BBFAW
Business Benchmark on Farm Animal Welfare

BRIEFING

Environmental Enrichment for Farm Animals

Heleen van de Weerd & Jon Day

Summary

Barren production systems are associated with a lack of stimulation and cause boredom and frustration in animals. Environmental enrichment describes the modifications of the living environment to make it more complex so that animals can perform behaviours that are important (more natural) to them. This has a positive effect on the animal's wellbeing.

The Business Benchmark on Farm Animal Welfare has included a question on environmental enrichment since 2019. To be eligible for points, the environmental enrichment must be a modification of the animals' environment that is considered effective and meaningful to the species it is provided to. This means it should enhance the performance of strongly motivated species-specific behaviours or encourage the expression of natural behaviours. This briefing defines what environmental enrichment is and why it is important to farm animals, it explains how the BBFAW assesses provision of environmental enrichment and explains what types of environmental enrichment are suitable for different species. The tables in the appendix provide examples of suitable environmental enrichment for the main categories of farmed animal (pigs, poultry, ruminants, rabbits, and fish).

Introduction

The Business Benchmark on Farm Animal Welfare (BBFAW) aims to stimulate improvement in corporate practices on animal welfare management and reporting by providing a robust assessment of company performance. The BBFAW progressively drives changes in practices which ultimately improve the lives of farm animals. It does this by continuously reviewing and updating its scoring framework and by adding relevant animal welfare topics to its scope. The BBFAW added a question on environmental enrichment in 2019.

What is environmental enrichment?

Environmental enrichment is the term used to describe modifications of the living environments of animals which aim to improve biological functioning, as well as benefitting the animals' subjective experiences (both of which improve their welfare)[1] [2]. This means providing animals with a more complex environment so that they can perform behaviours that are important (more natural) to them, for

[1] Newberry RC (1995). Environmental enrichment: increasing the biological relevance of captive environments. Applied Animal Behaviour Science, 44, 229-243.
[2] Mellor DJ and Webster JR (2014). Development of animal welfare understanding drives change in minimum welfare standards. The Scientific and Technical Review 33: 121–130. Available online.

example, scratching and pecking (chickens), nest building (pigs and poultry), foraging for food and developing social bonds with other animals (all animals). This has a positive effect on the animal's wellbeing.

The term environmental enrichment has been used widely and is often applied to anything that is added to the animals' environment. However, from a scientific point of view, modifications should only be viewed as environmental enrichment when they actually improve the welfare of animals[3].

This scientific goal of making the environments of animals more 'natural' originated in zoos in the 1960s. Shortly after, the Brambell committee (who laid the original basis for the "Five Freedoms" for farm animals) stated that play objects can minimise the expression of destructive behaviours such as tail biting in pigs by occupying the attention of a group of farmed pigs[4] [5].

The concept of environmental enrichment is now applied to all animals in our care, whether on a farm, in a zoo, in a laboratory or at home (companion animals). Scientific study has defined what specific characteristics make environmental enrichment effective enrichment for various types of farm animals.

Different dimensions of an animal's environment can be enriched, and each dimension offers different ways of contributing to the welfare of an animal. The dimensions include[6]:

- Social (e.g. contact with other individuals of the same species);
- Occupational (e.g. encouraging exercise);
- Physical (e.g. objects or 'toys');
- Sensory (e.g. smells or sounds);
- Nutritional (e.g. varied and novel foods or novel food delivery).

Why is environmental enrichment important for farm animal welfare?

Intensive farming systems are often associated with barren living conditions (only feed and water provided) and close confinement (many animals in large groups or in cages, with relatively little space per animal). This can lead to a range of welfare problems as the animals can become bored and frustrated by the lack of stimulation and the close proximity of other animals in their space. The frustration resulting from animals' needs not being met can lead to aggression and stereotypic behaviour (repeated, similar movements with no apparent purpose, regarded as a sign of poor welfare).

Environmental enrichment can be used to enhance these barren living conditions and allow for the performance of a broader range of species-specific behaviours (i.e., those typical/natural for the animal species), leading to the expression of a more complex behavioural repertoire and stimulating positive behaviour, such as play. This also offers animals more choice over how they would like to spend their time, adding to a sense of control (which in turn can reduce stress). In addition, for many species, enrichment can also be used as a tool to reduce and manage undesirable and damaging behaviours that can emerge due to the frustration and boredom in barren housing. For example, tail biting in pigs or feather pecking in laying hens.

