

Abstract

Globalization and global issues affect all animals, particularly those kept primarily for monetary reasons. This contributes to internationalism: activity by individuals or groups on an international basis, including sharing of information. We discuss the impacts on animal welfare of the increasing trade in animals and animal products, including competition for lower costs but also the initiation of global welfare standards and some tendency towards the 'levelling up' of animal treatment. Two aspects of treatment that pose major problems for the welfare of huge and increasing numbers of animals are transport and slaughter (and other methods of killing animals). However, here too there is growing awareness of the benefits to both animals and people of protecting animal welfare, and therefore the implementation of improved techniques in many countries. Similarly, all three pillars of sustainability – environmental protection, economic profitability and social equity – are generally supported by care for animal welfare, although finding the right balance between animal, human and environmental needs is challenging. Both increased communication about animal welfare and greater involvement of stakeholders (including civil society) in international decision making are resulting in positive outcomes for welfare, although many problems remain to be addressed, for vast numbers of animals worldwide.

19.1 Introduction

We are all world citizens now. Consider the effects of China joining the World Trade Organization (WTO) in 2002. China has about one-fifth of the world's human population, but nearly half of the world's pigs. It exports pork and would doubtless be keen to export more but cannot do so because of the prevalence of diseases such as foot-and-mouth and classical swine fever. On the contrary, increasing meat consumption in China is being supplied by increased imports from other major producers such as the European Union (EU), the USA and Canada (Fuller *et al.*, 2003). That implies increased competition within and between those countries and others for cheap pork production and exports, with consequent effects on grain prices, water supplies, and so on. Such changes will affect everyone, and arguably all animals.

The most acute effects of the global economy on animal welfare are on the interactions of humans with animals kept primarily for monetary reasons, notably farm animals. However, globalization affects the relationships between people and all animals (Appleby, 2005a). Interactions with wild animals are affected

both directly, for example through ecotourism, hunting, capture and trade in bushmeat, and indirectly, through the impacts on habitat of farming, water use, urbanization, etc. Relationships with companion animals are affected by diverse factors, such as the availability of exotic species, the cost of pet food and the risk of diseases brought from abroad. The treatment of laboratory animals is influenced by international standards – or their lack – in the testing of pharmaceuticals, food products, and so on.

Much information about and understanding of animal welfare issues has always been international, but in recent years consideration of the international context has become much more important and explicit. Reasons include the following overlapping considerations:

- Increases in trade, including trade in food, medicines, wildlife and products from wildlife.
- Concerns about disease, disasters, loss of environmental services, climate change and other issues not restricted by borders.
- Attempts to promote or regulate trade on an international basis and to address its problems (such as the risk of disease spread).

- Attention to the differences between developed and developing countries (for example in poverty, malnutrition, infant mortality).
- The rapid development of the Internet and other factors, including travel, promoting information transfer.

These factors interact in complex ways to produce some positive and some negative effects on animal welfare.

19.2 Internationalism

The previous chapters have outlined some of the ways in which economic and political decisions affecting animals are made, primarily within countries. In at least democratic countries, decision making – such as the passing of legislation – must take public opinion into account. In recent decades, that consideration increasingly has attempted to involve all relevant stakeholders, such as producers, retailers and users of animals or animal products, animal welfare scientists, veterinarians, legislators, non-governmental organizations (NGOs), media and other people active on welfare issues.

This chapter is concerned with the international context for such decisions, and until recently the relationships between international decision making and public opinion have generally been more tenuous. When trade representatives of the member countries of the WTO meet, or national veterinary officers who make up the constituency of the World Animal Health Organisation (OIE), they represent the citizens of their countries to some extent, but the government, industries and companies probably to a greater extent. So, given the diversity of those countries, the influence of public opinion, about animal welfare among other matters, on their discussions has in the past been weak at most. That influence is now increasingly strong – or to put it another way, the involvement of all relevant stakeholders is now more complete, more similar to that within countries – because of the growth of internationalism.

By internationalism, we mean activity by individuals or groups on an international basis, taking a multinational or global viewpoint, interacting with other international and intergovernmental organizations (IGOs) and utilizing or influencing international connections, networks and agreements. Such activity is apparent in many different groups, such as the following:

- Producers with operations in more than one country.
- Producer groups such as the International Egg Commission and the International Federation of Organic Agriculture Movements.
- Multinational companies like the chain restaurant company McDonald's.
- International NGOs.
- Veterinary and other scientific associations and committees, such as the International Council for Laboratory Animal Science.
- Networks for transdisciplinary research.
- Groups of countries, such as the Council of Europe and the EU.
- The United Nations, including its Food and Agriculture Organization (FAO), the WTO, OIE and other IGOs.

This is particularly so because there has also been growth in the attention paid to animal welfare, in requirements for accountability, and hence in communication about both such activity and stakeholder involvement.

Yet, not surprisingly, these different groups take different approaches to international issues depending on how they perceive the interests of their own stakeholders. Here are three examples. First, the EU may be expected to act on behalf of its citizens, partly as individuals and partly as represented by their national governments. It maintained a balance between individual concerns for animal welfare and established government positions in the 1997 Treaty of Amsterdam:

The High Contracting Parties, desiring to ensure improved protection and respect for the welfare of animals as sentient beings, have agreed the following provision to the Treaty establishing the European Community ... In formulating and implementing the Community's agricultural, transport, internal market and research policies, the Community and the Member States shall pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States.

