



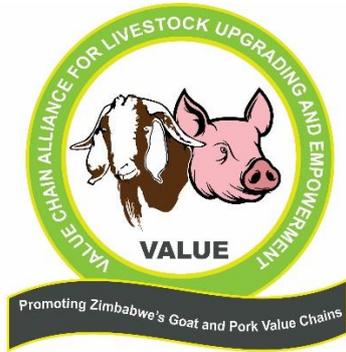
Government of Zimbabwe



Zimbabwe  
**AGRICULTURAL  
GROWTH**  
Programme



Funded by the European Union



## ZAGP VALUE Project Pork Value Chain Booklet on Pig Housing and Housing designs



*Transforming the Pork Value Chain for the Future*

## 1. INTRODUCTION

Successful pig production business hinges primarily on good pig husbandry practices while proper housing structures are an aid to management. The practice of keeping pigs in housing is part of intensive system of pig production and has the following advantages

- The environment can be controlled – provision of artificial heating where required
- Management control is easy, for example checking pigs on heat and breeding
- Disease occurrence is minimized as high standard of hygiene can be practiced
- Feed conversion efficiency is improved as the space of movement is limited.

The other systems of production are free range whereby pigs are left to roam and there are high chances of contracting diseases. Semi intensive system whereby pigs are partly housed and left to roam during part of the day. In these two systems mortalities are high and it is difficult to optimize productivity.

Pig houses must provide a dry bed and protect pigs from extreme temperature and sunburn. Minimum space requirements apply for lying, dunging, provision of fresh air, access to feed and water. The stated requirements should not predispose the pigs to illness or injury. The pens should also enable the stockman to work with ease.

This document details the different types and designs of pigsties that a farmer can adopt to suit the available resources but achieving the best possible results in pig business.

The starting point is to have a workout as to the number of pens required for different classes of animals. A decision will then be made on which type of pens to construct.

Below is a workout of the number of different pens required for a 50-sow unit.

## 2. PEN REQUIREMENTS WORKOUTS FOR A 50 SOW UNIT

### i. Assumptions

- Farrowing index 2
- Weaning age 5 weeks
- 18 pigs are sold per sow per year
- 20 weaners are produced per sow per year
- Sows enter farrowing house 1 week before farrowing and the pens are rested for a week after weaning
- Weaners occupy weaner pens for 3 weeks and the pens are rested for 5 days.
- Fatteners occupy the fattening pens for 105 days and the pens are rested for 3 days.

### ii. Farrowing Places

- Farrowings per year  $50 \times 2.0 = 100$
- With a 7-week occupation period the number of times the same farrowing place can be used =  $52/7 = 7$  approximately
- No of farrowing places required =  $100/7 = \mathbf{14 \text{ Farrowing places}}$

### iii. Dry sow places

- The sow is weaned after 5 weeks.
- The sow enters the farrowing house a week before farrowing. At 2 litters per sow per year a period of  $(6 \times 2) = 12$  weeks is spent away from dry-sow housing.

- The period the sow is in the dry sow pens is 40 weeks.
- The number of dry sow places required is  $40 \times 50/52 = 38$
- If sows are housed 8 in a pen
- No of pens required =  $38/8 = 4.75$
- No of pens required = **5 pens**

#### v. Weaner Pens

- Output of weaners per year =  $50 \times 2 \times 10 = 1000$  weaners
- Weaners stay in the weaner pens for 3 weeks with the pen being rested for 5 days.
- Batches per year =  $365/26 = 14$  batches
- No of pigs/batch =  $1000/14 = 71$  pigs
- At 12 weaners/pen the number of pens required =  $71/12 =$  **6 pens**

#### vi. Fattening Pens

- Pigs occupy the fattening pens after 8 weeks.
- Fatteners are marketed when they are about 5 1/2 months of age.
- Allowing 3 days cleaning between batches the number of batches that can use the same facility per year is  $365/109 = 3.3$
- Output per year is  $50 \times 18 = 900$
- For a 50-sow unit the number of pigs per batch is  $50 \times 18/3.3 = 272$ .
- 272 fattening places are required per time.
- At 15 pigs/pen the number of pens required is  $272/15 =$  **18 pens.**

### 3. IDEAL HOUSING PROVISIONS

#### Temperature

Providing ideal temperatures to different classes of pigs is critical for the pigs to exploit their production potential. The recommended temperatures for the different classes of pigs are given in table 1 below

**Table 1- Temperature requirements for the different classes of pigs**

| Class of stock | Live weight of pig (kg) | Temperature °C |
|----------------|-------------------------|----------------|
| Suckling pigs  | < 2                     | 34-35          |
|                | <5                      | 28-32          |
| Weaners        | <8                      | 28             |
|                | <10                     | 26             |
|                | 10-15                   | 22             |
| Growers        | 15-30                   | 20             |
|                | 30-60                   | 18-20          |
| Finishers      | 60-120                  | 18             |
| Breeding sows  |                         | 18             |
| Boars          |                         | 16-18          |

In young stock, prolonged time below normal temperature results in the pig utilizing its body reserves to heat the body thereby resulting in more feed usage and consequently higher feed conversion ratio. Too high temperatures lead to less feed consumption resulting in the pig taking too long to attain slaughter weight.