[3] Van de Weerd, H and Ison, S (2019). Providing effective environmental enrichment to pigs: How far have we come? Animals 9 (254). Open access.
[4] Lawrence A and Vigors B (2020). Farm animal welfare: origins, and interplay with economics and policy. In: The Economics of Farm Animal Welfare (Eds: Vosough Ahmadi, B, Moran, D, D'Eath, R). Pp. 1-29.
[5] Brambell, R (1965). Report of the technical committee to enquire into the welfare of animals kept under intensive livestock husbandry systems. Available online .
[6] Bloomsmith MA, Brent LY, Schapiro SJ (1991). Guidelines for developing and managing an environmental enrichment program for nonhuman primates. Laboratory Animal Science 41(4): 372-377.

The types of environmental enrichment that are effective differ between animals and should be adjusted to the needs of the species in question. Domesticated animals still possess similar motivations and exhibit very similar behaviours to their wild ancestors. This has implications for the needs of animals in our farming systems and the behaviours we may try to satisfy with the provision of enrichment.

When selecting effective environmental enrichment for a given type of animal, it is essential to have knowledge about the typical behaviour and characteristics of that species in its (original) natural environment, so that the modifications adopted are biologically relevant and will enhance the welfare of the animals.

In addition to enhancing the expression of species-specific behaviour, successful environmental enrichment should also consider the effects on animal health, the economics of the production system (cost and benefits) and practical considerations around implementation and maintenance[7] (see below). Assessment of the (economic) benefits of enrichment should take note of the costs of low welfare (e.g. early losses and culling due to disease or injury, and health care costs), rather than only focus on the costs of provision and maintenance.

There are a number of benefits of providing enrichment. These can include (depending on animal type):

1. Improved welfare through behavioural expression of highly motivated behaviours:
    - Provision of enrichment is shown to be associated with a more positive state in animals (happier, more playful) as observed by scientific methods (e.g. Quantitative Behaviour Assessment).

2. Improved health and physical wellbeing:
    - Increased thermal comfort (not too hot, or too cold), leading to improved immune/health status (reducing health costs);
    - Prevention or reduction of damaging behaviour and injuries (and associated care);
    - Increased physical activity leading to better leg health in particular.

3. Improved productivity:
    - Improved performance (e.g., better growth, feed conversion, carcass quality), animals sent earlier to slaughter, therefore efficiency gains (reduced costs, e.g., savings on feed);
    - Improved breeding performance (e.g., improved pregnancies, easier and shorter birth process, increased maternal care), fewer dead born;
    - Young animals more likely to thrive e.g., coping with and adapting to weaning, reducing growth dip after weaning).

Furthermore, providing animals with enrichment can also increase the enjoyment of animal caretakers or owners who look after the animals.

How does the BBFAW assess environmental enrichment?

The BBFAW includes a question on companies' commitments to provide farm animals with environmental enrichment. To be eligible for points in the BBFAW, the environmental enrichment must

[7] Van de Weerd HA and Day JEL (2009). A review of environmental enrichment for pigs housed in intensive housing systems. Applied Animal Behaviour Science 116: 1-20.

be both something that has been added to a farming system, as well as being considered effective and meaningful to the species it is provided to.

In the BBFAW, the scoring for environmental enrichment is distinct from the scoring for production systems. The BBFAW scores different types of production systems (from intensive to extensive) in the questions on close confinement (e.g., cages for hens and pigs, high animal numbers and group sizes in confined spaces for broiler chickens, beef cattle or fish). Whilst access to the outdoors will enhance the animal's ability to perform more natural behaviour and experience more stimulating environments, this is generally not classed as environmental enrichment. Additional enrichment is required to enhance these systems, for example, in the form of natural or artificial shade for cattle on pasture. Further examples of suitable enrichment of outdoor areas are provided in the **Annex**. The BBFAW follows this line of reasoning and assesses the provision of enrichment (and whether this is effective) in a separate question to that related to confinement. This prevents double scoring.

