

FARM STRUCTURES IN TROPICAL CLIMATES FOR PIGS

Pig Housing

Pig farming is relatively unimportant in most regions of Africa, as in most tropical countries, except China and South-East Asia. However, pig production is increasing in many tropical countries as processed pork finds an increasing market and pig production yields a relatively rapid rate of return on the capital employed. Pigs are kept primarily for meat production, but the by-products, such as pigskin, bristles and manure are also of economic importance.

To some extent pigs compete with man for food, but they can also utilise by-products and wastes from human feeding.

Management Improvements

In many tropical countries pigs roam freely as scavengers or are raised in the back-yard where they depend on wastes for feed. Little attempt is made to obtain maximum productivity. However, a few simple management practices can help to improve the productivity and health of these pigs. They include:

1 Fenced paddocks with shade and water where:

- a Pigs are protected from direct sun, which will cause sunburn, and sometimes sunstroke particularly with whiteskinned pigs.
- b Pigs can be fed supplementary feed secure from neighbouring pig.
- c Some basic measures to control disease and parasites are possible to reduce the often very high mortality rate and to improve the poor reproductive and growth performance and inferior quality of meat experienced in traditional pig production in the tropics. The paddock can be sub-divided into 4 to 6 smaller areas so that pigs can be moved from one enclosure to another at 2 week intervals.
- d Sows can be bred to selected sires.

2 Simple semi-covered pens constructed of rough timber with a thatch roof and floor of concrete as shown in Figure 10.25. An earth floor can be used, but is more

difficult to keep clean and sanitary. Several pens can be arranged in a row as required. The main disadvantage with this type of accommodation is the relatively high labour requirements for cleaning.

3 Wallows or sprinklers can be provided to alleviate heat stress. Being unable to sweat sufficiently pigs have a natural instinct to wallow to increase the evaporative cooling from the skin.

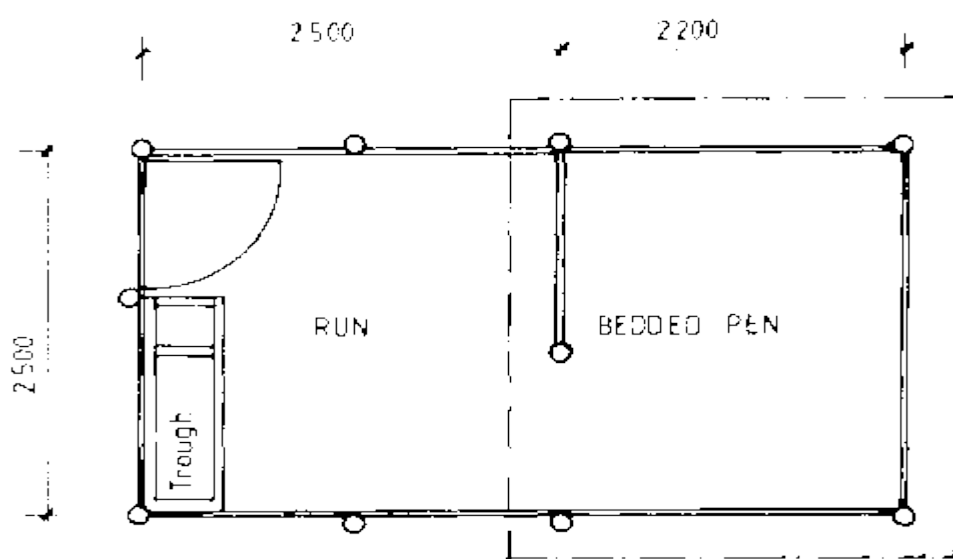
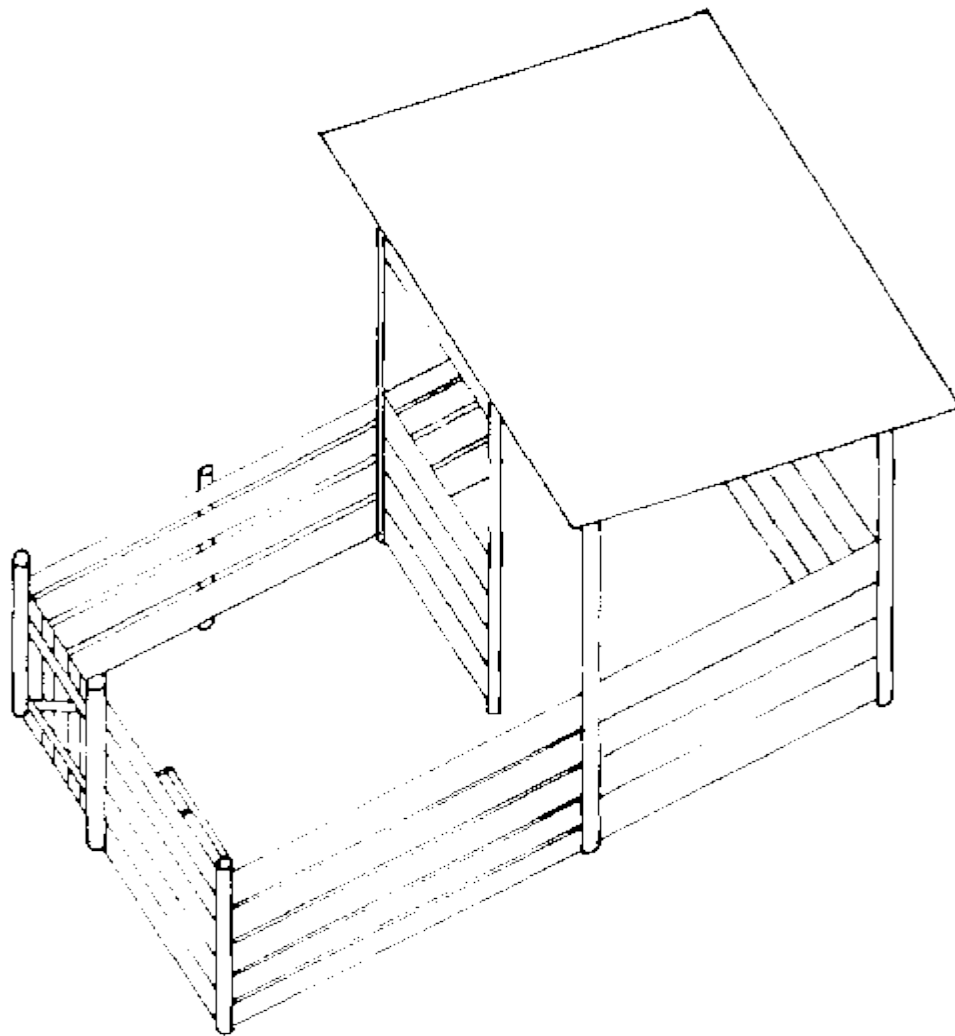


Figure 10.25 Smallholder's pigsty for one sow with litter or 4 to 5 fattening pigs.

