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## CHAPTER 5 B

### ***SECOND VIEWPOINT: FROM A SUSTAINABILITY AND PRODUCT QUALITY PERSPECTIVE***

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#### INTRODUCTION

The scientific study of animal welfare has developed rapidly in recent years. The concept is defined here and its relationship with other concepts, such as health, stress and needs, is discussed.

The welfare of animals is a matter of substantial public concern and is an aspect of our decisions about whether or not animal usage systems are sustainable. A system that results in poor welfare is unsustainable because it is unacceptable to many people. The various criteria for sustainability are briefly discussed. The quality of animal products is now judged in relation to the ethics of production, including impact on the welfare of the animals, as well as on price, taste and consequences for consumers.

Animal welfare is a term which describes a potentially measurable quality of a living animal at a particular time and hence is a scientific concept. It requires strict definition if it is to be used effectively and consistently. A clearly defined concept of welfare is needed for use in precise scientific measurements, in legal documents and in public statements or discussion.

Welfare refers to a characteristic of the individual animal rather than something given to the animal by people (Duncan 1981). Broom (1986) defined the welfare of an individual as its state as regards its attempts to cope with its environment. It has been emphasised (Duncan 1981, Broom 1988, 1991a,b, Broom and Johnson 2000, Fraser 2008) that welfare can be measured scientifically, independently of any moral considerations. Once the welfare has been objectively assessed, ethical decisions can be taken about what is to be done about it. This definition of welfare refers to a characteristic of the individual at the time, i.e. how well it is faring (Broom and Fraser 2007, Broom 2008). This state of the individual will vary on a scale from very good to very poor. Welfare will be poor if there is difficulty in coping or failure to cope so that the individual is harmed. One or more coping strategies may be used to attempt to cope with a particular challenge so a wide range of measures of welfare may be needed to assess welfare.

Feelings, such as pain, fear and pleasure, are often a part of a coping strategy and they are a key part of welfare (Duncan and Petherick 1991, Broom 1991b, 1998). They are adaptive aspects of an individual's biology which must have evolved to help in survival just as aspects of anatomy, physiology and behavior have evolved. Fear and pain can play an important role in the fastest acting urgent coping responses, such as avoidance of predator attack or risk of immediate injury. Positive and negative feelings, as well as other brain processes that involve no affect, are among the causal factors determining what decisions are taken in longer time-scale coping procedures, where various risks to the fitness of the individual are involved. Aspects of suffering also contribute significantly to how the individual tries to cope in attempts to deal with very long-term problems that may harm the individual. In the organisation of behavior so as to achieve important objectives, pleasurable feelings and the expectation that these will occur have a substantial influence.

Coping with pathology is necessary if welfare is to be good so health is an important part of the broader concept of welfare, not something separate (Dawkins 1980, Webster 1994, Broom 2006, Broom and Fraser 2007). However, health is not all of welfare, as those with a medical or veterinary background have sometimes assumed. Health is the state of the individual as regards its attempts to cope with pathology. This refers to body systems, including those in the brain, which combat pathogens, tissue damage, or physiological disorder.

When considering how to assess the welfare of animals it is necessary to start with knowledge of the biology of the animal and of all of its needs. It is important to be aware that needs have a biological basis but this does not mean that degree of naturalness is a part of the definition of welfare (Fraser 2008). Some events that occur in nature, such as starvation or predation, result in very poor welfare. The needs of individuals will vary according to genotype and will be affected by conditions during development. It is more useful to consider the needs of animals of a given species, using scientific information about them, than to use the vaguer concept of freedoms.

The word “stress” should be used for that part of poor welfare that involves failure to cope, as the common public use of the word refers to a deleterious effect on an individual (Broom and Johnson 2000) Reference to stress as just a stimulation that could be beneficial, or as just an event that elicits adrenal cortex activity, is of no scientific or practical value. One indicator of adversity is whether there is an effect on biological fitness. Stress can be defined as an environmental effect on an individual which over-taxes its control systems and reduces its fitness or seems likely to do so. Using this definition, the relationship between stress and welfare is very clear. Firstly, while welfare refers to a range in the state of the animal from very good to very poor, whenever there is stress, welfare is poor. Secondly, stress refers only

to situations in which there is failure to cope but poor welfare refers to the state of the animal, both when there is failure to cope and when the individual is having difficulty in coping.