What is effective species-specific environmental enrichment?

Effective environmental enrichment enables animals to exhibit biologically relevant and motivated behaviours, such as nest building for sows or dustbathing behaviour that chickens display for the maintenance of their feathers. To do so, enrichment needs to meet certain species-specific characteristics.

The tables in the **Annex** provide key information on environmental enrichment, by category of farmed animal (pigs, poultry, ruminants, rabbits, and fish). The examples focus mainly on physical enrichment. Whilst certain physical enrichment objects are convenient to provide (e.g., they are readily available and durable), science has shown that some have limited functionality and are not meaningful to the animal. Points may not be awarded by the BBFAW if environmental enrichment is known to be ineffective (see list of inappropriate enrichment materials to avoid in the **Annex**).

Further guidance

There are some further practical considerations around the provision of enrichment:

- Quantity and size of enrichment: in relation to group size (to prevent competition and frustration).
- Renewal rate: when enrichment is depleted (or eaten), soiled or worn out (to prevent boredom, habituation and therefore reduced effectiveness). To be effective, environmental enrichment should maintain an animal's interest.
- Location: where to place enrichment to allow it to be easily accessible. This depends on enclosure or pen layout and group composition and dynamics (avoiding sleeping areas so that active animals do not disturb sleeping or resting animals, avoid slotted floors, as materials may fall through and become inaccessible).
- Short and long-term effects of the enrichment strategy used: quantify its benefits (as well as any potential harmful effects).
- Suitability of the enrichment at different stages of the animal's life, ensuring that the enrichment is effective, for example, for both young and older animals.

ANNEX - Important information on enrichment that can be added to enhance a production/farming system (in addition to basic system properties), by category of farmed animal.

Pigs – meat pigs, sows

Species (type)	Considerations for enrichment (motivations to address, welfare risks and practical considerations)	Characteristics of effective enrichment / examples
Meat pigs, boars and gilts (young breeding sows)	Growing pigs are strongly motivated: • To explore their environment, • To forage, search for food (nosing, rooting and chewing). Welfare risks: If pigs cannot perform these behaviours, they can get frustrated, expressed as undesirable pig-pig manipulation behaviours such as tail and ear biting. Pigs are strong and can quickly destroy materials, with a risk of injury to themselves and others. Other considerations: In the EU, Council Directive 2008/120/EC laying down minimum standards for the protection of pigs states that pigs must be provided with suitable enrichment material. It specifically states: "pigs must have permanent access to a sufficient quantity of material to enable proper investigation and manipulation activities, such as straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such".	**Offer:** To enable exploration and foraging - substrates (particulate, natural materials) and materials that allow investigation, manipulation and are chewable (deformable, destructible), edible (with an interesting texture, flavour, or smell) and allow ingestion. **Examples of optimal enrichment**: Straw or hay, ideally as big bales or loose material. Objects which offer multi-dimensional benefits e.g. straw bales which allow pigs to root and hide are ideal. When offering the above is not possible, enrichment materials provided in a rack or dispenser, preferably loose or less preferably, in compressed forms. **Avoid (inappropriate enrichment):** Chains, tyres, plastic tubes, simple plastic toys, hardwood beams, loose canisters as these do not meet animals' motivational needs.
Gestating sows (pregnant)	Gestating sows are strongly motivated: • To forage, search for food (nosing, rooting and chewing), as they are fed a restricted quantity of food (i.e., less than their desired *ad libitum* intake), • To explore their environment (especially if their food needs are met). Welfare risks: If needs are not met, risk of stereotypic* behaviours (sham chewing, jaw stretching) and undesirable pig manipulation (vulva biting, aggression).	**Offer:** To enable foraging (and exploration) - substrates (particulate, natural materials) that are chewable and edible (with an interesting texture, flavour, or smell), that allow ingestion and with some nutritional value and gut fill; substrates that allow investigation and are chewable (deformable, destructible). **Examples of optimal enrichment**: straw or hay, ideally as bales or loose material. When offering the above is not possible, enrichment materials provided in a rack or dispenser, preferably loose or less preferably, in compressed forms. **Avoid (inappropriate enrichment):** See above.
Nursing sows (with litter)	When close to giving birth, pregnant sows are strongly motivated: • To perform nest-building behaviour. Welfare risks: If needs are not met, there is a risk of longer farrowing duration resulting in lower piglet survival rate. Frustration	**Offer (optimal enrichment):** Nest-building materials - substrates (particulate, natural materials), ideally provided as loose material on the floor (optimal enrichment), but if this is not possible, provided in a rack or dispenser, loose.

