9.1 INTRODUCTION

Housing is required for providing comfortable environment to the animals as well as to protect them from extreme weather conditions and wild animals/predators and rodents. The livestock houses should be planned depending on the number of animals to be housed, facilities to be provided for feeding the animals economically, collection and disposal of manure and cleaning and washing. There are two main types of housing systems practiced in Cattle and Buffaloes viz. loose houses and conventional barns. In this experiment, you will prepare a housing design for 50 dairy cows under Conventional housing system having tail-to-tail arrangement.

Objective

After performing this experiment, you should be able to:

- prepare a housing plan for 50 dairy cows under Conventional housing system.

9.2 EXPERIMENT

9.2.1 Principle

In Conventional system, animals are tied in stalls and milking is done in this shed. This is the common type of housing adopted by farmers in India and most developing countries. There are two types of sheds in this system viz., Single row shed (farms having small number of animals; less than 20) and Double row shed (large farms having more number of animals). Further, in these sheds, the arrangement of animals can be of two different types as follows:

i) **Head-to-head arrangement (Face-to-face):** Here, the animals face each other. Hence, feeding is easy as the feed and fodder can be provided in the manger by walking through the common feeding passage. However, cleaning of the shed and milking is difficult as the worker has to go through each side passage separately.

ii) **Tail-to-tail arrangement (Back-to-back):** In this, it is easy for the workers to clean the shed and milk the animals and it becomes difficult to feed the animals.
9.2.2 Requirements

- Drawing sheet
- Pencil
- Scale
- Eraser

9.2.3 Procedure

1) Before drawing a floor plan of a double row shed (tail-to-tail arrangement) to house 50 cows, you should have a clear idea of the requirements of a cow and minimum measurements of each structure in the shed which are as follows:
   - Standing length for a cow: 2 m
   - Standing width for a cow: 1.2 m
   - Width of manger: 70 cm
   - Width of drainage: 30 cm
   - Width of central walking passage: 1 m
   - Width of side passage: 1 m

2) Calculate the total length and width including the other components of the shed for accommodating 50 dairy cows using the above mentioned measurements.

3) For drawing a floor plan, take a blank white sheet, a pencil and a scale.

4) Prepare a floor plan, marking the exact measurements (length, width) as per the calculations in the respective place.

9.2.4 Calculations

As per the measurement and guidelines provided above, calculate the length and width including the other components of the shed for accommodating 50 dairy cows.

Notes for calculations:

1. You need to imagine just as you did in your high school geometry classes. You have to think of a three-dimensional structure; that is, a building with a length, width and height.

2. First consider the data given. Imagine a farm with that number of animals tied in the way specified.

3. You can now get an idea where the values given fall.

4. From the above data, you can easily fix the minimum width required for the animals, manger and drainage.

5. All round the above, passage has to be given for workers to move and feed the animals; if the number of animals is high, even a central connecting passage may also be essential.
6. Having fixed the width, including the passages, now you need to fix the length. This obviously requires total area required by all the animals and the passages. Area as you remember is a two-dimensional value and hence, it will be in square of the unit used for measuring width and length. Remember, you should use the same unit of measurement for length, width and height through out the calculations.

7. Calculate the total area required. You are already aware from your high school maths that area is a product of length and width (Area = Length \times Width); you have found the width required and hence, length will be given by \( \frac{\text{Area}}{\text{Width}} \).

8. After length and width are found, you can decide on the type of roof and a suitable height and slope depending on air flow (ventilation) requirements and type of roof depending on availability, cost and other considerations.

9. Floor diagram (floor plan), once again calls for your imagination; you should imagine as though there is no roof and you are looking the entire structure from top (see Fig 9.1).

![Floor plan for a dairy animal shed](image)

10. Cross section, on the other hand, refers to cutting the entire structure (including roof) from roof to floor along the width (see Fig 9.2).

![Cross-section of a dairy animal shed](image)

### 9.2.5 Results

The prepared floor plan gives an idea of how animals are arranged in a double row shed with tail-to-tail type of arrangement.

### 9.3 PRECAUTIONS

- Use actual measurements (measurements are likely to change depending upon the size of the animal).

- Before preparing a floor plan, visit a nearby dairy farm having tail-to-tail arrangement and learn about the different aspects of housing which will help you in designing the floor plan.