In the early 1990s and later, Broom's definition was referred to by some as a functional definition and was contrasted with the feelings - related definition of Duncan (see also Broom 2008). Duncan argued that welfare is wholly about feelings (e.g Duncan and Petherick 1991). A more common position was that of Marian Dawkins (1990) who stated that the feelings of the individual are the central issue in welfare but other aspects such as the health of that individual are also important. As explained earlier in this paper, feelings are biological mechanisms that form part, but not all, of the set of coping systems. The term welfare means essentially the same as well-being but, in most of the world, welfare is used as the scientific term.

## 2. SUSTAINABILITY

A central question, when decisions are made about whether a system for exploiting resources should be used, is whether or not the system is sustainable (Aland and Madec 2009). The fact that something is profitable and there is a demand for the product is not now sufficient reason for the continuation of production. 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 (Broom 2001, 2010). A system might not be sustainable for several possible reasons. For animal usage systems, examples of such reasons are: i) because it involves so much depletion of a resource that this will become unavailable to the system, ii) because a product of the system accumulates to a degree that prevents the functioning of the system, or iii) because members of the public find

an action involved in it unacceptable. Where there is depletion of a resource or accumulation of a product, the level at which this is unacceptable, and hence the point at which the system is unsustainable, is usually considerably lower than that at which the production system itself fails. Other reasons for unacceptability are exemplified below. A system could be unsustainable because of harms to the perpetrator, other people, the environment, or other animals (Table 1).

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**Table 1 - Reasons for lack of sustainability of a system:**

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|-------------------------|--|
| 1. resource depletion   | - to level that is unacceptable.<br>- to level that prevents system function.  |
| 2. product accumulation | - to level that people detect and find unacceptable.<br>- to level that affects other systems in an unacceptable way.<br>- to level that affects the system itself, perhaps blocking its function. |
| 3. other effect         | - to level that is unacceptable.   |

The consequences of acts or of system functioning (in 1, 2 and 3)

could be unacceptable because of immediate or later:

- [a] harm to the perpetrator : resource loss or poor welfare
- [b] harm to other humans : resource loss
- [c] harm to other humans : poor welfare
- [d] harm to other animals : poor welfare
- [e] harm to environment including that of other animals.

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(modified after Broom 2010)

No system or procedure is sustainable if a substantial proportion of the local or world public find aspects of it now, or of its consequences in the future, morally unacceptable. Each of the examples in Table 2 is unsustainable. Adverse effects on people or animals can be reported in the media around the world and there are now consequences around the world of unacceptable practices in manufacturing, animal production or other human activities because of increased efficiency of communication..

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**Table 2 Unsustainability – categories of unacceptable harms and examples that led to headlines in newspapers**

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1. Harm to perpetrator: resource loss or poor welfare
  - [a] system for energy production uses more energy than it produces.
  - [b] Machinery for process made of poor quality materials so injury to working person likely.
  - [c] Toxic insecticide spread on fields - spreaders poisoned by insecticide in China.
  
2. Harm to other humans: resource loss
  - [a] factory/agricultural system outflow into lake or river – fishing industry lost because of the pollution of a river by manure in Thailand.
  - [b] Heavy metals from industry – reduces farm production.
  - [c] Radiation from energy production system – reduces farm production.
  
3. Harm to other humans: poor welfare

[a] dioxin released from factory – people become sick, some die.

[b] Cheap cattle protein fed to other cattle – bovine spongiform encephalopathy in cattle and people catching new-variant Creutzfeldt-Jacob disease by eating beef in the U.K. Also, consumer health risk from slaughtered sick cattle in U.S.A.

[c] Work which is too demanding – some workers become injured, depressed or psychotic.

4. Harm to other, non-human, animals: poor welfare

[a] traditional entertainment for people e.g. bull-fight, dog-fight, cock-fight, bear-bait, throw goat off church tower.