	regarding limited space and lack of substrate can lead to aggression and stereotypic* behaviour.	**Sub-optimal enrichment:** When the above is not possible, as a minimum: hessian or cloth sacks or ropes, accessible within the farrowing crate or pen and offered near the head of the sow (if movement is restricted) **Avoid (inappropriate enrichment):** See above. Paper bedding as nesting material as it can be unsafe for piglets
Piglets (before and after weaning)	Young piglets are strongly motivated to: • To explore novel aspects of their environment, • To learn (social) skills through play, • To hide from others. Other considerations: Extra attention should be paid to biosecurity in selecting and managing enrichment.	**Offer:** To enable exploration and play - substrates (particulate, natural materials) that allow investigation, manipulation and are chewable (deformable, destructible), edible (with an interesting texture, flavour, or smell) and allow ingestion. **Examples of optimal enrichment:** straw or hay, ideally as bales or loose material. When offering the above is not possible, materials provided in a rack or dispenser, preferably loose, or less preferably, in compressed forms. **Sub-optimal enrichment:** When the above is not possible, as a minimum, hessian or cloth sacks or ropes, novel substrates (particulate, natural materials) to play with, shelter or panels to hide in or behind. Enrichment needs to be adjusted to the size of the piglets and allow multiple piglets to use it (similar to synchronized suckling bouts). **Avoid (inappropriate enrichment):** Materials which may cause entanglement of piglets.
Outdoor enrichment (for free range pigs)	Outdoor areas that are part of the production system (see introduction), can be managed to provide more stimulation by including enrichment (this should be in addition to the enrichment of any indoor environment). Motivations will be similar to those listed above.	**Offer:** Cover for shade and shelter - natural or artificial barriers, including trees and shrubs to provide shade or shelter. Wallows.

*Stereotypies: repeated, similar movements with no apparent purpose, regarded as a sign of poor welfare

Poultry – broiler chickens, laying hens, turkeys, and ducks

Species (type)	Considerations for enrichment (motivations to address, welfare risks)	Characteristics of effective enrichment / examples
Poultry reared for meat	Poultry are strongly motivated: • To explore their environment to forage for food (pecking, scratching, foraging), • To perch high up at night (safety) (for hens, broilers, turkeys), • To seek cover and shelter when unexpected stimuli evoke fear (providing control), • To maintain their feathers by dustbathing (species-typical behaviour), for ducks: to use water for this purpose.	**Offer (optimal enrichment):** To enable exploration and foraging - bales of substrates for pecking and exploration (e.g., straw, wood shavings, alfalfa), novel objects for pecking and exploration, including pecking stones. Feeding grain. To enable perching: Raised perches and platforms (with access ramps).

	Welfare risks: Prolonged contact with floor surface has detrimental effects on footpads and hocks (contact dermatitis). Prolonged inactivity (lying down) impacts on walking ability, leg health and thereby welfare. If needs are not met, there is a risk of feather pecking.	Cover - natural or artificial barriers, panels, bales of substrate, high platforms. To enable feather maintenance -trays or dedicated areas with dustbathing substrates. Ponds, baths, troughs or running water for bathing (ducks). **Avoid (inappropriate enrichment):** Simple plastic objects or toys e.g. hanging CDs as these do not meet animals' motivational needs. Consider the safety of hanging objects (e.g. string): risk of hanging, entanglement and ingestion.
Egg laying poultry	See meat poultry for motivations. In addition, egg laying poultry are strongly motivated to: • To seek seclusion for egg laying. Welfare risks: If needs are not met, there is a risk of feather pecking.	**Offer:** Seclusion - nestboxes with comfortable flooring (small group or individual nests) **Avoid (inappropriate enrichment):** Simple plastic objects or toys e.g. hanging CDs as these do not meet animals' motivational needs. Other secluded areas that are less suitable for egg laying. Badly designed nests can lead to crowding or smothering.
Outdoor enrichment (for free range poultry)	Outdoor areas that are part of the production system (see introduction), can be managed to provide more stimulation by additional enrichment. Motivations will be similar to those listed above.	**Offer:** Cover for shade and shelter - natural or artificial barriers, panels, including trees, shrubs, bales of substrate, high platforms, or (high) netting or fabric.

