



Module 15

Environmental Enrichment

Student Activities

Questions

- 1. The conditions in which humans keep animals can cause the animals to experience stress and therefore compromise animal welfare. Identify four features of confined environments that are considered to be stressors for the animals.**

(4 marks)

Any four of the following:

- Lack of sensory stimuli
- Restricted space in which to move
- Abnormal social groupings
- Lack of areas to retreat to
- Forced proximity to humans
- Lack of environmental control
- Too much or too little predictability

- 2. When housed and managed in confined living conditions, an animal's behaviour typically changes in one or more of three ways. Identify these three categories of behaviour change.**

(3 marks)

- Abnormal repetitive behaviours (oral and/or locomotor stereotypies).
- Aggressive behaviour, e.g. fighting.
- Passive behaviours that are consistent with negative mental states.

3. Describe the mental states that animals may experience in association with being kept in confined conditions. (2 marks)

- Animals may experience negative emotions when confined. This may include experiencing boredom when there is a lack of general behavioural opportunities, such as novelty or new spaces to explore.
- Frustration may occur when important motivations are thwarted, such as the motivation to forage, nest or interact with conspecifics.

4. What is 'environmental enrichment' and what does it aim to do? (2 marks)

Environmental enrichment is the alteration of the environment of captive animals in order to increase their behavioural diversity, with the ultimate aim of improving their welfare.

5. Describe four ways in which environmental enrichment may improve the welfare of animals. (4 marks)

Environmental enrichment improves animal welfare through:

1. providing opportunities to perform species-typical behaviour that is important to the animal
2. increasing the animal's ability to cope with the challenges of confinement, such as relatively high stocking densities compared to in the wild, or interaction with handlers for the taking of blood, or the presence of visitors in zoos
3. reducing the frequency of abnormal behaviours such as repetitive behaviours (stereotypies), aggression or passivity
4. providing opportunities for increased interaction with the environment.

6. Explain how, according to research findings, environmental enrichment has been found to improve the physical functioning of two different animal species. (2 marks)

Any two of the following:

- Keeping sows in pens or outside allows them to exercise their limbs, which strengthens their musculoskeletal system and reduces the likelihood of them falling to the ground as they lie down and killing their piglets.
- Providing variety in the diet of growing calves and allowing them to select what they eat was associated with a faster growth rate and lower feed costs than if they were all fed a complete mixed diet.

- Environmental complexity is associated with improved learning ability in laboratory rats.
- Preliminary research indicates that keeping farm animals in stable social groups of appropriate size and make-up enhances their ability to resist infectious diseases and increases their productivity.
- Environmental enrichment may increase the breeding success of some zoo species.
- Increasing horses' access to pasture or forage can reduce the occurrence of gastric ulceration and associated crib-biting.

7. Despite the benefits of providing environmental enrichment, it may not be effective for all animals in all situations. Identify two factors that may limit the extent to which environmental enrichment is effective.

(2 marks)

Any two of the following:

- The animal's early experience: if that is negative – e.g. rearing in isolation – there may be permanent changes in brain function that are similar to those found in autism. For such animals, environmental enrichment may not affect their performance of abnormal repetitive behaviours.
- The self-reward of endorphins released when the animal performs the abnormal behaviour.
- The animal's genetic make-up may limit the success of environmental enrichment in reducing repetitive behaviours and increasing his/her behavioural diversity.
- For zoo animals, the presence of visitors may be a stressor which could also limit the effect of environmental enrichment.

8. There are two different approaches to the provision of environmental enrichment. Identify and explain these differing approaches.

(4 marks)

- The 'naturalistic' approach involves making the captive environment as similar as possible to the one that the species experiences in the wild. This is common in zoos where there are only a few animals of any one species, and research indicates that members of the public feel that animals are happier in a naturalistic setting. This may be of particular consideration if the animals are being bred for eventual reintroduction into the wild.
- The 'behavioural' approach incorporates adopting artificial interventions in the captive environment in order to allow the animal to satisfy his/her behavioural needs. This is more common in farm animals, because it is not economical to provide huge, naturalistic spaces.

9. There are six principles associated with the appropriateness of the environmental enrichment provided. Identify three of these.

(3 marks)

- It should be based on the primary behaviours of the species in free-living conditions.
- It should maximise the utilisation of space.
- It should provide the animal with the opportunity to satisfy the behavioural need for control in his/her environment.
- It should be safe for the animal(s).
- It should be used by the animal(s).
- It should be economical and practical to implement.

