

REPUBLIC OF KENYA

MINISTRY OF LIVESTOCK
DEVELOPMENT



HOUSING IN A ZERO GRAZING SYSTEM

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INTRODUCTION

Under the zero-grazing system, cattle are confined in one place where feed and water are brought to the animals. Other animal husbandry activities such as animal health, are also carried out under zero grazing.

Zero-grazing is a good system for keeping dairy cattle in densely populated, high potential areas, where land per farm family is small.

Other dairy cattle rearing systems which also require housing are semi-zero grazing and free grazing. Different dairy cattle rearing systems have different requirement for housing although they share some common needs.

Climatical differences between the Coastal/hot humid areas and the highland areas necessitates that there will be slight modifications of the unit depending on where the dairy cattle reared. Thus in Coastal and hot humid conditions, more open units which allow for air circulation will be appropriate.

Generally, the main advantages of the zero-grazing system are:

- Cows are confined and therefore use most of the energy from feeds for growth and milk production.
- Saves land for other enterprises by allowing the use of high yielding fodder crops like Napier.
- Enables on farm clean milk production.
- Good calf rearing is possible
- Manure can be easily collected for the benefit of fodder crops
- The animals are better protected against diseases, especially tick-borne diseases.
- Close observation of the animals is possible, making heat detection and attendance to animals easier and faster.
- The animals are kept inside which is more secure and protect them from attack by predators
- Little or no time is spent on herding the animals. Therefore labour for other farm tasks is saved.

The disadvantages of the zero-grazing system are:

- Much labour is required to take feed and water to the animals.
- Much capital is required for construction of a 'zero-grazing unit.
- The possibility that animals are stressed because of too much confinement inside the zero grazing unit

In this booklet, explanations are given about the layout and construction of a zero-grazing unit. The guidelines contained here are mainly for farmers in high potential areas of Kenya. The zero grazing housing system has various areas some of which are essential

and therefore must be included in the structure while others are optional and need not necessarily be part of the unit. Accordingly, these parts or areas are as listed below

Basic (Essential) parts:	Basic (Optional) Parts
1. The cubicles	7. The store
2. The walking area	8. The manure storage
3. The feed and water troughs	9. Fodder cutter
4. The milking place	10. Roof water catchment
5. The calf pen	11. Water tank
6. The fodder chopping area	12. A holding crush

Zero-grazing system requires intensive (a lot of) labour for cutting and carrying fodder crops (e.g. Napier grass), milking and carrying water and other feed materials to the animals. This means that the tasks of some of the family members may increase. Proper planning is therefore required before starting a zero-grazing system. This will enable the farmer to appreciate the high financial and labour demands of zero-grazing before getting involved.

Because zero-grazing requires a lot of money (capital) for the construction of the unit, it can be done in steps by first constructing the essential parts of a zero-grazing unit. The optional parts can then be added as money becomes available.

One option is starting with semi-zero grazing as a first step before turning to full zero-grazing unit. This can be the case where farm size is large enough to allow for free grazing.

The basic parts in a semi-zero-grazing system are the feed and water troughs and the milking place. The cubicles and walking area are optional.

These options, in zero-grazing and semi zero-grazing, are necessary when you have inadequate financial and cannot meet the labour and high skills demanded by zero-grazing.

The following are strongly-recommended as considerations during construction of a unit:

1. Ensure that the correct site, considering the direction of wind, is chosen for the unit. The choice of site influences the security and protection of animals from rain, sunshine and other weather effects.
2. The unit should be closer to the house and on the opposite side of the wind. The location of the unit in relation to the house should ensure minimal smell from manure pit. It should be noted that it is more important to protect an animal from the rain than from wind or sunshine.

3. Ensure that the **fundi** (constructor) is supervised by a Livestock Extension Officer during the construction of the unit. This is necessary because some parts (i.e. walking area, troughs) once constructed are permanent. Mistakes made during construction can be very costly.
4. Use of local materials for construction of the unit will reduce cost.
5. Finally, one should as much as possible, carry out regular maintenance of the zero-grazing unit while in use. This is usually very important for the walking area.

2. THE CUBICLES (RESTING AREA)

Each cow has her own place in the resting area, called cubicle. The cubicles must be covered with a roof made of iron sheets (Mabati), grass thatch or makuti. The roof must be high enough so that it cannot be eaten by a cow if it is made of grass or if hay is stored under it.