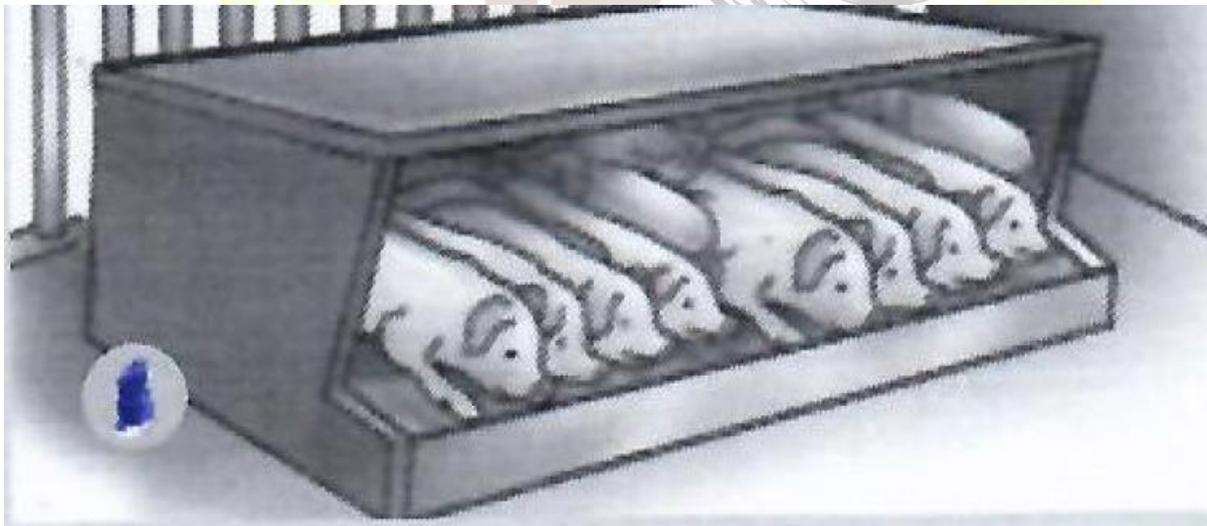
The most favorable temperature for newborn piglets is between 27 and 35°C. During the first week after birth, a piglet's ability to withstand cold is limited hence need to create a microenvironment in order to warm them.

Use of creep boxes or covers or weaner designated pens as shown below should be used to retain warmth and reduce draughts.

**Creep area with an infra-red lamp.**



**Piglets lying in a creep box**



**Lying Area**

A dry concrete floor is always desirable for better warmth and disease prevention since bacteria cannot thrive on dry environments. The foregoing statement emphasizes the need for waterproof roof in pigsties. There is always need for pigsties and weaners to be stocked with dry straw or untreated wood shavings so as to achieve excellent insulation against cold conditions.

In cases of too high temperatures older pigs get affected more than young ones. Temperatures over 27°C are generally considered undesirable for growers, finishers, and breeders. Where heat stroke is experienced especially in spring and early summer, there is need to cool the surroundings using drip or sprinkler irrigation.

### **Ventilation and insulation**

A minimum amount of fresh air is very necessary since that helps to remove water vapour, carbon dioxide, ammonia, airborne dust, bacteria and odours. Where resources permit, it is necessary to insulate the roof and walls in order to reduce heat gain or loss by conduction, and window flaps to reduce uncontrolled air change. Space between buildings should also be considered when one is planning a piggery. Buildings close to each other affects the movement of air, it is recommended to leave a space of at least the width of a building between houses.

### **Hygiene**

Proper housing of pigs goes a long way in diseases prevention and control. Micro-organisms are mostly found in the pig's gut as well as manure so unhygienic conditions expose the pigs to infections via dung or airborne dust particles hence the need for clean, dry conditions that reduce bacterial multiplication. Such conditions are achieved by adhering to proper floor slope and placement of feeding and water troughs. The slope should be 3-5% from the lying area to the dunging area where run off water, urine and water used for cleaning easily flows to the drain. The feed trough is placed upslope where it will be dry and the water troughs are placed in the dunging area.

### **Floor**

Floors should be strong enough to prevent damage by pigs and this is achieved by having 80 to 100mm of concrete on a consolidated gravel base. A slope of 3 to 5% towards the drains so that water does not accumulate in the pen is recommended. The floor should not be slippery when wet. The floor can be of concrete or hard plastic slates raised to some height from the ground. Pigs do not come into contact with the soil, and they are less susceptible to infection with parasites. The slates should be spaced at not more than 2 cm apart.

### **Provision of feed and water**

There is need to make provision for feed and water. For pigs on restricted feeding regimes, the feed trough provided should enable all the pigs to feed at the same time. Below are the recommended feeder trough dimensions for the different categories of pigs.

**Table 2- Feeder trough measurements**

| Pig category     | Length cm/pig | Width cm | Height cm |
|------------------|---------------|----------|-----------|
| Piglets/Weaners  | 15-20         | 20       | 10        |
| Fattener         | 30-35         | 20       | 15-20     |
| Breeding females | 40-50         | 35-40    | 15-20     |
| Breeding boar    | 40-50         | 35-40    | 15-20     |

Water can be accessed from water troughs or nipple/ bite drinkers. It is important to ensure that clean water is available all the time. If water is provided from drinkers there is need to ensure that the water comes at the right pressure and the nipple drinkers are correctly positioned.

### **Loading rump**

There is need to construct a loading rump that can hold the maximum number of pigs that are sent to market at a time.

## **3. FACTORS TO CONSIDER WHEN CONSTRUCTING A PIGGERY**

### **Siting**

The preferred site should have enough space for expansion should the need arise. Siting of piggery units are done in such a way that the piggery unit is always on the windward side of human residential area so that odours and flies are not a menace. A distance from the houses to the piggery of at least 50m for small piggeries and about 100m for large scale operations is ideal. Where the terrain does not support that, piggeries can be either on the northern, southern, or western side of the residential areas. This goes a long way in controlling disease infections on humans.

Buildings should not be erected too close to dams and rivers as these areas become too cold in winter and at night. There is need to avoid poorly drained areas as these can become wet basins.

### **Building orientation**

Long, narrow buildings are cooler in summer and warmer in winter if the long axis runs from east to west. The pigsty should be situated to take advantage of prevailing winds for coolness in summer whilst ventilation openings should be protected from prevailing winds in winter. The building should stretch from east to west direction with the two end walls constructed up to roof level to prevent direct sun into the pig pens. Windows or openings are to face northern and southern directions.

One way of reducing heat in summer is through planting selected trees in a shelter belt that does not interfere with airflow required for cooling in summer.

### **Pig flow**

Another consideration is pig flow. In general, the flow should move from the dry sow accommodation, the farrowing house, weaner pens and lastly the fattening pens. This will ensure that as pigs are promoted from one class to another, they will not move a long distance to the new accommodation. Pens should not just be dotted around in a piggery.

Feed stores should be positioned in such a way that lorries/tractors easily access them.

### **Housing Space**

Knowledge of good housing without considering the appropriate space required by the pig can adversely affect its performance hence productivity. For practical purposes, space requirements for the different classes of pigs are given as stated in Table 2. The space is adequate for lying, feeding, watering, and dunging.

