

Happy Cow Challenge

What's the farmer's problem?

"I need to house my small herd of 60 dairy cows over winter. I have an open barn that is 20m wide and 35m long but I want my cows to be as happy in the barn as they are out in the fields. "

Available resources:

- Access to the internet for researching ideas
- Poster paper and post-it notes for thinking through ideas and planning

What is the design brief?

Create a 2D scaled floor plan of your barn design, using an A3 sheet of paper and a scale of 1cm per 1m. The dimensions of the barn are 20m x 35m. All areas should be clearly labelled and explained on the plan.

Include the following basic components:

- Resting areas
- Feeding trough
- Water stations

Consider how to enrich the cows' natural behaviour and well-being by allowing areas for:

- Socialising
- Exercising
- Grooming
- Play

The engineering design task

Can you design an indoor environment for the farmer that will meet the cows' basic needs as well as stimulate their natural behaviour?

Cows need spacious homes with clean comfortable beds and plenty of light, this is particularly important in winter, when most cows stay indoors to keep warm and dry. As well as the basic needs of food, water and a space to lie down, the cows' well-being needs to be considered. Farmers know that cows enjoy each other's company and like to move around, so barns should have designated areas for exercise as well as rest.

Top tips to get started:

Think about the barn layout, ensuring enough space for all 60 cows:

- Will you have **loose housing**, where cows move freely around and have communal lying areas, or **bedded stalls** where every cow has their own space to rest when they want?

Think about the basic needs for the cows wellbeing:

- Where will the cows eat and drink? How will you ensure the cows are comfortable? How will you make sure cows don't slip?
- How will the barn be kept clean to ensure good hygiene?

Think about how will you enrich the living space for happy cows, will they be able to carry out all the behaviours and actions you identified on the **ethogram**.



Behaviour	Description
Walking	Movement from one place to another without the head near the ground
Foraging	Grazing or browsing; using frequent bits of forage
Standing	Standing still, no movement to another place
Ruminating	Cow is lying down and chewing the cud
Drinking	Drinking water from a trough
Grooming	Cleaning or scratching itself
Social	Interaction with other cows (e.g. grooming, mouning)

Background Information:



Thinking about stalls?

- Stalls need to be 2.4m long and 1.2m wide to accommodate each cow.
- Stalls are normally organised in rows either double or single formation.
- The passage width between each set of rows should be 4m in between and 5m at the front and end of each row.

Non-slip floors could be textured concrete, rubber mats or any other surface that won't be slippery when wet.

Think about the space for moving around so that cows can get access to the water troughs, grooming brushes and other elements you have included for their comfort.



There are a huge variety of bedding choices to keep cows comfortable: mattresses, paper, compost, sand, sawdust or straw. As well as keeping cows warm, you might want to think about how to keep cows cool if temperatures increase.

Installation of cow brushes can help animals with their grooming. Creative ways that cows can access some of their food such as pinatas provide stimulation.

Research had shown that cows can enjoy music and smells such as lavender. Visual enrichment can be provided with mirrors, colour (yellow, orange and red), large pictures of companions and projectors with moving images of cows in the field.

Glossary:

dairy barn - a building or part of a building used for the sole purpose of housing, feeding and milking cattle.

free stalls - a comfortable place for dairy cows to lie down and rest. Cows are not restrained in the stalls and are able to enter and leave as they like.

trough - a long, narrow open container for animals to eat or drink out of.

manure robot - a device that automatically cleans the barn floor at times set by the user. This can be done by scraping or vacuuming the manure.

enrichment - the act or process of improving the quality or power of something by adding something else.

grooming - brushing and cleaning the cow.

Ethogram - a table of all the different kinds of behaviour observed in an animal.

hygiene - maintaining health and preventing disease through cleanliness.

More information and inspiration!

Take a virtual visit to a farm in Somerset to see how 1000 cows live in year-round housing. You could research the products different engineering companies provide for barn design.

Explore this article about Creating an enriching life for cows

Want to take it further?

How could you adapt your design to monitor and maintain the health of the cows?

- You might monitor their temperature or their growth.
- What about maintaining hoof health or providing medicine?

How well did you do?

Success Criteria	Score /5
Enough space for all 60 cows to rest	
Cows can eat and drink whenever they want	
The cows will be comfortable	
The cows can demonstrate their natural behaviours.	
Cows will be kept clean and safe.	