(EUR-Lex, 1997)

The McDonald's company naturally takes a commercial approach. Their Corporate Responsibility policy (McDonald's, 2016) includes statements that assert the importance of animal welfare while allowing their managers to manage the business, including making different decisions in different countries:

Healthy animals provide safe food. For a company that's built our reputation on serving safe food since 1955, this is critically important to us and our customers ...

As a global enterprise doing business in 100+ countries, we understand the complexities of raising food animals in different climates with varying regulation and legislation as well as the need to be respectful of the cultural and geographic diversity that exists. We also recognize the positive influence we can have as a large purchaser of beef, poultry, pork and dairy products.

Our focus is on prioritizing the opportunities we know are important to our business and to our customers. This prioritization is informed via our ongoing consultation with animal health and welfare experts, and drives work plans for issue-specific working groups, defined outcomes and timelines.

The third example may also be expected to give regard to commercial factors, but across the whole sector of farming. The International Federation of Agricultural Producers (2008) states that:

Good animal welfare practices reward farmers with good productivity. Animal welfare must be safeguarded in the production of farm animals, in the breeding process, when designing housing, in feeding and in production systems, as well as during transport and slaughter ...

Farmers realize that animal welfare has also become a global concern in a context of increasing market globalization. They recognize that the adoption of and respect for internationally harmonized minimum standards for animal welfare requirements are necessary to maintain consumer confidence in livestock products. Indeed, the high costs for animal welfare compliance will be rewarded with better opportunities for international trade.

The financial factors, including globalization, and pressure for harmonized standards introduced in that statement are applicable to the most pervasive international issues concerning animal welfare to which we shall now turn: first trade, then transport and slaughter, and last the overarching topic of sustainability.

19.3 Trade

In the livestock agriculture of developed countries, a predominant tendency over the past 60 years has been a drive for efficiency. One result has been the development of intensive farming and other practices that can

cause problems for animal welfare, a situation that is also now occurring in many developing countries. Pressure for cheap production has been more variable for other categories of animals, such as companion and laboratory animals, but where it existed it had similar effects; for example, in development of 'puppy mills', producing large numbers of pedigree dogs for sale, often in very poor conditions. Meanwhile, there has been increasing concern in many countries for animal welfare. This has restricted practices deleterious to welfare or, conversely, led to standards for the protection or promotion of welfare, albeit very unevenly. But fear is often expressed that such standards are put under further pressure by the growth of international trade in animal products and the increased competitiveness that this produces (Phillips, 2015).

Trade in agricultural products is certainly increasing, and this is clearly regarded as desirable by governments and the agricultural industry. The goal of discussions in the WTO (1995) to bring agriculture under its remit is to accelerate this growth. Yet so-called free trade does not occur in a vacuum: it could be argued that other changes in the context within which production occurs are equally important, such as information exchange. Increased communication about animal welfare is maintaining the upward trend in international awareness. People concerned for animals hope, with some justification, that the positive effects of such awareness on animal welfare and on welfare protection standards are accelerating (Turner and D'Silva, 2006).

Trade is thus not wholly free, and this is particularly true of international trade. A country's own animal products, produced to certain welfare standards, may be promoted by its authorities (by advertising, the use of tariffs, etc.) and favoured by its citizens, both because of those standards themselves and for other reasons, such as local food security. There are also practical factors supporting in-country production, notably transport costs and hygiene controls – although these certainly do not always overwhelm other factors. Thus, egg production in Europe is subject to competition from imports (partly because of the costs in Europe associated with more stringent animal welfare standards, but more because other costs such as labour and feed are greater than in competitor countries). This will probably have little impact on sales of European-produced whole eggs, but more on those of liquid and dried egg products, which are both more easily transported and sterilized (Fisher and Bowles, 2002).

Where restrictions on international trade exist, not directly warranted by the WTO, they may be challenged under that authority. However, one defence for such restrictions on welfare grounds is Article XX of the General Agreement on Tariffs and Trade (World Trade Organization, 2007), which says:

Nothing in this agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures (a) necessary to protect public morals, (b) necessary to protect human, animal or plant health.

In 2014, the WTO upheld an EU ban on importing seal products from Canada and Norway, established because EU citizens believed the methods used to kill seals caused suffering, and thus that the ban was 'necessary to protect public morals'. This was supported by scientific evidence of the welfare problems in the seal hunt (Butterworth and Richardson, 2013; Butterworth, 2014). Nations faced with imports from countries with less extensive welfare standards can thus potentially argue that protecting the welfare of their animals is important for public morals and both human and animal health.

It remains true that the pressure of increased trade, both domestic and international, makes the creation, strengthening or even maintenance of animal welfare standards even more difficult than in a less competitive market. Some existing standards may prove incompatible with an increasingly free market, although both the factors discussed so far in this section and the strong public support for the establishment of those standards suggest that these will be few. Perhaps the strongest effect of freer trade will be a reduction in the creation of new standards, or a weakening of any newly created. As one example, the EU passed a Directive for the protection of broiler chickens in 2007 (CEC, 2007). This was weaker than earlier drafts, apparently because of concerns over the pressure of imports of chicken meat and the threat to the industry of avian influenza.

