

Cattle Carers - Session 3

How can we redesign dairy living spaces to improve cow wellbeing?



Context:

Learners focus on specific problems related to a cow's health and wellbeing when kept in an indoor environment on dairy farms. They learn about normal behaviours for a cow and think about how indoor environments can be designed to encourage cows to exhibit those behaviours. Learners use information provided, additional research and their own creativity and imagination to design a dairy barn that is the ultimate indoor cow environment.

Engineering focus:

Learners will be working as an engineer by imagining and planning possible solutions to the farmer's problem with taking care of the wellbeing of the dairy cows.

Learning time:

1.5 hours

Suggested age group:

9-11 years old

Curriculum for Excellence links:

Second Level:

I can extend my knowledge and understanding of engineering disciplines to create solutions. TCH 2-12a

I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way. MNU 2-20b

I can develop and communicate my ideas, demonstrating imagination and presenting at least one possible solution to a design problem. EXA 2-06a

I can use a range of graphic techniques, manually and digitally, to communicate ideas, concepts or products, experimenting with the use of shape, colour and texture to enhance my work. TCH 2-11a

I can investigate how product design and development have been influenced by changing lifestyles. TCH 2-05a

Keywords

herd
grooming
socialise
behaviour
ethogram
ruminating
conditions
freedom
comfort
enrichment
hygiene
trough
stalls
cow brushes
manure robots

Resources:

- Cattle Carers - Session 3 PPT
- Ethogram templates
- Cattle Carer Problem on a page handout
- Poster paper/flip chart paper
- Post-it notes
- Pens, pencils and rulers
- Squared paper

Optional:

- Laptops/tablets with internet access

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1

What makes a happy cow?

Find out learners prior knowledge about animal wellbeing and their basic needs by challenging them to work in groups to develop a list of things that a dairy farmer would need to think about when planning for the health and wellbeing of their animals. Display a words search which has clues hidden it for learners who are stuck for ideas. (Slides 2-3)

Take time for groups to share their ideas to build up a collective list of the needs of dairy cows on the board - this will be useful later in developing detailed design criteria for the challenge.

Explain the observable clues that indicate that a cow is healthy and happy (slide 4) and allow learners to put this new learning into action by making careful observations of a dairy cow at a country show and considering its health (slide 5).

2

Where do cows spend their time?

Explain that some dairy cows spend spring and summer outdoors and move indoors for the colder seasons, while others are always indoors (slide 6). Ask learners to discuss in pairs:

- Why do you think that dairy cows live in different places in different seasons?
- How might living indoors be different for the cows compared with spending time in the fields?

3

What is normal behaviour for a cow?

Ask learners to consider how we know cows are 'happy' in their environment. Explain to pupils that in order to understand how to develop the best environment for a cow, it is important to spend some time observing their natural behaviour. Explain when scientists and farmers study animal behaviour they use a tool called an ethogram. The information they collect is useful to inform them and others, like engineers, for a variety of purposes (slide 7).

Learners **watch the short video** on slide 8 and complete their own ethogram, making a list of all the behaviours and actions they observe in the cows. Learners can then compare their ethogram with one produced by scientists (slide 9).

Learners can improve their ethogram and then test it by making observations over time of the two videos on slide 10, keeping a tally of the frequencies with which they observe the different cow behaviours.

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



Imagine and plan the ultimate indoor cow environment.

Understanding normal cow behaviours can help farmers and engineers to work together to design environments for cows that keep them happy and healthy. Learners collaborate to imagine and plan possible solutions to the farmer's problem in the Happy Cow challenge. Provide groups with the Problem on a page: Happy Cow Challenge handout to support them in their problem solving (slide 11).

Encourage learners to collaboratively plan their barn layout using post-it notes so they can move elements around until they are happy with the layout. Each group should have access to a laptop of table to research aspects of their design. Encourage learners to justify their different design choices and layout.



Learners independently create a 2D scaled floor plan of their 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 justified on the plan. Encourage learners to look back to their ethogram to help them justify how their design choices will encourage the cows to exhibit normal healthy behaviour. An example is available (slide 12) to share with learners with need additional guidance.

How well does your design meet the success criteria?

Allow time for learners to reflect on how well their designs meet the design criteria. Learners can pair with someone from another group and take a few minutes to share their design with their partner, taking it in turns. Students can peer assess each other's ideas - identifying strengths and areas for development.

Learners can then self reflect on their own success using the table of the problem on a page layout.

Take it further

- To learn more about how researchers study the behaviour of dairy cows watch this [short film](#).
- To find out more about how farmers monitor the health of their dairy cows watch this [short film](#).

Make your own ethogram

Behaviour	Description



Ethogram of cow behaviour



Behaviour	Description
Walking	Movement from one place to another without the head near the ground.
Foraging	Grazing or browsing, taking 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, mounting)



What are typical behaviours for happy cows?

Behaviour	Tally	Total
Sleeping/resting		
Moving around		
Eating		
Foraging		
Drinking		
Grooming		
Social (playing & interacting)		



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**.



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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.	