**Table 2- PIG HOUSING SPACE REQUIREMENTS**

| Pen Use                               | Area  |
|---------------------------------------|---|
| In-pig sow stalls                     | 2m long x 0.64m wide  |
| Cubicles                              | As for stalls and similar dunging and exercise area                   |
| Sow pens                              | 2 – 3 m <sup>2</sup> per sow  |
| <b>Farrowing</b>                      |   |
| Crate                                 | 2.13m long x 0.64m wide   |
| Pen, including crate                  | 6.2m <sup>2</sup>   |
| Follow on, including creep area       | 10m <sup>2</sup>  |
| Multi suckling                        | 7-8m <sup>2</sup> /sow and litter                                     |
| <b>Weaners</b>                        |   |
| Cages                                 | 0.2m <sup>2</sup> lying area + 0.2m <sup>2</sup> slatted area per pig |
| Porkers (pen including dunging area)  | 0.73m <sup>2</sup> /pig   |
| Baconers (pen including dunging area) | 0.93m <sup>2</sup> /pig   |
| <b>Trough space (per pig)</b>         |   |
| Light porkers                         | 0.2m <sup>2</sup>   |
| Heavy porkers                         | 0.25m <sup>2</sup>  |
| Baconers                              | 0.3m <sup>2</sup>   |
| Gilts/Sows                            | 0.35m <sup>2</sup>  |

**Walls**

The walls should securely confine the pigs inside. Walls must be well plastered and normally 1,18m high. The first metre from the floor should be skimmed so that pigs will not get bruised when rubbing against the wall. A 115mm wall is strong enough provided the mortar used is of the right mix of cement and pit sand. Timber off cuts can also be used to make walls, although there will not be as strong. Use treated poles to support the structure. Timber structures are not to be used for farrowing and weaner pens for they compromise on warmth. Brick under iron sheets are the best structures for these two classes of pigs.

**Roof**

The roof is made from locally available materials like grass, polythene sheets, asbestos or iron sheets. Roof should keep the inside of the house cool. The roof should be rain and sun proof and securely fixed to avoid destruction by wind. The slope of a thatched roof should be steep enough, that is not less than 45° to facilitate water drainage. Thatch presents a number of problems some of which are harbouring insect pests and snakes. Thatch is not recommended in the farrowing house because it promotes a cool environment which is not ideal for piglets. It can also catch fire easily and requires more frequent repair and maintenance.

#### 4. PIG WASTE MANAGEMENT

Pig housing is not complete without talking about proper disposal of large amounts of effluent that is generated in pig units. Farmers need to take cognisance of the fact that effluent from pig units has negative environmental effects such as:

- i. Contamination and pollution of surface waters and groundwater through direct discharge, seepage, or runoff; and
- ii. Pollution of the atmosphere through emissions of ammonia and odours that are detectable beyond farm boundaries. Efforts to control the above concerns have been made by Government through a statutory instrument enforced by the Department of Environmental Management Agency (EMA).

When it comes to surface water and ground water pollution, piggeries are not allowed to discharge their effluent direct into public water rivers or reservoirs or direct on open ground. All piggeries are required to direct their effluent into waterproof reservoirs such as septic tanks to avoid pollution of the environment. Violation of these rules carries a heavy penalty. To minimize chances of borehole water contamination, the piggery unit is supposed to be sited away from the water source such as boreholes, wells or ponds. To help effectively manage waste, a well-constructed cement drainage channel with internal measurements equal to broom width, that drains into the septic tank is put in place.

Whilst pig waste has the above stated negative environmental effects it has also valuable benefits such as biogas production, use in fish farming and manure for organic fertilizer production.

#### 5. PIG HOUSING TYPES

##### Low Cost Pig Housing

This type of housing, commonly known as **multipurpose** is a standard pen that can house all pig classes though at different stocking rates depending on the space requirement for that particular pig. This housing is ideal for small to medium scale intensive pig production unit where producers have 30 sows and below. Each pen is about 9m<sup>2</sup> which makes it ideal for boar housing or 3 to 5 sows depending on their size. The same type of pen is also used as a farrowing house and as a fattening pen for up to 10 porkers.

##### Specialised Pig Housing

This housing type is intended for producers with more than 30 sows and the four pen designs are built specifically for different classes of pigs, namely dry sows, farrowing house, boars, weaners and fattening stock. The boar pen and farrowing pens are the only ones that are designed to house one animal in a pen. The dry sow, weaner pen and fattening pens are meant for large groups depending on the size of the pen. It has to be noted that building large pens to house a few animals is a waste of space and a cost.

