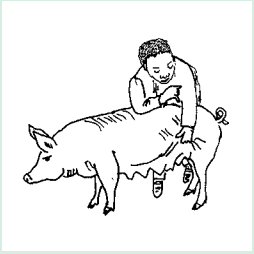
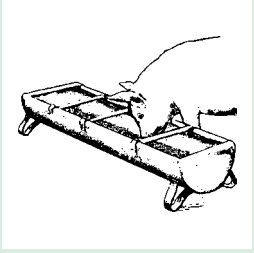
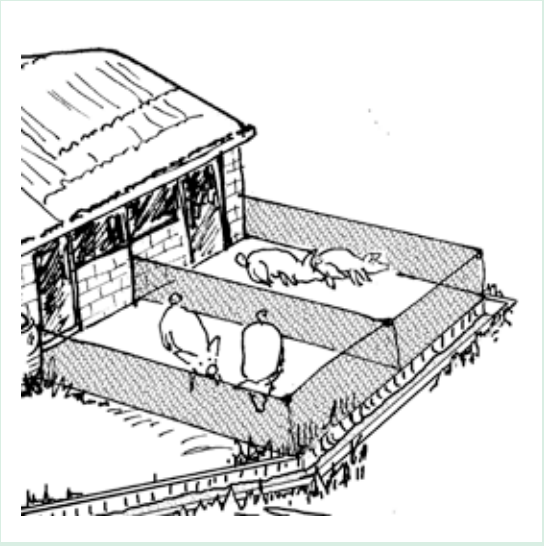
Pig farming in the tropics

From free range to small-scale intensive production systems







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Contents

1 Introduction

Pigs are kept in one form or another almost everywhere in the world. In rural areas of many parts of the world, it is still common to find pigs rooting and roaming freely around communities, which are sold or slaughtered when household needs require. Pig-keeping enterprises are also found in and around towns and cities, and they play an important role in feeding urban populations.

This Agrodok describes three typical pig-keeping systems:

- *Free-range scavenging pig keeping*

A more or less extensive system that provides a household emergency fall-back fund, whilst also supplying it with a little meat from time to time, with little investment of time or money. This domestic scale is typical of small farmer mixed holdings.

- *Semi-intensive pig keeping*

In this system the animals are housed and more attention is paid to their health and feeding. The aims are partly the same as those of domestic pig keeping, but with modest inputs. Production is higher and the pigs are also marketed.

- *Intensive pig keeping*

This system aims at producing meat for the market efficiently and profitably, usually with larger numbers of pigs. It requires significant inputs of time and money, with careful calculation of the costs and the resulting benefits.

We consider the main characteristics of each of these systems, the purposes they serve, and the methods employed, as well as noting their limits and ways of improving them. There are of course many systems of pig keeping. The three models we describe give an idea of the options available and ways to make the transition from extensive to intensive management, noting the points that need special attention.

This book is intended for those who advise farmers involved in pig keeping. It will also be of use to farmers themselves who want to set up or make changes to an existing system. Anyone who is considering keeping pigs, or improving an existing system, needs first to be clear about the existing situation, the resources available and the constraints faced, in order to decide which type of system is most appropriate to introduce.

It is very important that farmers who are new to pig keeping build up their enterprise gradually. They would be best advised to start with a semi-intensive approach, concentrating on establishing good housing and proper feeding routines for a small group of healthy animals, taking proper advantage of all locally available resources.

Agrodok summary

The three systems of pig keeping are presented in Chapter 2. Chapter 3 looks at housing: why this is such an important element in the system, and what makes for good pig housing. It outlines the various parts of a piggery and deals with the installations required for feeding and farrowing. It also considers the housing requirements of the sow and her piglets, and of the fatteners. Chapter 4 addresses the management of sows and boar(s), birth of piglets and potential problems, care of piglets (including teeth-trimming and castration). The signs of oestrus and fertility disorders are also dealt with. Chapter 5 covers nutritional requirements and practical aspects of feeding the different categories of pigs. Chapter 6 describes the main diseases that affect pigs, the symptoms and treatments. Preventive measures are described in detail, and general remarks on the use of medicines are made. Chapter 7 covers the important question of keeping management records and basic financial management.

2 Pig-keeping systems

2.1 Free-range 'scavenging' pig keeping

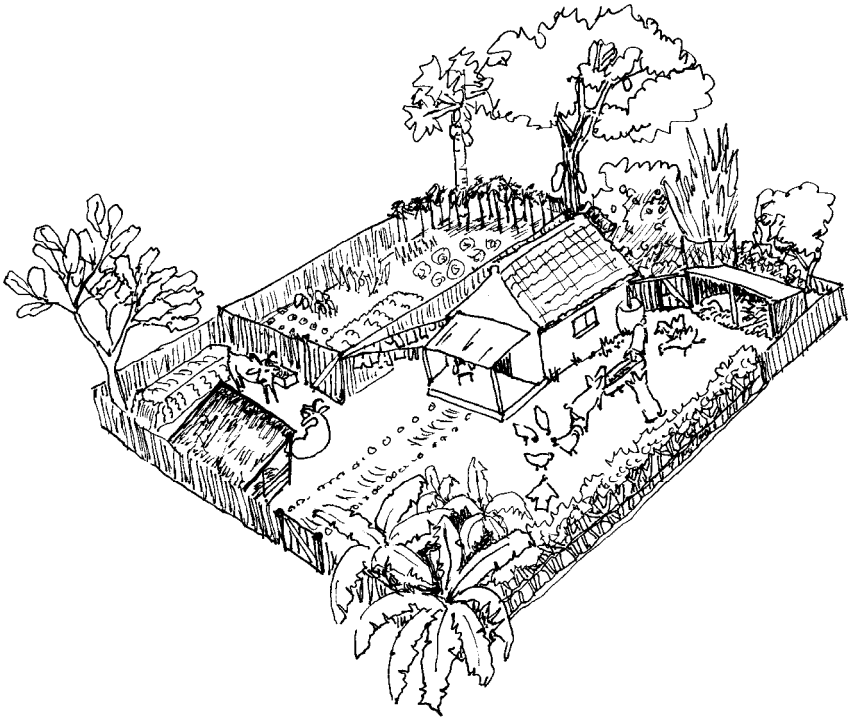

Figure 1: Free-range pig keeping

Main characteristics

The main characteristic of this system is that the pigs move freely around the house and surroundings, scavenging and finding most of their food themselves. This is supplemented with kitchen refuse or agricultural waste products.

At night the pigs are kept in an enclosure surrounded by a fence of sticks, and a simple roof provides some shelter. Little or no money is invested in food or medical services.

Local breeds are commonly used, since they can manage with low-quality feed and are more resistant to diseases. In general there is no attempt to improve production by selective breeding or any other means.

In some cases the pigs are not bred on the farm: piglets are bought from a breeder and are fattened during a season when food is plentiful, to be sold at a later date.

Production goals

In most cases the pigs are not kept to provide meat for the household, or as a regular source of cash income (if there is any regular cash income, this comes from other activities). Scavenging pigs are kept as a 'savings account' or 'insurance policy': they are only sold when extra cash is needed, e.g. for buying seeds or fertiliser, at times of illness or family festivity, to pay school fees, to make up for a lost harvest, etc. In this way loans (and the associated problems of high interest rates and repayment) can be avoided. Pigs may also play a specific role in social life, for example when they are presented as gifts or offered as food at weddings and other festivities.

First steps to improving productivity

The main constraints of free-range pig keeping are the high rates of piglet loss and slow growth rates. The pigs do not grow quickly because they spend a lot of energy on their scavenging activities. Worm infestation is also an important problem that results in slower growth rates.

Enclosing the pigs

Improving management should be done step by step. It should be realised that extra inputs are needed to increase the productivity of the pigs. Putting pigs in an enclosure means that water must always be

How to make a good fence

Strong wire netting is ideal, but local materials like bamboo, thorny shrubs and tree trunks can be used. Make the fence in such a way that small piglets cannot escape. Shade is essential. Even if there are trees, a small shelter must be provided so the animals have a dry sleeping place. A simple structure can be made from four solid tree trunks with a roof on top. For lactating sows with piglets, it is advisable to make a simple pen with at least 2 closed sides, about 60 cm high.

Feeding the pigs

Providing scavenging pigs with extra feed will improve their growth. Root crops or their peelings, vegetables or fruits and almost any village refuse can be fed. Young pigs, pregnant pigs in the last month of pregnancy and lactating sows with piglets can be given cheap by-products such as wheat bran, coconut cake, rice bran or fish offal. If the pigs are enclosed, part of the land can be used for growing green fodder or other food crops. In the dry season, when there is little to scavenge, additional feed must be given. The pigs must always have an adequate supply of fresh drinking water.

Hygiene and prevention

Parasites pose a serious problem to pigs whether kept outside or inside, as the wet tropics provide ideal breeding conditions for them. Worms are the most common parasites. A pig infected with worms will be in poor health and will grow very slowly. If the pigs are kept in an enclosure, measures must be taken to control the levels of worm infestation. This is explained in Chapter 6.

2.2 Semi-intensive pig keeping

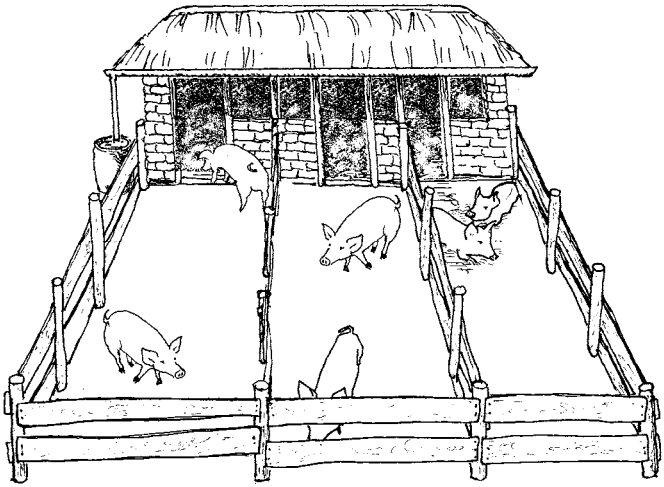

Figure 2: Semi-intensive pig keeping

Main characteristics

In semi-intensive systems, pigs are normally confined to a limited space. This means that most (or all) of them cannot gather their own food and are completely dependent upon their keeper. Once or twice a day, fresh water and feed (usually kitchen refuse or agricultural waste) have to be brought to the pigs. This system of pig keeping opens up possibilities for improved feeding and disease control, which in turn can result in faster growing and healthier pigs and/or larger litters.