While such improvements have the advantage of low investment in buildings and less need for balanced feed rations, they should only be regarded as first steps in raising the general level in present primitive systems.

The raising of pigs in confinement is gradually replacing the old methods because of lower production costs, improved feed efficiency and better control of disease and parasites. Thus, the confinement system is usually advisable in circumstances where:

- good management is available;
- high-quality pigs are introduced;
- farrowings occur at regular intervals throughout the year;
- land is scarce or not accessible all the year;
- balanced rations are available;
- labour is expensive;
- parasite and disease control is necessary;
- the target is commercial production;
- herd size is reasonably large.

Some systems keep only part of the herd in confinement. The order of priority for confinement housing for the different classes of animals is usually as follows:

- 1 Growing/finishing pigs (25-90 kg or more liveweight) for higher control daily gain, better feed conversions and parasite control.
- 2 Farrowing and lactating sows, to reduce pre-weaning mortality and for higher quality weaners.
- 3 Gestating sows, to allow individual feeding and better control of stock.

Management Systems in Intensive Commercial Pig Production

There is no standard type or system of housing for pigs. Instead, accommodation and equipment are chosen to suit the type of management system adopted. However, there are certain similar principles and practices in most systems. These originate from the fact that most pig units will contain pigs of different ages and classes as shown in Figure 10.26.

Farrowing-Suckling Pens

In small and medium scale intensive pig production units a combined farrowing, suckling and rearing pen is normally used. The sow is brought to this pen one week before farrowing and stays there together with her litter for 5 to 8 weeks when the piglets are weaned by removing the sow. The sow is often confined in a farrowing crate a few days before, and up to a week after birth to reduce piglet mortality caused by overlaying or trampling. Systems 1 and II in Figure 10.27.

Early weaning after a suckling period of 5 to 6 weeks or even less can only be recommended where management and housing is of good standard.

The piglets remain in the farrowing pen after weaning and until they are 12 to 14 weeks of age or weigh 25 to 30 kg.

Group keeping of farrowing-suckling sows that have given birth within a 2 to 3 week interval is possible, but is unusual in intensive production. However, there are few acceptance problems and the litters cross-suckle and mix freely. The pen should have at least 6m² deep litter bedding per sow, with an additional creep area of 1m².

In a large scale unit, which has a separate farrowing house, sometimes either of the following two alternative systems are practiced instead of the system described above:

The first alternative (System III in Figure 10.27) is similar to the system already described, but the piglets are moved two weeks after weaning to a weaner pen where they may remain either until they are 12 to 14 weeks of age (25 to 30 kg) or until 18 to 20 weeks of age (45 to 55 kg). Note that the piglets should always remain in the farrowing/ suckling pen for a further 1 to 2 weeks after the sow has been removed so that they are not subjected to any new environmental or disease stress at the same time as they are weaned. The weaning pens can contain one litter or up to 30 to 40 pigs. The pigs are often fed 'ad libitum'.

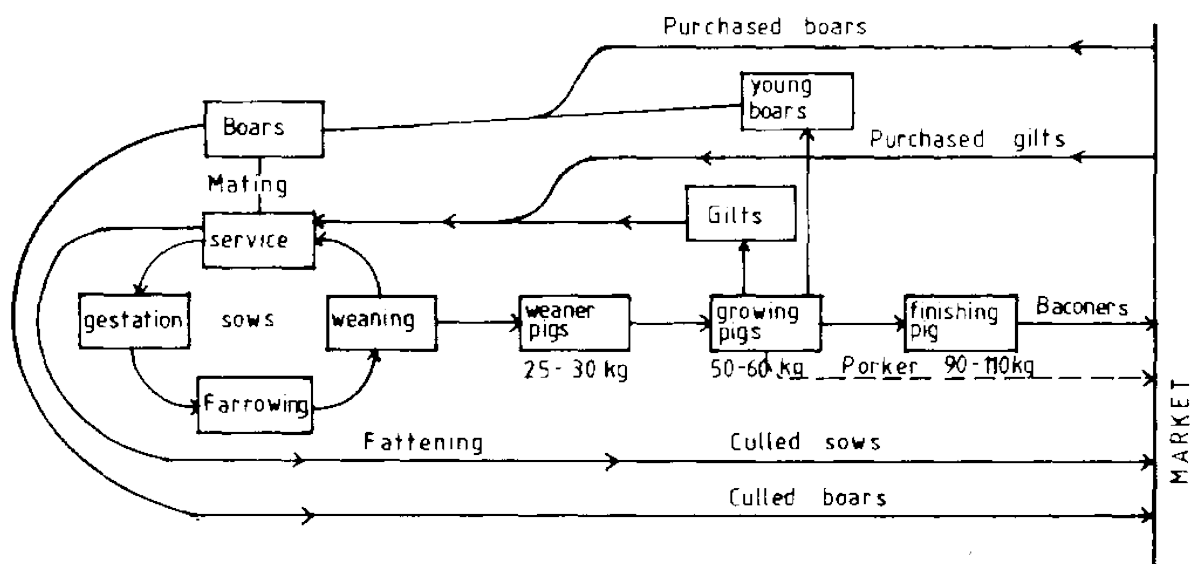


Figure 10.26 Flow Chart of the life cycle of pigs.

In the second alternative showing (System IV in Figure 10.27) the sow is placed in a farrowing crate in a small pen one week prior to birth. Two weeks after farrowing the sow and the litter are moved to a larger suckling pen. The piglets

may remain in this pen until 12 to 14 weeks of age or be transferred to weaner accommodation two weeks after weaning.

Dry Sow Pens

After weaning a sow will normally come on heat within 5 to 7 days and then at 3 week intervals until successful mating. The average weaning to conception interval can vary between 8-20 days depending on management. In the period until pregnancy has been ascertained the sow is best kept in a pen or stall in close proximity to the boar pen.