Thus, international trade rules can constitute obstacles to the adoption of improved animal welfare standards by producers, because of the possibility or perception that animal welfare policies and the legislation of countries with more stringent standards might act as a non-tariff barrier to imports from other countries.

However, there are two overlapping ways in which such negative effects of trade pressure on animal welfare are being offset by positive developments. First, there is consumer demand within certain countries for 'high-welfare' products (food, clothing, cosmetics, and so on) and for other niche products that consumers

may perceive to be associated with improved welfare, such as organic food. This demand has produced a market for the export of such products from other countries, including developing countries (Bowles *et al.*, 2005). This market is small but growing, and its potential has been recognized by the International Finance Corporation (IFC), part of the World Bank Group; for example, in its publication *Creating Business Opportunity Through Improved Animal Welfare*:

The sustainability of your business depends, among other things, on you responding positively to marketplace trends and grasping new opportunities. Consumers globally are increasing their demand for animal welfare assurances in their food supply. Meeting these demands is not only good for the animals involved, but also greatly enhances animal production and business efficiency.

(IFC, 2006a, p. 1)

Probably the most important area of improvement resulting to date has been in the treatment of animals before and during slaughter (see below).

Second, increasing trade in animal products has been a major factor stimulating proposals that there should be global animal welfare standards, recognized by all countries, as in the quotation above from the International Federation of Agricultural Producers. This task has been taken on by the World Animal Health Organisation (OIE, 2017a), because it recognizes that animal health is affected by other aspects of animal welfare. In 2005, the first standards on transport and slaughter were agreed unanimously by the member countries (which, at the time of writing, number 180), and it is now producing both standards for the rearing of farm animals and standards for the treatment of street dogs and laboratory animals. All these standards may be more basic than those of some member countries: for example, than EU legislation on farm animals, which is the strongest in the world. Nevertheless, their implementation (which is starting in a number of countries) will lead to improved animal welfare in the majority of OIE member countries. And there is no indication that any reduction in standards is likely in countries that already have safeguards for welfare. There is, therefore, strong reason to believe that this increased attention to animal welfare worldwide is leading not to a 'levelling down' effect, as was feared, but to a 'levelling up' effect. An additional process that might contribute will follow if the WTO comes to accept – either implicitly or explicitly – that the

judgement on seal products mentioned above sets a precedent for countries to consider animal welfare in their trade decisions. The WTO already recognizes OIE standards on animal health as a consideration in trade disputes.

In 2011, the International Organization for Standardization signed a cooperation agreement with the OIE to develop technical specifications for the implementation of the OIE's welfare standards, to provide guidance for the application of public or private standards and the relevant legislation, and to facilitate the integration of animal welfare principles into business-to-business relations. These specifications, which are nearing completion at the time of writing, will act as a bridge between the public and private sectors.

Levelling up is actively promoted by the EU and FAO, among others. The EU funded a major project called 'Welfare Quality[®]: Science and society improving animal welfare in the food quality chain' (Welfare Quality[®], 2004), involving a number of European countries and also four Latin American countries. The FAO led discussions on capacity building for developing countries to implement good animal welfare practices (Fraser *et al.*, 2009), and launched a web portal (FAO, 2009) for dissemination of information on the subject.

19.4 Transport

While trade in animal products has effects on welfare, trade and other transport of live animals has more direct effects, and the scale on which animals are transported worldwide is huge. This includes companion, laboratory, sport and zoo animals, and high-value breeding animals (Phillips, 2015), all of which are often moved by air (a procedure governed by specific regulations: International Air Transport Association, 2016). But by far the largest numbers are production animals, with more than 60 billion farm animals yearly transported at least once, to slaughter, by land or sea. This is often over long distances, despite the fact that, frequently, it would be possible to slaughter them nearer to the point of production and to transport the carcasses instead (see Appendix 19.1, <http://www.cabi.org/openresources/90202>).

The fact that the OIE's first animal welfare standards were on transport (by land and sea, together with standards for slaughter, considered below) may reflect

the severity and frequency of welfare problems, and the association of these problems with disease. It is widely agreed that:

Transport is generally an exceptionally stressful episode in the life of the animal and one which is sometimes far removed from an idealized picture of animal welfare.

(Knowles and Warriss, 2000, p. 385)

Both the stress and other aspects of transport have consequences for disease. Stress may have negative effects on the immune system, and this can result in increased susceptibility to infection and increased infectiousness. Furthermore, transport augments the intensity and frequency of contacts between animals, and this can result in diseases being spread (Manteca, 2008).

Most of the OIE recommendations are based on the behaviour and health of animals, the design of loading and unloading facilities (Fig. 19.1), the responsibility and competence of the people involved in animal transport, and the planning and duration of the journey (OIE, 2017b).