Apart from the economic reasons there are also some practical reasons for keeping the animals tethered or enclosed. It prevents crops from being damaged by the pigs, it reduces the risk of the pigs being stolen and spread of diseases and parasite infections is reduced.

Although this system of pig keeping only requires a fairly low or medium level of financial inputs, more time and effort needs to be spent on the pigs. More technical knowledge is also required.

Production goals

The creation of a 'savings account' or 'insurance policy' still plays a role in this form of pig keeping. Nevertheless, in areas close to urban centres or on main traffic routes or any place where it is possible to sell pigs, smallholders can use their intensified pig enterprise to produce pigs for the market. In other words, the pigs are kept to generate income. That means that the business must be profitable.

Potential for improvement

Improvements to semi-intensive systems are made by focusing attention on feeding and health care practices, and by selective breeding. Housing, in particular of lactating sows and young piglets, also needs attention. Economic and technical results start to become important and therefore records must be kept.

Feeding

A first, simple step is to make sure that the available feeds are properly distributed. It is important that the best of the feeds are given to the nursing sows and the suckling piglets, and also to the piglets that have just been weaned to give them a good start. Sows in the last month of pregnancy also need better feed.

A further improvement is to raise the quality of the feed. If this means buying in additional feed, consider carefully whether the advantages really justify the cost. This will depend on several factors, such as the quality and the price of the feed, the transport costs of the feed, the price obtained for the pigs that are marketed and the improvement of productivity as a result of these better feeds. It is important to understand that better results obtained from improved feeding will be even greater if the quality of the pigs is also improved. Chapter 5 covers nutrition issues.

Breeding

Farmers can improve the quality of new stock by using their best animals for breeding (selective breeding). If nursing sows and their piglets are kept separate from the others, it is easier to select the stronger

piglets for breeding. Records will show the best mothers, whose piglets can be selected. The remaining piglets can be sold or fattened for slaughter. A quick way to improve the quality of the breeding animals is to buy a (slightly) improved or upgraded boar. As a boar is costly, a few farmers might want to buy one together. Make sure that the boar is not related to the sows on the farm. If your aim is to produce weaners for fattening, it is advisable to do crossbreeding. That means that the boar is a different breed from the sows. Also, crossbred sows are normally more productive than pure-line sows. This level of management however demands more knowledge, experience and time. See Chapter 4 for more information on improved breeding.

Health and hygiene

When pigs are improved and given better feeds, we expect better results. Improved pigs are less resistant to diseases and parasites. This means more attention must be paid to preventive health measures. Visitors must disinfect their shoes before entering the farm. Or even better, supply visitors with boots (and outer clothing) and let them wash their hands. It is important to keep the farm as clean as possible. If the pigs are on a mud floor, it is advisable to shift the whole unit at least once a year to a different place and follow a kind of rotation. This is a lot of work, so concrete floors that slope towards the back side of the pens are becoming popular. This makes worm control and hygiene much easier (more information in Chapter 6).

Pigs kept outdoors must not eat human excreta as they may be contaminated with *Cysticercus*, the larval stage of tapeworms (*Taenia*), which grow in pigs' muscles. The pigs show no signs of illness, but if humans eat infected pig meat that has not been properly cooked, the tapeworms can grow in the human body, leading to serious brain and muscle damage.

Use of pig manure

It is a good idea to use pig fields occasionally for crops, as the pig manure fertilises the soil. Doing this also clears the soil of parasites and, after one or two years' cropping, the land will be safe again for

pigs. Pigs that are kept indoors or confined in a small area need to be cleaned daily. Store the manure so that it is protected from sun and rain. The nutrients will not be washed away and the pig manure makes a good fertiliser for crops and vegetables. The liquid manure can also be used as a fertiliser, but should be applied during rainy weather, to prevent the crops from burning.

2.3 Small-scale intensive pig keeping

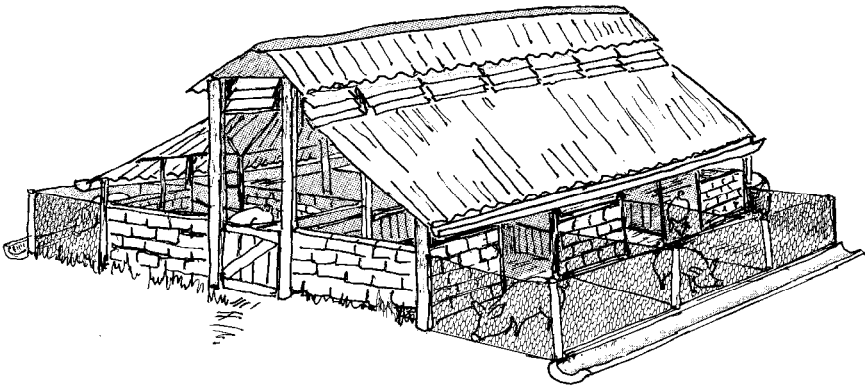

Figure 3: Small-scale intensive pig keeping

Main characteristics

The main characteristic of an intensive pig-keeping system is that pigs are kept to generate income. Generally pigs are kept indoors, although pregnant sows may be allowed outside to graze in a field. Pig houses are built with concrete floors, proper roofs and separate pens for lactating sows, weaned piglets, pregnant sows, boars and fatteners. On bigger farms it is even advisable to keep weaned piglets and fatteners in different buildings. In this system housing means much more than providing a simple shelter. Larger numbers of pigs are kept and the pigs must be well managed because commercial commitments have been made. Know-how is required to make the right decisions at the right time. The following chapters in this book provide information on small-scale intensive pig keeping.

High investments are required to provide improved buildings, and to buy in feeds and medicines. These are absolutely necessary if the change towards improved breeds is to be made. And improved breeds are needed to obtain satisfactory results.

In this system of pig keeping, kitchen waste and agricultural waste products will generally not be enough to feed the animals. Moreover, these feeds are not sufficiently balanced to supply all the necessary proteins and minerals. So certain feeds will have to be bought. Buying in extra feed, in order to obtain a higher number of piglets per sow per year and to obtain better growth rates, only makes sense if the extra income exceeds the extra expenses. To know whether this is the case it is necessary to keep records and analyze them.

Local breeds are often considered to be the reason for low productivity (small litter sizes and slow growth rates). In general, however, these breeds are very well adapted to the local conditions. Although 'improved' breeds have great potential, they require high feed quality and good husbandry. High growth rate is not the only aim to consider. If very cheap by-products are available and the ingredients to make a well-balanced feed are very costly or far away, it may be advisable to keep local or slightly improved pigs, which can be fed on cheap local feeds. The productivity will be fairly low, but good profits are possible.

Production goals

The aim of intensive systems is to provide a major source of income for a group or household. The animals no longer function as a savings account but are raised to be sold. This means that regular access to a market is needed. In some countries farmers depend on a middleman, but by organising themselves, the farmers can bypass the middleman or place themselves in a stronger position to bargain with these middlemen.

Potential for improvement

Improving small-scale intensive systems needs specialised know-how. Progress can be achieved particularly by paying attention to the animals' health and housing conditions. The stability of the undertaking depends on adopting a new approach to production. The farmer has to start thinking more and more in terms of the market and higher and more efficient productivity.

Marketing

To make an intensive system economically viable requires a completely different approach to keeping pigs. The animals have to be brought to the market when they have reached the desired weight. A strategy for optimum buying and selling has to be developed, which requires the presence of regular transport and dependable sales outlets.

A farmer has to decide what type of pig enterprise is most suitable for his/her circumstances. We list the following possibilities:

- *Keeping sows only for breeding or multiplication*
  The piglets are sold at the age of 2-3 months to fattening farmers. This is advisable in a situation where there are many smallholders who want to fatten just a few pigs. There will be good demand for piglets, which can be sold for a good price. The farmer can start to become a specialist on breeding issues.

  Farmers with very good quality pigs and a lot of experience can also produce new breeding stock. Then, farmers who keep sows only to produce piglets for fattening can buy their replacement sows and boars from a very good breeding farm. Young sows (gilts) and boars can be bought at the age of 2-3 months, but also at an older age, up to about one month before the first mating.

- *Keeping only fattening pigs*
  Piglets are bought at the age of 2-3 months, at a weight of 15-20 kg. This can be done on a very small scale, even with just one pig.

Farmers can gradually gain experience and then expand their farm or start breeding as well.

Fatteners must be sold at the right weight. For local or crossbred pigs this may be around 50-80 kg live weight. For improved pigs this can vary from 80-110 kg. In hot countries pigs are normally sold at around 80-90 kg, as it is difficult to get fatteners to eat enough feed when temperatures are high.

It is very important to know what buyers want. Pigs sold in local markets may have more fat than pigs destined for restaurants or shops in bigger cities. Buyers may also have different wishes concerning the slaughter weight.

- *Having a closed farm*
  This means keeping sows *and* fattening the piglets on the same farm. Farmers with enough experience can keep control over the whole cycle: the breed used, quality of fatteners and health status of the animals. Another advantage is that fewer pigs move from one farm to another, which prevents spread of disease.

  However, if problems (e.g. disease or accident) occur, an extra source of finance must be available to keep the unit in operation. In some countries, African swine fever can kill a whole herd. Therefore it is always risky to rely on pigs as a sole enterprise.

Technical knowledge

A local extension service is an important source of support and technical advice. Veterinary services should also be available when required. On bigger farms the owner or manager should have some training in pig management and, where possible, will be able to find considerable information on the internet. Once again, it is very important to keep careful detailed records for correct management of an intensive pig farm (see Chapter 7).