Gestating sows are kept in yards or pens in groups of up to 10 to 12 sows, that will farrow within a 2 to 3 week interval. They can also be kept in individual pens confined in stalls or tethered in stalls.

Weaner and Fattening Pens

The weaners, whether they come from a farrowing pen or a weaner pen, will at 12 to 14 weeks of age be sufficiently hardened to go to a growing/finishing pen. Finishing can be accomplished either in one stage in a growing/ finishing pen from 25 kg to 90 kg - systems 1 and IV in Figure 10.27 or in two stages so that the pigs are kept in a smaller growing pen until they weigh 50 to 60 kg and are then moved to a larger finishing pen where they remain until they reach marketable weight. System II in Figure 10.27. In large scale production the pigs are arranged into groups of equal size and sex when moved into the growing/finishing pen. Although finishing pigs are sometimes kept in groups of 30 or more, pigs in a group of 9 to 12, or even less, show better growth performance in intensive systems. An alternative, where growing and finishing are carried out in the same facility, is to start about 12 pigs in the pen and later, during the finishing period, reduce the number to 9 by taking out the biggest or smallest pigs from each pen.

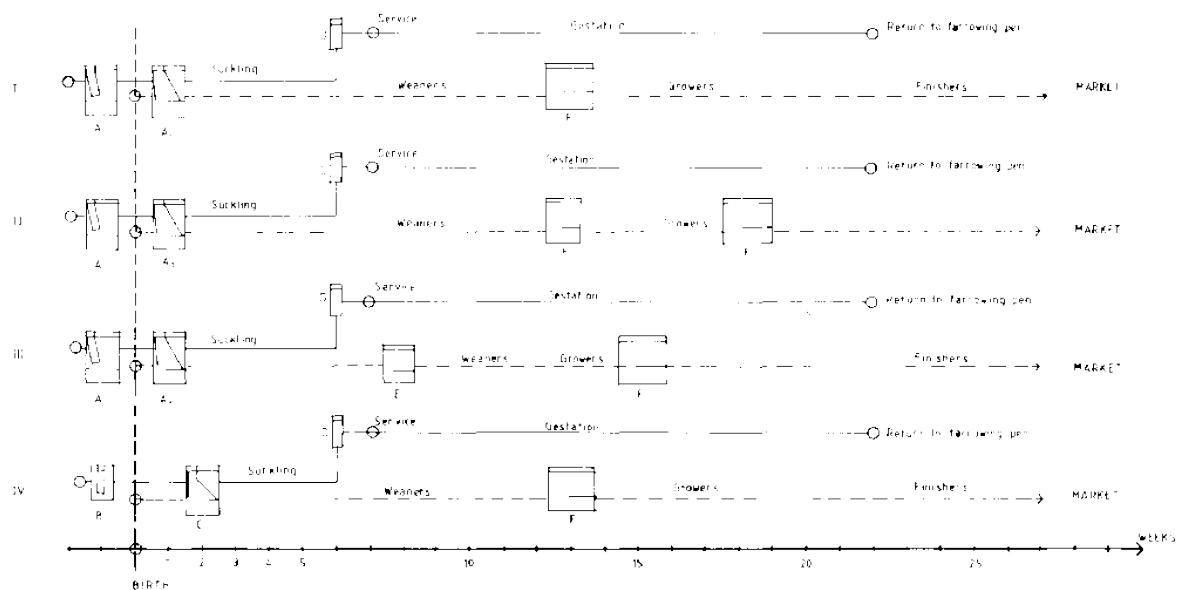


Figure 10.27 Flow chart of four different management systems in the pig production.

Replacement Pens

In intensive systems a sow will, on average, produce 3 to 6 litters before she is culled because of infertility, low productivity or age. Young breeding stock should be separated from the rest of the litter at about 3 months of age, since they should be less intensively fed than the fattening pigs. Gilts are first covered when they are 7 to 9 months of age or weight 105 to 120 kg. After mating they can either be kept in the same pen up to 1 week before farrowing, or kept in the gestating sow accommodation, but in a separate group.

Boars in the tropics are usually quiet if run with other boars or with pregnant sows, but may develop vicious habits if shut up alone.

Determining the Number of Pens and Stalls Required in a Pig Unit

One objective in planning a pig unit is to balance the accommodation between the various ages and numbers of pigs. Ideally, each pen should be fully occupied at all times, allowing only for a cleaning and sanitation period of about 7 days between successive groups.

In the following example the number of different pens required in a 14-sow herd, where 8 week weaning is practised, will be determined.

I Determine the farrowing interval and number of farrowings per year.

Average weaning to conception interval	20 days
Gestation	114 days
Suckling period (7 x 8 weeks)	56 days
Farrowing interval	190 days

Number of farrowings per sow and year $365 / 190 = 1.9$

2 Determine the number of farrowing pens.

The piglets remain in the farrowing pen until 12 weeks of age.

Before farrowing	7 days
Suckling period	56 days
Rearing of weaners	28 days
Cleaning and sanitation of pen	7 days
Occupation per cycle	98 days

Thus one farrowing pen can be used for: $365 / 98 = 3.7$ farrowings per year.

A 14 sow herd with an average of 1.9 farrowings per sow and year requires $(14 \times 1.9) / 3.7 = 7$ farrowing pens.

3 Determine the number of servicing/ gestating pens.

Average weaning to conception interval	20 days
Gestation period less 7 days in farrowing pen	107 days
Cleaning and sanitation of pen	7 days
Occupancy per cycle	134 days

Thus one place in the servicing/gestation accommodation can be used for: $365 / 134 = 2.7$ farrowings per year.

With a total of 27 farrowings a year

$27 / 2.7 = 10$ places would be required.

4 Determine the number of places for replacement stock.

Presume the sows on average get 5 litters, then 20 percent of all litters will be from gilts.

Rearing of breeding stock (12 to 35 weeks)	168 days
Gestation less 7 days in farrowing pen	107 days
Cleaning and sanitation of pen	7 days
Occupancy per cycle	282 days

About 30% more animals are separated than the required number of gilts thus the required number of places in the 14 sow herd will be

$$(14 \times 1.9 \times 0.2 \times 1.3 \times 282) / 365 = 6 \text{ places}$$

5 Determine the number of places in the growing/finishing accommodation:

One stage finishing:	
Fattening of pigs 12 to 27 weeks of age, (25-90 kg)	105 days
Extra period for last pig in the pen to reach marketable weight	21 days
Cleaning and sanitation of pen	7 days
Occupancy per cycle	133 days

Assuming that 8 pigs per litter will survive to 12 weeks of age the number of places required in the finishing accommodation will be:

$$(14 \times 1.9 \times 8 \times 133) / 365 = 78$$

That is 8 pens with 10 pigs in each or 10 pens if each litter should be kept together.

