



Environmental enrichment for cattle



What is an enrichment?

In natural habitats, animals receive many stimuli that vary in place and time. In such habitats, they can express a wide range of behaviours that define the species' behavioural repertoire. Farming or captive environments are designed to meet biological basic needs (e.g. for rest, feeding), but are far less complex than "natural" habitats. When performed, some behaviours may procure positive emotions (e.g. play in young, control of the environment). In poor environments, animals are not able to express some of the behaviours from their repertoire and lack stimulation. As a consequence, they may be frustrated, lack positive emotions, or experience boredom.

Enriching the environment requires understanding the animals' needs and preferences, which depend on the individual and its different characteristics (e.g. species or breed, experience, developmental stage). As a starting point, a good knowledge of the species, their behaviour and biology, is essential to investigate and potentially implement relevant enrichments.

The concept of environmental enrichment refers to a wide range of modifications to the environment of captive or farmed animals that offer adequate stimulation and facilitate the expression of highly motivated behaviour thus promoting positive emotions and improving the animal's welfare. Environmental enrichments can be classified into five (non-exclusive) categories:

- **Physical enrichments** that include the complexity of the animal's enclosure and the provision of additional elements (e.g. hiding places);
- **Occupational enrichments** that promote physical and/or psychological activities by providing

opportunities to exercise or to engage in cognitive tasks;

- **Sensory enrichments**, designed to stimulate one or several senses of the animal, and include visual, auditory, olfactory, tactile and taste stimulations;
- **Feeding enrichments** that promote foraging and feeding behaviour by providing new or varied foods, or feed delivery methods or tools;
- **Relational enrichments** that embrace social contacts, development of safety feeling, social facilitation or learning in diverse situations, and specific bonds with conspecifics or individuals of other species (including humans).



Legal requirements

The EU legislation to protect farm ruminants and equines does not mention enrichment. Council Directive 98/58/EC for the protection of farmed animals nevertheless mentions ethological (behavioural) needs. Council Directive 2008/119/EC specifies that calves must have visual and tactile contacts and must be kept in group from the age of 8 weeks.

Council Directive 2010/63/EU for the protection of animals used for scientific purposes mentions enrichment, in reference to behavioural expression and stress reduction.



Additional considerations

Enrichment is only considered to be enriching if it is perceived as such by the animal, i.e. providing opportunities to fulfill behavioural needs and experience positive emotions and good welfare. Housing supplementations (i.e. adding a few elements to suboptimal environments) that decrease poor welfare in the short term but are not sufficient to promote good welfare are thus not considered as enrichments.

Cattle and their farming systems

For inspection recommendations, see the **Indicator Factsheet 'Environmental enrichment for ruminants and equines'**

Cattle behaviour and sensory abilities

- Cattle distinguish colours. They are very sensitive to motion and contrasts between light and dark. They hear sounds from 23 Hz to 35 kHz; amplitude above 85 dB seem aversive. Cattle have good olfactory abilities, they can distinguish complex odours and can recognise the emotional states of conspecifics from olfactory cues. They distinguish the five tastes (sour, bitter, sweet, salty, umami). Cattle are sensitive to tactile stimulation.
- Cattle are gregarious, live in social and stable groups with a dominance hierarchy. Thus, individual housing leads to decreased welfare, for both adults and calves. In natural conditions, calves stay with their dam for several months and exhibit play behaviours with other calves.
- At pasture and during daylight, cattle spend around 60% of their time foraging, feeding or ruminating, 30% resting, 5% walking and 5% in other activities like social interactions, drinking or self-grooming. Cattle permanently housed indoors may express a frustration linked to the relatively low level of activity needed for foraging or looking for other resources.
- Cattle like to consume a diversified diet throughout the day.



Richness of cattle environment in the main European farming systems

- In the European Union, most adult cattle are kept outdoor at pasture during the grazing season and indoor in winter. The duration of each period depends on weather conditions and grass availability. Zero grazing is also practiced in some EU member states (e.g. Netherlands where cattle are commonly housed indoors all year to avoid pollution by manure leaching into canals).
- When indoors, cattle are generally housed in group pens, with a straw-yard or cubicles to rest.
- Tethering is decreasing in the EU. It is most often seen in mountainous areas or in some countries such as Germany and Poland.
- Beef bulls are generally housed in a straw-yard and have no access to pasture.
- Calves can be housed in individual stalls with visual and tactile contact with other calves, and not tethered, up to 2 months of age according to EU legislation (2008/119/EC). Calves from beef breeds suckle their dams and have access to pasture. Most dairy calves are separated from the dam soon after birth, are fed milk or milk replacer at least twice a day from buckets, with or without a teat, and have no access to outdoor.
- Cattle may be fed with monotonous diets: total mixed rations, high concentrate rations with straw or low diversified pastures. This occurs notably for high producing dairy cows or fattening bulls.