[b] Use leg-hold trap for pests or fur-bearing animals.

[c] Veal production from calves kept in small crates and fed only milk.

[d] Sheep on an Australian ship dying in large numbers en route to Saudi Arabia.

[e] Slaughterhouse cruelty in the U.S.A.

[f] Chickens killed by inhumane methods during avian influenza control in Indonesia.

5. Harm to environment including that of other animals.

[a] use of CFCs in refrigerators – ozone layer damage.

[b] Use chlorinated hydrocarbon insecticides – birds etc. which are insectivores or top predators killed or unable to reproduce.

[c] Produce too much carbon dioxide and other greenhouse gases – global warming.

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(modified after Broom 2010)

Media reports of activities or events that the public find unacceptable, may result in consumers in many countries refusing to buy animal and other products from the companies or countries involved (Table 3, Broom 2002).

Table 3 Examples of actions that led to consumers refusing to buy products.

<b>Action reported by media</b>	<b>Consequences</b>	
Dolphins being killed in nets set for tuna.	The sales of tuna dropped sharply. This was a long-term effect and resulted in a permanent change in fishing practices.	
In France, poor welfare of calves kept in small crates for veal production.	In U.K., a drop in the sales of all French products, including unrelated products such as wine. For most consumers, this was temporary but for some it continued until the introduction of European Union legislation banning the production of veal using crate-housing and low iron and low fibre diets.	
The death of thousands of sheep on an Australian ship going to Saudi Arabia.	In several countries, a temporary drop in sales of Australian products.	
Very low payments to poor coffee farmers in third world countries supplying a coffee shop chain reported in many countries.	Temporary and permanent loss of customers at coffee shop chain.	

Rainforest destruction for beef production for restaurant company.	A drop in sales of company in many countries. Some permanent loss of customers.
Cruelty to poultry in slaughterhouse shown in one television program and cruelty to cattle in another.	Temporary reduction in poultry sales. Reduction in beef consumption, duration not known. A few people respond to information about poor welfare in animals by becoming vegetarian but a much larger number make some changes to their food purchasing practices.

Consumers drive legislation and retail company codes of practice for animal production (Bennett 1994, Bennett et al 2002). Legislation on animal welfare has developed in the European Union and in many countries because of pressure from voters (Broom 2002, 2009). In general, the standards of retail companies have a substantially greater effect on the welfare of farm animals than legislation. The codes of practice of food companies have international impact. For example, many pig producers in Brazil have to comply with the animal welfare standards of United Kingdom supermarkets in order to sell to them and egg producers in Thailand have to rear their birds according to the standards of the increasing numbers of United States food chain companies who have animal welfare standards.

### 3. WHAT IS FOOD PRODUCT QUALITY?

The idea of quality for the goods that people buy has changed in the last 10-20 years. Quality referred formerly to immediately observable aspects, i.e. for an animal food product, its visual qualities and taste. These aspects of quality are still important, and expectations about taste are tending to become more refined, but other factors are now becoming incorporated into what constitutes good quality. Consumption has consequences and a higher proportion of these are now considered. If a food causes people to become sick, the quality is considered poor. If the food tends to make you fat, for some people the quality is considered poor. If food has added nutrients, some consider the quality to be better. In addition, a major recent change is that the ethics of the production method are taken into account. Factors considered by purchasers include: (i) the welfare of the animals used in production, (ii) any impact on the environment, including conservation of wildlife, (iii) ensuring a fair payment for producers, especially in poor countries, (iv) the preservation of rural communities so that the people there do not go to live in towns and (v) the carbon footprint of each product as factors leading to global warming are now high on the agenda of many discriminating consumers.

If food is not safe, in that it contains damaging levels of toxins or pathogens, most consumers will never buy it however cheap it is. Individual food production companies are expected to be responsible for this aspect of food quality but the public expects their government to ensure that adequate standards and adequate checking systems exist. National governments have fallen and companies have gone bankrupt because of known failure on this issue.