Two stage growing/finishing unit:

Growing pigs 12 to 20 weeks of age will occupy a growing pen for 63 days including 7 days for cleaning.

$$(14 \times 1.9 \times 8 \times 63) / 365 = 37 \text{ places is required in the unit.}$$

Finishing pigs 20 to 27 weeks of age will occupy a finishing pen for 70 days including 14 days emptying period and 7 days for cleaning. (The emptying period will be shorter if the pigs are sorted for size while being transferred from the growing to the finishing pens.

$(14 \times 19 \times 8 \times 70) / 365 = 41$ places is required in the unit

From the above example it will be appreciated that the number of pens of various kinds required in a pig unit is based on a number of factors. It is, therefore, not possible to lay down hard and fast rules about the relative number of pens and stalls. However, a guide line to the requirement of pens in herds with average or good management and performance in tropical conditions is given in Appendix VI.

Space Requirement

In intensive pig production systems all pigs should be raised on concrete floors to provide for a clean and sanitary environment. In semi-intensive systems a concrete floor is only used in the pens for finishing pigs and perhaps in the farrowing pens, whereas an earth floor or deep litter bedding is used in other pens and yards. Litter may or may not be used on a concrete floor, but its use is desirable, particularly in farrowing pens.

Because of the cost of a concrete floor there is a tendency to reduce the floor area allowed per animal. However, too high stocking densities will contribute to retarding performance, increasing mortality, health and fertility problems and a high frequency of abnormal behaviour thus endangering the welfare of the animals. Increasing the stocking density must be accompanied by an increased standard of management and efficiency of ventilation and cooling. In particular, to aid in cooling, finishing pigs kept in a warm tropical climate should be allowed more space in their resting area than is normally recommended for pigs in temperate climates. Table 10.9 lists the recommended space allowance per animal at various stocking densities. The figures listed for high stocking density should only be used in design of pig units in cool areas and where the management level is expected to be above average.

The dimensions of a pen for fattening pigs are largely given by the minimum trough length required per pig at the end of their stay in the pen. See Table 10.10. However, the width of a pen with low stocking density can be larger than the required trough length. This will reduce the depth to 2.0 to 2.4m, and thus the risk of having the pigs create a manure area within the pen.

Furthermore, the flexibility in the use of the pen will increase and the extra trough space allow additional animals to be accommodated temporarily or when the level of management improves.

Sometimes finishing pens are deliberately overstocked. The motive for this is that all pigs in the pen will not reach marketable weight at the same time and the space left by those pigs sent for slaughter can be utilized by the remainder. Such overstocking should only be practiced in very well managed finishing units.

General Requirements for Pig Housing

A good location for a pig unit meets the following requirements: easy access to a good all-weather road; well-drained ground; and sufficient distance from residential areas to avoid creating a nuisance from odour and flies.

An east-west orientation is usually preferable to minimize exposure to the sun. Breezes across the building in summer weather are highly desirable. A prevailing wind during hot weather can sometimes justify a slight deviation from the east-west orientation. Ground cover, such as bushes and grass, can reduce reflected heat considerably, and the building should be located where it can most benefit from surrounding vegetation.

A fairly light well-drained soil is preferable, and usually the highest part of the site should be selected for construction.

Pig houses should be simple, open-sided structures as maximum ventilation is needed. A building for open confinement is therefore essentially a roof carried on poles. The roof supporting poles are placed in the corners of the pens where they will cause least inconvenience. A free span trussed roof design would be an advantage but is more expensive.

In some circumstances it may be preferable to have solid gable ends and one tight side to give protection from wind or low temperatures, at least for part of the year. If such walls are needed they can often be temporary and be removed during hot weather to allow maximum ventilation. Permanent walls must be provided with large openings to ensure sufficient air circulation in hot weather. If there is not sufficient wind to create a draught in hot weather, ceiling fans can considerably improve the environment.

The main purpose of the building is to provide shade, and therefore the radiant heat from the sun should be reduced as much as possible. In climates where a clear sky predominates, a high building of 3m, or more, under the eaves gives more efficient shade than a low building. A wide roof overhang is necessary to ensure shade and to protect the animals from rain. A shaded ventilation opening along the ridge will provide an escape for the hot air accumulating under the roof. If made from a hard material the roof can be painted white to reduce the intensity of solar radiation. Some materials such as aluminium reflect heat well as long as they are not too oxidized. A layer of thatch (5cm) attached by wire netting beneath a galvanised steel roof will improve the microclimate in the pens. A roof of thatch is excellent in hot climates, particularly in non-confined systems, but cannot always be used because of fire hazard and because it is attractive to birds and rodents. A pig house with two rows of pens and a central feeding alley would require a ridge height of 5 to 6 metres if covered with thatch.

Table 10.9 Dimensions and Area of Various Types of Pig Pens

	Units	Stocking density		
		Low	Medium	High
A. Farrowing/ suckling pen.				
Resting area, if weaner pens are not used	m ²	10.0	7.5	6.0
Resting area, if weaner pens are used	m ²	8.0	6.0	5.0
Manure alley width	m	1.7	1.5	1.3
Farrowing pen (System IV)	m:	-	4.5	4.0
Farrowing crate, length excl. trough	m	2.0	2.0	2.0
width depending on size of sow	m	0.65 - 0.75	0.6 - 0.7	0.55 - 0.65
free space behind the crate	m	0.4	0.35	0.3
Piglet creep (incl. in resting area)	m ²	2.0	1.5	1.0
B. Boar pen				
1. Pen with yard				
Resting are (shaded)	m ²	6	5	4.5
Yard area (paved)	m ²	12	10	08
2. Pen without yard	m ²	9	8	7
C. Gestating sow pens				
1. Loose in groups of 5 - 10 sows				
Resting area (shaded)	m ²	2.0	1.5	1.1
Yard area (paved)	m ²	3.5	3.0	2.5
Feeding stalls, depth x width	m	2.0 x 0.6	1.8 x 0.55	1.7 x 0.5
2. Individual stalls with access to manure alley, length of stalls excl. trough	m	2.2	2.1	2.0
width of stalls	m	0.65 - 0.75	0.60 - 0.70	0.55 - 0.65
width of manure alley	m	1.5	1.4	1.3
3. Confined in individual stalls				
length x width of stalls	m	2.2 x 0.70	2.1 x 0.65	2.0 x 0.60
D. Weaner pen (to 25 kg or 12 wks)				
Resting area excluding trough	m ² /pig	0.35	0.30	0.25
Manure alley width	m	1.0	1.0	1.0
0E. Growing pen (to 40 kg or 17 wks)				
Resting are excluding trough	m ² /pig	0.5	0.45	0.40