The measurements of the cubicle are very important. It should not be too small for the cow or too big to allow the cow to turn around inside the cubicle. The cubicle should be constructed such that the cow remains clean all the time.

One should construct the number of cubicles enough to be occupied by animals most of the time. Unoccupied cubicles are a waste of space and money.

For a given number of cows to a unit, extra cubicles are required to house young-stock (heifers). If young bulls are to be kept inside the unit (although this is not recommended), then they must be provided with separate cubicles. However, when the bull matures, it is better to house it away from the unit.



Fig 1: Cows in cubicles

Below is a list of the recommended number of cubicles for a given number of cows (including followers – heifers or bulls):

Number of Cows:	Number of cubicles:
1 cow	2 cubicles
2 cows	3 cubicles
3 cows	5 cubbies
4 cows	6 cubicles
5 cows	7 cubicles
6 cows	9 cubicles

A mineral box can be fixed at the head of each cubicle for individual mineral supply to each cow. This can limit fighting among cows and between cows and young stock for access to the mineral

The recommended measurements for a cubicle are based on pure breed cows (Friesians and Ayrshires). The reason for this is because pure breeds give the highest economic returns in a zero-grazing system. They are therefore used as the standard. A cubicle has a length of 210 cm (7ft) and a width of 120 cm (4 ft). Cubicles are separated from each other by two timbers.

If the cows are small in size (i.e. Jerseys), the measurements can also be smaller (6'6" x 3'7"). However, it is much better to use the above standard measurements for a cubicle because the size fits most animals. The standard cubicle can also be adjusted to fit smaller breeds whenever necessary. They can therefore be used for both larger and smaller breeds as need arise.

The floors of the cubicles are raised and filled with plain soil such as murrum. A soft bedding provides comfort to a cow and prevents wounds on its skin. In this way, the animal has a comfortable place which is cheap and easy to maintain. Do not make the floor of a cubicle with concrete. If this is done, then fill the cubicles with saw dust.

The resting area is roofed to provide shelter against rain and sunshine. A neck-pole is fixed across the cubicle. This prevents the cow from entering too far into the cubicle and ensures that the urine and dung will drop on the walking area. The cubicle and the cow then remains clean.

Young animals should be separated from the milking cows. This will ensure no fighting occurs between young animals and cows. Cubicles for young animals should be adjusted according to their size by moving the neck-poles backwards to make the cubicles shorter. An extra timber can also be added lengthwise to make each cubicle narrower.

3. THE WALKING AREA

The walking area is about 3 meters wide i.e. between the resting area and where the feed and water troughs are located. No roofing is required for this area except under very hot conditions like in the Coastal region. The floor of the walking area is made of concrete. This makes it possible to collect urine and manure. The floor and the cows are also kept clean. The surface of the floor should be rough so that animals cannot slip on it. But it should be easy to clean.

The floor should slope from the milking place towards urine and dung collecting pit located at one end of the walking area. The slope should allow for easy cleaning of the milking and walking area.



Fig: 2: Walking area of the unit

4. THE FEED AND WATER TROUGHS

The feed troughs should run along the length of the walking area with a water trough in the middle. The total length of the feed trough should be such that each cow or heifer has two and a half to three (2.5-3) feet to itself.

The water trough should be placed such that both the young stock and the mature cows have access to it instead of constructing separate trough for each side (the unit divided to separate young and mature stock). Fighting between young stock and cows will not occur due to the boundary created between them. Fighting can also be prevented to constructing vertical poles along the inside of the feed trough at intervals of 2.5 to 3 feet.

A horizontal line of timber is nailed along the vertical ones at 3 feet above the feed trough. Each cow then has its own feeding space.

The trough can be made of timber or stones. For water, a half drum can be used, each for two cows, instead of constructing a trough. For more than two cows more drums are used as necessary so that water and enough space for each animal is available.

If sufficient funds are available both feed and water troughs can be made of bricks and cement (assuming that concrete is more costly in relation to costs of drums and timber). The choice of the materials used for making troughs depends on the costs and availability of materials.

The inside measurements of the feed trough should be 60 cm (2 ft) wide at the bottom and should be raised at least 15 cm ($\frac{1}{2}$ ft) above the ground level of the walking area. The feed trough should not be too deep or cows will have difficulty reaching feed at the bottom. If it is too shallow, spillage and wastage of feed will occur. The trough is constructed such that its outside is raised to prevent spillage of feed.



Fig: 3: A cow feeding from a feed trough

A mineral box should be placed centrally in the walking area if not already placed at the head of the cubicle for each animal. This will make it easy for all animals to reach the mineral box.