Disease control

Where many pigs are confined together there is a higher risk of infection spreading quickly among the animals. In the case of African swine fever, very strict isolation measures must be taken. Even if your own farm is not infected, other nearby farms with infected pigs pose a risk of contamination. Therefore, when starting an intensive pig farm, it is advisable to look for a place at a reasonable distance from other pig farms. All it takes is one visitor who does not follow the guidelines to contaminate your animals, which can result in the death of the entire stock. See Chapter 6.

3 Housing

Improved housing is an essential factor in the conversion to commercial pig keeping. This chapter addresses the technical aspects of good pig housing.

There are numerous advantages to keeping pigs inside:

- The animals conserve energy, as they do not have to seek food and shelter.
- Pigs are protected from sun and rain.
- More piglets will survive if they are born in safe, warm and healthy surroundings.
- Housing makes good hygiene maintenance easier and contributes to the health of the pigs.
- Feeding routines can be more carefully controlled, especially when they are adjusted for different categories of pigs.
- Weaning, heat control and service management can be done at the right time and in the right way.
- Record keeping and management are easier.
- Manure can be easily collected and used for fertilising land.

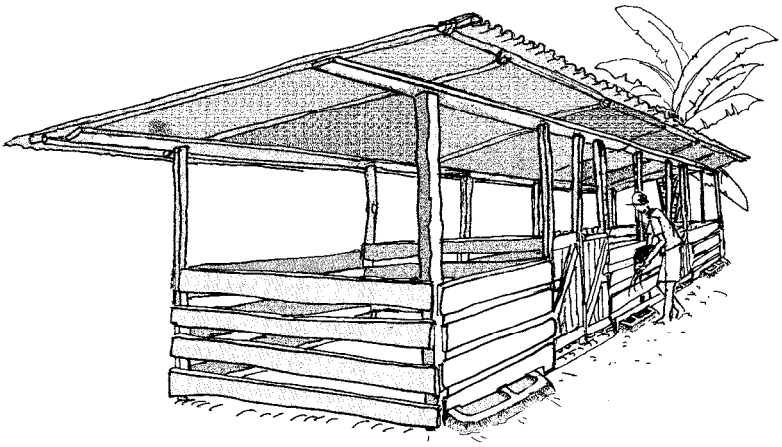

Figure 4: Simple pig house

However, advantages can easily turn into disadvantages when standards are not maintained.

Where many pigs are kept together in a small space, infectious diseases can spread rapidly and therefore hygiene must receive top priority. If living conditions are not good, a pig house can become a place of torture for the animals as disease outbreaks will be frequent and can cause high mortality.

A free-range pig has a certain amount of freedom to search for the optimum micro-climate. In confined systems, we force the animals to stay in a limited space, and they no longer have any influence on their living conditions. Farmers are entirely responsibly for providing their pigs with the most appropriate housing. The piggery should be well designed. The farmer should inspect it at least twice a day, to check that the pigs are healthy and the pens are clean.

3.1 Climate

The climate to which a pig is exposed is very important. If a pig is housed this can be controlled to some extent. Pigs, and young pigs in particular, are very sensitive to sudden changes in temperature. They cannot stand heavy rain or draught. Strong sunlight is bad for them, as it causes their skin to dry out. Pigs kept for optimal production should therefore be protected from climatic stress. This is only possible by ensuring that the animals are well housed.

One of the most important factors to consider when creating proper housing is **temperature**. In tropical countries it is important to construct the houses in such a way that daytime temperatures are as low as possible, and that young pigs can be kept warm enough during the nights and cool periods.

Body temperature

The normal temperature of an adult pig is between 38 and 39 °C. For piglets this is 39-39.5 °C. A sick pig's temperature rises above 40 °C.

Heavier fattening pigs, but also pregnant and farrowing pigs, have difficulties regulating their body temperature if the air temperature is too high. If this happens they eat less, which results in lower growth rates and/or lower milk production. Pigs become less fertile when temperatures are above 32 °C. Pigs cannot sweat and therefore the temperature must be below 35 °C in tropical pig houses. However, it must be warm enough for young pigs, especially newborn piglets.

Ideal temperatures for pigs

The temperature at which optimum growth and food conversion is achieved differs with the weight of the pig:

- piglets 1 day old 35 °C
- piglets 1 day-1 week old 30 °C
- piglets 1-6 weeks old 30-24 °C (2 degrees less per week)
- pigs from 20-60 kg 26-20 °C
- pigs from 60-90 kg 22-18 °C
- adult animals 18-22 °C

3.2 Technical requirements for good housing

The construction of pig pens and houses depends to a certain extent on the climate and how many pigs are to be kept. Local conditions are also important when considering the construction site (waterlogged, exposed to wind, etc.), materials and skills available for building the housing.

In hot, humid or damp areas, breeze and shade are important factors. The buildings should be as open and airy as possible. The walls of the pens should be constructed so that the wind can pass freely through for good ventilation.

Important requisites for the pen:

- It should not be draughty.
- Bright sunshine and rain should not be able to enter.
- Temperature inside the pen should not vary too much.
- It should be easy to clean.

- The floor must be sloping but not slippery.
- Work and management should be easy.
- Provision should be made for storing manure, litter and run-off for later use.

A pen that satisfies these requirements will make a major contribution to the good health of the herd, lower piglet mortality, faster growth and increased feeding efficiency.

The most suitable housing for less intensive holdings in tropical regions consists of a walled and roofed pen with a yard or run. Bedding material can be provided in the covered part and the run should contain a trough.

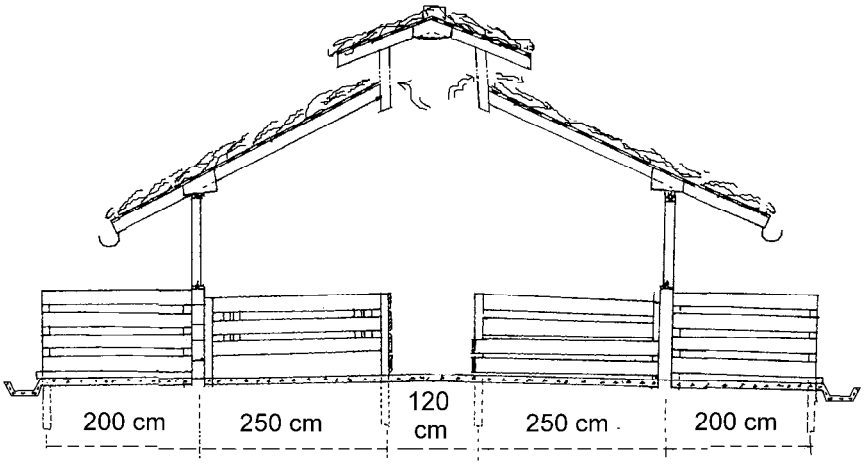

Figure 5: Cross section of a pig house

Siting

When building a house, choose the site carefully. In hot areas the best orientation of the building is east-west. A group of trees can provide shade, as trees absorb and screen a good deal of heat. The pen should be near a water supply, so that water is readily available for the animals and for cleaning.

The roof

The first essential is a roof, which can be made of various materials. The most practical approach is to use a local roofing material. A roof of leaves insulates well against heat and cold, but it has the disadvantage of rotting quickly and will be destroyed by strong winds. A roof made of leaves has to be renewed every 2-3 years. Corrugated iron or aluminium sheets covered with leaves last longer, but are more expensive. Corrugated iron only is not recommended, because of its bad insulation properties (hot in warm periods and cold in low temperature periods). Moreover, it causes condensation and the drips make the floor wet.

Whatever materials are used, the roof must slope sufficiently. If possible, it should be constructed so that the longest slope faces the prevailing wind and rain direction. In most cases it is advisable to build lengthwise from east to west.

If there is an opening between the walls and the roof, make sure that the roof has enough outside overhang to prevent rain from entering. In hot countries, an open roof ridge (see figure 5) helps to keep temperatures down.

Floors and bedding

The floor of the pen should be slightly raised above its surroundings, with a slight slope to avoid flooding in wet periods. A slope of 3 cm per metre also allows the liquid manure to run off more easily. Build a drain at the lowest part of the run so that run-off and manure can be collected into a pit. Pig manure is a good fertiliser so it is important to collect it. The floor can be of compacted soil or loam; it should be kept hard and smooth so that it can be easily swept clean. Wooden floors are not advisable: they are difficult to keep clean, and the pigs chew on them. Wood rots and can be very slippery.

If cement is available a concrete floor is a possibility, and for intensive farms this is advisable. It is important to make the floor at least 10 cm thick and the ratio of cement, sand and stones should be 1:2:3 (mix 1

part cement with 2 parts sand and 3 parts stones). The concrete should not be so rough that the animals can scratch themselves on it. But a floor that is too smooth is also dangerous, as the animals may slip and injure themselves. To improve a floor that is either too rough or too smooth, throw a few shovels of soil into the pen every day after cleaning. This is not only a precaution against accidents, but it is also healthy, as the animals will absorb valuable minerals (e.g. iron) from the soil. Take care where you collect the soil from. It must be 'clean' soil, not contaminated by free-ranging pigs or wild pigs!

The disadvantage of concrete is that it is a bad insulator. In hot weather the animals can take advantage of this by lying on the cold concrete to cool down, but in cold weather they will lose too much body heat. For the younger animals it will be too cold, which increases the risk of diseases like pneumonia. The coldness of the concrete can be reduced by supplying bedding material in the pen. For young piglets a piece of cloth or some wooden planks can be put on the floor. Wet bedding material should be removed daily to keep the pen clean and to avoid any parasite build-up. Bedding mixed with dung and urine makes an excellent fertiliser for the fields, especially if it is first converted into compost (see last paragraph in this chapter).