In parallel with the FDA in the United States, in the European Union the European Food Safety Authority (EFSA) has been set up. A difference from the FDA is (i) that many aspects of sustainability are part of the work of EFSA and (ii) that the major part of its work is done by independent scientists, appointed solely on scientific expertise and not as representatives of countries or interest groups. In producing scientific reports, a significant part of their work is the assessment of risks and benefits. The subject area covered by EFSA is wide, reflecting

the public concern. One Panel deals with animal disease and animal welfare. The reports that it produces led to changes in E.U. legislation and scientifically based standards in Europe and elsewhere in the world. A scientific committee producing reports on animal welfare is of value in any major country. Measures to check that there is compliance with legislation exist in the Member States of the E.U. and in other countries, such as the U.S.A. with regard to food content.

In order that the ethics of the production method can be properly taken into account, products must be traceable. If foods can be traced, it is less likely that toxins, other poor quality materials or pathogens will be in them. If animals can be traced, the sources of animal disease outbreaks are more likely to be found and places where injuries, or other causes of poor welfare, occurred are more likely to be found (Broom 2007). Legislation and industry initiatives ensuring traceability are important.

#### 4. ASPECTS OF SUSTAINABILITY AND PRODUCT QUALITY

Consumers will refrain from purchasing animal products if they judge that the production procedures are unsustainable and thus not of good quality. The quality may be judged to be poor on the basis of negative effects of the production or the product on: human health; human diet; the acceptability of genetic modification; animal welfare; environmental effects such as pollution, conservation and carbon footprint; the efficient use of world food resources; fair trade i.e. considering poor producers; and preserving rural communities. Each of these factors, now an aspect of both product quality and the sustainability of the production method is considered here.

##### 4.1 Human disease resulting from a food product, sustainability and product quality

Some examples of human health issues that affect views of product quality are: *Salmonella* in eggs and meat, *Campylobacter* in chicken carcasses, avian influenza (H5N1 or H1N1) and bovine spongiform encephalopathy (BSE) in beef products. In the late 1980s and early 1990s the British government failed to initiate measures that would prevent the large-scale mortality of people from new-variant Creutzfeldt Jacob Disease (CJD) if they ate meat products from animals with BSE. Luckily for the British public, the number dying is likely to be a few thousand rather than hundreds of thousands. Eventually, with scientific expertise from E.U. committees, an appropriate policy was developed. The one good consequence of this has been the development of the risk assessment approach in disease management and in animal welfare in Europe. However, the subsequent unwillingness of other governments, faced with an unknown amount of BSE, to damage their beef production industries is disturbing. Recent actions in the United States make it clear that cattle showing abnormal locomotion and other behavior on arrival at the slaughterhouse must still be considered a BSE risk.

#### 4.2 Human diet sustainability and product quality

In recent years, there have been large effects on animal production because of concern about human diet. In particular, saturated fats increase risks of heart disease and farm livestock are a major source. As a consequence of the benefits of consuming fish oils, fish production is increasing rapidly. The production of fish that consume vegetable matter, rather than predators like salmonids, which have to be fed mainly fish products, is likely to increase the most because much of the fish product fed to the salmonids could have been consumed by humans and less resource wastage occurs if the fish are herbivorous. The value of farmed fish production is already larger than that of open water fish production and the weight of farmed fish will be greater than that of fish from open water within a few years.

#### 4.3 Genetic modification, sustainability and product quality

In some countries, genetically modified plants are not accepted because of ethical concerns, the issue being whether or not living things should be modified in the laboratory as opposed to genetic changes that occur naturally. There is also concern because protein changes can cause allergies. Genetic modifications in animals can: benefit the animals (e.g. confer disease resistance), or help to treat human disease (e.g. a blood clotting factor in the milk of a sheep), or develop new products for other purposes, or increase efficiency of animal production. Some people accept all of these but others accept some or none as sufficient justification for genetic modification. A major reason for this is that, in some cases, animal welfare may be poorer as a result of the modification. The conclusion of many people is that any production of genetically modified animals should occur only if it has been demonstrated by scientific studies of animal welfare that the welfare of the animals is not poorer than that of unmodified animals as a consequence.

