterized by inflammation of the joints.

Treat with antibiotics (such as Penicillin)
Control by observing strict hygiene

3) Anthrax

- A fatal disease (high death rate) characterized by:
  - High fever and sudden death
  - Dark blood oozes out of all body openings

Treatment

- In very early stages, it can respond to antibiotics (Penicillin is effective)

Control

- Vaccination in areas where the disease is considered to be a problem

Note:

- Avoid opening animals, which have died suddenly and have blood oozing out of their bodies, as it may lead to spread of spores in the environment.
- Notify a veterinarian as soon as possible
- Dead animals should not be eaten as the disease affects man and other warm blooded animals.
- Infected animals must be burnt or buried (deep to avoid foxes accessing carcass).

8.7.3 Pneumonia

- Affects the lungs and is caused by different agents, viruses, bacteria etc.
- Some agents may infect the pig simultaneously
- The signs include:
  - Coughing, laboured breathing and exhaustion
  - Fever
  - Loss of appetite

The predisposing factors for the establishment of pneumonia are:

- Poor nutrition
- Low temperatures and dump conditions in the pens
- Inadequate ventilation
- Infestation by lung worms

Treatment and Control of Pneumonia

- Can be treated with antibiotics, and sulphur drugs
- Controlled through:
  - Observing strict hygiene
  - Ensuring proper housing that is warm and well ventilated
  - Control of lung worms

8.8 Non-living Causes of Disease

1) Nutritional diseases
   - The most common is piglet anaemia (*see management of piglets*).
2) Diseases specific to the sow
   - Such as Mastitis, Agalactia, Metritis (see management sows)

8.9 Control and Preventive Measures of Pig Diseases

1) Use of medicines and drugs
   - For some diseases, this can be done by the farmer e.g. drenching
   - Complicated cases and those which need injection of drugs require a veterinarian

2) Use of antiseptics and disinfectants

The proper use of disinfectants can play a vital role in an effective disease control programme for pig units.

- To eliminate microorganisms, a disinfectant must gain access to them, therefore the farmer should ensure cleanliness of pig houses and equipment.

Procedure:

- Remove all portable equipment for cleaning outside the house or pen
- Pre-clean the house or pen and equipment to remove all dust and dung/litter
- Brush and sweep out the house or pen and remove the sweepings
- Thoroughly apply the disinfectant to all surfaces and equipment in the house or pen.
- Effective disinfection requires surfaces to be thoroughly wet for at least 30 minutes

3) Isolation and Quarantine
   - Quarantine is a government regulation for the prevention of the spread of infectious diseases (particularly notifiable diseases).
   - Animals from infected areas are restricted from mixing with other animals.
   - Any sick animal must be isolated from the rest of the animals as soon as the disease is suspected.
   - When new animals are introduced on a farm, isolate them for a minimum period of not less than 1 month.
   - Follow veterinary personnel instructions.

4) Disposal of dead animals
   - If an animal dies:
     - It should not be cut open
     - The meat should not be sold or eaten as the disease may be transmissible to humans.
   - Invite a veterinarian to establish the cause of death
   - Burn or bury dead animals at the site of death.
     - Bury deep 3 – 4 m under the ground (to avoid foxes and dogs eating the carcass)
   - Beware of diseases dangerous to man, such as anthrax. In suspected cases of anthrax burn or bury the carcass.

5) Vaccination
   - Vaccines are developed to protect animals against some diseases
   - Vaccines stimulate the body defence mechanism to fight against infection
   - Seek out vaccination services from the veterinary department

6) Control of carriers
   - Some wild animals can get infected with a disease but do not show clinical signs, such animals (carriers) are a potential danger as sources of infection
   - House or fence animals to avoid contact with carriers
   - Ticks can also act as carriers of diseases e.g. ASF. Spray the pigs with acaricide regularly

8.10 Notifiable Diseases
- These are highly contagious (fast spreading) diseases
- They are of high economic importance due to:
  - High death rates
  - Loss of condition
  - Their potential to affect humans (Zoonotic diseases)
- They must be reported to veterinary authorities immediately
- Usually quarantine restrictions are imposed
- The common examples include African Swine Fever, Foot and Mouth Disease and Anthrax