The walls

The construction of the walls depends on the climate. In the tropics they should be left as open as possible for good ventilation. A low wall approximately 1 metre high will suffice, with an opening of at least 1 metre between the wall and the roof. The wall in a boar's pen should be at least 1.2 metres high. In windy areas, the roof (or ceiling) should not be too high; otherwise the pen will cool down too quickly during strong winds. Completely open walls, made of wire netting for example, are not recommended, as pigs like to shelter from wind and rain. In higher and colder areas, the walls should be constructed in such a way that it is possible to close the openings under the roof completely. In the daytime, when temperatures are higher, the top section of the walls can be opened, and then closed again towards evening to keep the warmth in. It should be possible to close the side exposed to the

rain completely. In places where the temperature differences are not extreme, the house can be open, but you can make a small area with a warmer microclimate by covering (part of) some pens.

If the walls are made using traditional mud and wood techniques, a protective row of hard wooden poles should line the inside. This will prevent the pig from digging into the earthen wall. The walls can also be made of boards or bamboo poles. A row of small tree trunks will provide a simple wall, even though the wind can enter more or less freely. Part should be closed, with a wooden structure where the pigs can shelter.

Cement and brick walls are most expensive, but they are stronger and last longer. They also make it easier to maintain good hygiene, as they are easy to clean. If the supply of cement is limited, priority should be given to using it for the floor.

Feeding and water troughs

Feeding can be done inside or outside. In places with long rainy periods it is advisable to feed the pigs inside. Especially young pigs tend to eat more when their feed is indoors. Water can be given outside. This forces the pigs to leave the pen and they will then excrete outside. The feed trough can be made of cement, iron, hardwood or plastic. The trough should be long enough for all the animals in the pen to feed from it at the same time. Sows need 40-50 cm of space, while fatteners weighing 90 kg need about 30 cm. Instead of a long trough, a self feeder can be used for a group of 10 fatteners or weaners. The water trough should not be too wide; otherwise the pigs may try to bathe in it. If it is large, fix an iron bar above the water trough.

Animals of different sizes (e.g. weaned piglets and fatteners) should not be kept in the same enclosure. Weaker animals may be bitten and do not get enough to eat when feeding. The stronger animals will fatten at the expense of the others.

If for one reason or another, animals of different age and size have to be kept together, precautions should be taken to ensure that they do not get in each other's way when feeding. The way to do this is to give each animal or group of animals a separate feeding space (a feeding box) by enclosing them inside railed-off sections. These sections have to be closed from behind and can be of metal or wood.

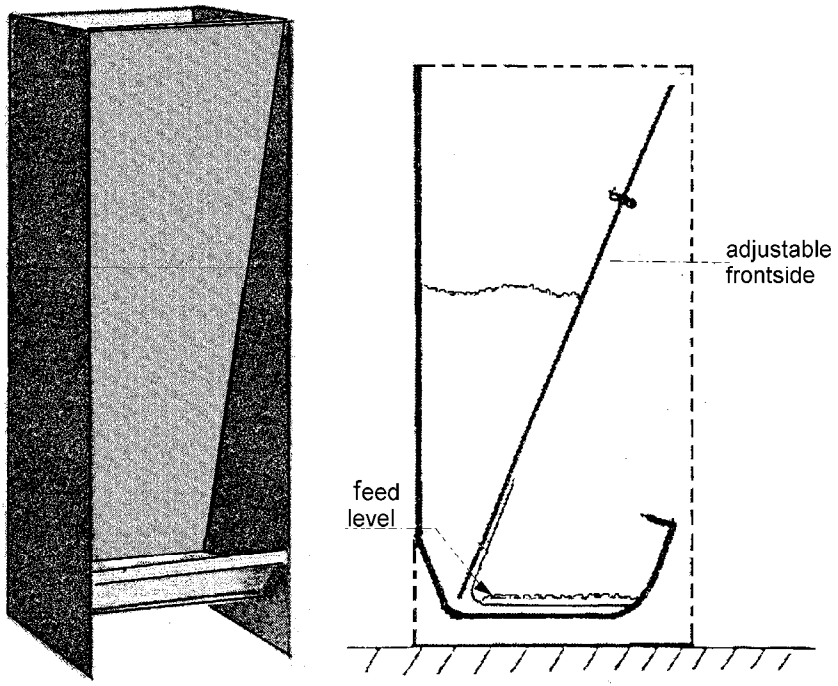

Figure 6: Self feeder

If temperatures in the pen rise too high, the pigs will suffer from heat stress. They will start to urinate and defecate in their resting places to cool themselves down in the dirt. In such cases, showers or sprinklers can cool down the pigs.

Size of pens and runs (dung area)

Figure 7 shows an enclosure that is suitable for all types of pig. If there is a run, the animals will get into the habit of going outside to excrete. You can encourage this by ensuring that the covered pen is not too big. Provided that the doorway is wide enough, the inside area of the pen need not be very large.

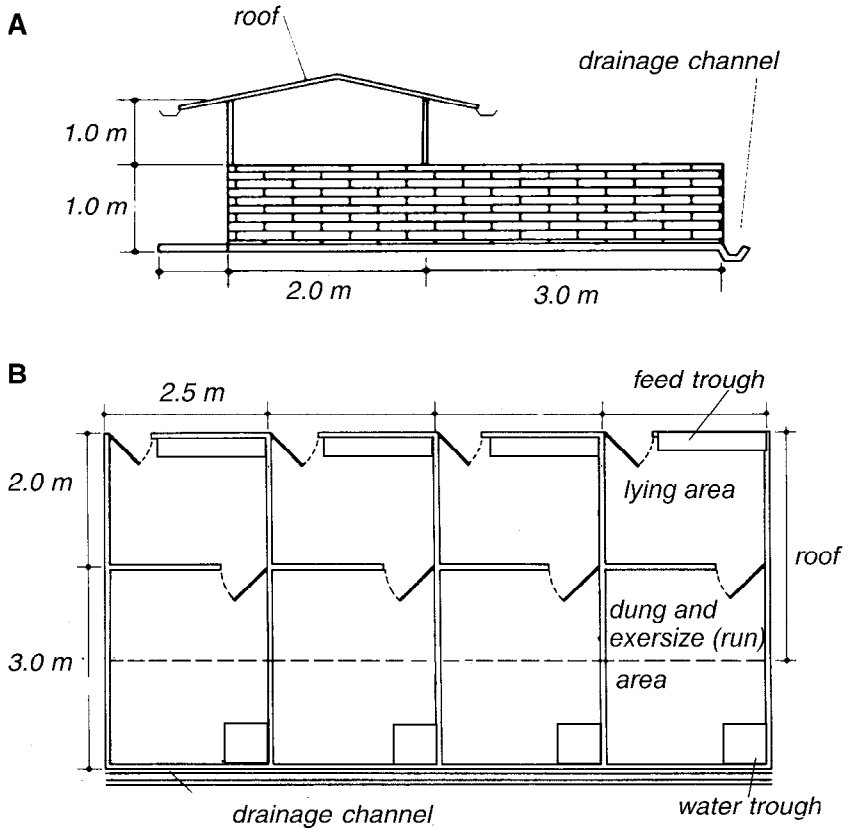

Figure 7: Pen and run for all types of pigs (A: side view; B: top view)

Pigs need three areas in their housing: a resting place with good ventilation and a comfortable temperature; a clean feeding area with a feed-

ing and water trough; and a toilet area for excretion. A pen designed in this way encourages pigs to exhibit their natural hygienic behaviour and keeps the resting and eating places clean. In large intensive pig farms, these three areas are mostly all in one room. This kind of housing often has small holes in the floor (slatted floor) so the manure drops through and is stored underneath.

A pen measuring 2 × 2.5 m is adequate for a sow with a litter of piglets. The run should be at least 1.5 × 2.0 m. A pen for 8-10 weaners should be at least 2 × 2 m. A pen for 10 fatteners should be about 3 × 3 m, depending on size and weight at slaughter. Allow roughly 1 square metre per fattener. A pen of 2 × 2.5 m is big enough for 2 sows. A pen of 2.5 × 2.5 m is suitable for 3 sows.

The pen in Figure 7 is suitable for all types of pig. For the piglets a trough in a separate corner is necessary so that they can feed on their own, away from the sow (see next paragraph).

If preferred, the troughs can be placed along the walls of the run instead of in the covered area.

Housing the sow and her piglets

Newborn piglets must be protected from cold. Plentiful quantities of good dry bedding or a piece of cloth or wood should be available to keep the piglets warm. It is also possible to cover the piglet corner with a piece of board. If this is not enough, and you have the means, a heating lamp should be installed in a separate corner of the pen for the first few weeks.

The piglets should, if possible, be given a secure place of their own in the sow's pen, but close to her. This is because there is always the risk that the sow will accidentally kill her piglets by lying on them. To make it impossible for the sow to crush her piglets against the walls, inside the pen a horizontal rail should be installed parallel to each wall, 20-25 cm away from the walls and at a height of 20 cm from the floor.

Farrowing crate

Another, even better solution to prevent piglets from being crushed during and after birth is to use a movable farrowing crate. This is a kind of cage that confines the sow and limits her movement, and is made of iron or wooden bars. There is a door at the back of the crate and in some cases there is also a door at the front. Bars across the top prevent the sow from climbing out. The crate is installed in the pen and just next to it a warm spot is provided for the piglets, so they remain in close contact with the mother but can move freely about and away from her as they please. The dimensions of the farrowing crate depend on the size of the sow. For smaller types the crate should measure about 60 × 180 cm and for the larger commercial breeds 65 × 220 cm.