Manure alley width	m	1.1	1.1	1.1
F. Finishing pen, resting area excl. trough				
For porkers to 60 kg or 21 wks	m ² /pig	0.70	0.60	0.50
For beacons to 90 kg or 27 wks	m ² /pig	0.90	0.75	0.60
For heavy hog to 120 kg or 33 wks	m ² /pig	1.0	0.85	0.70
Manure alley width	m	1.2 - 1.4	1.2 - 1.3	1.2

The pen partitions and the 1 metre wall surrounding the building, which serves to reduce heat reflected from the surrounding ground, can be made of concrete blocks or burnt clay bricks for durability or perhaps soil-cement blocks, plastered for ease of cleaning. Regular white washing may improve the sanitary conditions in the pens.

Doors have to be tight fitting and any other openings in the lower part of the wall surrounding the building should be avoided to exclude rats. Apart from stealing feed and spreading disease, large rats can kill piglets.

For all types of confinement housing a properly constructed easily cleaned concrete floor is required. Eighty to 100 mm of concrete on a consolidated gravel base is sufficient to provide a good floor. A stiff mix of 1:2:4 or 1:3:5 concrete finished with a wood float will give a durable non-slip floor. The pen floors should slope 2 to 3% toward the manure alley and the floor in the manure alley 3 to 5% towards the drains.

Housing for a Small Scale Pig Unit

For units with 2 to 15 sows, specialized buildings for the various stages of production may not be practical or desirable. For the smallest units of 2 to 6 sows a kind of universal pen which is about 2.7m wide and 2.8-3.0m deep (including feed through) which can be used for:

1 sow and her litter, or
 2 litter of weaned piglets, or
 3 to 4 gestating sows, or
 9 growing/finishing pigs of up to 90 kg live weight, or
 1 boar

This type of pen shown in Figure 10.28, provides a high degree of flexibility but usually does not allow as efficient a use of the building space as the more specialized pens.

When used for farrowing, the pen should be adapted with guard rails 25cm above floor level and 25 from the wall to protect the piglets from being crushed as shown

in Figure 10.28b. However, confinement farrowing is one of the most efficient ways of reducing piglet losses. An arrangement with fixed or removable rails, which divide the pen, as shown in Figure 10.28c, will offer some degree of confinement.

In some climates it may be desirable to give sows with litter access to exercise yards. However, for the relatively short suckling period (6 to 8 weeks), it is usually considered best to keep the sows confined in pens with their litters.

A creep for the piglets is arranged in one corner of the pen. It is recommended that a temporary ceiling (e.g. wire netting covered with straw) 50 to 60cm above the floor in the creep area be constructed to prevent draughts and to keep warmer temperatures for the piglets during their first weeks of life. Where electricity is available, heating with an infra-red lamp may be used instead. Piglets are fed in the creep area out of reach of the sow.

Figure 10.29 shows a single row pig unit for 2 sows and fattening pigs, and Figure 10.30 a double row pig unit for 4 sows having a central feeding alley. The semi-covered manure alleys are arranged along the outside walls separated from the resting area of the pen. This arrangement will allow rain water to help flush away the waste to the drain channel and on to the manure store which has to have extra capacity for this water. However, in the 4 sow unit the farrowing pens have fully covered manure alleys for increased protection of the piglets.

The roof may be equipped with gutters so that rain water can be drained away separately or be collected for use as drinking water for the pigs.

A single tubular steel or round timber rail 20cm above the outside, rear wall (1m high) is desirable to increase security without interfering with ventilation.

Both buildings shown in Figures 10.29 and 10.30 can be extended to accommodate 2 to 4 more sows by adding 2 pens for fattening pigs at one end every time a farrowing pen is added at the other end.

Table 10. 10 Minimum Trough Length and Height of Partitions in Various Types of Pig Pens

		Minimum trough length	Minimum height of pen partitions
		m/pig	m
Sow in farrowing pen		0.7	1.0
Loose dry sows in pens		0.5	1.0

Stall for dry sows		0.5	1.0
Boars		0.6	1.2
Piglets	10 kg	0.14 - 0.15	0.6
Piglets	15 kg	0.16 - 0.17	0.7
Pigs	25 kg	0.18- 0.20	0.8
Pigs	40 kg	0.22 - 0.24	0.9
Pigs	60 kg	0.25 - 0.27	0.9
Pigs	90 kg	0.30 - 0.32	0.9
Pigs	120 kg	0.35 - 0.37	1.0

[Figure 10.28 Universal pen.](#)

[Figure 10.29 Single row pig unit for 2 sows and fatteners.](#)

[Figure 10.30 Double row pig unit for 4 sows and fatteners.](#)

Housing for the Medium Scale Pig Unit

In pig units for more than six to eight sows it becomes feasible to construct specialised pens for the various production stages, but these can still be accommodated under the same roof. A larger production volume can be accommodated by extending the unit shown in Figure 10.31 up to about 15 sows. A further increase should then be accomplished by building an additional separate unit of this type with up to 15 sows, as too many animals in one building is a potential health hazard.

Housing for the Large Scale Pig Unit

In large scale units special provisions must be made for efficient health control. This means: not too many animals in one building; animals of approximately the same age housed together; using an all-in-all-out system with thorough cleaning and disinfection of every house between each batch of pigs; placing the buildings 15 to 20m apart and surrounding the entire site with a secure fence.

Specialised pens in separate houses for the various stages in the production is normally feasible in units for more than 20 to 30 sows. Each type of pen can be designed with dimensions for the most efficient use of the building space, as they don't have to fit in a layout with other types.

Farrowing House

The type of farrowing pen shown in Figure 10.32 offers a relatively high degree of confinement in that the sow is restrained in a farrowing crate during farrowing.

Five to ten days after farrowing the crate is removed or opened, to free the sow, as indicated in the figure. A slightly askew arrangement of the farrowing crate will allow for a longer trough for the piglets in the front of the pen, but is more complicated to construct.