8.11 Proper Use of Medicines and Drugs
- Follow the instructions given by the veterinarian and/or the manufacturer's instructions written on the container (see figure 55).
- The instructions often include:
  - Type of animal for which the drug can be used
  - Route of administration (oral, topical, injection)
  - Dosage indicating amount, frequency and duration, often calculated by animal weight.
  - Withdrawal period (Some drugs have a safety period where the animals should not be taken for slaughter)
  - Expiry date
  - Storage requirements (cool, shade, frozen etc.)
  - When the drug should not be used (contra indications)
  - Precautions
- Do not use expired drugs (carefully read the label for the expiry date) - see figure 55.
- Give the correct dosage

- Overdosing can poison/kill the animal
- Under dosing will be partially effective. Organisms may get used to the drug and develop resistance

- Observe withdrawal periods as instructed by the manufacturer
  - This helps to avoid presence of antibiotic residues in the meat

Figure 55: Read the label and note the expiring date.

CHAPTER NINE

9.0 ECONOMICS OF PIG PRODUCTION AND MARKETING

9.1 Introduction

- Before starting a pig business it is advisable that the farmer makes an estimate of the expenditure and income (budget). The farmer should therefore develop what is called a budget.
- The budget will:
  - Itemize the different costs envisaged
  - Suggest ways of reducing these costs
  - Identify ways of maximizing profits
- This can only be done if:
  - Appropriate records and up-to-date information regarding the state of affairs are kept.
  - Interpret the data and confirm the identified causes of poor performance on time.

9.2 Costs

Costs can be broadly categorized into:

- Fixed costs are incurred before any production can take place. They remain the same irrespective of any production increases or decreases, and are made up of:
  1) Building costs
     - The cost of housing and equipment should be paid for during the number of years the building is estimated to last.
     - If the building is estimated to last 5 years, divide the building cost by 5.
     - Add the figure obtained to the annual costs of production.
  2) Purchase/construction of feeding troughs
     - Purchase or replacement of breeding stock

- Variable costs: These vary with the level of production. They are made up of:
  - Veterinary costs
  - Stationery
  - Transport
  - Maintenance of facilities
  - Marketing costs
  - Wages & salaries
  - Losses due to mortalities

9.3 Income

Expected sources of money are from sale of:

- Weaners
- Porkers and baconers
- Cull boars and sows sold
- Breeding boars and sows sold
- Possible income from sale of manure

9.4 Profits

- This is the difference between the costs and the income. The costs should include labor and any possible risks in the enterprise.

9.5 Developing a Budget

- The information on costs and income can be used to develop a budget.
- The budget will only be reliable if the pigs are well managed and nothing extraordinary happens like an outbreak of disease.
- The table below presents a five-year budget for a 5-sow pig unit.
- The budget has been developed by including the construction costs of a 5 row unit (see figure 56)

Budget for a 5 Sow Pig Unit:

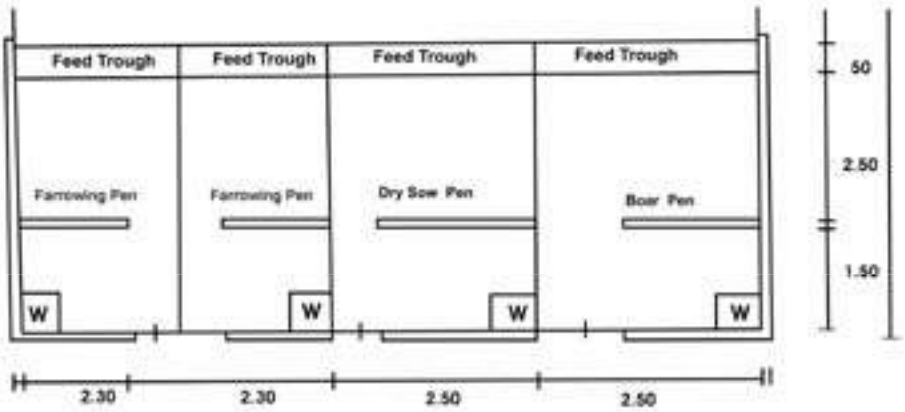
		Startup Period – Year1			Year 2	Year 3	Year 4	Year 5
	EXPENDITURE (A)							
		Qty	**Unit Cost**	**Value**	**Value**	**Value**	**Value**	**Value**
1	**Building**							
	▪ Stones	1 Trip	30,000	30,000				
	▪ Sand	1 Trip	30,000	30,000				
	▪ Cement	7 Bag	17,000	119,000				
	▪ Water			11,000				
	▪ Timber off cuts	60 Pcs	1,000	60,000				
	▪ Treated posts	20 Pcs	3,000	60,000				
	▪ Iron sheets	10 Pcs	10,000	100,000				
	▪ Nails			15,000				
	▪ Labour			75,000				
	Sub Total			**500,000**				
2	**Foundation Stock**							
	▪ Gilts	5	25,000	250,000				
	▪ Boar	1	50,000	50,000				
	Sub Total			**300,000**				
3	**Feeding 1 pig for 1 Year**							
	▪ Bran	570 Kg	150	85,500				
	▪ Protein supplement	190 Kg	400	76,000				
	▪ Vit-Min supplement	40 Kg	450	18,000				
	▪ Transport			20,000				
				199,500				
	Feeding 6 pigs for 1 Year			**1,197,000**	**1,197,000**	**1,197,000**	**1,197,000**	**1,197,000**
4	**Veterinary Costs**							
	▪ Dewormer	100 Ml	300	30,000				
	▪ Iron supplement	100 Ml	100	10,000				
	▪ Antibiotics	100 Ml	160	16,000				
	▪ Transport			5,000				
	Sub Total			**61,000**	**61,000**	**61,000**	**61,000**	**61,000**
	Total Expenses (A1)			**2,058,000**	**1,258,000**	**1,258,000**	**1,258,000**	**1,258,000**
5	**Labour for husbandry**	1 Man	40,000	**480,000**	**480,000**	**480,000**	**480,000**	**480,000**
	Total Expenses (A2)			**2,538,000**	**1,738,000**	**1,738,000**	**1,738,000**	**1,738,000**
		Qty	**Unit Cost**	**Value**				
	REVENUE (B)							
1	Piglets	80	25,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
2	Manure			120,000	120,000	120,000	120,000	120,000
3	Culling							
	▪ Sows	5	110,000					550,000
	▪ Boars	1	170,000					170,000
	Total Revenue			**2,120,000**	**2,120,000**	**2,120,000**	**2,120,000**	**2,840,000**
	EXPECTED PROFIT (B-A1)			**62,000**	**862,000**	**862,000**	**862,000**	**1,582,000**
	EXPECTED PROFIT (B-A2)			**-418,000**	**382,000**	**382,000**	**382,000**	**382,000**

Assumptions: *A mature breeding pig consumes 800 kg of a complete diet per year*
Breeding stock is sold off at the end of the fifth year

1. EXPECTED PROFIT (B-A1) = *When labour is given Zero value*
2. *EXPECTED PROFIT (B-A2) = When labour is valued at 40,000 per month*

Note: *A farmer is strongly advised to make savings by reducing cost of feeding. Produce own feed e.g. cassava, sweet potato, sorghum, maize and soybean. (See chapter on feeding)*

Figure 56: Ground plan for a 5 Sow unit:



NOTE: All distances are in metres
W = Water trough

9.6 How to Reduce Costs

- Cost to produce weaners depends on
  - Total number of weaners per year produced
  - Feed conversion rate
  - Cost of total feed required to produce a weaner

- Cost to produce growers and finishers depends on
  - Level of feed intake
  - Feed conversion rate
  - Feed wastage

- Feed Conversion rate can be improved by
  - Correcting faulty feeding methods
  - Feeding well balanced diets
  - Eliminating feed wastage
  - Improving environmental conditions
  - Deworming animals regularly
  - Maintaining health and hygiene

9.7 Marketing

9.7.1 Introduction

- Plan for the market when starting a pig farm
- Aim at exploiting the existing market at an optimal level of productivity
- Plan your production cycle to coincide with periods of peak demand for pork
  - To target the Christmas season breed the sows so that the majority farrow in June
  - To target the Easter season breed in October

- Another batch could farrow in January to have pigs ready in June for the Martyrs day celebrations in June

9.7.2 Weaners

- Weaners can be sold at 15-20 kg to other enterprises or grown to a predetermined slaughter weight.

9.7.3 Slaughter Pigs

- Can be marketed at any weight during the growing phase.
- Sows that have completed their production cycle 4-6 litters can be marketed in this category.

