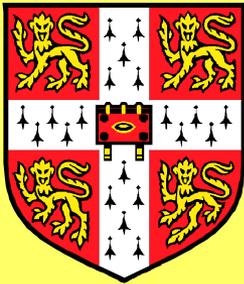


Animal welfare research indicators and welfare outcome indicators on farm and at slaughter



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Topics

1. Brief comment on morality in relation to animal use.
2. Current usage of the welfare concept.
3. The future of animal welfare science.
4. Welfare outcomes and practical assessment of welfare for laws and codes of practice

Background: morality has a biological basis.

The human concepts of what are and are not moral actions have probably changed little over many millennia.

1. Helping others and not harming others are effective strategies, especially for animals that live in long-lasting social groups.
2. Morality has evolved and religion is a structure for morality.
3. Attitudes to others have been much affected by the major improvements in communication.
4. Animals have always had welfare but what humans know of it has become modified over time, especially recently.

Non-human animals are now generally included within our duty of care concept.

Welfare in relation to sustainability and product quality

A system or procedure is **sustainable** if it is acceptable now and if its effects will be acceptable in future, in particular in relation to resource availability, consequences of functioning and morality of action.

This includes the impact on animal welfare.

For consumers and producers of animal products, the concept of **quality** has broadened.

Good quality now means:

- good in taste
- nutritionally good,
- acceptable in relation to human health,
- acceptable in relation to animal welfare,
- acceptable in relation to pollution impact,
- acceptable in relation to conservation/biodiversity,
- acceptable in relation to world resources,
- acceptable in relation to fair trade - poor producers,
- acceptable in relation to rural/urban communities.

In 1964 **Ruth Harrison's** (UK) book “Animal Machines” was published.

In 1965 the U.K. Government set up the Brambell Committee.

One of its members was **W. H. Thorpe**, an ethologist in Cambridge.

He explained that animals have needs with a biological basis and that animals would have problems if there was frustration of natural behaviour.

This view came to be written in the Brambell Report as the “five freedoms”

Bill Thorpe was my Ph.D. supervisor. He asked me in 1964 to comment on some material used by the Committee.

Professor Brambell's committee did not define welfare in their report.

At this time, the emphasis was on what people should do, i.e. on animal protection, not on animal welfare.

Following the writings of Lorca, Barry Hughes (1981) proposed that the term animal welfare meant that the animal was in harmony with nature, or with its environment.

This is a biologically relevant statement and a precursor of later views but it is not a usable definition.

Being in harmony is a single state so it does not allow scientific measurement.



However, the term welfare was being used more and more in science, in laws and in discussion about the effects of the treatment of laboratory, farm and companion animals.

There was a clear need for a scientific definition.

A problem in the borderline areas of physiology, pathology and behaviour, including animal welfare science, has been terminology imprecision.

In 1986 I presented this definition of welfare.

The **welfare** of an individual is its state as regards its attempts to cope with its environment.

In a series of papers (1988 - 1991), I emphasised that:

Welfare will be poor if there is difficulty in coping or failure to cope.

One or more coping strategies may be used to attempt to cope with a particular challenge. Feelings, such as pain, fear, pleasure, may be part of a coping strategy.

The system may operate successfully so that coping is achieved or may be unsuccessful in that the individual is harmed.

Welfare can be measured scientifically and varies over a range from very good to very poor.

In the early 1990s and later, this definition was referred to as a functional definition and was contrasted with the feelings - related definitions of Ian Duncan (see Broom 2008).

Duncan argued that welfare is wholly about feelings. My papers referred to feelings but as a part of welfare.



Even in recent times, the myth that the definition did not include feelings ¹ has been perpetuated. For example, Dwyer and Lawrence (2008) argued that my definition is a functional one, rather than one that refers to suffering and other feelings.

This was never the case and it is clearly explained by Broom (1991) that when welfare is defined in this way, feelings are included.

The arguments for the evolution of feelings as part of animal functioning are explained by Broom (1993 and especially 1998 and also Broom and Fraser 2007).

Like bad feelings, such as pain or fear, good feelings are a biological mechanism which has evolved.

There are problems with a definition of welfare that only refers to feelings.

-Feelings are just one part of an animal's repertoire of coping mechanisms.

-Although the brain condition which results in a feeling may have first arisen accidentally, most feelings now occurring are a result of natural selection and are adaptive.

Marian Dawkins argues that feelings and health are key aspects of welfare.

John Webster refers to health, feelings and other coping attempts.

