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Stephen Devereux

Summary

Livestock perform several vital roles in rural livelihoods in Africa, providing food (meat, milk, eggs), draught power and transport, as well as income from sales of animals and animal products. However, the implications for animal welfare are not always considered. Theory suggests that animal welfare follows an 'n-curve' in relation to productivity. It tends to be low in smallholder farming and pastoral systems (due to inadequate feed, water and veterinary care), to rise with semi-commercial livestock production (increasing the use-value of animals requires investment), and to fall again with full commercialisation (exploitation for profit maximisation overrides welfare considerations). This paper argues that livestock keepers invest in animal welfare to the extent that this increases their productivity, but they might also derive non-use value from treating their animals well. If the economic returns plus non-use value are not sufficient, regulations to protect livestock must be introduced and compliance must be enforced, to ensure that an adequate investment in animal welfare is achieved and to achieve a better balance between human and animal welfare.

Keywords: animal welfare; commercialisation; livestock production; rural livelihoods; smallholder agriculture.

Stephen Devereux is a Research Fellow in the Rural Futures Cluster at IDS. His interest in rural livelihoods includes considering the wellbeing of animals as well as that of people.

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Abbreviations

AWE	Animal Welfare Education
CAHWs	Community-based animal health workers
FANMEAT	Farm Assured Namibian Meat Scheme
HIS	Humane Society International
HPAI	Highly Pathogenic Avian Influenza
OIE	World Organisation for Animal Health
SADC	Southern African Development Community
VSD	Veterinary Services Directorate
WSPA	World Society for the Protection of Animals

1 Introduction

Livestock perform many functions in African households, including being sources of food, sources of income, working animals, stores of value, and performing social and ceremonial roles.

Sources of food: Livestock provide meat, milk, eggs and blood that are consumed by livestock keepers, their families and communities.

Sources of income: Live animals are bartered or sold for cash. Animal products – milk, eggs, manure (for fertiliser or cooking fuel), hides and skins – are also sold for cash income.

Working animals: Oxen, camels and mules are used as draught animals for ploughing fields. Horses and donkeys are used as pack animals to transport commodities and people.

Stores of value: Because rural Africans have limited access to financial services, livestock are accumulated as a form of savings. Livestock are also a form of insurance – they can be sold when cash is needed urgently (to buy food during a drought, or for medical costs).

Social and ceremonial roles: Owning livestock is associated with social status in many African societies. Livestock are exchanged as dowry between families when two people marry. Livestock are also slaughtered at funerals and in traditional rituals.

Clearly, livestock are central to human wellbeing in rural Africa. Animals contribute directly and indirectly to household food security and poverty alleviation, they also meet practical needs (e.g. dung can also be used as flooring and plastering material for houses), and they are central to social and communal life. For these reasons, the relationship between people in African countries and their livestock is often close, and is not based solely on an animal's economic value. Nonetheless, this paper recognises that animals in Africa are reared for their use value, including as sources of food, and the focus here is on animal welfare, not animal rights.[1] 'The position of animals in such societies is of necessity utilitarian and the welfare issue is not one of animal rights, but rather motivating the prevention of avoidable suffering.' (McCrindle 1998: 228).

In 2005 the total livestock population in Africa was estimated at 447 million sheep and goats, 224 million cattle, and 34 million equines (horses, donkeys, mules) and camels (Masiga and Munyua 2005). Other animals and birds reared for food in Africa include pigs, rabbits, chickens, guinea fowls, ducks, geese and turkeys. This paper focuses on the welfare of animals reared for food (meat, milk, eggs), so the living conditions and welfare of working animals (e.g. draught oxen used for ploughing, donkeys used for transport) are not considered here. Wild animals (including "bush meat"), zoo animals, laboratory animals and companion animals or pets are also not covered. Commercial livestock production is not included, nor are fisheries and seafood production. There is an intermediate category of "semi-commercial" production that is sometimes practised by smallholders, which will be discussed in this paper.