## PIGSTY DESIGNS

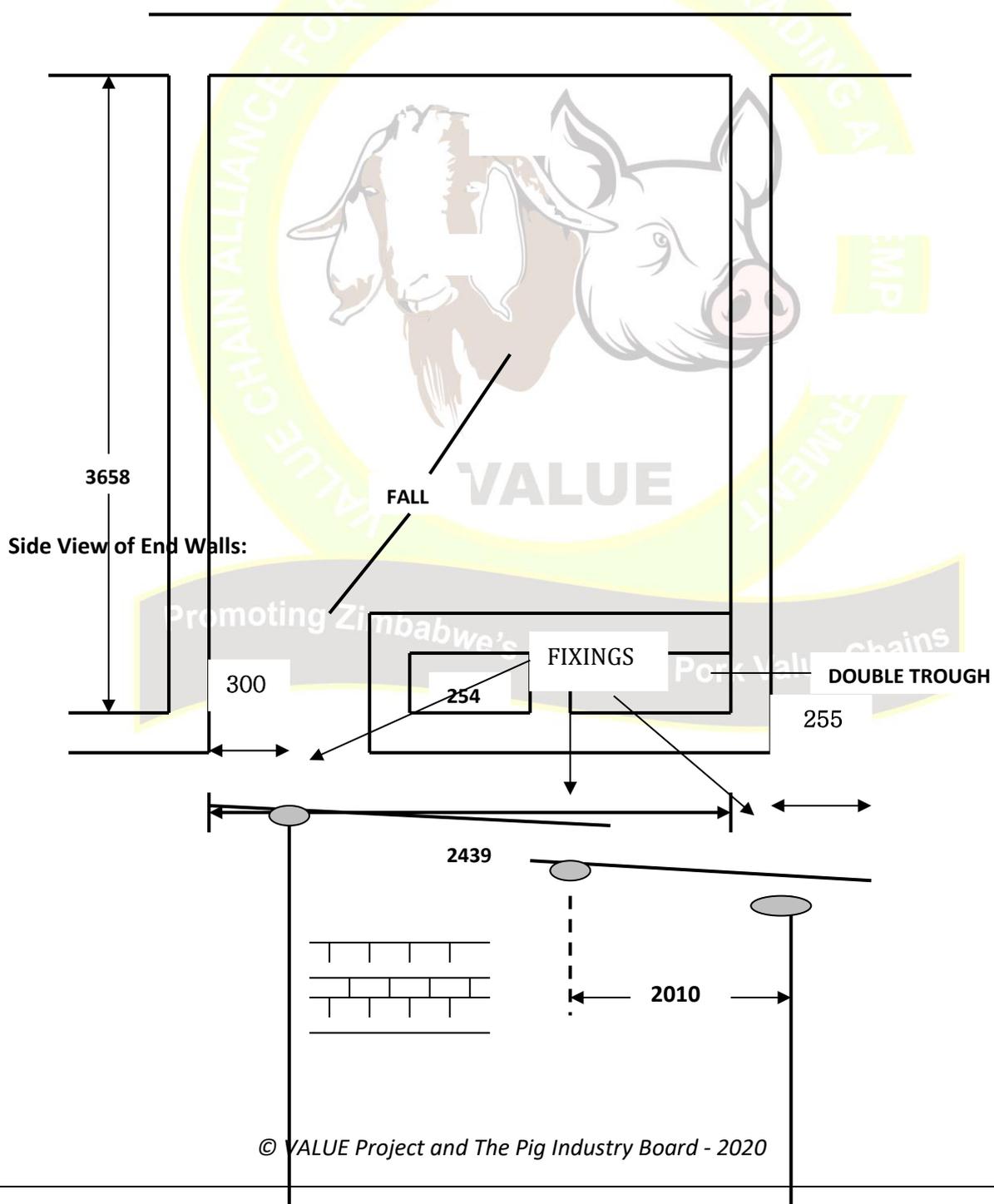
Measurements for the designs are in mm

### Low Cost Pig House

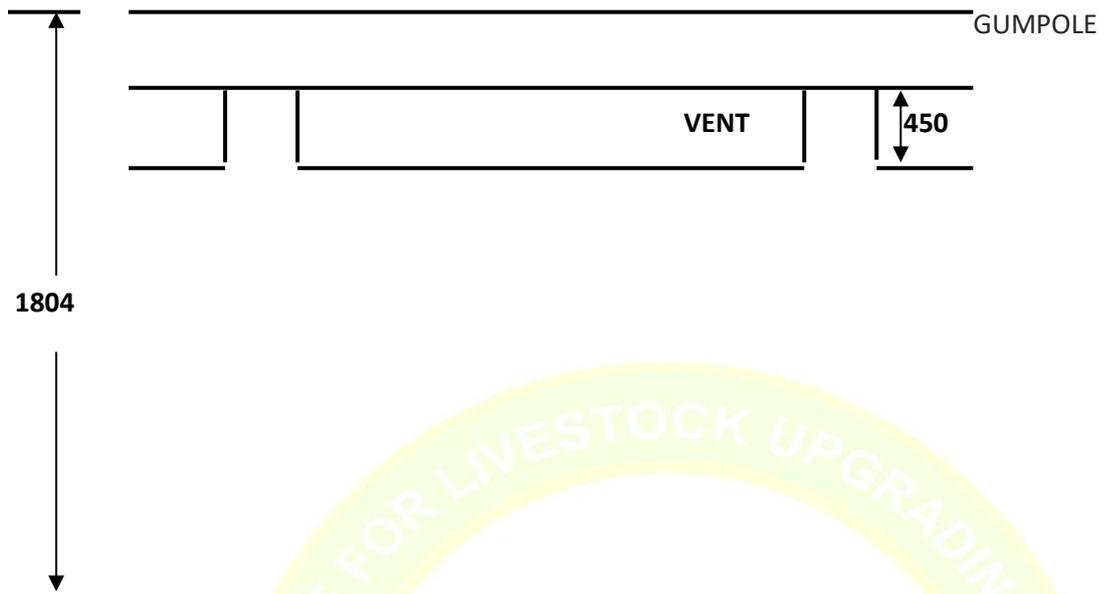
#### Brickwork:

1. All brickwork is 115mm reinforced with brick force (reinforcing wire) every 4 courses if common bricks are used but when farm bricks brickwork is 230mm and brick force wire every 3 courses.
2. End walls of rows of pens and dividing walls between pens are all built full height to the roof.
3. All interior brickwork surfaces are plastered with a metal float finish to facilitate cleaning