The OIE's emphasis on safeguarding welfare during transport may also have been because this subject should be relatively uncontroversial. Protecting an animal during a journey should also protect its value on arrival, whether for further use alive or for slaughter. Indeed, the producers and owners of livestock sometimes claim that this overlap between owners' and animals' interests proves that concerns about welfare – in transport and in other stages of animal production – must be groundless, or at least that any problems that exist must be unavoidable. However, their primary concern is with group performance. From the animals' perspective, it is the individuals that matter. Furthermore, the owner's decisions must be affected by financial considerations: for example, some modifications to transport methods may reduce weight loss in animals, and therefore increase the price received from their sale, but nevertheless be considered too expensive to implement. So, owners' and animals' interests do not overlap completely. As such, applying scientific approaches directly to animal welfare may produce different conclusions to those of traditional animal production science. In fact, the conventional approach, emphasizing financial efficiency, has not always identified the best methods, even to achieve its own aims. Thus, it took an alternative approach, aimed at reducing problems for the animals concerned, to identify the fact that understanding animal behaviour could improve the design of handling



Fig. 19.1. Some of the worst welfare problems associated with transport occur during loading and unloading. Good facilities for these procedures allow animals to enter or leave the transport on the level, or by a gently sloping ramp with good footing, and with races and barriers that encourage quiet movement. Such facilities need not be expensive to construct.

systems, and hence the efficient use of labour in handling livestock (Fig. 19.2; Grandin, 2014).

This difference in approaches is perhaps demonstrated most clearly by the fact that records of welfare problems in the handling and transport of farm animals have been sparse in many countries, even of unequivocal problems such as mortality. This reflects the commercial assumption that the prevention of such problems must be impossible or financially prohibitive. Yet record keeping is a basic requirement for scientific understanding of a problem, and for conclusions on how to address it. This is now better understood, and record keeping is required for most on-farm assurance schemes, although still frequently underemphasized for transport. Records of mortality in commercial or experimental conditions, both during and after transport, have shown, for example, that it is increased by high or

low temperatures (Knowles and Warriss, 2000), by long journey times (Warriss *et al.*, 1992) and by transporting very young animals (Knowles, 1995).

Precursors to mortality are also, of course, important welfare problems in themselves. The incidence and severity of injury and disease are directly measurable, and aspects of transport that affect these have been reviewed elsewhere (Appleby *et al.*, 2008). In addition, a considerable amount is known about the causes and effects of injury and disease, at both an anatomical and a physiological level (Flecknell and Molony, 1997; Hughes and Curtis, 1997), together with their implications for welfare. For example, Flecknell and Molony say that:

Injury is of concern both because of the consequent pain which is likely to arise from traumatized tissues,



Fig. 19.2. Minimizing welfare problems while moving animals requires understanding of their behaviour: for example, that cattle generally react much more calmly to a human on horseback than on foot. This understanding improves efficiency in the use of labour and, when applied to pre-slaughter handling, increases meat yield and quality, food safety, disease control, worker safety and profit.

and also because of its incapacitating effect on the animal. This incapacity can lead to other problems such as hunger, thirst and inability to find shelter.

(Flecknell and Molony, 1997, p. 63)

The long-distance transport of animals for slaughter occurs in all regions of the world, and also between regions – most notably from Australia to the Middle East, a trade that includes 6 million sheep/year (Fisher and Jones, 2008). Variation in practices is associated loosely with the degree of development of a particular country. In developed countries, there is often more legislation protecting the welfare of transported animals; however, these countries tend to have good infrastructure, such as roads, which enables more systematic and often larger-scale transport of animals over long distances. Developing countries have fewer structures in place for

legislation or for supervision of animal treatment. Their transport systems are generally less advanced, so animals are not often moved over such long distances; however, it is more common for unsatisfactory vehicles and other procedures to be used (Box 19.1; Table 19.1; Appleby *et al.*, 2008; Gallo, 2008).

Despite the scale of animal transport worldwide, and the many welfare problems caused, this is an area where there is reason to believe that progress is being made in the prevention of such problems, and will continue to be made. As more information becomes available, the economic advantage of considering welfare becomes clearer. For example, short-term costs in slaughtering animals closer to the farm where they are produced may be covered by the long-term benefits of avoiding disease spread or reduced meat quality.

Box 19.1. Livestock transport in Latin America

Countries in the central and northern part of Latin America (Bolivia, Colombia, Ecuador, Peru, Venezuela) are less developed and give less priority to animal welfare than those in the south (Argentina, Brazil, Chile, Paraguay, Uruguay). The region includes some countries among the world's most important beef exporters (Brazil, Paraguay, Uruguay) and others where this business is small but important (Chile). Extreme variation in country size, socio-economic and cultural diversity, climate and geography also contributes to variation across Latin America in welfare during transport (see [Table 19.1](#)).

Journey durations generally range from 1 to 12 h, but sometimes reach 60 h, due mostly to bad weather or poor road conditions (Gallo, 2007). Countries exporting animal products (mostly to Europe) have government welfare guidelines and requirements from consumers, so the welfare of animals is taken into account. In other countries, animals including cattle, sheep and goats are transported in varied ways (by foot, trucks and, occasionally, boats) and welfare can be severely compromised. Common problems found in most countries are excessive stocking density, used to reduce transport costs, and poor handling during loading and unloading (Gallo and Tadich, 2008).