Although feelings are an important part of welfare, welfare involves more than feelings, for example:

an individual with a broken leg but asleep,

an addict who has just taken heroin,

an individual greatly affected by disease but unaware of it,

an injured individual whose pain system does not function.

Pragmatically, some do not accept that feelings/affect can ever be measured.

Views of animal welfare science: Veterinarians. In the early years of animal welfare science 15-30 years ago, few veterinarians were involved.

Most veterinarians were not very sympathetic to animal welfare as a scientific discipline that should be taught to veterinary students and be promoted by those in practice.

Many veterinarians thought: that only they knew about animal welfare, that almost all of welfare was treatment of or prevention of disease, and that animal behaviour and welfare effects on disease were of minor importance to their work.

Medical researchers. Veterinary views had close parallels with the medical profession in which those who studied behavioural or mental problems were thought of as peripheral to the major tasks of human medicine.

Research biologists in universities seldom thought of the study of animal welfare as a science. They often viewed it as an impediment to research.

Vets, medics and biologists were unwilling to refer to animal feelings.

It is still the case that no animal welfare scientists are regarded as major figures in science.

Animals have needs for resources, such as food, water or heat and needs to carry out actions whose function is to attain an objective.

A **need** is a requirement, which is part of the basic biology of an animal, to obtain a particular resource or respond to a particular environmental or bodily stimulus.

For example: a hen or a sow building a nest when about to give birth or lay



an egg.

The need itself is in the brain. It allows effective functioning of the animal.

It may be fulfilled by physiology or behaviour but the need is not physiological or behavioural.

Obtaining accurate information about needs has been very important to improving animal welfare. For many species further information is required.

The idea of providing for “the five freedoms”, first suggested by W.H.Thorpe in the Brambell Report in 1965, is now replaced by the more scientific concept of needs.

The list of freedoms just provides a general guideline for non-specialists.

Animals have many needs and these have been investigated for many species. This is the starting point for reviews of the welfare of a species.

A list of needs, rather than of freedoms, has been the starting point for Council of Europe recommendations and E.U. scientific reports on animal welfare for over 20 years.

The freedoms are not precise enough to be used as a basis for welfare assessment. This is now an out-dated approach that should not be used if scientific evidence about needs is available.

We all have obligations in relation to causing harm or poor welfare in others. Assertions of rights and freedoms cause problems.

Where does naturalness fit with the concept of welfare?

Fraser (1999) pointed out that when members of the public talk about animal welfare, their ideas include the functioning of the animals, the feelings of the animals and the naturalness of the environment.

Fraser did not say that these aspects contribute to a definition or concept of welfare. He did not advocate that naturalness be part of welfare assessment.

☐ The feelings fit comfortably into my definition of welfare as they are an important component of coping mechanisms.

Naturalness is not at all part of the definition of welfare.

The state of an individual trying to cope with its environment will depend upon its biological functioning. Natural conditions have affected the needs of the animal and the evolution of coping mechanisms in the species.

The environment provided should fulfil the needs of the animal but does not have to be the same as the environment in the wild.

OIE said the following about animal welfare:

“Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing.

Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.”

This is essentially my definition but with other, somewhat confusing words added.

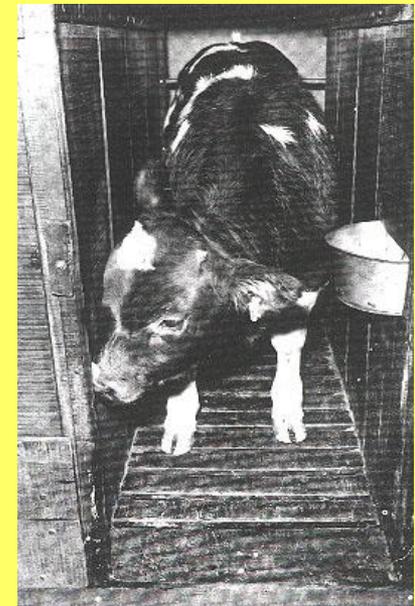
The first sentence is not good English. Also, it is not correct. ‘How an animal is coping’ means ‘by what method?’ Welfare is more than this.

The term ‘innate behaviour’ is not accurate as innate means unaffected by environmental factors, hence no behaviour is innate.

How should we relate duration of a problem or benefit and welfare?

There are differences among the welfare indicators that are most useful for assessing welfare according to how long the positive or negative welfare goes on.

Short-term measures like heart-rate and plasma cortisol concentration are appropriate for assessing welfare during handling or transport but not during long-term housing.