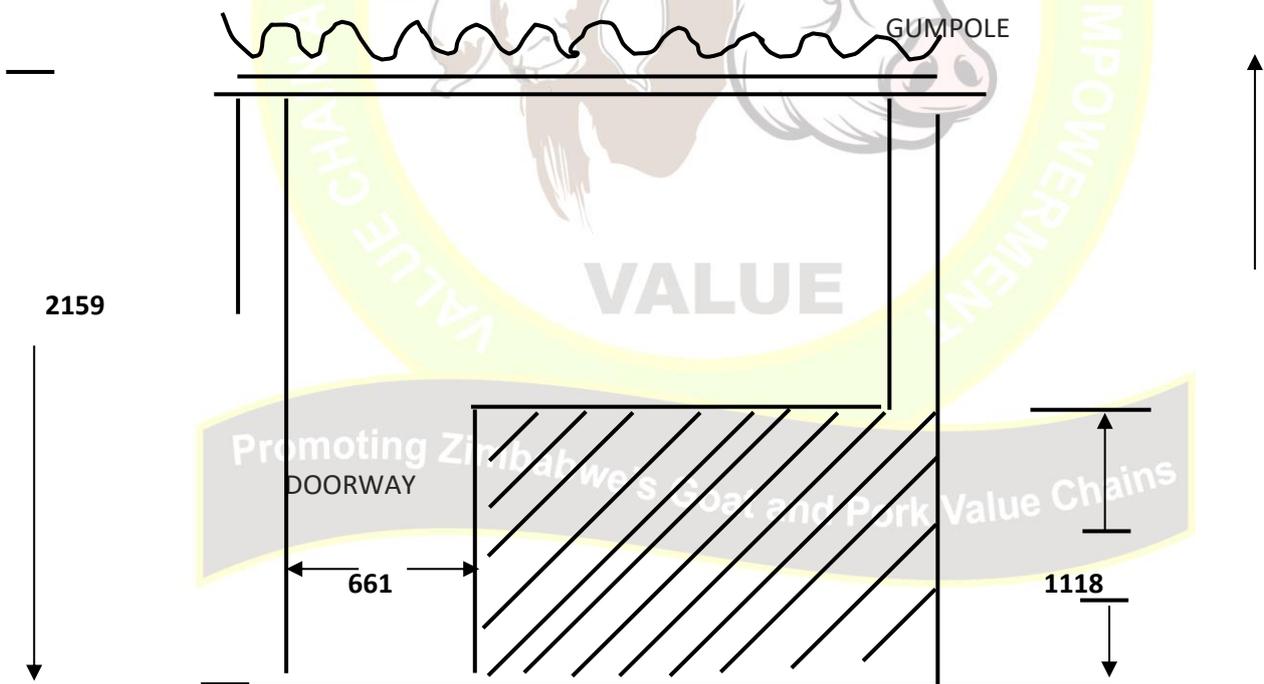
### MULTI – PURPOSE PEN



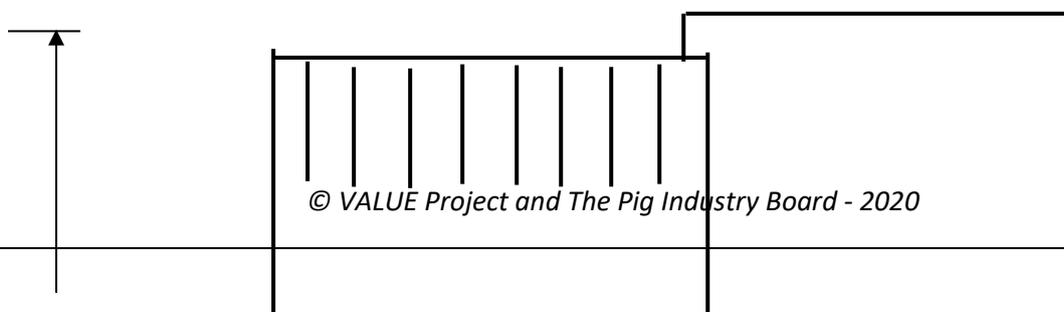
**BACK SIDE VIEW**

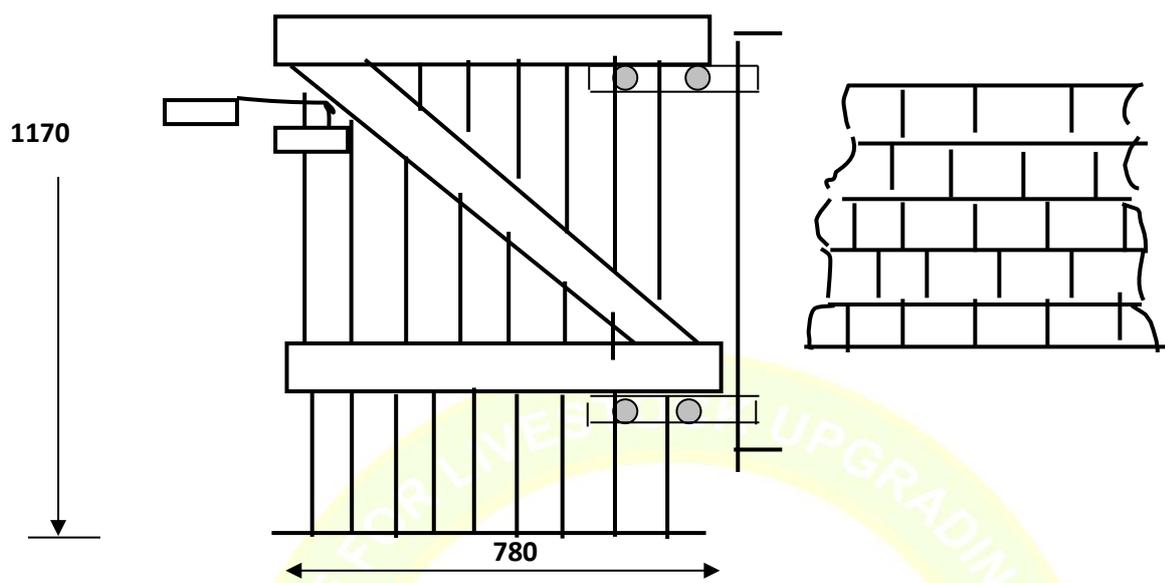


**FRONT VIEW**



**DOOR SETUP**





**PEN REQUIREMENTS FOR DIFFERENT SOW UNITS USING MULTIPURPOSE PEN**

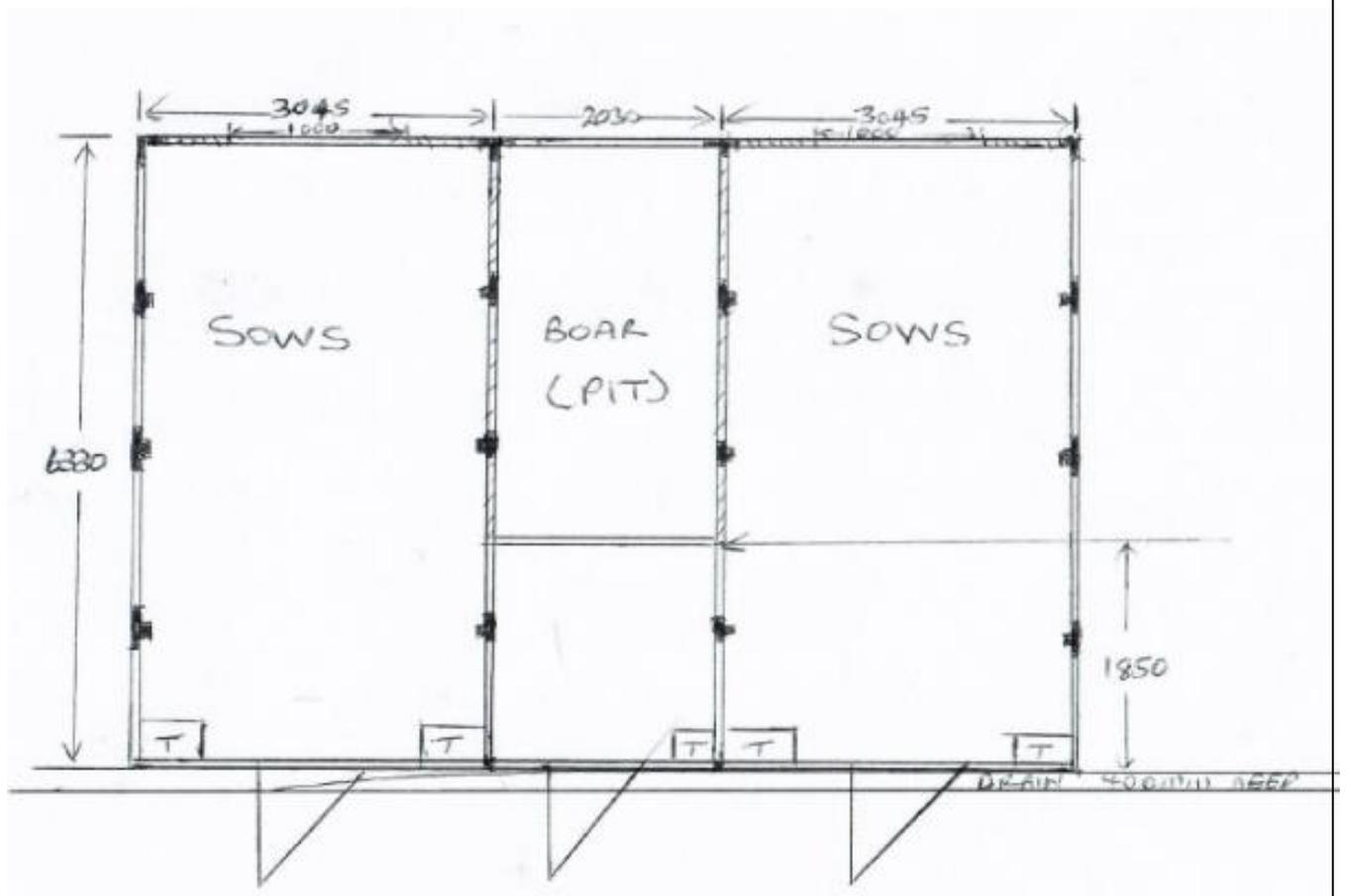
| Pen Type      | Number of Pens Required |          |           |           |           |           |           |
|---------------|-------------------------|----------|-----------|-----------|-----------|-----------|-----------|
|               | 3 Sow                   | 5 Sow    | 10 Sow    | 15 Sow    | 20 Sow    | 25 Sow    | 30 Sow    |
| Farrowing     | 1                       | 2        | 3         | 5         | 5         | 6         | 10        |
| Dry Sow       | 1                       | 1        | 2         | 3         | 4         | 5         | 6         |