As a specific example, Uruguay is the eighth largest beef exporter in the world, with only 3 million people but 12 million cattle, and animal welfare and meat quality are therefore increasingly important. Several institutions, led by the Veterinary Faculty of the University of Uruguay, have carried out research on welfare problems in cattle transport. During 2002 and 2003, trucks transporting steers (average 450 kg) to slaughter plants travelled a mean of 214 km in 5 h. However, 50 % of carcasses had bruises, and more than 2 kg of meat was lost per animal during the dressing process, totalling at least 4000 tonnes from the 2 million animals slaughtered each year. Trucks were old but well maintained. The methods used to move animals were mostly prods and sticks, as well as dogs and shouts (Huertas *et al.*, 2003, 2010). A 2-year programme of training was carried out all over the country, sponsored by the Ministry of Livestock, the Uruguayan meat board, the producers' association and academia, and by 2008 carcass bruising had decreased by more than half (Huertas *et al.*, 2010). Disappointingly, bruising had increased again by 2013 (INAC, 2015), perhaps because local stakeholders relaxed their pressure on the chain. A continuous improvement model is needed to maintain animal welfare at a high level.

19.5 Killing and Prior Management

Similarly, the argument is gaining ground that care for the welfare of animals before and while they are killed is advantageous, not just for animals but also for humans.

If dogs or other companion animals do have to be killed, gentle handling and careful euthanasia will be more acceptable and safer for the workers involved than inhumane methods. Guidelines on the euthanasia of dogs and cats are available (Tasker, 2008; AVMA, 2013).

However, sometimes good management involves a decision not to take the obvious course of killing animals and instead to treat them. For example, over 55,000 people are killed by rabies worldwide every year, mainly infected by dog bites (World Health

Organization, 2004), and a common reaction by municipal authorities is to attempt to kill street dogs, for example by shooting (Windiyarningsih *et al.*, 2004) or beating. Yet many such attempts do not just cause suffering in the dogs but are also ineffective, for reasons that include increased breeding and mobility among survivors. Since 1996, an NGO called Help in Suffering has been using an alternative approach in the city of Jaipur, India. Over 50% of the dogs in an area 8 × 14 km were captured carefully, sterilized, vaccinated against rabies, treated for any other health problems and released (Reece, 2007). Not only the dogs benefited: cases of human rabies to hospitals in the area reported fell from 10 in 1993 to none in 2001 and 2002, while those outside the area continued to increase (Reece and Chawla, 2006). Consideration of the needs of animals led to a positive outcome for both the animals and the people involved.

Table 19.1. Cattle transport in Latin America. (From Gallo, 2007.) Under 'Welfare legislation', 'Partial' means that there are regulations to avoid suffering during transport and slaughter; 'Yes' that there are specific laws on animal welfare. Under 'Road conditions', 'Regular' means that most roads are not paved; 'Good' that most of them are paved. Countries included in 'Others' are mostly in Central America.

Country	Area (km ²)	Production	Cattle (million), usual species	Meat consumption (kg/person/y)	Welfare legislation	Mean transport time (h)	Road conditions	Personnel training courses
Paraguay	406,752	Mostly extensive	14 <i>Bos indicus</i>	46	Partial	36	Regular	No
Uruguay	175,215	Mostly extensive	12 <i>Bos taurus</i>	66	Yes	5	Good	Yes
Argentina	3,761,274	Mostly extensive	51 <i>B. taurus</i>	63	Partial	5–12	Regular	Yes
Brazil	8,511,965	Mostly extensive	200 <i>B. indicus</i>	30	Partial	12–24	Regular to acceptable	Yes
Chile	756,623	Mixed	4 <i>B. taurus</i>	23	Partial	8–20	Regular	Yes
Others			58	20	Partial		Regular to acceptable	No

Conversely, consideration of welfare may promote acceptance that euthanasia is appropriate to terminate avoidable suffering. Discussion among countries in the Organisation for Economic Co-operation and Development (OECD) led to agreement by many countries that laboratory tests for the safety of chemicals do not require the death of the animals within the test as an end point. Clinical signs of toxicity and other safety problems have been agreed, allowing animals to be killed humanely rather than continuing to suffer (see Section 12.6, this volume, for more detail). Furthermore, Demers *et al.*, reviewing progress on the harmonization of laboratory animal use, report that:

These instances of collaboration have reduced unnecessary duplication of studies involving animals by developing internationally accepted common methods for chemical testing.

(Demers *et al.*, 2006, p. 700)

With farm animals, including fish, it is increasingly recognized that care for welfare during handling and slaughter improves the yield of saleable meat, food safety, disease control, worker safety, and therefore profit. As just one example, moving animals at the slaughterhouse by beating them with sticks causes bruising, whereas using flags or rattles avoids this problem for both welfare and meat quality (Fig. 19.3; Grandin, 2014). As with transport, the fact that the

OIE chose slaughter as an early topic for welfare standards might have been partly because of this recognition of potential 'win-win' opportunities and partly because of the severe welfare problems that occurred, and continue to occur, in connection with slaughter, sometimes constituting abuse. In one instance, the Humane Society of the United States (2008) obtained a video in a California slaughterhouse of workers trying to force sick or injured cows to walk to slaughter by kicking them, ramming them with the blades of a forklift, jabbing them in the eyes and applying electric shocks. It is to be hoped that such behaviour is rare in most countries, but welfare problems during pre-slaughter handling and slaughter are not.