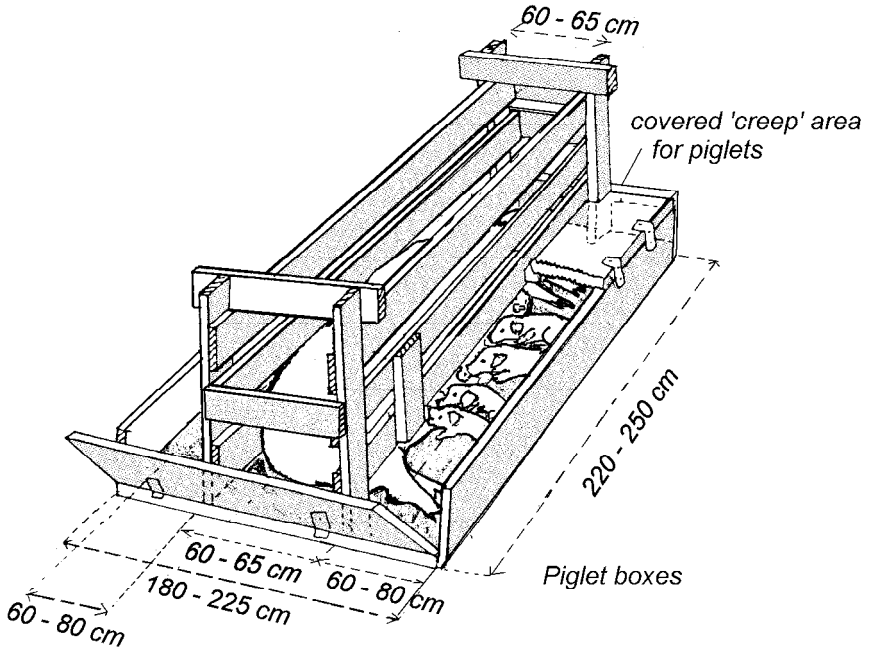

Figure 8: Farrowing crate with covered 'creep' area for piglets

Piglet boxes

Figure 8 illustrates a 'piglet-box'. This is a farrowing crate combined with a special 'creep' area where the piglets are kept warm. The box allows the piglets to crawl away from the sow to a bedded area on either side of her. After a few days the extra shutters can be removed, so that the piglets can run freely about the pen. This system has proved very successful; the piglets nearly always prefer the protective 'creep' rather than lying against the sow. The sow should be kept in the farrowing crate for at least two weeks after farrowing. In intensive farms the sows remain in the farrowing crate until weaning.

Before using the crate for the next sow it should be thoroughly cleaned. When the sow leaves the crate, the piglets must be given a warm place. This could be in a separate corner of the pen, where they can be introduced to special piglet feed and kept safely until they are weaned.

Housing fattening pigs

Pens used for fattening pigs are simpler. You should not keep more than 15 fattening pigs in one pen, and a simple pen with or without a run will suffice. A lying area of 1 square metre per fattener should be allowed.

Housing breeding stock

In semi-intensive systems, the breeding sows and boar can be allowed out occasionally on a fenced piece of land, as this is good for their general condition. The danger of parasite infection and disease spread must be taken into account when putting the animals out in a paddock (see Section 6.4).

In intensive systems pigs are not usually allowed outside, although there are situations where breeding animals, especially pregnant sows, are allowed to scavenge. If pigs do go outside, it is very important to follow a strict de-worming programme and, if possible, to have more than one enclosed outside area so that a rotation scheme can be used.

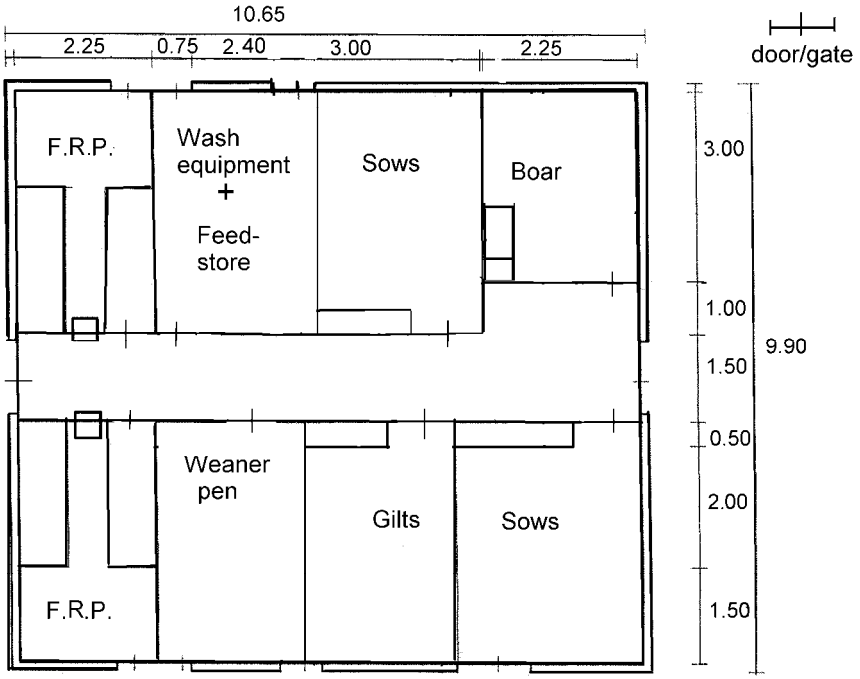

Figure 9: Layout of a 5 sow unit, FRP = Farrowing and rearing pen

Using liquid and solid manure

Pig urine and dung are good fertilisers for crops and vegetables, and can also be used on pastures, so it is wise to make good use of them. Before using the dung it is best to let it decompose first by leaving it in a heap separately. Pigs enjoy chewing their litter and playing with it, so it is good to give them plenty of any kind of organic matter for this purpose. The litter and dung should be left to rot for at least a few months. Protect the heap of waste from the sun and rain, as this will improve the quality.

Pig keeping combines well with on-farm fish culture. Apart from spreading it on the land, pig manure can be used to fertilise a fish-pond. The manure, or a small amount of the rich run-off from the pens, will stimulate the growth of natural fish food and water plants.

This increases the food available for the fish, which in turn grow faster. In addition, surface water plants such as *Ipomoea reptans* grow more rapidly and provide excellent green fodder for pigs. For further information on this combination see Agrodok No. 21: **On-farm fish culture**.

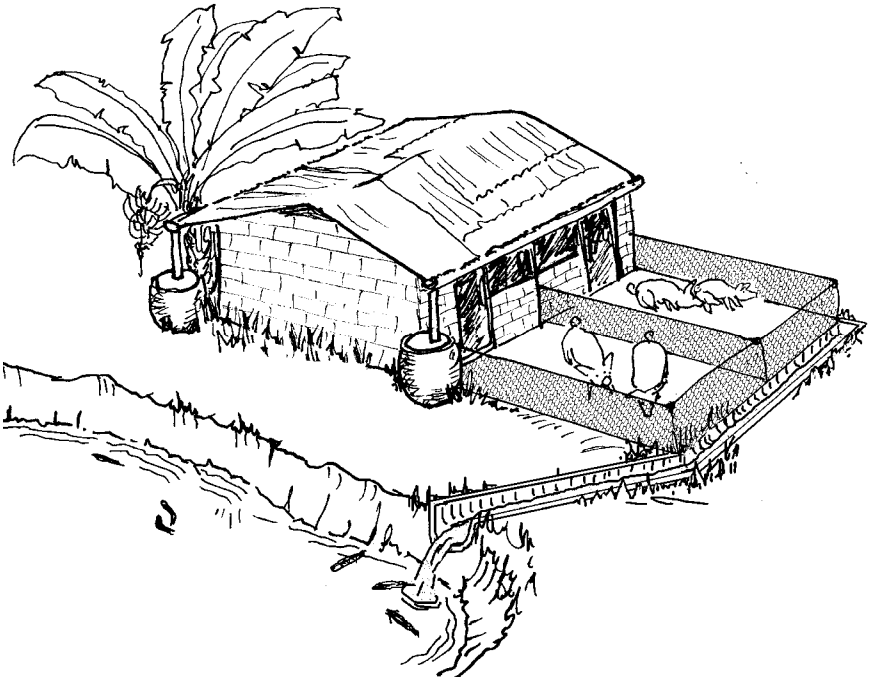

Figure 10: Pig keeping combined with on-farm fish culture

pigs and other animals out. Build the farm at a distance from other pig farms; the greater the distance, the better.

Prevention is better than cure. Not only are sick animals less productive, but modern remedies are difficult to obtain or even unavailable in the tropics. They are often very expensive. For this reason, particular attention must be paid to the health of the piglets, which are very vulnerable to disease. A good start in life lays the foundations for pigs' ability to resist disease later on. (To a certain extent the loss of some piglets has to be seen as inevitable. In the Netherlands for example, a piglet death rate of 8-12% is considered acceptable.) On small farms in tropical countries piglet mortality should remain below 20%.

Spread of disease by infection

Upon any outbreak of disease it is essential to ensure that the disease is not passed on to healthy animals on the footwear, clothing or tools of the people working with the pigs. Even insects, wild animals and earthworms can transmit disease. Therefore take precautionary measures:

- Put the sick animal in a separate pen or house.
- Do not let people into the pig house unless absolutely necessary (they might have pigs at home and carry germs away with them).
- Feed and clean the healthy sections first, and after that enter the section where the sick animals are. Use different tools and boots in this section.

The pen should be cleaned very regularly with disinfectant or sodium hydroxide (NaOH, 5%). Avoid contact with your eyes and skin, as it is very caustic! Whenever pigs are sent to slaughter their housing should be disinfected before new pigs are brought in. Any animals that die of a disease should be burnt (if possible, after a post mortem has been done if the cause is not clear), to prevent further contamination.

Even the meat of healthy pigs may be contaminated with germs. It is therefore important to always boil or roast meat very thoroughly before eating it.

6.2 Disease-causing organisms

Diseases are caused by specific types of organisms. So to treat a particular disease, you have to know which organism is involved and choose the appropriate medicine. A badly chosen medicine is money wasted. The principle types of organism responsible for diseases are:

Bacteria
Very small and invisible to the naked eye. Antibiotics can kill bacteria, but if antibiotics are not properly used, the bacteria can become resistant to them (see 6.3).

Viruses
Also very small, invisible even with a microscope! Viral diseases are difficult to treat and there are not many medicines available. Antibiotics are sometimes effective against secundary (bacterial) infections and vaccinations can prevent some viral diseases.

Parasites
These are small animals living on or inside the pig, such as various types of worms, ticks, lice, fleas, etc. Hygiene is an important factor in their prevention. Treatment varies with each type of parasite.

Sometimes diseases are caused by a combination of harmful organisms. Pneumonia is an example: it can be caused by bacteria or viruses (and usually by both at the same time), and by parasites (lung worms and intestinal worms that have found their way into the lungs). A poor climate (for example a low temperature for piglets) and poor management can also play a role. Pneumonia is described in more detail in 6.6.