6. THE MILKING PLACE

The milking place should be constructed next to the cubicles. It should also be of same dimensions as cubicles i.e. 120 cm (4 ft) by 210 cm (7 ft).

The floor should be flat and made of firm concrete and slope towards the walking area. The direction of slope of the floor would ensure that dirt collected from the floor can flow through the walking area onto the manure pit.

There should be a feed trough at head of milking place for feeding the cows during milking. The milking place should be kept clean. Noise during milking may disturb the cow making it hold back some of her milk.



Fig: 4: The milk area with a feed trough and neck yoke

For a zebu cow, a calf pen should be constructed next to the milking place. This is because most zebu cows let milk down only-when they see their calves.

A head yoke is constructed to restrain the animal during milking.

Milking place is not optional under semi-zero grazing system. If a farmer chooses to make it optional, then clean milk production is not guaranteed.

PHOTO – Front view of a neck yoke

6. THE CALFPEN (OPTIONAL)

Calf housing is recommended where free suckling is not permitted like in the case of zero-grazing system.

The calf pen is situated opposite the milking place. It has a floor surface of 120 cm by 150 cm (4x5 ft). A calf pen can also be situated on the side of a cubicle or milking place. This depends on the type of unit and whether zebu, cross breeds or pure dairy cattle are kept.

The floor of the calf pen should be slatted and raised by half to one ($\frac{1}{2}$ -1) foot above the concrete floor. The raised and slatted floor makes it easier to clean the calf pen floor and the concrete under it. The floor under the slats can be concrete or not.

The sides should be open to allow for free air flow around the calf pen. They should also be high enough to contain the calf inside.

The calf pen can be movable or fixed. The advantage of a movable calf pen is that it can be taken to the family house, for example when the weather is too cold.

Beddings are not recommended for a calf pen. They can encourage parasites resulting to disease condition and/or infection of the calf.

7. THE FODDER-CHOPPING AREA (OPTIONAL)

This place is for a fodder chopping equipment (chaff cutter) and the chopped fodder. It is situated opposite the store next to the calf pen. It is also placed under the roof.

The fodder chopping area floor can be made of concrete to avoid the feed getting mixed with soil.

A fodder chopper is recommended if there are more than three cows in the unit and where labour on the farm, is generally inadequate.

One can chop napier grass or any other fodder in an open space next to the unit, therefore, a fodder-chopping area is optional.

8. THE STORE (OPTIONAL)

If required, a store can be attached to the zero-grazing unit next to the milking place and opposite the fodder-chopping area. In this way, concentrates, minerals, milk utensils and other small equipments can be stored near to the animals.

A store is optional where finances are inadequate. It can however be built later-on when funds are available. Inputs like dairy meal and drugs are kept in the living house before a store is built.

When building a store, rainwater collection facilities and cemented floor are optional.

9. THE MANURE STORAGE (OPTIONAL)

Manure can be stored in a small pit dug out of the soil. The pit may or may not be cemented. Manure can also be stored as compost made from dung, urine and plant materials. In this case the compost is heaped next to the unit. Compost may be covered with soil or plastic.

The dairy or livestock extension officer will provide the right measurements for the size of the pit to hold slurry (manure) for at-least two days for any number of cows in the unit.

10. MATERIALS REQUIRED FOR CONSTRUCTION OF A ZERO GRAZING UNIT

Strong Posts:

The first 2 columns below represent number of posts required for a unit of 5 and 3 cubicles respectively.

<u>Number</u>		<u>Length</u>	<u>Diameter</u>
-	(3)	310 cm	15 cm
10	(9)	280 cm	15 cm
7	(8)	260 cm	15 cm
5	(6)	180 cm	15 cm
12	(-)	120 cm	15 cm

Timber:

3"x1"	-	(-)
3"x2"	99.5 metres	(55 metres)
2"x2"	33.5 metres	(50 metres)
6"x1 1/4"	45 pieces	(170 meters)

Iron Sheets:

12 corrugated iron sheets of 3.00m for a 3 cubicle unit and 17 similar iron sheets for a 5 cubicle unit (28 or 30 gauge).