A development in the design and management of slaughter systems for poultry, for which such multiple benefits are claimed, is controlled atmosphere killing. This is carried out by passing birds in their transport crates through a chamber containing gas, usually argon or carbon dioxide or both, mixed with air. The welfare problems associated with other killing methods are described by Raj, when he points out that gas killing can eliminate:

... stress and trauma associated with removing conscious birds from their transport containers, in particular, under the bird handling systems which require tipping or dumping of live poultry on conveyors; the inevitable stress, pain and trauma associated with shackling the conscious birds, i.e. compression of birds' hock bones by metal



Fig. 19.3. Moving animals at the slaughterhouse by beating them with sticks or other violent methods causes bruising, whereas using flags or rattles avoids this problem for both welfare and meat quality. Well-designed facilities at slaughterhouses, such as this curved race, also benefit operators while improving animal welfare. Global communication about animal welfare is increasing the implementation of such ideas in many countries; this slaughterhouse is in Uruguay.

shackles; the stress and pain associated with conveying conscious birds hanging upside down on a shackle line which is a physiologically abnormal posture for birds; the pain experienced by some conscious birds that receive an electric shock before being stunned (pre-stun shocks); ... the pain and distress experienced by some conscious birds which miss being stunned adequately (due to wing flapping at the entrance to the water bath stunners) and then pass through the neck cutting procedure; [and] the pain and distress associated with the recovery of consciousness during bleeding due to inadequate stunning and/or inappropriate neck cutting procedure.

(Raj, 1998)

To that list must be added the pain and distress of some birds that are still conscious when they enter the scalding tanks for feather removal and die by scalding or drowning (Duncan, 1997). By contrast, Duncan says of controlled atmosphere killing that:

In my opinion, this is the most stress-free, humane method of killing poultry ever developed. The birds are

quiet throughout the operation. They remain in the transport crate until dead and the killing procedure itself is fast, painless, and efficient. There is no risk of recovery from unconsciousness.

(Duncan, 1997, p. 9)

In 2004, Deans Foods, one of the largest processors of end-of-lay hens and breeders in the UK, adopted controlled atmosphere killing, and reported major advantages for bird welfare, carcass quality, plant efficiency and working conditions (Castaldo, 2004). However, other producers and commentators are not convinced, and discussions continue on the advantages and disadvantages of different poultry stunning and slaughter methods.

In the international context, the most important factor in acceptance that slaughter methods taking welfare into account are desirable has again been international trade.

In recent years, the USA and the EU have together accounted for over one-third of the world's agricultural

trade (Kelch and Normile, 2004), with the EU and the USA as the largest agricultural importers, and with animals and animal products a significant proportion of the imports. In these and other developed countries, there are stringent requirements for food hygiene and quality, and hence for the conditions in which animals are slaughtered for food and handled beforehand. In addition, there are increasing requirements applied by purchasers such as supermarket companies for livestock welfare to be protected, especially for organic and other niche markets. And as such requirements are applied at exporting slaughterhouses, it proves that careful attention to the design and management of handling and slaughter processes, primarily intended to improve hygiene and animal welfare, also improve working efficiency, worker safety, meat yield and quality, and hence contribute in many ways to profitability (Grandin, 2014) – ways additional to the main aim of securing the intended export market.

This approach is spreading in developing as well as developed countries. These include large meat-exporting countries such as Brazil, and other large meat producers such as China. For example, the World Society for the Protection of Animals worked with government authorities in both Brazil and China to promote welfare protection at slaughter by making recommendations on the design of slaughterhouses and facilities, implementing ‘train the trainer’ programmes (these reached over 3000 slaughterhouse workers in China in 18 months) and advising on legislation (Kolesar *et al.*, 2009). A similar approach is also found in some smaller countries, such as Namibia:

The Namibian beef industry has a strong reputation for superior beef. This is due partly to a national assurance scheme which addresses animal health and welfare, transport and handling, and slaughter, and partly to its guaranteed hormone-free status. The scheme gives this beef industry advantages over its competitors and the country is the largest exporter to the UK of beef from the African continent. Over 100,000 tonnes of beef are produced each year, of which about 80% is exported.

(IFC, 2006b, p. 8)

The IFC updated its advice on ‘improving animal welfare in livestock operations’ in 2014.

However, many welfare problems continue in pre-slaughter handling and slaughter in many countries, perhaps particularly those where even limited short-term expenditure to improve facilities or training is difficult. Problems also persist in the slaughter of animals that

have little economic value, such as end-of-lay hens and cull sows in some countries, and animals that are killed for disease control. Standards for the welfare of animals (including fish) killed both for human consumption and for disease control have been agreed by all member countries of the OIE (OIE, 2017b), but the implementation of these in some countries is likely to be slow.

19.6 Sustainability

Having addressed three specific activities affecting animal welfare – trade, transport and killing – we now turn to the overarching international issue of sustainability. Sustainability has been defined in a number of ways, many reflecting the definition of sustainable development by the Brundtland Commission (1987, p. 41) as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’. It is generally accepted as requiring a balance between environmental, economic and social priorities: all are important (sometimes helpfully visualized as a three-legged stool) but are sometimes in conflict. Animal welfare is, in some respects, best considered as a social priority: such priorities include an increasing worldwide consensus that animal welfare should be protected and improved, as illustrated by the unanimous adoption of welfare standards by the 180 member countries of the OIE, already discussed. But, not surprisingly, as animals are an integral part of the world, animal management and welfare are also relevant to environmental and economic issues. So all three pillars of sustainability will be considered here in turn, with particular reference to livestock, while recognizing that they overlap and that the trade-offs between dimensions must be considered in the future.