6.3 Use of medicines

Before proceeding to consider the individual diseases, some critical remarks on the use of medicines need to be made.

Treatment for natural parasites

The routine use of medicines against parasites (e.g. worms) or bacteria is common. The intention is to kill or greatly reduce in number the organisms causing disease or weakness in the animal. Mange mites (a parasite on the skin of the pig) can be eradicated completely. Most organisms nevertheless remain present in the animal's surroundings and represent a potential source of re-infection. This often means that, if no special hygienic measures are taken, repeated treatment with de-wormers or other medicines becomes necessary. These repeated treatments reduce the natural resistance of the animals. Eventually damage by parasites can actually be much worse under repeated treatment than in circumstances where the animals are not treated (for financial or other reasons) and are obliged to rely on their natural resistance to their environment.

It is therefore important, before using these medicines, to first assess the losses you are likely to suffer as a result of disease or infection. Secondly the likelihood of the treatment being properly applied and succeeding (without inefficient repetitions) must be assessed. However, in more intensive farms, with improved breeds of pigs and proper housing systems that are easy to keep clean, regular dosing has become routine.

In some cases it is considered useful to treat animals only occasionally, in specific situations. For example one might choose to treat all animals arriving on the holding and not yet accustomed to the new environment, as well as pregnant sows in preparation for farrowing (de-worming), and any animals weakened for some reason and whose resistance is low.

Resistance to medicines

All disease-causing organisms are capable of developing resistance to medicines. They do so when medicines are used in the wrong doses, or too often, or without respecting the treatment times.

Antibiotics

Antibiotics are very useful medicines but they must be properly used.

- The body of a healthy animal harbours many useful bacteria; for example, the bacteria in a pig's intestines help the animal to digest its food. Antibiotics are devised to kill certain bacteria. However, sometimes they also kill the useful bacteria in the body. Unfortunately therefore when an animal is treated with antibiotics its good bacteria are also killed. Consequently, although the antibiotics may effectively arrest the disease, they may also weaken the general condition of the animal. For this reason give your animal all possible attention when it is being treated! (If you are able to, feed yoghurt to encourage the re-growth of the useful intestinal bacteria.)
- Treatment with antibiotics always takes a few days and a course of treatment must be carried out to the very end. If this is not done the disease will hit back again. There is a great temptation to break the treatment off earlier, because the benefits of the antibiotic are nearly always seen shortly after starting the treatment, and the medicines are expensive. But don't make this mistake: for ending the treatment early can leave the animal even more severely ill, and the medicines (and the money) will have been wasted.
- The meat of an animal recently treated with antibiotics must not be eaten or sold. The antibiotics enter the meat and will affect the health of the people eating it; they will get diarrhoea. If an animal is destined for slaughter you must decide whether it is useful to treat it with antibiotics, and judge the best time to slaughter it so that it can be sold with the meat untainted. Normally the waiting period is indicated on the label of the medicine.

Local medicines

There are often local medicines (medicinal plants) or treatments in use which have been developed over many years. Do not neglect these traditional practices. Several have been shown to be successful, while they are not as expensive or difficult to obtain as modern medicines. See also Agrodok 44: Ethnoveterinary medicine. Medicines that are used for human beings can also be effective on pigs, as pigs and human beings have similar digestive systems.

Products such as DDT have very dangerous side-effects for man and animals and should on no account be used.

6.4 Parasitic diseases

Internal parasites (worms)

Worms are one of the most serious threats to pig keeping; there are more than 30 types affecting the intestines. The most important of these are the intestinal roundworm, the lung worm, the kidney worm, the stomach worm and the tape worm.

Infection occurs when the worms' eggs are eaten while the pig forages for food; the eggs cannot be seen with the naked eye and are present in the soil, in the dung of worm-infested pigs, in the vegetation at the bottom of ditches, wherever pigs are found. In Section 2.2 we mentioned the importance of field rotation as a measure for worm prevention in semi-intensive systems.

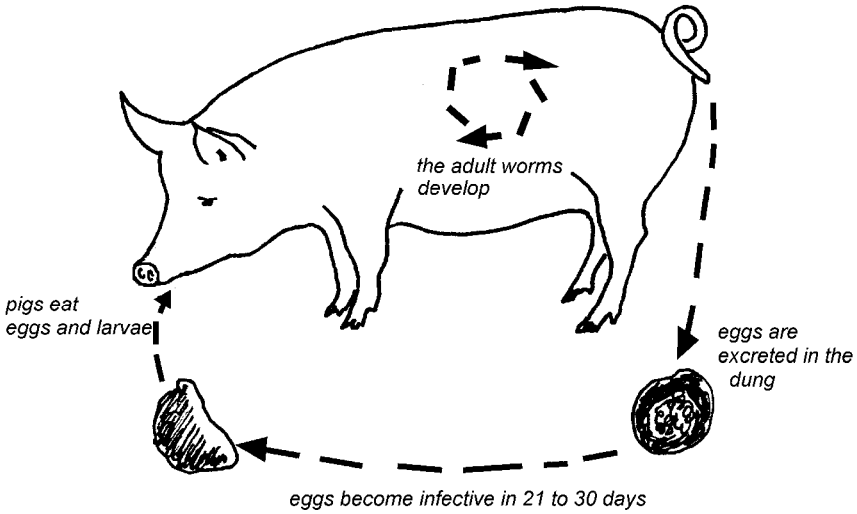

Figure 17: Life cycle of the intestinal roundworm

The eggs and the larvae in the soil can die out after a while if sufficient time passes for them to dry out under the sun. One way of reducing the risk of serious parasite build-up in the field is to regularly change the grazing area. If possible the animals should be given a fresh piece of land about every 14 days. The cycle in the pig, from egg until adult egg-producing worm, lasts about 14-21 days.

It is a good idea to de-worm the pigs, before you start the first land-grazing-rotation. The de-wormer (medicine for expelling the worms) should also eliminate the worm-larvae inside the pig. Attention: some – mostly cheap – de-wormers kill only the adult worms in the gut! Choose the right de-wormer and the pigs will not contaminate the grazing area until 14 days after de-worming.

In dry periods the animals can stay longer in the same field because the worms do not develop so quickly. After a period of grazing, the field should be left empty for a while to allow the larvae to die. In the wet season it is better to leave a field for about 2.5 to 3 months before re-using it; in the dry season when the larvae and eggs die more quickly, the field can be used again after 2 months. With this system, changing the enclosure every two weeks requires at least four different fields, which is expensive. If there is a shortage of land, in some areas a simple pigsty can be made to keep the pigs in during the wet season. By letting the pigs out in the dry season only, less land will be required.

In intensive systems prevention is achieved by ensuring excellent hygiene.

Breeding sows kept outside will always be slightly contaminated with worms, but some infestation in older animals is not serious, as these animals usually have a measure of resistance. Young piglets however are very vulnerable. To prevent the young piglets from being infected directly after birth, the sow should be wormed about 10 days before delivering. A few days later wash the sow with soap in order to remove worm eggs from the skin.

After washing with the soap, the external parasites can be killed by spraying or washing the pig with a mange killer. Directly after these treatments, put the pig in a clean farrowing pen. She should then be kept inside for delivery. To prevent re-infestation, clean the pen well every day. This way the young piglets have a good chance of being born into a worm-free and clean environment.

A particularly nasty worm, which accumulates especially in intensive pig-keeping systems, is the Ascaris roundworm. Its eggs can survive for at least 5 years in the pens. Normal cleaning with disinfectants will not eliminate these eggs. Pigs do not die from this infection, but it will slow down their growth. You can check if this worm is a problem in your piggery by inspecting the pigs' livers after slaughter. If the livers show many 'white spots', you will have to introduce a good, strategic de-worming plan.

As de-wormers are dosed per kg live weight, it is better to treat young pigs before they get heavy. This is cheaper, and you also avoid the pens being contaminated. Worms are more harmful to young pigs than to older pigs. De-worming weaners at the start of fattening – before they enter the new fattening pen – should be sufficient. In very contaminated pens, a second de-worming after 6 weeks may be necessary. It is very important to choose de-wormers that also kill the worm-larvae that are developing inside the pigs. Do not use de-wormers that only kill the adult worms in the gut (e.g. Piperazine derivates).

Ivermectin by injection is a very effective way of controlling intestinal parasites, but it is expensive. However, it also kills larvae and it kills mange mites in the skin.

Lung worms

General hygienic precautions are necessary to control this condition. Typically the infected animals cough when they are made to move around and they grow poorly. Riperol (or Levamisole) injections are used in treatment, but are probably difficult to obtain in many places.

Mange

This is a skin-irritation caused by small external mites. They provoke severe itching and irritation, and mainly affect the skin between the legs, around the eyes, ears and neck. Treatment involves removing crusts and dirt with soap and water and a stiff brush. Afterwards the pig should be washed with calcium sulphide. Repeat this treatment several times. Giving all the pigs two injections of Ivermectin with an interval of 14 days can eliminate the infection. This is an effective, but expensive treatment and no untreated pigs may be introduced (watch the boar!). Smearing the pigs with coconut oil can provide effective control in cases of light contamination.

Lice

These are blood suckers that also cause irritation of the skin. They can be kept away to a certain extent by planting a pole sturdily in the ground at an angle of 45° with an old sack wound around it immersed in crude oil or used motor oil. The insecticide benzene hexachloride is a very effective remedy (0.1-0.25% solution) against lice. The treatment for mange also kills lice.

Sand fleas

The sand flea lives on plants and dry grass and passes from these to piglets in particular. The female fleas dig into the skin of the host to lay their eggs (usually between the toes and around the jaw). The fleas should be removed from their breeding places in the skin without bursting the blisters, which are full of eggs. The best remedy is to clean the breeding places and then smear them with disinfectant.