[1] It is important to recognise that 'animal welfare' and 'animal rights' are fundamentally different, effectively in ideological opposition to each other. Animal welfare campaigners are preoccupied with preventing unnecessary suffering and cruelty to animals, but they are not opposed to the responsible and humane use of animals to meet human needs such as food, clothing and medical research. Animal rights activists argue that animals have equal moral rights to humans, and they campaign to end all forms of exploitation of animals, including raising and slaughtering livestock for food, hunting wild animals for sport, keeping animals in zoos or circuses or as pets, and experimenting on laboratory animals for medical research purposes.

The concept of animal welfare has been defined in various ways, though most definitions share some common elements, as will be discussed below. One of the most comprehensive recent definitions was that adopted by the World Organisation for Animal Health (OIE) in 2008:

> 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.
> (OIE 2008: 1)

From this definition it is clear that animal welfare is a complex outcome of several determinants. The discussion in this paper is therefore disaggregated to examine each determinant in turn. This paper is structured as follows. The next section reviews livestock production in African agriculture, considering three dominant (non-industrial) farming systems: mixed crop-livestock farming, pastoralism and agro-pastoralism, and semi-commercial livestock production. The following section discusses the economics of animal welfare – under what conditions livestock keepers will invest in ensuring a good quality of life for animals in their care, and under what conditions economic imperatives could result in animal welfare being compromised. The final main section reviews available evidence on five dimensions of animal welfare within African farming systems: food and water, living conditions, health, transport, and slaughter. The paper concludes by identifying knowledge gaps and proposing recommendations for interventions that could enhance the welfare of animals reared by African smallholder farmers and pastoralists.

2 Livestock production in African smallholder agriculture

Livestock are intrinsic to livelihoods in sub-Saharan Africa, where the majority of people still live in rural areas and derive their living mainly from agriculture. In pastoral and agro-pastoral systems livestock are the primary economic resource. In mixed farming systems livestock are reared alongside crop production, and both crops and livestock contribute to the household economy. Semi-commercial and commercial livestock production systems are less common in Africa, but are increasing steadily. Most livestock in Africa (70–90 per cent) are reared in extensive natural grazing conditions; only a minority (10–30 per cent) are kept in semi-intensive and intensive conditions (Masiga and Munyua 2005). These different livestock systems can be compiled into a classification scheme (Box 1). In sub-Saharan Africa, mixed farming predominates, followed by (agro-) pastoralism, then semi-commercial and industrial farming. Each system has different implications for animal welfare. Generally speaking, as will be demonstrated below, animal welfare is relatively low in extensive pastoral and mixed farming systems due to inadequate access to feed, water and veterinary services and poor transport facilities and management practices. It rises somewhat as limited intensification requires some investment in livestock care to improve the value of animals, then falls as heavy intensification results in animals being exploited for profit maximisation.

Box 1 A typology of livestock production systems

This typology integrates a system's natural resource potential, population density, and market access.

- **Agro-pastoral and pastoral systems** characterised by low population densities, low agro-ecological potential and weak linkages to markets. Crop production in these areas is marginal and livestock predominates as a source of livelihood.
- **Extensive mixed crop-livestock systems** characterised by rain-fed agriculture, medium population densities, moderate agro-ecological potential and weak linkages to market. Farming practices incorporate crops and livestock with limited use of purchased inputs.
- **Intensive mixed crop-livestock systems** characterised by high population densities, irrigation or high agro-ecological potential and good linkages to markets. Farming practices incorporate crops and livestock, but with intensive use of purchased inputs.
- **Industrial systems** characterised by large vertically integrated production units and in which feed, genetics and health inputs are combined in controlled environments. These systems account for the largest share of the volume of tradable livestock products.

Sources: Herrero *et al*. (2010); McDermott *et al.* (2010).

2.1 Agro-pastoral and pastoral systems

Pastoralism is practiced in low rainfall areas where crop farming is difficult or impossible. Arid and semi-arid areas cover half the land area of Africa, and are dominated by livestock-based livelihoods – transhumant or nomadic pastoralism, and agro-pastoralism in areas where some crop cultivation is possible. Pastoral areas are populated mainly by sheep and goats (together called “shoats” in some contexts, for example in Ethiopia), camels, cattle and donkeys. Pigs and poultry are not common. In pastoral areas of the Horn of Africa and the West African Sahel, over 80 per cent of household incomes are derived from livestock (McDermott *et al.* 2010). Although pastoralists are popularly believed to survive almost entirely on a diet of meat, milk and blood from their animals, this is not the case. Most pastoralists sell or exchange livestock and livestock products for staple cereals and other food items. Selling or trading animals is the major source of income for most pastoralists.