A reduction in space requirement can be accomplished by putting the sow in a farrowing pen, consisting merely of a farrowing crate with 0.5 and 1.0m wide creep areas on either side, one week prior to farrowing. Two weeks after farrowing the sow and piglets must be transferred to a suckling pen equipped like the pen shown in Figure 10.28b but with the dimensions 2.3m wide, by 2.35m deep and with a 1.4m wide manure alley.

[Figure 10.31 Pig unit for 10 sows and fatteners.](#)

[Figure 10.32 Farrowing pens with crates for confinement of the sow during birth.](#)

Housing for Growing/Finishing Pigs

Growing/Finishing pens 2.8m wide by 1.9 to 2.2m deep and with a 1.2m manure alley can accommodate the following number of pigs, according to their weight:

up to 40 kg - 12 pigs
40 - 90 kg - 9 pigs
over 90 kg - 7 pigs

Where it is very hot it is preferable to reduce the number of pigs per pen below the numbers given here. The manure alley must be well drained, preferably by a covered drain, but an open drain will also serve provided that it is outside of the pen to prevent urine from flowing from one pen to another. Bedding in the pens is preferable for the animals' comfort and to reduce stress, as the bedding will provide them with something to do. Controlled feeding is important to ensure the best possible feed conversion.

Housing for Gestating Sows

Gestating sows are usually the last group in a pig herd to be considered for confinement housing. However, there are obvious advantages which could have a great influence on the production efficiency when sows are confined and controlled during gestation.

As their litters are weaned, sows can be returned to the gestating sow structure and placed in one of the pens arranged on either side of the boar pens for easy management of sows in heat. After mating and the three week control period, the sows should be re-grouped according to the actual farrowing dates.

The type of accommodation shown in Figure 10.33a will always have four sows per group as the gates in the manure alley are used to enclose the sows in their stalls while cleaning the pen. The stalls, which are used for both feeding and resting, should be 0.60 to 0.75m wide, depending on size of the sows.

With the type shown in Figure 10.33b, the numbers in the groups can vary according to the size of the herd and farrowing pattern, but sows in one group should be in about the same farrowing period (within about 10 to 15 days of each other).

The feeding stalls should be 50cm wide, and a bar should be installed which can be lowered after all the sows have entered the stalls. This arrangement will prevent sows from backing out of their assigned stall, and biting and stealing feed from other sows. When all the sows have finished eating, the bar is lifted and they can leave the feeding stalls.

Behind the feeding stalls there is a manure alley with gates across and which can close the opening of the resting area in order to confine the sow while cleaning out the manure alley. The width of the manure alley can be increased from 1.5 to 2.5m if desired, so that cleaning out can be earned out by a tractor mounted scraper.

In both types of pens, exercise yards when considered feasible, can be arranged behind the building.

[Figure 10.33a Groups of four sows in resting and feeding stalls and with access to a manure alley.](#)

[Figure 10.33b Groups of five sows with access to feeding stalls and a headed resting area, where they are enclosed during cleaning.](#)

[Figure 10.34 Layout of a 50 sow unit.](#)

Special Arrangements for Warm Climates

Many of the principles that have been discussed above apply equally well to both hot and temperate climates and are basic requirements for the housing of pigs. The open type of confinement system has its limitations, but applied in many warm areas leads to a major improvement in production.

The complete control of the environment in animal houses is generally far too expensive to be feasible, in particular when considered in connection with nonconfined systems. However, provisions for shade, proper roof colour and material and controlled air movements, which have already been discussed, can be both practical and economic.

A spray or a wallow can considerably reduce heat stress in pigs. A wallow can be anything from a water filled hole in the earth to a concrete trough. While wallows are effective and need not be expensive, they tend to become unsanitary if not regularly cleaned.

From a hygienic point of view sprinklers which spray water on to the pigs, are preferable, but water consumption can be up to four times as high as for a wallow. Water consumption is about 20 litres per pig per day for 10 hours continuous spraying, compared with 5 litres per pig per day using a wallow. However, a spray system can be operated intermittently by a timer which can limit use to about 2 litres per pig per day. The spray should be directed on to the pigs and not into the air. The spray system can be effectively used with all categories of pigs, except very young piglets. A sprinkler in the manure alley of the farrowing pen, operated from the time the litter is about two weeks old, may help the sow to maintain her feed intake. Hosing pigs once or twice a day is a great deal less effective than a spraying system.

Feed Troughs and Feed Storage

Efficient pig production requires a reliable supply of water and feed for a balanced diet. A large range of feedstuffs, including by-products and crop surpluses, may be used provided they are incorporated into a balanced diet. The requirements for feed change as the pigs grow and depend on the stage of production in sows. Table 10.11 shows the requirement where the feeding is based on a mix of meal feeds and can be used to estimate the required storage capacity for supply between deliveries.

Table 10.1 1 Feed and Water Requirement for Pigs

Animal		Feed Intake (meal feed) kg/pig	Drinking Water Requirement litre/day
Sow in farrowing pen		5 - 7	22 - 27
Gestating sow		2 - 3	12 - 17
Boar		2.5 - 3.50	10
Piglet	10 kg	0.60	1.0
Piglet	15 kg	0.75	1.5
Pigs	25 kg	1.10	2.5
Pigs	40 kg	1.70	4.0
Pigs	60 kg	2.30	5.5
Pigs	90 kg	2.90	7.0

Pigs	120 kg	3.10	7.0
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A wide variety of feeding equipment is available for pig operations. The easiest to clean and sanitize are made from concrete, metal or glazed burnt clay. Concrete troughs are commonly used and can be pre-fabricated using a metal mould. The trough is often placed in the front wall of the pen as shown in Figure 10.35d, e and f. Although such an arrangement makes for a more difficult construction than to have the trough inside the pen it is usually preferred due to easier feeding and it also prevents the pigs from stepping into the trough.

The wall above the trough can be made either solid or open and can be either vertical or sloping inwards to the pen.

An open front improves ventilation in the pen but it is more expensive than a close-boarded wooden front as galvanised steel pipes have to be used for durability. In particular a sow confined in a stall of a farrowing crate will feel more comfortable if she is able to see in front of her. A sloping front will more effectively discourage pigs from stepping into the trough but it is more complicated and expensive to construct.