Behaviour, immune system and disease measures are more appropriate for long-term problems.

How should we relate duration of a problem or benefit and welfare?

Welfare over longer periods is sometimes referred to as quality of life.

This term is much used by clinicians but it means welfare.

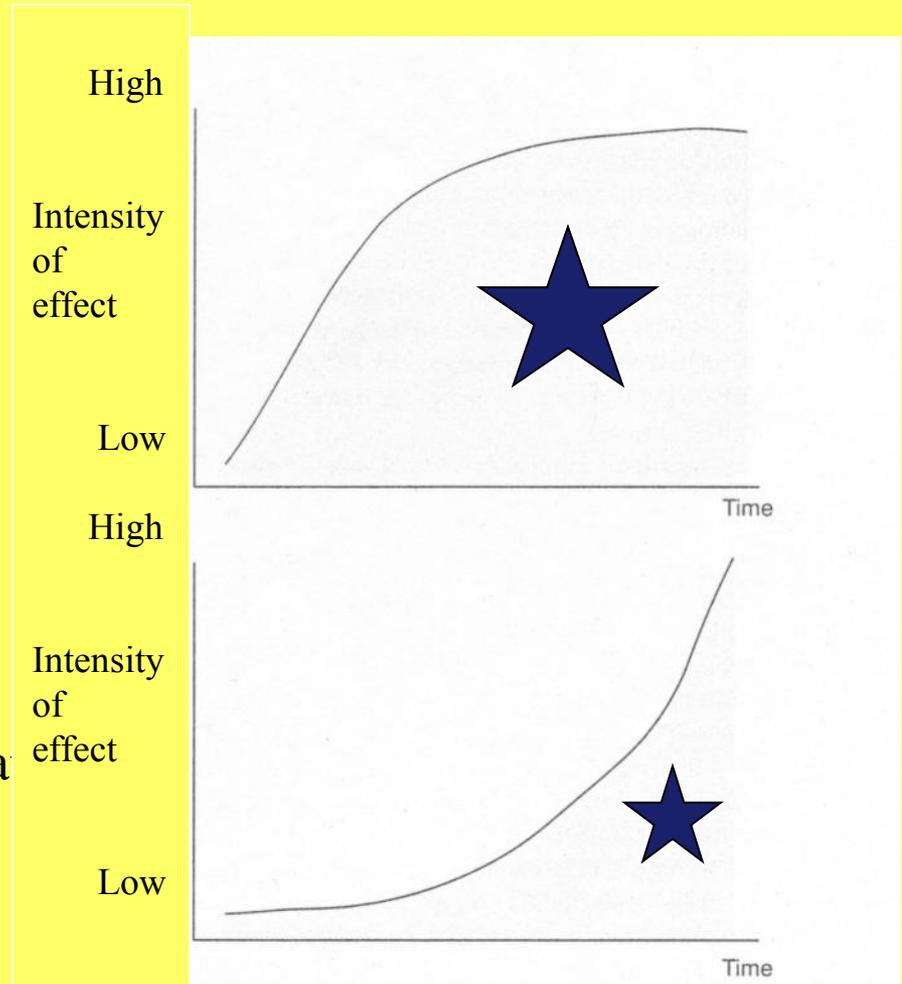


Over any time-scale, measures of severity or intensity of effect on welfare have to be related to the duration of the state.

When welfare is evaluated, the relationship between intensity and duration should be taken into account (modified after Broom 2001).

Where there is an adverse impact, e.g a procedure like stunning before slaughter, the area under the plot of intensity/severity against time is the magnitude of poor welfare.

Where the effect is a benefit, it is the intensity of positive effects that is measured and the magnitude of good welfare determined.



Current and future areas of activity in welfare research:

Disease and welfare

Assessing strength of preference

New indicators of good and poor welfare

On farm or other in situ indicators of welfare - Welfare Quality

Assessment of risk of poor welfare or likely benefit of good welfare

Cognition and sentience

Welfare in relation to sustainability and product quality

Disease and welfare. With disease challenge, as well as with other challenges, difficult or inadequate adaptation results in poor welfare.



e.g. osteoarthritis
in cats and dogs

Health is an important
part of welfare.

e.g. sole ulcer
in cows



Assessing strength of preference

How do we find out from animals what they need?

What is preferred?
(choice of floors)



How hard will the individual
work for a resource?
(lift weighted door)



Terminology used in motivational strength estimation

Resource – commodity or opportunity to perform activity.