6.5 Bacterial diseases

Enteritis or inflammation of the intestine

This is a condition that can be caused by a variety of micro-organisms or inappropriate feed. It is characterised by some of the following symptoms: loss of energy and interest, high temperature, loss of appetite, diarrhoea (sometimes bloody) and weight loss. If the problem is

avoided to a degree by good hygiene. If mastitis is noticed, the sow must be injected with antibiotics and oxytocin as soon as possible. See 4.4 for more information.

Anthrax

This is dangerous both to humans and other animals. A blood-stained fluid will be seen coming from all the body openings. The infected animals are usually found dead in the field. The body should not be buried but burnt, as the germs can survive in the soil for years. Cattle should be kept out of all fields that have ever been contaminated with anthrax.

Brucellosis

This causes abortion in female animals and infection of the reproductive organs in the male animal. Sterility may result. Although treatment with antibiotics is sometimes possible for females, it is better to dispose of infected animals. The boars should be carefully controlled because the germs from the boar can be transmitted without the boar himself being ill. See 4.7 for more information.

Trypanosomiasis

This is transmitted by the tsetse fly. The infected animals are feverish, lack appetite and breathe very fast. Prevention is only possible by eradicating the fly from the region. Pig breeding is therefore almost impossible in tsetse infested areas. Long acting drugs could be used to protect the pigs.

6.6 Viral diseases

Swine fever

This is caused by a very infectious virus. In pigs the following symptoms may vary from almost imperceptible to very serious:

- The animal may be very ill for a few days with a high temperature and constipation, after which it recovers.

- The animal is seriously ill, runs a high temperature (41-42 °C), with diarrhoea, an unsteady walk, possibly showing signs of bruising indicating bleeding under the skin (brown blemishes).
- In addition to these symptoms, pregnant sows may abort.

In piglets the following symptoms are found:
- Chronic cases show retarded growth and diarrhoea. The piglets lose colour and slowly die.
- In acute cases diseased piglets huddle together, pale, with diarrhoea and high temperature (41-42 °C). They walk unsteadily and may have brown patches on the belly.
- Sometimes one piglet in the litter will suddenly die (pale body with skin bleeding), whilst the rest of the pigs remain unaffected.

There is no treatment for this disease; only a preventive vaccination can reduce the danger. This vaccination (the 'crystal violet' vaccine) is first administered at the age of 8−10 weeks, and to sows and boars twice a year thereafter.

African swine fever

This is not the same disease as ordinary swine fever. The illness starts with a rapidly rising fever. Typically the animal will remain lively in the early stages, eating normally. About 36 to 48 hours before dying it becomes restless, stops eating, loses the use of its back legs and lies down a lot. It may sometimes have weepy eyes and a discharge (occasionally bloody) from its nose; it vomits. Its skin is often reddish-blue (especially on the legs and ears). There is no treatment and no vaccine for this disease. The disease is almost 100% fatal for swine and all ages are affected. It is not dangerous to humans.

Swine Erysipelas

This disease is often confused with swine fever. The differences between the two diseases are shown in Table 5. Treatment is by penicillin injection. It is not always effective. *There is a very effective vaccine against this disease.*

Table 5: Differences between swine erysipelas and swine fever

Swine erysipelas	Swine fever
constipation or soft dung	obvious diarrhoea
pink skin, often with indented bruising (you can put your thumb in the bruise)	pale skin, bruising, not intended
lack of appetite	often abnormal appetite
stiff, limping gait	weak, meandering gait
screeches hoarsely when roused	grunts
disease manifests itself in hot weather	disease can occur at any time of year
only one or few pigs ill in the herd	several pigs ill at the same time

Pneumonia

Pneumonia may be caused by bacteria, viruses (usually by both at the same time) or parasites (lung worms and intestinal worms that have found their way into the lung). The condition is made worse by keeping too many pigs in a small space, low temperatures, draughts, insufficient air humidity, and dusty surroundings. The illness is more common in the rainy season and at this time the pigs should have dry and draught-free conditions. The animals start coughing, especially after exertion and when roused, and they breathe with convulsions. Their growth is retarded. If viruses and bacteria are the cause, treatment is by antibiotics (streptomycin-penicillin, tetracycline). Ripercol R or Ivermectine is used if lung worms are involved.

6.7 Feed-related diseases

Anaemia (blood iron deficiency)

This is an important problem, especially for young piglets kept indoors. The piglets become very pale a few weeks after birth and their growth slows down. The cause is an iron deficiency in the mother's milk. This can be prevented by putting iron-rich soil (mud from the ditches, forest soil) in the pen every day, giving the pigs something to root in. This soil should not have been in contact with pigs previously, as it must not carry worms. Give soil from the very first week.

Very young pigs (0-3 days old) can be given an injection of iron-dextron if it is available. This is commonly done in (semi-) intensive systems.

Wood ash may also be put in the pen. Wood ash will not provide iron, but it provides other minerals such as calcium and phosphorus which are important for the growth of the piglets' bones.

Constipation

Constipated sows should have a 60 g dose of linseed oil in their feed every day. If this does not help, give 60 g of Epsom salts and the sow should be made to take exercise.

6.8 Other problems

Sunstroke

Cause: too much sun. Symptoms: the skin gets burned and pigs feel pain. White skinned pigs are most susceptible to sunstroke, and their skin turns red. Prevention: make sure there is enough shade available. Treatment: bathe (only) its head in cold water. If possible give it some brandy or whisky with a teaspoon. Make sure it has shade.

Skin or leg problems

Wounds or injuries

Cause: housing or fighting. Prevention: improve housing, separate pigs. Treatment: antibiotic injections for 3-5 days, clean/disinfect wound and use ointment.

Arthritis (swollen joints)

Cause: bacteria. Symptoms: one or more leg joints are seriously swollen. The pig limps, feels a lot of pain and has fever (often a body temp. > 40 °C). Prevention: disinfect umbilical cords, smooth floors. Treatment: antibiotic injections for 5 days.

7 Management and economics of pig farming

7.1 Record-keeping

For those who intend to keep a number of pigs for breeding purposes it is essential to have a good system of record-keeping. This will help to keep track of developments, make comparisons and take decisions on the management of the herd. It will also have a direct positive impact on daily management.

Good record-keeping means noting down simply and clearly all important details and events. It can also be used to provide and record information for future activities. It is important for example to calculate and note the next date for checking whether a sow is in heat or the date when she should farrow. Such information should be marked on a card, in a notebook or on a calendar, so that any necessary preparation can start well in advance (for example preparing the farrowing pen for the sow).

For a farm of up to 3 sows, a system of record-keeping requires no more than a notebook or exercise book. Use a few pages for each sow, and note down all the important events. For bigger farms it is good to use a separate farrowing card for each farrowing of a sow, and a sow card giving the details of all the litters of one sow (see Table 6). Also, the use of a boar card (see Table 7) is advisable. For fatteners, one card per pen or batch gives information about treatments, growth, feed intake and mortality.

Relevant information to record includes:

For a breeding sow:

- The name/number of the sow
- The month and year of her birth
- Her parents' names or numbers and breed

Important events:

- Date of 1st heat
- Date of 2nd heat
- Date of 3rd heat
- Date of mating, and name of the boar
- Result of the heat check 3 weeks after mating (did she come in heat again?)
  If there are no signs of heat she must be in-pig, and the date of farrowing can be established (about 114 days after mating).
  If she has come back in heat she will now have to be put to the boar again. Calculate the date when she might come back in heat (3 weeks after mating).
- Anticipated date of farrowing – mark this on a calendar!
- The date for putting the sow in a farrowing pen (1 or 2 weeks before farrowing). Mark this on the calendar too!
- Actual date of farrowing
- Size of the litter, number of healthy piglets, number of still-born piglets and, if possible, the weight of the piglets.
- Number and weight of piglets that have survived and have been successfully weaned (this gives an idea of the sow's mothering qualities).

Other information to note:

- Dates of illness, nature of the problem and the treatment and/or medicines administered.
- Information on the piglets, e.g. vaccination information.
- If a piglet is selected for further breeding, information should be transferred to the new page of records opened for that piglet in its new role as a breeding sow or boar.

Table 3 (Chapter 4) can be used to work out the date of farrowing, if the date of successful mating is known (date of farrowing = date of mating + 114 days)

Table 6: An example of a sow card. Particulars about the sow's health can be recorded on the reverse side of the card.

Sow number	Tattoo number:		Breed/cross:	
314	Birth date:		Mother:	
	Father:		Origin:	
	Dates of heat			

	Service date		Boar	Farrowing date	Born alive	Av. Kg	+/_ sow	Still born	Weaned	Weaning date	Av. Kg
	1	2									
1											
2											
3											
4											
5											
6											
7											
8											

It is important to record the boar's activity and the results obtained, so that his performance can be assessed. The fertility of the boar is indicated by the size of the litters he produces and the percentage of sows in-pig after a first service (insemination rate).

Table 7: Boar card

Name/number of the boar:		Date of birth:	
Breed:		Breed of the father:	
Origin:		Breed of the mother:	

Sow number	Date of first service	Date of repeat service	Born alive	Born dead
24	15/06/09		11	2
36	17/06/09	09/07/09		

The information to record is:
- the date of the service
- the identification (name or number) of the sow which was served
- the date of farrowing (which indicates whether the sow was pregnant after the first service)
- the litter size; number born alive and the number born dead
- number and type of abnormalities among the piglets born

On the back of the card: record treatments, vaccinations and abnormalities.

Marking the pigs

If records are to be kept and management activities are planned, it is essential to be able to identify the pigs. If you have more than one sow, it is necessary to mark them so you can identify them.

There are various methods of physically marking animals: notching, plastic ear numbers and tattooing. We describe notching here as this is easy for small-scale pig farmers to use. However, in most countries, equipment is available to use plastic ear tags. Although more costly, tagging is easier and the numbers can be read faster. The animals should be marked when they are young.

Notching

Notching involves cutting small pieces of skin out of the edges of the ears. By varying the pattern of the cuts you can individualise the animals for identification. This is a very cheap method requiring only a very sharp knife. It is even easier if a special pair of notching pliers is available. Keep the equipment clean! The disadvantages of the method are that it takes time 'to read' the patterns (or codes), and that problems can arise if the ears are damaged.