Examples of enrichments and impacts on welfare

Legend: ↗ = Increased, ↘ = Decreased, ⚠ = Attention point



Physical and occupational enrichment

| Enrichments | Positive effects on welfare |
|--|--|
| Access to pasture | ↗ exploring (foraging, free walking) ↘ aggressive behaviour, lameness, hoof disorders ⚠ insufficient feed/water/shelter/surveillance, unsuitable access routes |
| Access to an exercise area | ↗ walking, exploring |
| Shelters (natural or artificial) | ↗ rumination, grazing, protection against adverse weather ↘ heat stress |
| Subdivision of the pen | ↗ isolation need during parturition |
| Provision of objects for calves | ↗ locomotory and play behaviours ↘ non-nutritive oral activities ⚠ habituation to objects (they need to be regularly changed), risk of injury |
| Cognitive challenges (e.g. working for food) | ↗ learning opportunities ↘ boredom ⚠ frustration if not adapted (e.g. if the task is too difficult) |




Sensory enrichment


| Enrichments | Positive effects on welfare |
|-----------------------------------|---|
| Brushes, trees and human stroking | ↗ grooming of body regions that are hard to reach, positive emotions ↘ aggressive and stereotypic behaviours |
| Kind human voice | ↗ positive emotional state ↘ fear reactions to people |
| Music or radio broadcast | ↗ voluntary approach to being milked when music played in the milking parlour, positive social interactions ↘ stereotypic behaviour, vocalisations |

Examples of enrichments and impacts on welfare

Legend: ↗ = Increased, ↘ = Decreased, △ = Attention point

| Feeding enrichment  | |
|---|--|
| Enrichments | Positive effects on welfare |
| Feed diversity and variety | ↗ ingestion, sensory stimulation, opportunity to select appropriate feed in case of health disorders ↘ stress and boredom |
| Increased feed delivery frequency | ↗ feeding activity, access to feed for subordinates |
| More space at trough | ↗ feeding activity ↘ social competition |
| Longer and/or wet hay or straw for calves | ↗ feeding activity ↘ non-nutritional oral behaviours |



| Relational enrichment  | |
|--|---|
| Enrichments | Positive effects on welfare |
| Group housing with familiar conspecifics (adults and young) Young raised with their dam | ↗ social affiliative behaviours, social learning, growth, play behaviours ↘ stress and fear △ social space required to support group stability and avoid agonistic behaviour, warning to negative impacts on calf's health if not well managed |
| Regular, predictable and positive contacts with humans (e.g. talking, feeding, stroking) | ↗ approach towards humans, positive emotions ↘ avoidance of humans, stress during handling △ always having positive contacts can lead to dangerous situations during handling, humans should consider the individual variability (animal's personality) when establishing the contact |

Complexity and agency

Giving access to a variety of enrichments in place and over time (i.e. increasing the complexity of the environment and exposing animals to changing environments) while avoiding overstimulation, and allowing animals to behave as an active agent in their environment (i.e. allowing choice between items used for enrichment and control over situations) is generally highly valued by animals.

Legal requirements

Requirements listed are extracted from EU legislation at the date of publication of the present document. National legislation can be more stringent.

Council directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes

`(...)
[The principles of the Directive] include the provision of housing, food, water and care appropriate to the physiological and ethological needs of the animals, in accordance with established experience and scientific knowledge; (...)'
(Recital)

`(...)
Where an animal is continuously or regularly tethered or confined, it must be given the space appropriate to its physiological and ethological needs in accordance with established experience and scientific knowledge.'
(Annex, Paragraph 7.)

'Animals kept in buildings must not be kept either in permanent darkness or without an appropriate period of rest from artificial lighting. Where the natural light available is insufficient to meet the physiological and ethological needs of the animals, appropriate artificial lighting must be provided.'
(Annex, Paragraph 11.)

Council directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves

`(...)
(a) no calf shall be confined in an individual pen after the age of eight weeks, unless a veterinarian certifies that its health or behaviour requires it to be isolated in order to receive treatment. (...)
Individual pens for calves (except those for isolating sick animals) must not have solid walls, but perforated walls which allow the calves to have direct visual and tactile contact; (...)'
(Article 3, Paragraph 1.)

Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes

`(...)
(b) Enrichment
All animals shall be provided with space of sufficient complexity to allow expression of a wide range of normal behaviour. They shall be given a degree of control and choice over their environment to reduce stress-induced behaviour. Establishments shall have appropriate enrichment techniques in place, to extend the range of activities available to the animals and increase their coping activities including physical exercise, foraging, manipulative and cognitive activities, as appropriate to the species. Environmental enrichment in animal enclosures shall be adapted to the species and individual needs of the animals concerned. The enrichment strategies in establishments shall be regularly reviewed and updated. (...)'
(Annex III, Section A, Paragraph 3.3)



References

- Botreau, R., Lesimple, C., Brunet, V., & Veissier, I. (2023). Review – Environmental enrichment in ruminants and equines: Introduction. EURCAW Ruminants & Equines. <https://doi.org/10.5281/zenodo.7685132>
- Botreau, R., Brunet, V., & Lesimple, C. (2023). Review – Physical and occupational enrichment in ruminants and equines. EURCAW Ruminants & Equines. <https://doi.org/10.5281/zenodo.7687759>
- Brunet, V., Botreau, R., Veissier, I. (2023). Thematic factsheet – Environmental enrichment for ruminants and equines: the basics. EURCAW Ruminants & Equines. <https://doi.org/10.5281/zenodo.7760722>
- Ginane, C., & Rørvang, M.V. (2023). Review – Sensory and feeding enrichment in ruminants and equines. EURCAW Ruminants & Equines. <https://doi.org/10.5281/zenodo.7687769>
- de Oliveira, D., & Boivin, X. (2023). Review – Relational enrichment in ruminants and equines. EURCAW Ruminants & Equines. Manuscript in preparation.