| Sick Pens     |                         |          | 1         | 1         | 1         | 1         | 2         |
| Fattening     | 3                       | 5        | 10        | 12        | 17        | 18        | 19        |
| Boar          | 1                       | 1        | 1         | 1         | 2         | 2         | 2         |
| <b>Totals</b> | <b>6</b>                | <b>9</b> | <b>17</b> | <b>22</b> | <b>29</b> | <b>32</b> | <b>39</b> |

**SPECIALISED HOUSING**

**Boar Pen**

Boar pen is designed in such a way that the sows can see as well as contacting the boar for stimulation. Other stimulation factors are smell and sound which are achieved by making sure that the sows stay adjacent to the boar pen.

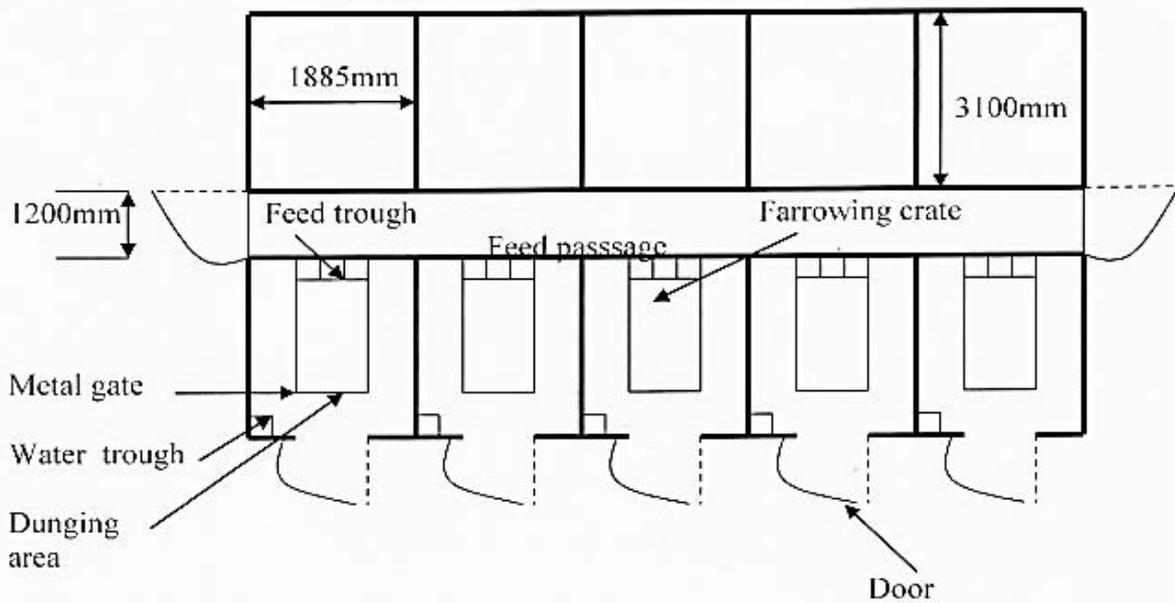
## Boar and Dry Sow Pens



Sows are housed in groups of 10 or more but making sure that they can see, contact, smell the boar and hear the sounds made by the boar.