Demand (as measured) – amount shown of action which enables resource to be obtained.

Price – amount of that action required for unit of resource.

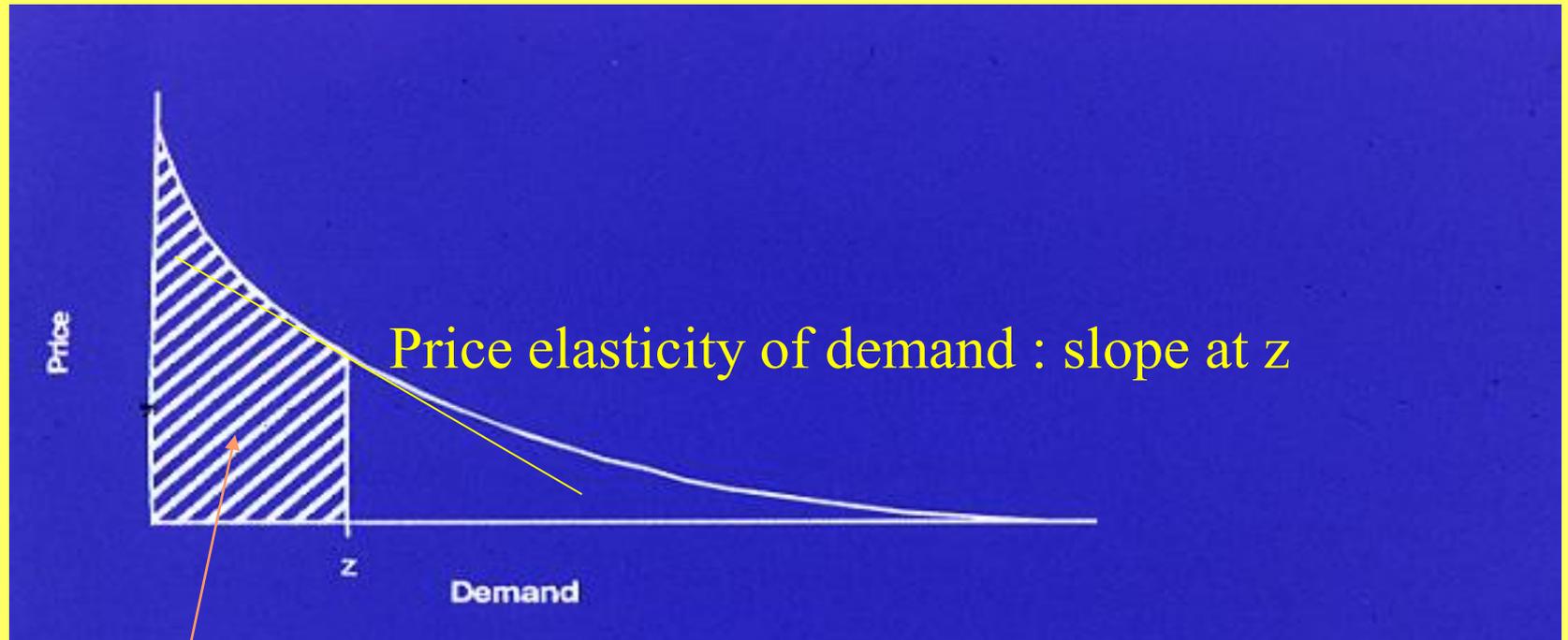
Income – amount of time or other variable limiting that action

Price elasticity of demand – proportional rate at which consumption or demand changes with price.

Consumer surplus – a measure of the largest amount which a subject is prepared to spend on a given quantity of the resource.

It corresponds to an area beneath an inverse demand curve.

Demand curve



The area under this inverse demand curve is the consumer surplus of the quantity z .



Mink were trained to perform operants to reach: an extra nest, various objects, a raised platform, a tunnel, an empty cage and a water pool to swim in.

The swimming water was given very high priority by the mink.
Mason et al (2001) *Nature*, 410, 35-36.

New indicators of good and poor welfare

How can we use physiological measures effectively?

What do stereotypes and other measures of abnormal behaviour tell us?

Direct measures of brain function: how are they related to welfare?



Evaluate the impact of adverse environmental conditions:

Assymetry of development.

Changes in physical development,
e.g. tooth growth.

Also, how is pain related to other
welfare indicators? – New EU research project.



New indicators of good and poor welfare

Physical impact of the environment.

We still know relatively little about the effects on welfare of:

high and low temperature,
starvation,
noxious gases.

Aspects of the social impact of the environment.