19.6.1 Environmental protection

The importance of farm animals for environmental health was given prominence in 2006 by the publication of *Livestock's Long Shadow* by the FAO (Steinfeld *et al.*, 2006), which estimated that livestock production released 18% of human-produced greenhouse gas (GHG) emissions. The FAO subsequently revised that estimate to 14.5% (Gerber *et al.*, 2013), although other commentators have published higher estimates (Goodland and Anhang, 2009). Livestock production has many other impacts on the provision of

environmental services. It releases ammonia and sulfur dioxide, which contribute to acid rain, and other air pollutants; it uses large quantities of water and causes water pollution; it competes with other land uses and contributes to deforestation and biodiversity loss (Steinfeld *et al.*, 2006).

What is the relevance of animal welfare in this picture? It is important to recall that sustainability requires a balance between needs – no one aim, such as increasing short-term production, can be prioritized over all others – and to point out that finding that balance for livestock requires optimization of their interactions with the environment. Much of that process is beneficial for their welfare, and, conversely, many measures to improve welfare are beneficial for the environment.

Sometimes, this requires accepting a lower level of production. For example, reducing the stocking density of cattle on pasture may produce less milk or beef per hectare, but may increase efficiency of production (maintaining profitability), cow welfare and the provision of environmental services (e.g. biodiversity), while reducing both outbreaks of disease and GHG emissions. The principal GHG, carbon dioxide (sometimes measured simply as ‘carbon’), may even be absorbed rather than emitted, as Webster explains:

Life-cycle analysis reveals that well-managed grasslands constitute a significant carbon sink, the extent of carbon sequestration depending on factors such as the intensity of grazing and the balance between grasses and legumes (clovers and alfalfa). Recently there have been several large-scale studies of grassland systems in Europe ... which balance the production of C and GHG by ruminants (sources) against the capacity of pastures to sequester C (sinks). In semi-intensive systems (e.g., dairy production) the sources and sinks were closely in balance. The most extensive systems, e.g., extensive beef production, proved to be a significant carbon sink.

(Webster, 2016, p. 143)

Furthermore, in many cases, improving efficiency and animal welfare actually increases production. There are many circumstances in which improving the management of animals – for example, improving their nutrition and health care – can increase both their welfare and their productivity and reduce both the relative and absolute emission of GHGs.

Similarly, cutting mortality, waste and inefficiency in livestock systems that are currently low yielding will help to address the other environmental impacts of

livestock production listed above, such as water use and pollution, excessive land use and biodiversity loss, while also improving animal welfare. And, as with considering production on its own, such benefits are made more likely by including animal welfare as one of the parameters to be considered in the sustainability assessment: ‘Look after your animals and they will look after you’ (Rollin, 1993).

Other examples of mutual benefit can be found in the development of new or the revision of existing systems: ‘win-win-wins’ for animals, producers and the environment. This has been true for silvopastoral systems, keeping ruminants on land with bushes and trees as well as grass (Broom *et al.*, 2013; see Appendix 19.2 <http://www.cabi.org/openresources/90202>), as emphasized by Webster:

Beef production from suckler cows living with their calves on pasture, amongst trees, is very hard to justify when measured simply in terms of production efficiency. However, when the potential environmental benefits are taken into account, it looks much more eco-friendly. Moreover, it can, in my opinion, be among the most welfare-friendly forms of livestock production on the planet.

(Webster, 2016, p. 151)

Environmental health is also, of course, affected by other animals. Some of these effects are negative, but again an increasing number of ways are being identified in which attention to animal welfare helps in environmental protection. For example, the ‘Compassionate Conservation’ movement advocates consideration of wild animal welfare as a help rather than a hindrance to conservation science and management (Born Free Foundation and Wildlife Conservation Research Unit, n.d.).

19.6.2 Economic profitability

Economics is discussed at length in Chapter 17, this volume, so we shall do so only briefly here. The emphasis on profitability as being necessary for the sustainability of agriculture is pragmatic: in general, if farmers do not make money, they cannot continue to produce food (subsistence farming will be considered below). And, to a large extent, safeguarding or improving animal welfare is positive for the profitability of livestock farming, partly because, as noted above, animal health is affected by other aspects of animal welfare. There are many cases that fit the section of Fig. 17.1 between A and B, with a positive correlation between productivity or profit and animal welfare.

Furthermore, making a profit depends, of course, on many factors. As well as managing production effectively and efficiently, it is also necessary to follow up with processes that offer products to the market, ensure those products are saleable and enable their purchase by customers. The welfare of the animals that generate those products plays many roles in those processes, because it has many effects on yield, food safety and food quality (including nutritional value). These affect sales to all customers, including those with limited funds for buying food: if animal products are not safe to eat, people will not continue to buy them, no matter how cheap they are. The same factors may, in addition, provide some producers with specialist markets to increase profit: some customers are willing to pay more for high-quality products; for example, those produced organically or guaranteeing the welfare of the animals involved (see Chapter 17, this volume).