The critical inputs for pastoral livelihoods are water and vegetation for the animals. Typically, livestock graze and browse on grasses and shrubs in extensive communal rangelands. In agro-pastoral areas they feed also in fallow lands and in crop fields after harvest. Their diet is often supplemented with crop residues and sometimes with purchased feed and salt licks.

Pastoralism is a hard life for both livestock and livestock keepers. Living in low rainfall areas, water stress is a constant reality, and especially during dry seasons and droughts. Adaptive strategies include trekking long distances in search of water and pasture, often while animals are already undernourished and dehydrated, which weakens them further. During a drought large numbers of animals are expected to die. The “boom and bust” cycle of herd accumulation before a drought, collapse during and rebuilding after the drought is “normal” and planned for. The larger the herd, the greater is the probability that the pastoralist will survive a drought with a viable herd: ‘large herds act as insurance in times of drought. Livestock mortality rates are similar regardless of herd size, but those with smaller herds are at greater risk of their herd size becoming unsustainable post-drought than those with larger herds’ (LOG Associates 2010: 12).

Even though pastoralists have a close bond with their animals and are genuinely concerned about their welfare, pastoralists are often living on the margins of survival themselves – seemingly wealthy but actually acutely vulnerable to the next shock, which if it is severe will kill their animals and destroy their way of life (Devereux 2010). In famine years, as in 1984, 2000 and 2011 in the Horn of Africa, thousands of pastoralists have been forced out of pastoralism and many livestock keepers died along with their animals.

Drought interventions for animals such as trucking in water, digging deeper boreholes to find groundwater and providing emergency feed aim to break the "boom and bust" cycle and keep animals alive through the crisis period. 'During a recent drought in northern Kenya FARM-Africa provided feed supplies to livestock owners as well as rehabilitating water supplies' (McLeod and Sutherland 2012: 45). However, these interventions can backfire. Maintaining stocking levels rather than allowing a "Malthusian adjustment" raises the pressure on natural resources, and can exacerbate the overgrazing of rangelands and depletion of groundwater supplies. From an animal welfare perspective, a preferable option might be destocking programmes, where animals are purchased and transported out of the drought-stressed area and either resold to pastoralists after the drought or sold on.

2.2 Mixed crop-livestock farming systems

Mixed crop-livestock systems produce about half of the world's staple cereals (41 per cent of maize, 86 per cent of rice, 66 per cent of sorghum, 74 per cent of millet), and most of the livestock products in developing countries (75 per cent of milk, 60 per cent of meat) (Herrero *et al.* 2010). Mixed crop-livestock farming is the dominant form of smallholder agriculture throughout most of sub-Saharan Africa. Farmers who cultivate food and other crops for consumption and sale typically keep some animals on their farms, also for consumption and sale, but often also as working animals. Different animals are used for different purposes – often for multiple purposes – by African farmers.

A mixed system does not only mean that the farmer keeps some animals as well as growing crops, it means there is integration and synergy between the two activities. Mixed crop-livestock farming is an integrated agricultural system: animal manure is used to fertilise crops, cattle plough the fields but are also slaughtered for meat, sheep and goats are reared for meat but also to finance purchases of farm inputs such as seeds and tools, donkeys carry produce to market, and crop residues from the farm are used to feed all these animals.