Ruminants – cattle (dairy, beef), sheep, goats

Species (type)	**Considerations for enrichment (motivations to address, welfare risks)**	**Characteristics of effective enrichment / examples**
Adults	Ruminants are strongly motivated: • To have a comfortable lying area (for lying down while ruminating and resting), • To perform skin care (grooming, rubbing, licking, scratching), • To hide and seek seclusion for giving birth, • To forage, graze and browse, • To explore and play; to climb (goats). Welfare risks: If needs are not met, there is a risk of stereotypies*, e.g. hair biting in sheep.	**Offer:** For comfort - lying substrates (e.g. natural bedding: straw, sawdust, sand) or synthetic (rubber and nylon mats or water beds with some bedding on top). To enable skin care - scratching and rubbing opportunities, e.g. brushes (automated or static), rubbing logs. To allow hiding - partition walls, space dividers. To enable foraging (indoors) - foraging opportunities (bedding), feed, fibre, racks. To enable exploration - objects (hanging or on the floor): logs, balls, canisters, rubber toys, ropes, bedding (straw). Climbing objects (goats, lambs). **Avoid (inappropriate enrichment):** Unsafe small objects that can be ingested.
Young animals	Young ruminants are strongly motivated: • To suckle • To learn (social) skills through play and housing.	**Offer:** To enable suckling - artificial teats (e.g. buckets with teats).

	Welfare risks: If needs are not met, there is a risk of cross-suckling (calves suckle each other's body parts).	To enable play - novel objects (hanging or on the floor): logs, balls, canisters, rubber toys, ropes or substrates to play with. **Avoid (inappropriate enrichment):** Unsafe small objects that can be ingested. Consider safety with hanging objects (risk of hanging and entanglement).
Outdoor enrichment (systems with outdoor access, feedlots)	Outdoor areas that are part of the production system (see introduction), can be managed to provide more stimulation by additional enrichment	Cover - natural or artificial barriers, panels, including trees, shrubs, providing shade and shelter, roofing, (high) netting, climbing opportunities for goats. Brushes (outdoors).

*Stereotypies: repeated, similar movements with no apparent purpose, regarded as a sign of poor welfare

Rabbits

Species (type)	Considerations for enrichment (motivations to address, welfare risks)	Characteristics of effective enrichment / examples
Rabbits	Rabbits are strongly motivated: • To gnaw (for teeth maintenance and for finding food sources), • To feel secure by hiding and sheltering (e.g. in holes), by standing upright to scan surroundings, • To build nests for seclusion for giving birth (does). Welfare risks: If needs are not met, there is a risk of stereotypies* and aggression.	**Offer:** To enable gnawing - wooden gnawing sticks, branches. Security and shelter - secluded places (burrows, tubes, partitions), raised platforms. Nestbuilding opportunities (does) - nest boxes, nest building materials (hay, straw, etc.) **Avoid (inappropriate enrichment):** Unsafe materials for gnawing.

Fish

Species (type)	Considerations for enrichment (motivations to address, welfare risks)	Characteristics of effective enrichment / examples
Fish	Knowledge on environmental enrichment for farmed fish species is limited and has focused on the main farmed species. This means that examples may be species-specific. Some general strong motivations: • To find shelter and safety (survival), • To rest, • To find food (hunt). There is some knowledge on occupational and sensory enrichment.	**Offer:** Shelter (survival). Substrates: cobbles, stones, sand. Structures: plants (artificial kelp), pipes, shade, cover. Occupational and sensory enrichment: Water currents and flows, bubble curtains, coloured backgrounds. Manipulable objects (e.g. vertical ropes).

Further reading

Pigs

European Commission (2016). Staff working document on best practices with a view to the prevention of routine tail-docking and the provision of enrichment materials to pigs.

European Commission leaflet 'Cutting the need for tail docking' (available in 8 languages: Danish, Dutch, English, French, German, Spanish, Italian, Polish).