An example of notching is shown in Figure 18. The codes used on large farms are shown. A value is assigned to each notch on each side of the ear. By adding up the values marked on the ear, you can work

out the sow's number. You can of course devise your own system of codes adapted to your particular circumstances.

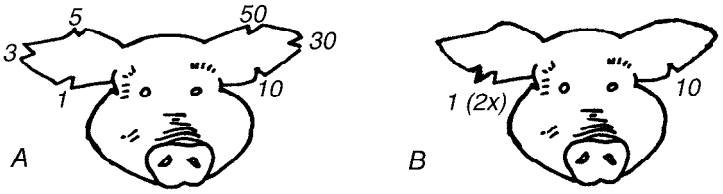

Figure 18: A - notching codes, B - an example: 1+1+10=12

Financial records

In order to be able to analyse the economic results, all costs have to be recorded, as well as the money received from the sales of pigs and manure. Feeds that were grown on the farm and fed to the pigs must also be added to the costs.

If breeding and fattening are done on the same farm, separate calculations can be made for the breeding section and for the fattening section.

The figures can tell us the cost price of a weaner and the cost price of a fattener of a certain weight, and from these figures we can see where most profit can be made.

7.2 Economics of pig farming

In (semi-) commercial pig farms it is very important to keep records to be able to analyse the technical results: piglets produced per sow per year, piglets born alive per litter, mortality in piglets, etc. Records of input (costs) and output (revenues) are needed to analyse the profitability of the farm.

A simple way to judge whether pig farming is likely to be profitable is to calculate the **ratio between the pork price and the feed price.**

Example
A 70 kg pig fetches about 60
70 kg live weight is roughly 50 kg dressed weight (this can vary in different countries).
So, 1 kg dressed meat fetches 60 : 50 = 1.20
Suppose that 1 kg mixed feed = 0.15
Then the ratio is 1.2 : 0.15 = 8.0

If the ratio is 7.5 or more, in general profit can be made. If the ratio is between 6.0 and 7.5, profit can be made if the level of management and the technical results are very good.

Suppose the feed price is 0.2 /kg
The ratio is now 1.2 : 0.2 = 6.0
It is almost impossible to make a profit.

Conclusion: good management influences the profit, but the profit depends a lot on the prices of feeds and pork.

Cost price calculation for fattening pigs

Example
A 20 kg piglet costs about 20
The pig grows from 20-70 kg
Total gain = 50 kg

The FCR (feed consumed per kg gain, see 5.3) can vary from 2.7-4.5
Let us assume that the pig grows 440 g per day and the FCR is 4.
The pig will need 50:0.44 = 114 days to reach the end weight of 70 kg.
The pig will consume 1 kg/day of feed at 20 kg live weight and 2.5 kg at 70 kg.
The average consumption per day is about 1.75 kg (1.75 × 114 = 200 kg).
A fattener will then consume 50 (kg gain) × 4 (FCR) = 200 kg of balanced feed.
Feed for fattening pigs costs 0.15 per kg.

From 30-45 kg the pigs need a more expensive feed, which costs 0.20 per kg. We assume an average feed price of 0.17 per kg.

So the total costs are:

Cost of piglet	20.00
Feed 200 × 0.17	34.00
Others (drugs, housing)	5.00

Total costs	59.00

A pig of 70 kg fetches 60.00 (see above).
Conclusion: Just 1.00 profit per pig.

How can more profit be made?

- First, by achieving better technical results.
  Suppose the FCR is 3.5
  Now the pig will consume 3.5 × 50 = 175 kg of feed.
  The feed costs will be: 175 × 0.17 = 29.75
  Profit per fattener is about 5.00
- By giving partly locally obtained by-products, mainly to pigs above 35 kg live weight.

Example

We give 130 kg balanced feed and make up the rest with by-products from the farm.
The balanced feed is 130 × 0.17 = 21.00

By-products may also have a certain value.
Roughly speaking, 4-5 kg of by-products is equal to 1 kg balanced feed.
So we need 45 × 4 = 180 kg
Suppose the price is 0.02 per kg (some may be free)
Total cost of by-products is 180 × 0.02 = 3.60
So the total feed costs are now just under 25.00
That means another 5.00 profit.

- If piglets of 20 kg can be obtained for 15.00, the profit will be 5.00 higher.
- If pigs can be slaughtered and the dressed meat is sold directly to the consumers, more profit can be made.
- In large cities higher prices are paid, but transport costs must be taken into account. Also, a larger number of pigs must be delivered at regular times, for example 20 per month.

Profitability of breeding

A medium-sized sow in the tropics consumes about 900 kg of balanced feed per year. (Bigger sows with a higher piglet production need 1000-1100 kg.) The average price of feed is 0.15 per kg. A boar consumes about 700 kg per year, which costs 105 per year. If only a few sows are present, the cost of the boar is relatively high.

We make the calculation for a farm with 2 sows and a boar. A sow can farrow between 1 and 18 piglets at one time. The average in a tropical country is between 8 and 10 (depending on quality and breed of sows, climate, feeding and management). Mortality varies from 10 to 50% (again depending on many factors). A sow can farrow between 1 and 2.4 times per year. In the tropics the figure is usually between 1.5 and 2.0.

Based on average figures for a tropical country, with well-balanced feed and slightly improved sows we assume:
Born alive/litter 9.5
Weaned 7.5 × 1.6 (litters/year) = 12 piglets produced per sow per year.
A piglet consumes about 26 kg of creep feed until it reaches a weight of 20 kg.

The costs are:
Sow feed 900 × 0.15 = 135.00
Piglet feed 12 × 26 × 0,20 = 62.40
Boar 105 : 2 (sows) = 52.50
Other costs (drugs, vaccines, housing) = 15.00
Total costs = 264,90:12 = approx. 22 per piglet.

If a piglet is sold for 20, then there is no profit at all. In fact we lose 2.00 per piglet!

How to obtain or improve profit

Reduce costs for the boar

- Let neighbours with healthy sows make use of the boar and charge them for every service of the boar.
- If you can increase the number of sows to 4 or more, the boar costs per sow are much lower. (With 5 sows, the cost of the boar will be only 21 per sow, so then there is a small profit.)
- Replace the boar when he gets heavy, sell for slaughter (only if people are willing to eat boar meat).
- Buy a cheaper young boar of about 9 months of age or buy it earlier at 4-5 months but do not cull the old one before the young one can do the job.
- The boar can be partly fed on by-products.

If we can raise 14 piglets/sow/year

The feed costs will be 2 × 26 × 0.20 = 10.40 higher + 3 (other costs) = 13.40 higher.
Total costs are 278.30 : 14 = 19.90 per piglet.
Now there is a very small profit of 0.10 per piglet.
Together with the reduction of the boar costs, there is a profit of about 2.50 per piglet.
If we can raise 16 piglets/sow/year the total costs will be
278.30 + 13.4 = 291.70, being 291.70 : 16 = 18.2 per piglet.
The profit is about 1.80 per piglet, or 4.00 – 4.50 with reduced boar costs.

We can also feed the sow (partly) on cheap by-products, in particular during the first 2 months of the pregnancy

Suppose we give 700 kg balanced feed = 700 × 0.15 = 105
By-products: 200 × 4 = 800 kg × 0.02 = 16.00
Total feed costs for the sow are 121
We can also reduce the costs for feed for the boar.

We need to take into account that, on average, a sow is replaced after 4-5 litters. Some may have 8 or more litters, but others will be slaughtered already after one litter. Also, raising a gilt (young female pig to replace an old sow) costs money. But in our calculation we assumed that the output of the culled sow would roughly balance the cost of raising a gilt.

Conclusion

It is not easy to make a good profit immediately after changing from a local to a semi-commercial system of pig rearing. Farmers have little influence over prices of pork and feeds. But the technical results depend mainly on management. In general a minimum of 14-16 piglets should be produced per sow/year. In reality, however, only 10-12 piglets are raised per sow per year in many situations where subsistence farming is replaced by commercial or semi-commercial farming.

Glossary

Anaemia	Lack of iron, piglets look pale.
Bacteria	Microscopic organisms found in all organic matter; often the cause of disease in animals and human beings.
Boar	Uncastrated male pig.
Colostrum	The first milk produced by the sow after the birth of the piglets. It is rich in nutrients and anti-bodies against diseases, and is essential for new-born piglets.
Complete mixtures	Purchased feed that is sufficiently balanced to be fed without any other feed (except water).
Cull	Select and sell or kill an unwanted animal.
Dry matter	The non-water content of feed: cereals for example consist of 20 - 30% water and 80 - 70% dry matter.
Farrow	Give birth.
Fatteners	Pigs destined for meat rather than being kept for breeding.
Gilt	A young female pig that has never had piglets.
Heat	The period of about 3 days in which a sow is fertile and ready for mating (service).
In-breeding	Excessive breeding of males with females that are closely related, resulting in deteriorating quality of offspring.
In-pig	Pregnant.
Lactation	Milk production, suckling offspring.
Litter	1: Bedding material, straw etc. 2: The group of piglets produced by a sow.
Mucus	Watery like fluid in the vulva when the sow is in heat.

Nucleus feed	A concentrated feed purchased to add to local feedstuff to raise the quality of the ration.
Oestrus	Also called heat, the period when ovulation takes place and the sow is receptive to the boar and able to become pregnant.
Parasite	Organisms that live at the expense of their host, another animal such as a pig. They live inside the body (e.g. worms) or on its skin (e.g. lice, fleas). They are often a cause of disease.
Placenta	The mass of tissue within the uterus from which the unborn animal is fed and which is expelled after the birth (also called after-birth).
Ruminants	Animals (cows, goats, sheep) with a complex stomach, which enables them to digest grasses and other plant foodstuff.
Sow	Female pig.
Still-born	Born dead, lifeless.
Sucklings	The piglets when they are still dependent on the mother's milk.
Uterus	Organ in the female in which the unborn pig develops (also called womb).
Virus	Very small microscopic disease-causing organism, smaller than bacteria.
Wean	To end piglets' access to the mother's milk, whilst simultaneously accustoming them to solid food.