#### 4.4 Animal welfare, sustainability and product quality

Poor welfare of animals that are used in the production system is a major reason why some animal production systems may be regarded by the public as unacceptable. Hence these systems become unsustainable unless there is some modification to them. Animal welfare is becoming more important to members of the public as a reason for demanding change from farmers, food retail companies and governments. Members of the European Parliament receive more letters about animal welfare than about any other subject (Broom 1999). However, most people think about animal welfare issues infrequently, unless their attention is drawn to it by media coverage. When the information is drawn to public attention, there is a point at which the welfare of the animals becomes so poor that the majority consider the system to be unacceptable. Hence animal welfare and public attitudes toward it must be

considered wherever the sustainability of an animal production system is evaluated. In order to produce laws or codes of practice, scientific evidence is needed.

#### 4.5 Conservation, carbon footprint, sustainability and product quality

A major harm that results from agriculture is that it normally reduces biodiversity as compared with the original natural vegetation. Where wild or semi-wild areas are cleared for animal production, substantial harm can be done to populations of animals and plants. Hence, some animal production is not considered acceptable and products are not bought because these harms have been done. One solution to this problem, for animals that currently consume pasture plants, is to keep the animals in areas where they can browse on bushes and trees as well as grazing

(Murgueitio et al 2009, 2010). A second solution is the creation of significant areas of nature reserve, as demanded by the public in most countries. Preservation of wildlife can sometimes result in greater income through eco-tourism than would have been possible by farming. The purchase of land to conserve natural resources can often stimulate local economies and lead to a sense of regional pride that would not have existed if low-level animal production had continued. A further example of a possible adverse impact of animal production on conservation is the inappropriate use of antimicrobials and other medicines. The numbers of several species of vultures in India have declined by 96.8 to 99.9% in 15 years (Prakash et al 2007). This is a consequence of poisoning by the painkiller Diclofenac and the Indian Government has recently banned its use (Pain et al 2008).

Mismanagement of resources and production of effluents that can result in contamination of water supplies, loss of plant nutrients, greenhouse gas production and increased human disease are also a cause of unsustainability. The animal producer should pay any costs of environmental pollution and, wherever possible, animal waste should be efficiently recycled.

#### 4.6 Efficient use of world food resources, sustainability and product quality

Many people consider that the inefficient use of world food resources is unsustainable. However, animal production activities can be changed so as to exploit existing resources. Some animals used for food production can eat food that humans cannot eat (see Chapter 13). Hence keeping grazers and browsers will often be more advantageous than raising pigs or poultry, since the latter do compete with humans for food. There will be energy loss if we eat animals that consume food that we could have eaten. There is also an effect on greenhouse gas production because carbon dioxide and other greenhouse gases are emitted in the course of production of animals such as poultry and pigs, for example because of the combustion of materials in the course of food production and the transport of food and animals. This advantage of using grazers or browsers can be weighed against any adverse consequences for greenhouse gas emissions of methane production by ruminants.

#### 4.7 Fair trade, preserving rural communities, sustainability and product quality

Many traditions and ways of life for people are associated with animal agriculture. Many human communities exist as they do as a consequence of particular animal production systems. If that production is changed so that the number of farms is greatly reduced in the original areas, or the whole production system is moved away from those areas, there are social and environmental consequences. The destruction of rural communities is thus another factor that is taken into account by those considering whether animal production systems are sustainable (see Chapter 6). A central aim of the European Union's Common Agricultural Policy was to preserve rural communities and to reduce the number of people who leave country areas and move to large cities, thus increasing their size. That policy has been successful in minimizing such movement and some United States government agricultural policies that prevented the prices of certain agricultural goods from falling to a low level,

have also had this effect. In many other countries, in contrast, cities have become much bigger and rural communities have declined or disappeared. Similar destruction of rural communities has occurred where the number of people employed on farms has been drastically reduced because machinery, often with high consumption of energy, has replaced the people. When all of the real costs of agriculture are properly evaluated, major changes will ensue. Areas for change include the welfare of agricultural animals, energy usage, conservation, of natural environments, the welfare of human consumers and agricultural workers and the preservation of rural communities. Sustainable agriculture is the only way forward.

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