10. The five main categories of environmental enrichment concern making physical, nutritional, occupational, social or sensory changes in the way the animal is managed. Give an example of how these categories may overlap in practice.

(2 marks)

Different categories of environmental enrichment may overlap, for example, in terms of modifications made to housing which also bring novel sensory elements into the animal's environment, as well as including occupational elements (the space to exercise, socialise, play and forage for food).

In-class activity

Discussion

We suggest you allow 35 minutes for this activity.

This discussion will focus on considering how various species are provided with environmental enrichment in different scenarios/systems.

Notes to lecturer:

Start by dividing the class into small groups and ask each to spend some time in identifying the main forms of environmental enrichment that could be used to improve the welfare of animals in captivity.

Key prompts:

- physical (housing)
 - flooring, substrates, outdoor/indoor space
 - environment (noise and light levels)
 - size
 - complexity, and how relevant furniture and accessories are to the species
- nutritional (how food is provided)
- occupation
 - exercise
 - toys and furniture
- opportunities to engage in or avoid social interaction with humans and/or animals
- sensory (auditory, olfactory, gustatory, visual, tactile).

The groups should report back to share the results of their discussion. Students should then be asked to consider the typical behaviours for a given species and discuss the enrichment available or provided in different systems. Each group can be provided with one scenario from the list below.

- Scenario 1: rats housed in a research laboratory vs. rats kept as pets.
- Scenario 2: laying chickens kept in a commercial egg-laying unit vs. chickens reared commercially for meat.
- Scenario 3: rabbits kept as pets vs. rabbits farmed for meat or fur.
- Scenario 4: dogs housed in a rescue shelter vs. dogs kept as pets.

Students should reflect on their knowledge of animal welfare science findings where possible in order to compare and contrast:

- what forms of environmental enrichment are typically afforded, and how, to the species in the two situations described in their given scenario?
- how the environmental enrichment may benefit the animals' welfare in both situations?

Finally, students can discuss as a class what, in their veterinary capacity, they could advise to people who manage the relevant animal species in order to optimise the environmental enrichment offered.

Debate

We suggest allowing 30 minutes for this activity.

In which of the following scenarios is it more important to provide environmental enrichment to animals:

- those in zoos
- those in farming systems
- those in research laboratories
- those kept as pets for companionship, or
- those used for sport and/or entertainment?

Notes to lecturer:

This is a class debate and will require consideration of all of the scenarios listed above. It is designed to challenge the students and a variety of approaches can be taken. The idea is that the class debates each scenario and eventually decides either that they can be ranked in order of importance, or that they all deserve equal consideration.

Some points to consider:

- The extent to which animals have been domesticated by humans.
 - Animals kept in zoos may be wild-caught or bred in captivity, while other animals may have been selectively bred over many generations for farming systems, laboratories, companionship and sport/entertainment. However, certain traits that have been selected may have given the animal species more pronounced needs than their wild counterparts. For example, pet dogs selectively bred for their relatively strong tendency to develop close relationships with humans may actually have the stressor of having to spend the majority of the day home alone, while wolves in captivity, who could be considered to have a stronger behavioural need to interact with conspecifics, generally spend the majority of the day with other wolves.

- Should the way in which humans use animals influence the degree to which the animals in these different scenarios are provided with environmental enrichment?
 - The degree to which humans engage with and form bonds with animals in the different systems may vary, and therefore determine the extent to which the owner will strive to provide environmental enrichment.
 - Even if there is the intention to provide environmental enrichment, there may be barriers associated with the system. For example, technicians who work with laboratory rats may not be able to provide environmental enrichment because of restrictions associated with research protocols, where husbandry procedures and provisions must remain as sterile and standardised as possible.
- For some scenarios there may be individuals of the same species who are kept and managed differently. For example, rabbits may be kept as pets, in laboratories for research, or they may be farmed for their meat or fur. In each scenario, the extent to which environmental enrichment is provided to members of the same species may vary according to why the animal is being kept. Additionally, chickens may be kept for eggs in enriched (or un-enriched) battery cages, while others are in free-range systems with woodland to forage in.
 - Within one of the above scenarios, members of different species may be afforded differing degrees of environmental enrichment. For example, veal calves may be reared in relatively isolated enclosures while lambs are allowed to mature alongside their mothers.
- Factors to do with human society, such as cultural differences, economics and the legal status of animals.