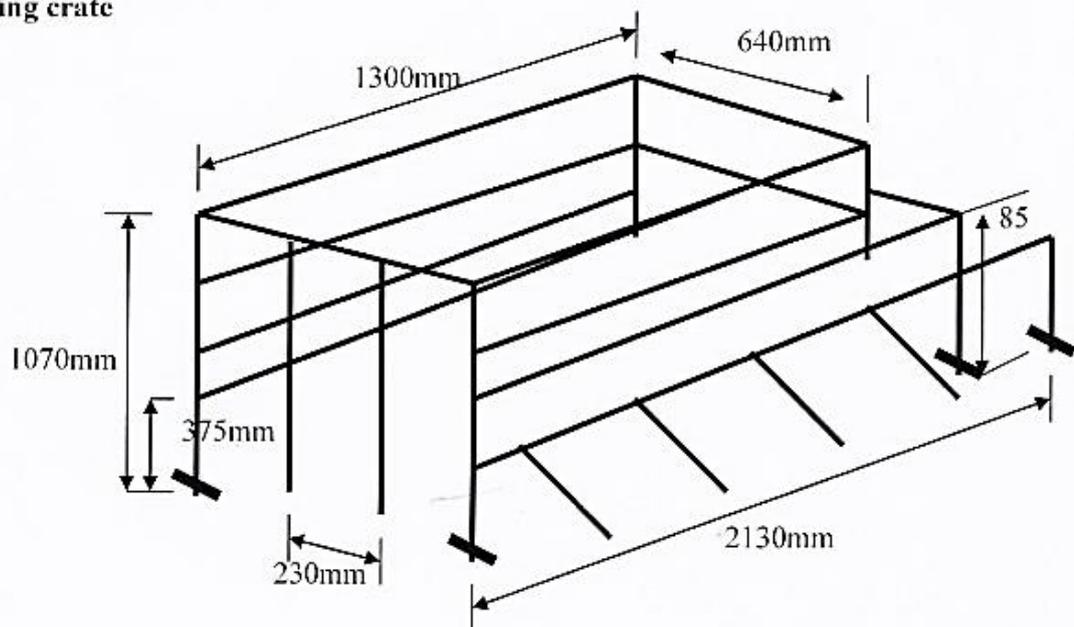
### FARROWING HOUSE

A farrowing pen is a pig pen that is reserved for a sow during the last part of its gestation period (10 – 7 days before farrowing) and the time the sow will be suckling up to weaning. This pen is normally fitted with a farrowing crate which helps reduce incidences of piglet crushing as well as preventing the sow from accessing creep feed. The creep area can be put in front or at the side of the pen.



**Floor plan for farrowing house**

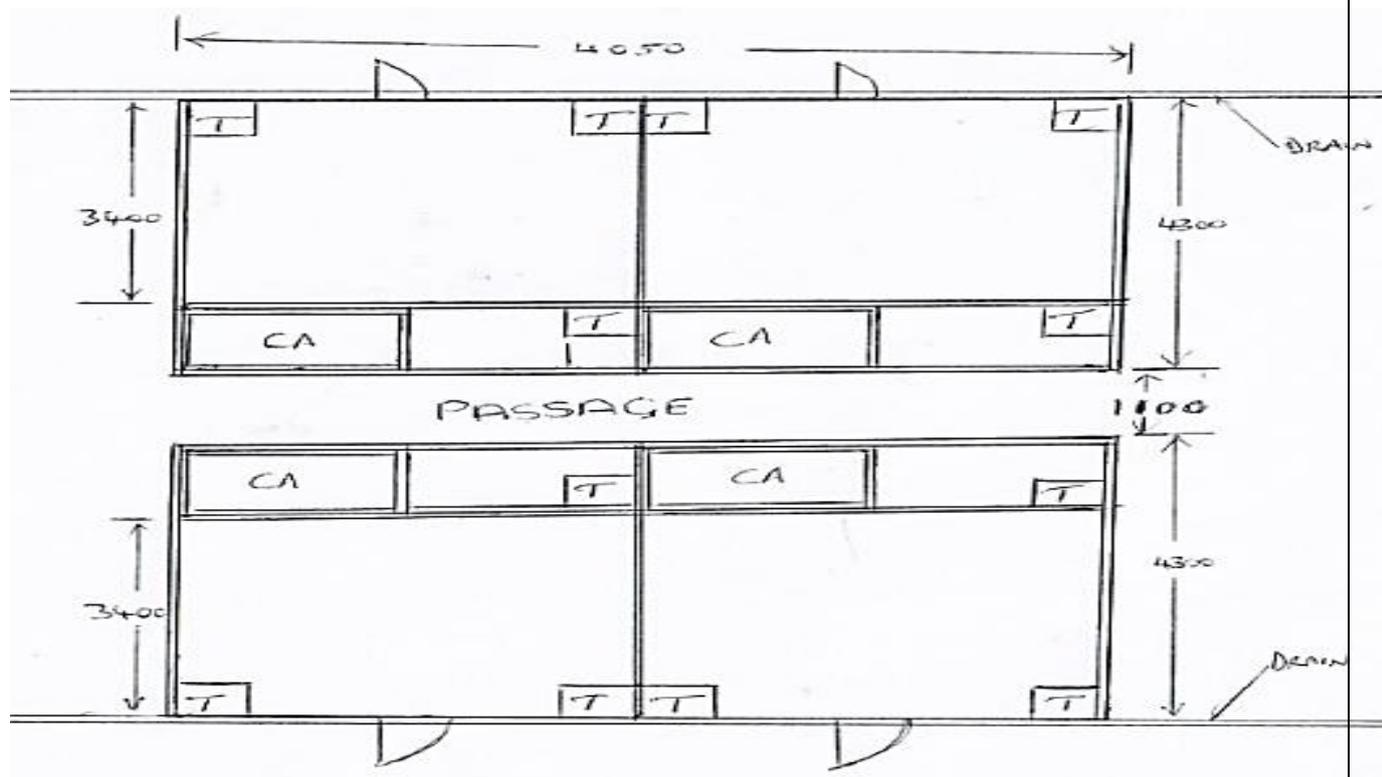
### Farrowing crate



### Weaner Pen

Weaners are a group that is still sensitive to cold so the pen is constructed in such a way that it becomes easy to control draughts.