Other requirements:

4 cubic meters hardcore (1/2 lorry-load)
3 cubic meters ballast (1/2 lorry-load)
3.5 cubic meters sand (1/2 lorry-load)
10 bags cement

The **concrete** should be mixed in the following ratio:

1 bag cement + 2 wheelbarrows sand + 3 wheelbarrows ballast

Nails:

3.5 kg of 4"

3.5 kg of 3"

2 kg of 2"

2 kg of roofing type

For Coastal/hot humid conditions, the complete unit, including the walking area and the feed and water troughs are roofed. In this case the following items are required in addition, for a 5 cubicles unit:

Strong Posts:

3 of 310 cm length

Timber:

3"x3" 14 meters length

2"x2" 12 meters length

Corrugated iron sheets:

5 pieces of 3 metres long (gauge 28 or 30)

Nails:

0.5 kg of 4"

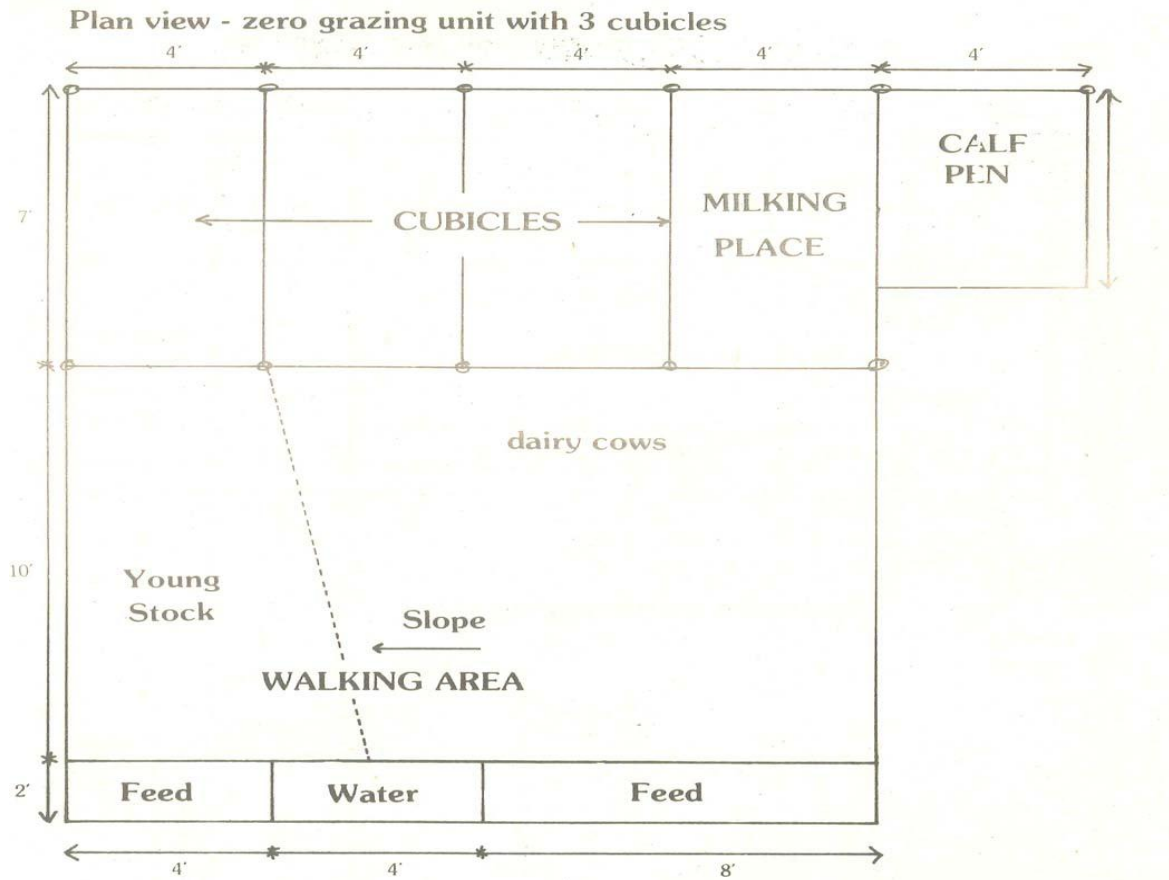
0.4 kg of 3"

1.5 kg of roofing type

To prevent high investment costs, it is advisable to make use, as much as possible, of local materials and where possible from the farm. The cows will not notice the difference and will be equally productive.