We still know relatively little about the effects on welfare of:
fear of attack by a conspecific or predator,
lack of social contact (for many species).

On farm or other in situ indicators of welfare

Genetic selection as well as husbandry

Lameness in cattle.

Leg problems of broilers: difficulties in walking.

Index specifying levels of difficulty in walking.

Extent of mastitis and reproductive problems of dairy cows.

Extent of stereotypies in confined animals, broken bones in hens, bruising.

Welfare Quality information: welfare outcome indicators, animal-based.

**Maximum can be specified,
e.g. 10% with detectable lameness or mastitis,
1% stereotypies, broken bones, severe bruising or hock burn.**

Assessment of risk of poor welfare or likely benefit of good welfare

Risk assessment in relation to disease, welfare.

List factors (hazards)

Calculate exposure

Estimate uncertainty

Good impact of particular exposures – benefit.

**Quantitative/
qualitative.**

Cognition and sentience

Which animals should be protected and to what degree should they be protected?

For most people, animals with awareness are thought more worthy of protection.

A **sentient being** is one that has some ability:

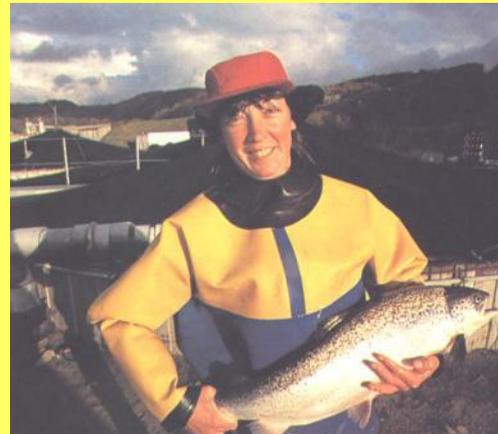
to evaluate the actions of others in relation to itself and third parties,

to remember some of its own actions and their consequences,

to assess risk,

to have some feelings and

to have some degree of awareness.



However, the term welfare, although not applicable to inanimate objects or plants, is relevant to all animals because they have a nervous system, not just to sentient animals.

People have long appreciated the sentience of various domestic and other animals and have often thought of them as an example to follow or a friend who would help, rather than just as a resource object.

However, a rabbit is viewed differently according to whether it is:

a family pet,
a laboratory animal,
an animal kept for meat production, or
a wild animal that eats your crops.

This is not scientifically sound.

A rabbit is a rabbit and each one feels pain or has cognitive function.

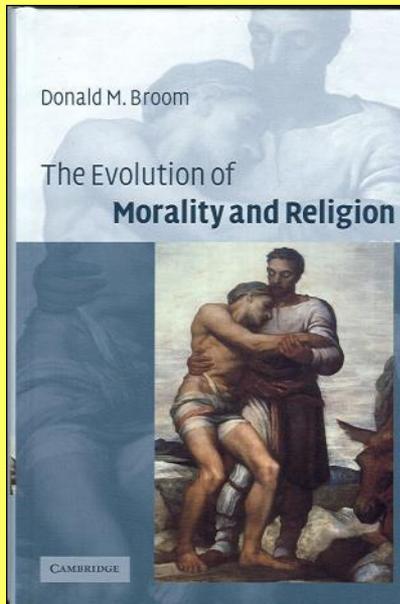
Animal welfare science is a key topic for providing information that the public wants.

Understanding how individuals cope with the world in which they live is a major area of fundamental science, for humans as well as for other species.

There is much to do!

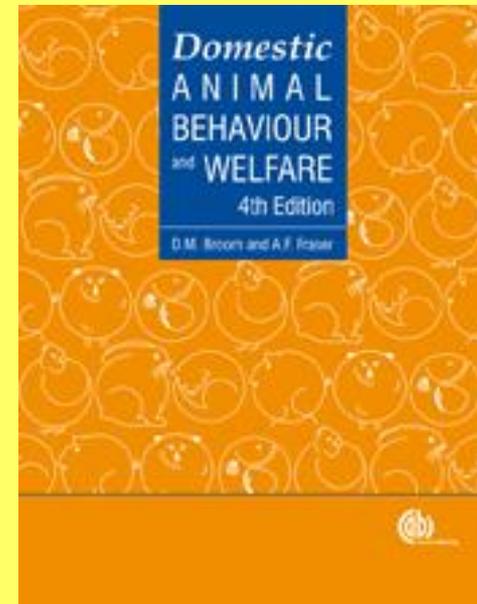
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