## Weaner Pen Floor Plan

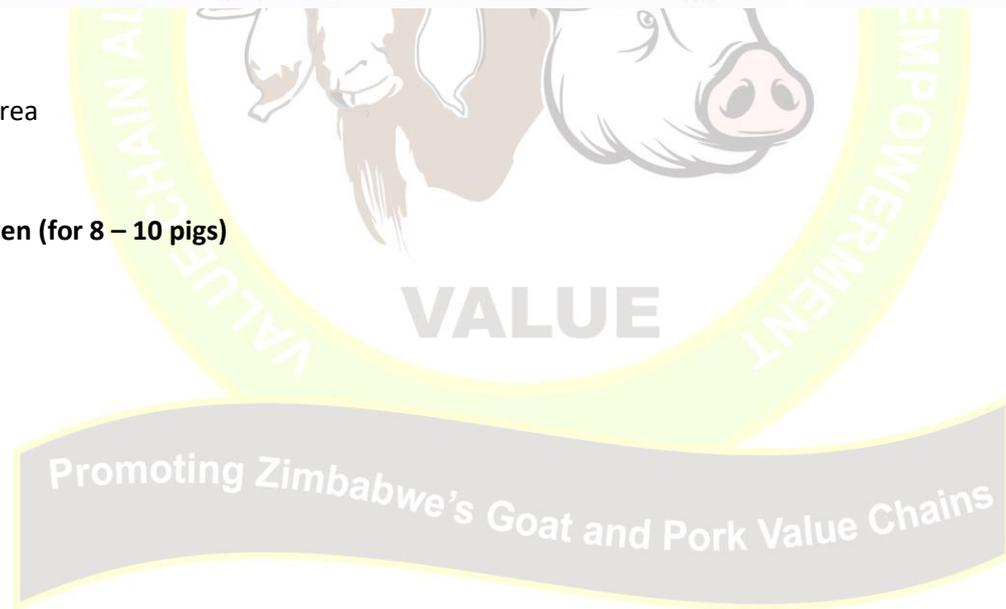


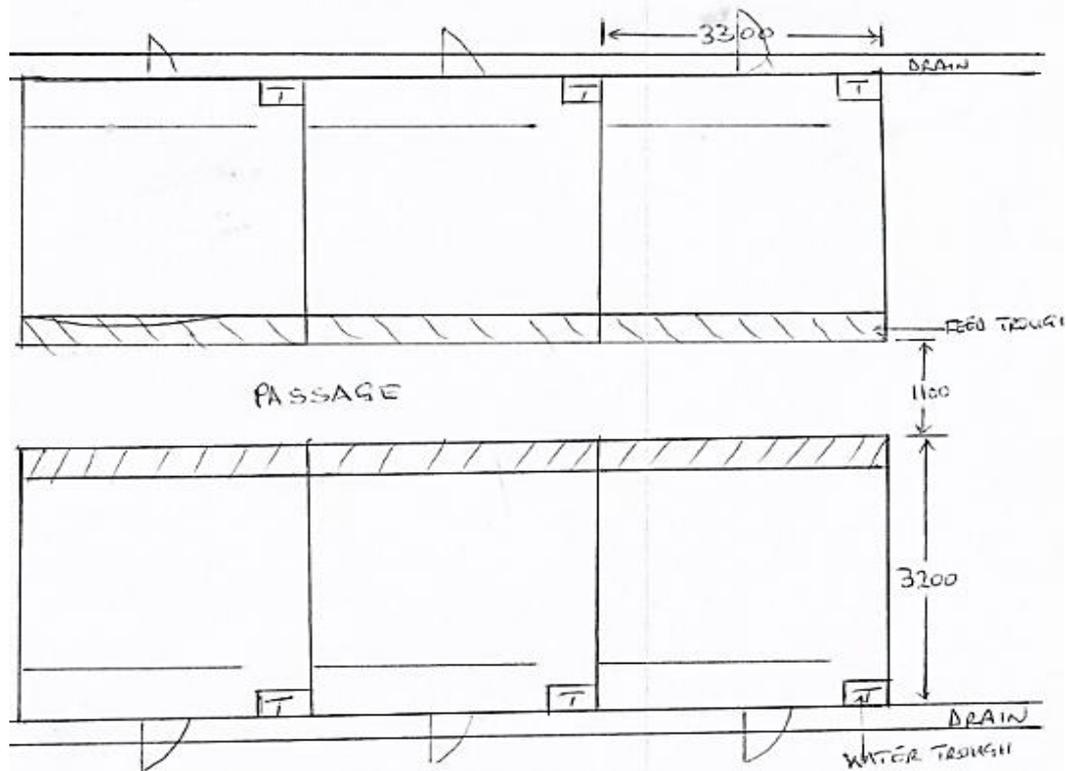
### Key

CA- creep area

T- Trough

Fattening Pen (for 8 – 10 pigs)





Since the producer has more than 30 sows, it is possible that weaning is done for several sows at a time hence fatteners can be housed in groups of 10, 15, 20, 30 or more depending on the scale of production.

Depending on availability of resources, floors can be either solid or slats.

***For more details on construction of housing, get in touch with the Pig industry Board- Technical Department, local Agritex, Integrator, Champion and Anchor farmers.***

## 6. CONCLUSION

Well-constructed structures attract less repairs and maintenance costs. Farmers should always bear in mind that the pigsties take a significant part of the capital investment in the piggery business. It is therefore very important to make sure that the structures are fully utilized effectively in order to recover costs of construction. From the analysis given above, farmers are therefore required to make decision on the type of pigsties based on the scale of production other than just copying from a neighbour's piggery set up.