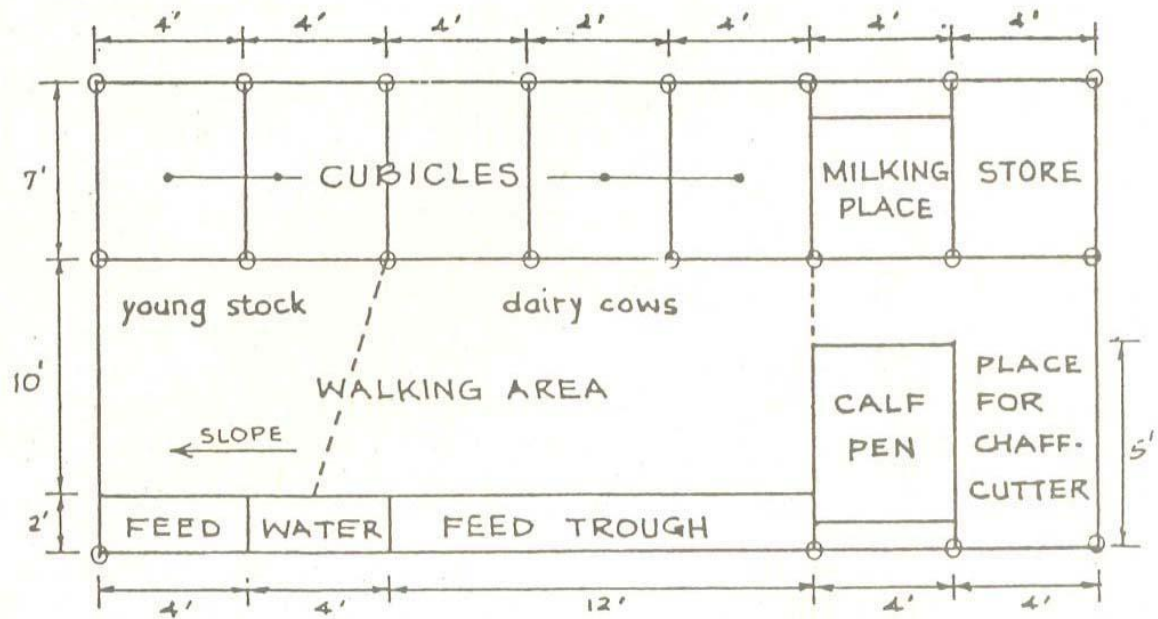
FOR MORE DETAILS ABOUT THE DIFFERENT PARTS OF A ZERO GRAZING UNIT, SEE THE FOLLOWING CONSTRUCTION PLANS:

A) Plan view – zero grazing unit with 3 cubicles

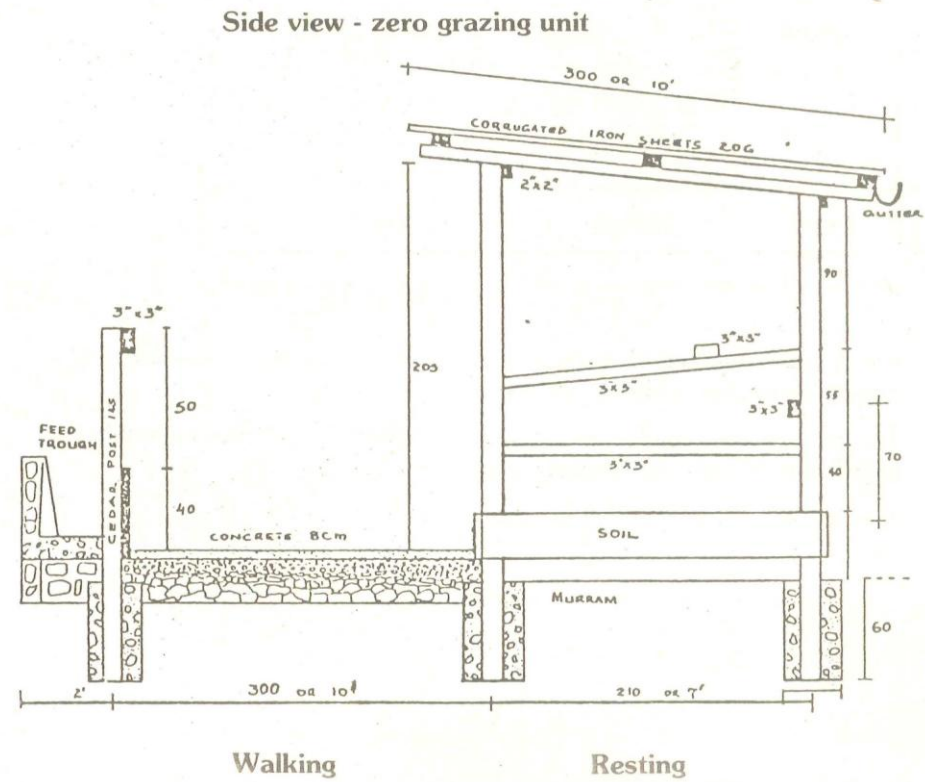


B) Plan view – zero=grazing unit with 5 cubicles

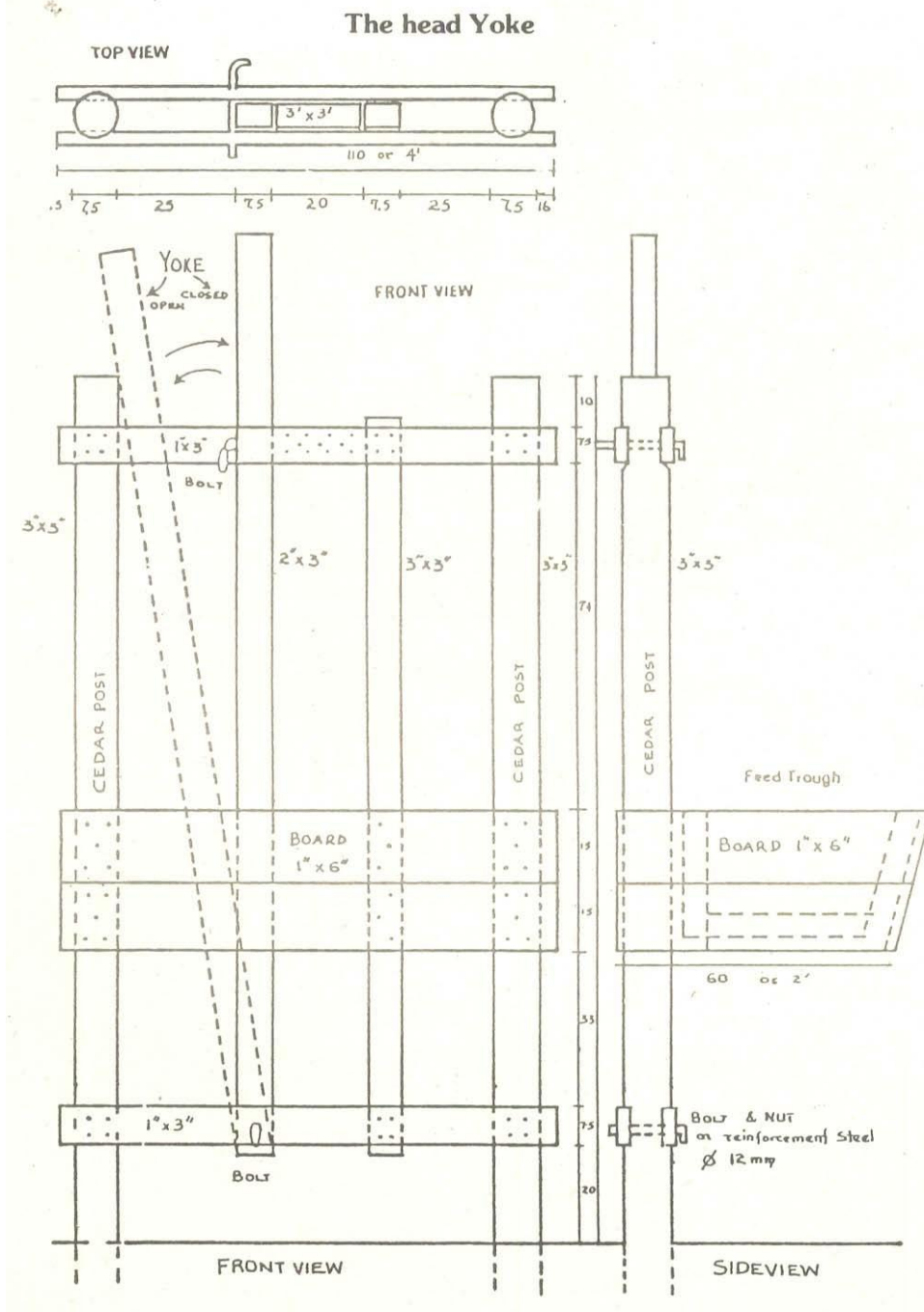
Plan view - zero grazing unit with 5 cubicles



C) Side view-zero-grazing unit



D) The view of a head Yoke



E) The view of a calf pen

The calf pen