Presentation: Scientific Conference

In this project, students create their own scientific research conference. The topic of the conference is “Environmental Enrichment of Livestock”. Divide the class into small groups (e.g. six to eight people in each group). Give each group two scientific papers (or have the groups find two papers themselves) with each group having a different area. The papers should describe original studies of the use of environmental enrichment in the species concerned.

Each group should prepare two eight-minute presentations, summarising each of their two papers. The presentation should use the papers to describe the background, methods, results, discussion, and conclusion from the research. The students should then take three to four minutes describing how the findings in the papers relate to how the species is farmed in their area.

Lecturers are advised to use their discretion in the awarding of marks and in the feedback given to students regarding their presentation skills. A good presentation contains typical sections such as:

- Introduction (describing the purpose of the research or task)
- Main content (the outputs from the options listed below)
- Summary/conclusion (rounding up all the findings and making concluding statements, linking back to the purpose outlined in the introduction).

A good presenter speaks clearly and slowly, and doesn't engage in distracting habits such as clicking a pen while speaking, or jangling change in his or her pockets. They should remain relatively still and not move about too much which can also be distracting to the audience.

PowerPoint slides should also contain a minimum amount of text and the presenter should know the subject well enough (or read from additional notes) so that the slide works as a prompt rather than the presenter simply reading the entire slide to the audience and adding nothing extra.

Applied Learning Opportunities

Survey of environmental enrichment

Divide the class into groups. Each group should go to a different animal facility e.g. zoo, farm, veterinary hospital (including the veterinary teaching hospital at your school), pet shop, animal shelter. They should observe animals in the facility for 1-2 hours and, using the areas of environmental enrichment discussed in class, they should compile data on the adequacy of the enrichment.

The data should include:

- a description of the pen / cage / holding area,
- data on the animal's behavior, presence of stereotypies, level of alertness,
- and the frequency and duration of bouts of interaction with any EE that they have.

A data sheet similar to the one below may be useful.

Date of visit		Start time:		End time:	
Establishment					
Breed of animal:		Age (range if a group observation):		Individual or group observation?:	
Relevant characteristics:					
Environment					
Space allowance:		Socially/ individually housed?		Group size:	
Feeding methods and routines:					
Behavioural Ethogram					
Normal Behaviour	Frequency (or duration)				
<i>e.g. rooting</i>					
<i>e.g. self-grooming</i>					
<i>e.g. drinking</i>					
Stereotypic Behaviour					
<i>e.g. bar-biting</i>					
<i>e.g. swaying/ pacing</i>					
EE					
<i>e.g. puzzle feeder</i>					

After completing the observation, produce a report describing what you have seen and considering the extent to which the animals' need to perform certain behaviours is being met. Make conclusions about the welfare status of the animals. Also consider what could be done to provide the animals with opportunities to perform specific behaviours that are important to them.

The students should then summarise their data for the class, and might consider writing it up as a short communication (perhaps compiling all the groups' data for the local veterinary journal).

Important: This exercise may require some care. It is essential that the students do not stand in judgment over the owners of the facilities, and that the students see their role as impartial researchers. The class professor may need to write an introductory letter for each group to send to the facility concerned (especially if the facility is privately owned), or the group should take the letter with them. The class professor may also wish to discuss the project with the dean first. The students could provide the owner with a report of their findings, with practical suggestions for any improvements that might be necessary.

Developing an enrichment device (repeated in Module 13)

Using the principles outlined in the lecture, students in small groups are presented with the following design brief:

You are charged with designing a nutritional enrichment device for a brown bear kept in captivity. Brown bears are omnivores but mainly eat vegetation such as grasses, sedges, bulbs, and roots. They also eat insects such as ants, fish, honey, and small mammals, and in some areas they have also become significant predators of large hoofed mammals such as various deer species. As with other bears they have an excellent sense of smell which they use to search and identify food sources. The organisation that is responsible for the bear has limited funding, so the device needs to be able to produced relatively cheaply i.e. less than \$300 per device.

The students should present their device in whichever ever way they see fit to the rest of the class, as well as describing a high welfare experimental setting in which they could test their device.

Alternatively:

Using the principles outlined in the lecture, students should make an item to enrich the environment of one of their own animals. If necessary, the students should work in small groups, so each student has access to an animal. The students should then present the item to the animal and see if the animal uses it: how often and for how long, and in what way. Whether the animal uses it or not, the students should describe what happens and discuss why the enrichment was, or was not, effective.