Two piglet feeders for use in the creep area are shown in Figure 10.36. The same types can be used for growing pigs up to 40 to 50 kg, but the dimensions will need to be increased. Metal is preferred, although a feeder made of wood can be satisfactory if cleaned regularly and thoroughly.

Watering Equipment

The requirement of drinking water is shown in Table 10.11. It is preferable to mix mealfeed with 1.5 to 2.1 litres of water per kg feed. The rest of the water can be given in the trough between feedings or in special drinkers. Clean water must be available to the pigs at all times, including the piglets in a farrowing pen.

Automatic drinkers are the most hygienic and can be used where piped water is available. There are two types, one which is placed above the feed trough and sprays into the trough when pushed by the pigs and the other type, which is operated by the pigs biting around it. This latter type is often placed in the manure alley or in the pen close to the manure alley to prevent the pigs from getting the resting area wet.

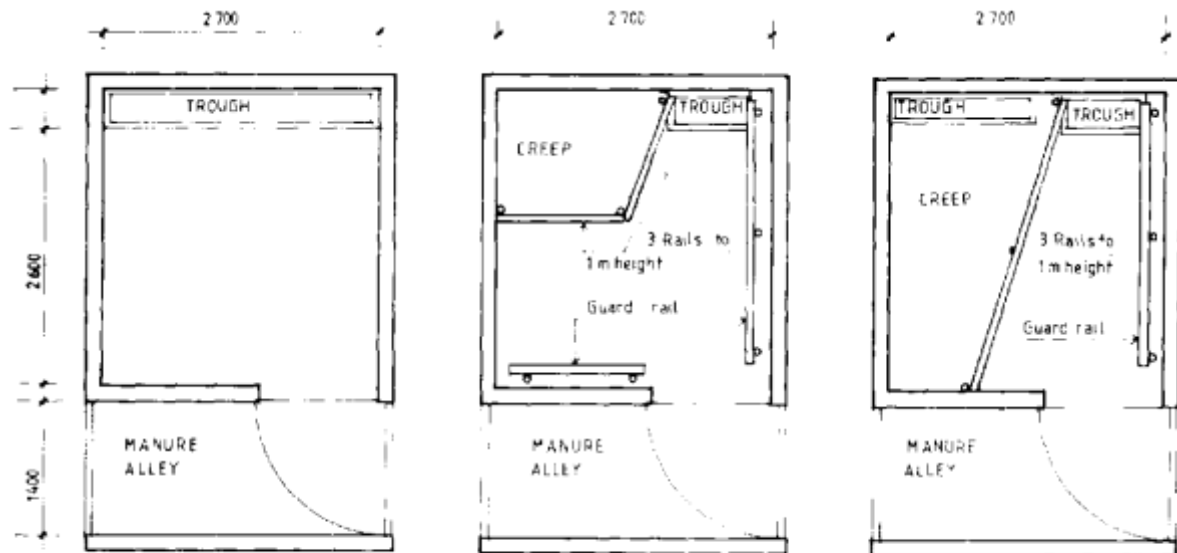
Manure Handling

The pig pens must be cleaned once or twice per day. Provided sufficient bedding is used and the urine is drained away separately to a urine storage tank the solids may have a consistency, which allows it to be stacked on a concrete slab. Where little or

no bedding is used or the urine is not separated, a manure storage slab of the type shown in Figure 10.22 can be used. Table 10.12 shows the manure production.

[Figure 10.35 Feeding equipment.](#)

[Figure 10.36 Piglet feeders.](#)



- a Universal equipped for fattening pigs.
- b Universal pen equipped for farrowing/suckling (non-confined sow).
- c Universal pen equipped for farrowing/suckling (slightly confined sow).

Fig 10.28

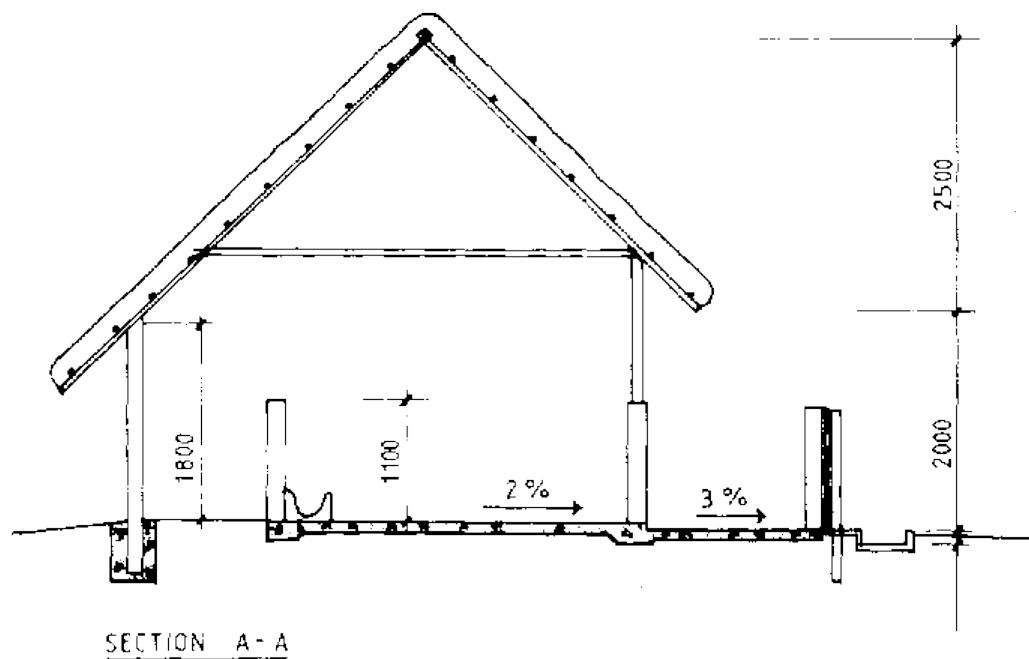
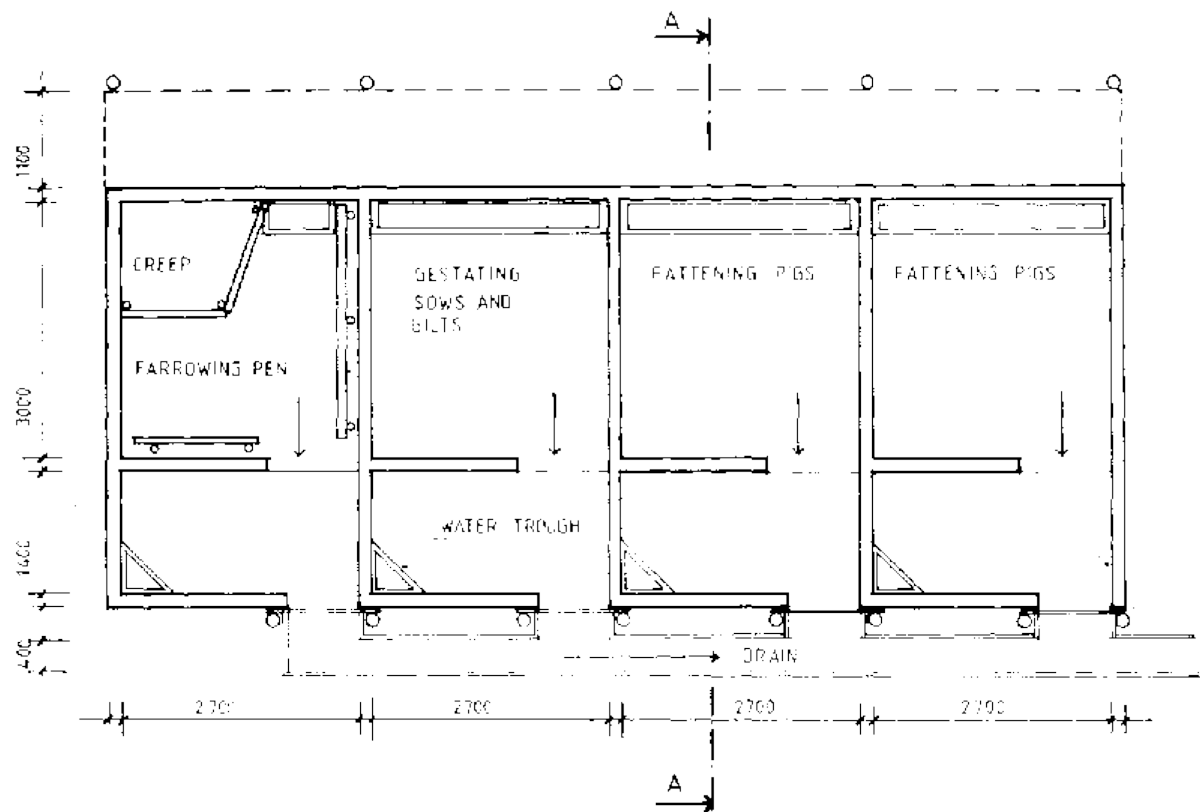