In Uganda pigs can be sold by

- Negotiating a price between two farmers (a seller and a buyer), used as breeding stock
- Negotiating price between farmer and meat trader or butcher
- Slaughtered at home and sold to final consumer
- Sold to a middleman who supplies hotels/restaurants

9.7.4 Improvements Needed in the Marketing System

- Need to organize in groups and agree on a system of sale
- Need to bulk produce and access the paying markets in urban areas
- Need to sell by weight not visual estimation
- Need to demand a premium for quality of meat

In case of a farrow to weaner operation, locate it where there is ample land and keep the sows out on pasture to reduce building maintenance costs and overall feed costs as the sows obtain part of their nourishment from the pasture.

Locate the weaner to finish operations close to urban areas that have a good market for pork. Most feed processing operations are close to urban centres and so feedstuffs will be obtained at low cost. Moreover costs of transportation will be greatly reduced.

9.8 Marketing Strategies

- In Uganda, farmers keep pigs individually and market their pigs individually
- Most farmers have identified marketing as a problem.
- Meat traders control prices, buy at low prices transport the pigs to market and sell at a large profit.
- Farmers can overcome this problem by marketing their pigs as a group.

Advantages of Marketing as a Group

- The group can sell directly to abattoirs at a higher price, bypassing the middlemen.
- They can provide a large number of pigs and maintain a continuous supply
- They have a stronger bargaining position

Disadvantages of Marketing as a Group

- Marketing requires skills and involves some risks
- Establishing a marketing system takes time

- Setting up a marketing system may be difficult without some external assistance say by an NGO or Government agency

Suggested steps in setting up a group marketing system

- Get to know the market situation for pigs
    - How are pigs sold? Who sells? Who buys?
    - What are the prices? Do they fluctuate over time?
    - Who already supplies pigs?
    - How many pigs can be bought?. Is demand already satisfied?
    - Can the market be supplied by the group e.g. is transport cost reasonable
    - Is the price for pigs high enough to cover costs and yield a profit.
- Discuss with the group the market situation and tell them the type of pigs expected.
- Select some retailers and explore their interest in trading with the group.
- Agree on the types of pigs to be delivered – numbers, quality and timing of deliveries
- Train farmers on how to look after the pigs to get the quality required
- Provide continuous advice to farmers and inspect their production units to solve problems as they arise
- At sale, keep records of what each farmer delivers
- Transport the pigs and receive payment
- Deduct portion to cover transport and overheads and pay out the rest.

APPENDICES

Appendix I: Example of a page in a record book

Sow No/Name	
Date Born	
Boar Used	

Date	Description

Appendix II: Example of a Sow record card

SOW RECORD CARD					
Sow Number/Name _____	**Boar Used** _____		**Date Served** _____		
Farrowing Record					
Farrowing Date _____	Number Born Alive _____ Number Born Dead _____		Female _____ Male _____		
Litter Weight and Deaths Record					
Piglet Weight Record			Piglet Deaths Record		
Growing Stage	**Date**	**Total Weight**	**Date**	**Number (F/M)**	**Cause**
At Birth					
3 Weeks					
Weaning					
Sow and Litter Health Record					
Date	**Diagnosis/Notes**				

Appendix III: Example of a Growing/ Finishing card

GROWING/FINISHING CARD												
Pen Number												
Weaning Date												
Number of Growers/ Finishers												
	Pig Name/Number											
Date	**Weekly Body Weight (kg)**										**Total Weight**	**Feed Allocation**
Health Record												
Date	**Diagnosis/Notes**											

Appendix IV: Example of a Boar Record Card

BOAR RECORD CARD			
Date of Birth _____ Breed _____			
1. Sow Number/ Name Served	**Date of Service**	**Number of Piglets Born**	**Number Weaned**
Health Record			
Date	**Diagnosis/Notes**		

Appendix V: Example of a page in a Cash Book

CASH BOOK					
Money received (Receipt)			Money spent (Payment)		
Date	Item	Amount	Date	Item	Amount
	TOTAL				
	BALANCE				

Acknowledgements

The NAADS Secretariat, who recognised that pig production, was a key enterprise, commissioned the pig production manual. Farmers demanded information on pig production, however service providers were, in many instances not able to provide the requisite information. A team from Mukerere University, Department for Animal Production, led by Dr David Mutetikka was recruited to write this manual. Users of this manual will need to refer to Dr Mutetikka team for further information and clarification.

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