EUWelNet Pig training (available in 7 languages: English, Dutch, French, German, Italian, Spanish, Polish).

Wallgren T and Gunnarsson S (2021). Effect of Straw Provision in Racks on Tail Lesions, Straw Availability, and Pen Hygiene in Finishing Pigs. Animals 11(2): 379. Open access: doi:10.3390/ani11020379.

World Animal Protection briefing. Provision of enrichment for pigs: Why it matters for animals and business.

Laying hens

Campbell DLM, de Haas EN, Lee C. (2019). A review of environmental enrichment for laying hens during rearing in relation to their behavioral and physiological development. Poultry Science 1; 98(1): 9-28. Open access: doi: 10.3382/ps/pey319.

Broilers

Riber AB, van de Weerd HA, de Jong IC, Steenfeldt S (2018). Review of environmental enrichment for broiler chickens. Poultry Science 1, 97(2): 378-396. Open access: doi: 10.3382/ps/pex344.

Turkeys

Martrenchar A, Huonnig D, Cotte JP (2001). Influence of environmental enrichment on injurious pecking and perching behaviour in young turkeys. British Poultry Science 42(2): 161-170. doi: 10.1080/00071660120048393.

Ducks

Colton S and Fraley GS(2014). The effects of environmental enrichment devices on feather picking in commercially housed Pekin ducks. Poultry Science 93(9): 2143-2150. doi: 10.3382/ps.2014-03885.

Cattle

Mandel R, Whay HR, Klement E, Nicol CJ (2016). Invited review: Environmental enrichment of dairy cows and calves in indoor housing. Journal of Dairy Science 99(3): 1695-1715.

Park RM, Foster M, Daigle CL. (2020). A Scoping Review: The Impact of Housing Systems and Environmental Features on Beef Cattle Welfare. Animals (Basel) 27; 10(4): 565.

Ude G, Georg H, Schwalm A (2011). Reducing milk induced cross-sucking of group housed calves by an environmentally enriched post feeding area. Livestock Science 138(1–3): 293-298.

Fish

Environmental Enrichment for Fish in Aquaculture - A literature review of the science on environmental enrichment for farmed fish. Compassion in World Farming.

Infographic – Enrichment for Fish During Rearing - Summarizing the science on environmental enrichment for farmed fish. Compassion in World Farming.

Authors Details and Contact

Dr Heleen van de Weerd is a global farm animal welfare consultant who works with clients to apply welfare knowledge in order to improve the quality of animals lives as well as business performance. Heleen is the Animal Welfare Specialist for Chronos Sustainability, providing advice on projects such as the Business Benchmark on Farm Animal Welfare and the Global Coalition for Animal Welfare.

Dr Jon Day is Chronos Sustainability's' Chief Operating Officer. He is a specialist in animal welfare, nutrition and agri-food and provides strategic oversight for Chronos' food business and sustainability portfolio, which includes working with multinational companies as well as delivering or supporting multi-stakeholder initiatives such as the BBFAW, the Global Coalition for Animal Welfare (GCAW), and several corporate clients.

The Business Benchmark on Farm Animal Welfare (BBFAW) is the leading global measure of farm animal welfare management, policy commitment, performance and disclosure in food companies. It enables investors, companies, NGOs and other stakeholders to understand corporate practice and performance on farm animal welfare, and it drives – directly and through the efforts of others – corporate improvements in the welfare of animals reared for food.

BBFAW maintains the Global Investor Statement on Farm Animal Welfare and convenes the Global Investor Collaboration on Farm Animal Welfare, a collaborative engagement between major institutional investors and food companies on the issue of farm animal welfare. In addition, BBFAW manages extensive engagement programmes with companies and with investors and provides practical guidance and tools for companies and for investors on key animal welfare issues.

The programme is supported by the BBFAW's founding partner, Compassion in World Farming International and supporting partner, FOUR PAWS International, who provide technical expertise, guidance, funding and practical resources, alongside supporting the assessed food businesses with training, programmatic expertise and consultancy engagement.

More information on the programme can be found at **www.bbfaw.com** or contact the BBFAW Secretariat at **secretariat@bbfaw.com**