The same principles apply to subsistence farmers, and to small-scale farmers who only partly work for profit while also supplying food to family and neighbours: care for the welfare of livestock improves survival, growth, production and the yield of products that help to promote food security. Indeed, ‘economic profitability’ does not apply just to money: ‘economics’ refers to the use of resources in general, so livestock production is ‘economically profitable’ if it generates sufficient food to justify the inputs and effort involved. The part animal welfare played in this was recognized at an intergovernmental level by the UN’s Committee on World Food Security, which drew up Principles for Responsible Investment in Agriculture and Food Systems (2014) to enhance food security and nutrition. These include:

Principle 8. Promote safe and healthy agriculture and food systems [through investment] supporting animal health and welfare, and plant health, to sustainably increase productivity, product quality, and safety.
(Committee on World Food Security, 2014, p. 16)

19.6.3 Social equity

Animal welfare is important for social equity, both because of the practical effects of animal welfare on production, disease and so on, discussed already, and because animal welfare is itself of increasing concern worldwide, to people in all countries. Thus, as pointed out above, the OIE’s welfare standards are agreed unanimously by all its 180 member countries, which include many developing as well as developed countries.

This is explained partly by the many roles that animals, including livestock, play in people’s lives. These were well described by an Expert Group convened by the FAO:

The welfare of humans and the welfare of animals are closely linked. In many regions, a secure supply of food for people depends on the health and productivity of animals, and these in turn depend on the care and nutrition that animals receive. Many diseases of humans are derived from animals, and the prevention of these animal diseases is important for safeguarding human health. Roughly one billion people, including many of the world’s poor, depend directly on animals for income, social status and security as well as food and clothing, and the welfare of their animals is essential for their livelihood. Moreover, positive relations with animals are an important source of comfort, social contact and cultural identification for many people.

(Fraser *et al.*, 2009, p. 1)

Thus, the survival, performance and welfare of people’s animals are important to them, and many measures to improve animal welfare also benefit their owners, as outlined in the ‘community development approach to animal welfare’ presented by McCrindle (1998) for a developing country, South Africa.

It is also arguable that social equity is ethically due to animals as well as people. Indeed, one formulation of this pillar of sustainability is that sustainable agriculture should be ‘socially just and humane’ (Appleby, 2005b), and this may also apply to all other human–animal interactions. Broom reflects this by explaining sustainability in terms of acceptability to people, an approach that includes attitudes to animal welfare:

A system or procedure is sustainable if it is acceptable now and if its effects will be acceptable in the future, particularly in relation to resource availability, consequences of functioning, and morality of action ... [An animal-usage] system that results in poor welfare is unsustainable because it is unacceptable to many people.

(Broom, 2010, p. 83)

To conclude this section on sustainability, all three pillars of sustainable agriculture – environmental protection, economic profitability and social equity – are supported by care for livestock welfare. Remembering that animal production is primarily a biological process, not a technical one, and focusing on the animals’ needs as a primary input rather than an afterthought, generally (although not uncritically) helps to optimize their

interactions with the environment and find the right balance between animal, human and environmental needs. Transdisciplinary research is needed to assess the trade-offs between these pillars in different production systems around the world, and to develop science-based policies and appropriate incentive programmes for farmers.

It is generally – not uncritically – true that ‘sustainable agriculture is humane, humane agriculture is sustainable’ (Appleby, 2005b). Similarly, there are positive relationships between animal welfare and sustainability in many other areas of human–animal interaction.

19.7 Conclusions

- Globalization and changes in socio-economic and cultural patterns in most countries of the world have made animal welfare an international issue. Increases in trade, concern about transnational problems (such as disease, disasters and climate change) and burgeoning communication have considerable influences on animal welfare – some positive, some negative – in both developed and developing countries.
- The growth of international trade in animal products has increased competitiveness, with some negative effects on welfare, and trade rules can be obstacles to the adoption of improved welfare standards. However, consumer demand in some countries for high-welfare products has produced a market for export from other countries, including developing countries. Increasing trade has also been a factor in the initiation of global animal welfare standards.
- The transport of animals occurs on a vast scale worldwide, and causes many welfare problems. Considerable progress is being made in preventing such problems and is likely to continue. A controversial practice is live transport for slaughter; this should be replaced where possible with the transport of meat.
- Good practices in pre-slaughter handling, slaughter and other killing of animals are being adopted in many countries, benefiting both human and animal welfare, partly because of information sharing and partly because of legal, advisory and financial incentives. However, many welfare problems associated with the killing of animals continue, particularly in countries where expenditure for improvements is difficult.
- Consideration of animal welfare is not just compatible with but also important for achieving all three pillars of sustainability – environmental protection, economic profitability and social equity – although in each of these areas, finding the right balance between animal, human and environmental needs is challenging. In many countries, such benefits of considering welfare have more impact than ethical arguments.
- Transdisciplinary research is needed on the management, transport, killing and trade of animals and animal products, to assess the mutual benefits and trade-offs between outcomes for animals, humans and the environment, and to develop science-based policies and practices for implementation.

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