Fig 10.29

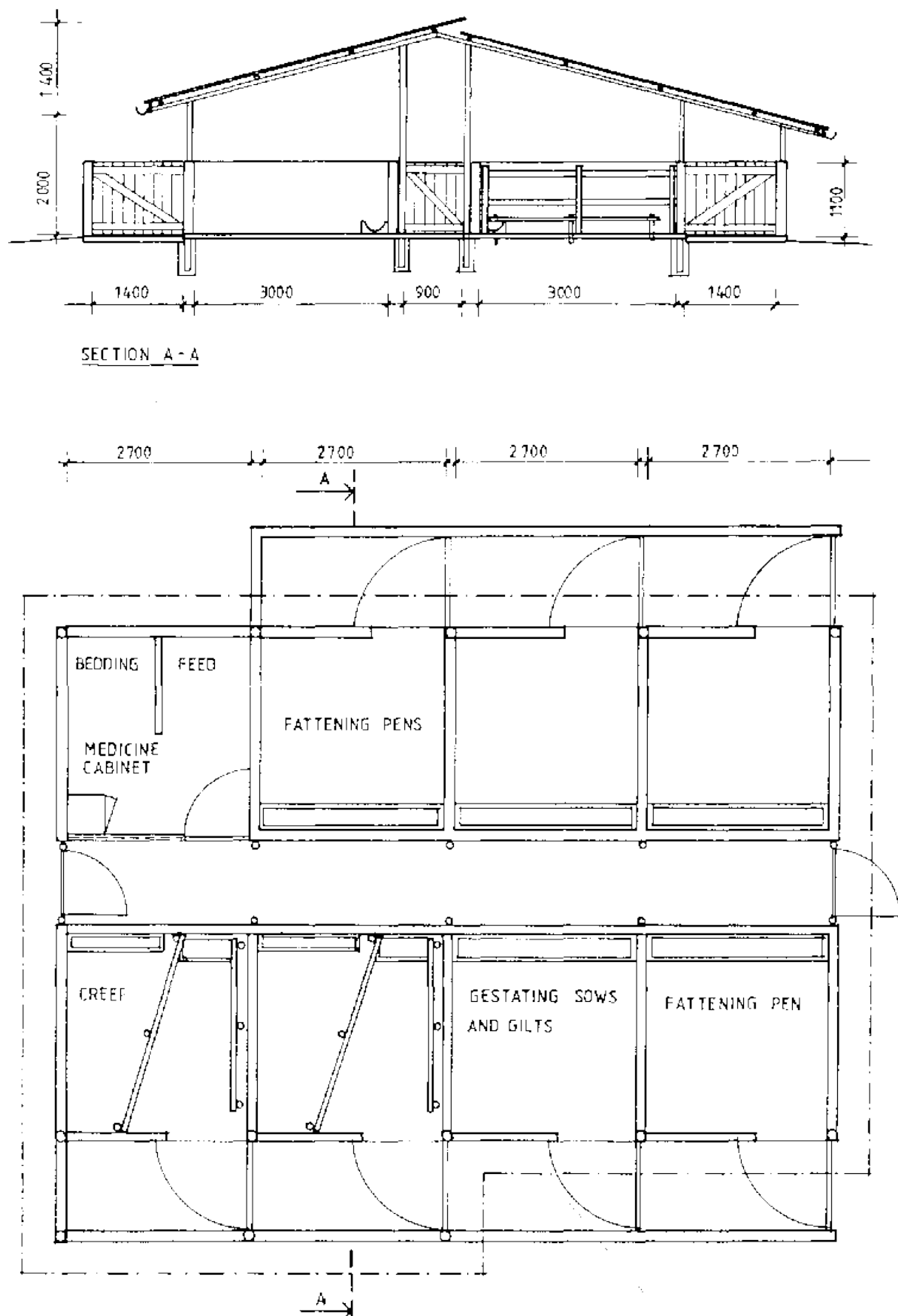


Fig 10.30

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