Despite these synergies between crop production and livestock production, challenges to animal welfare in mixed farming systems arise because crops and livestock compete for the same resources, especially land and water, and also for the household's investment budget. In densely populated areas such as the highlands of central and east Africa, households cannot keep as many animals as they would like because of shortages of grazing and water. Some farmers keep one ox that they pair with a neighbour's single ox to plough their fields, while other farmers keep no oxen and are forced to hire at ploughing time. Animals are tethered during growing seasons to prevent them from eating standing crops, or kept in stalls ("zero grazing") rather than roaming free in communities where no land can be reserved as pasture. Crop residues and hay that are stored for the dry season are frequently inadequate to keep animals well nourished, and severe losses in bodyweight are commonly observed. Poor farmers facing income constraints spend as little as they can on maintaining their animals, typically just enough to keep them alive, so that they have enough money to buy fertiliser and seeds for their farms.

Ethiopia, for example, 'holds the largest livestock population in Africa estimated at about 43.1 million heads of cattle, 23.6 million sheep, 18.6 million goats, 4.5 million donkeys, 1.7 million horses, 0.33 million mules, 34.2 million chicken and 4.9 million beehives. Similarly,

contributions of livestock to cash income of smallholders accounts for up to 87%' (Duguma *et al.* 2012: 472). Nonetheless, livestock productivity is low, due to: 'Inadequate feed and nutrition, widespread diseases and poor health, poor breeding stock, and inadequate livestock policies with respect to credit, extension, marketing, and infrastructure' (Benin *et al.* 2006: 142). Low productivity of livestock is also associated with low animal welfare. Even if they survive the annual dry seasons, animals suffer and die in huge numbers during the droughts that strike Ethiopia every few years.

2.3 Semi-industrial livestock production systems

In the 1990s, rapidly rising global demand for meat and livestock products was predicted, driven by rising incomes and living standards in low– and middle–income countries, which would move poor consumers up the food chain – from subsisting mainly on staple cereals, root crops and pulses to enjoying a more diversified diet, including more meat, fish and dairy products. The "livestock revolution" would be driven initially by increases in domestic production, but would later involve imports. Countries with rapid economic growth have indeed seen large increases in domestic livestock production and consumption. Examples include pork in China, milk in India and poultry in Latin America (Dijkman 2009).

Two pertinent questions for this paper are raised by the "livestock revolution": (1) What potential exists, if any, for smallholder livestock producers and pastoralists in Africa to export live animals and/or animal products to countries where demand is rising? (2) What are the implications for animal welfare as production increases?

In general, African smallholders have not taken advantage of emerging market opportunities. Instead, the rising demand for livestock products has been met by an expansion of industrial-style commercial production, or by imports. South Africa, for instance, has over 12 million beef cattle, but South Africa imports 10–15 per cent of its beef consumption, mainly because off-take rates from the smallholder communal sector are low, averaging only 5 per cent (Mapiye *et al*. 2009). Small-scale producers face several constraints in supplying livestock and livestock products to these rapidly expanding markets. 'These include lack of own funds to invest or access to credit; small and diminishing land holdings; poor access to input and output services and markets; increasingly stringent food and safety standards; the growing power of supermarkets; and poor knowledge access and infrastructure' (Dijkman 2009: 4).

Theoretically, moderate intensification of livestock production is associated with improvements in animal welfare, as livestock producers have economic incentives to invest in upgrading the quality of their animals by improving the quality of their feeding, health care, and so on. One example of how improvements in animal welfare can be incentivised by the possibility of exporting livestock or livestock products is the beef industry in Namibia, which is dominated by small-scale commercial producers. Eighty percent of Namibia's beef production is exported, mostly to the European Union, which offered a quota to Namibia on condition that specified meat quality and animal welfare standards were adhered to. In response, the government initiated the Farm Assured Namibian Meat Scheme (FANMEAT), which set out standards for livestock production systems, veterinary issues, animal handling, transport and housing conditions (Table 1). Standards include: annual veterinary inspections, adequate handling facilities at loading and off-loading points, and no use of electric goads (Bowles *et al.* 2005).

Table 1 Animal welfare standards in the Farm Assured Namibian Meat Scheme

Issue	Standard and animal welfare applicability
Production systems and general animal welfare	Hormone free; livestock owners are responsible for the welfare of their animals and must ensure that they are aware of all welfare requirements.
Veterinary issues	Records are kept and annual veterinary inspections carried out.
Animal handling	All animal handling facilities must be designed to ease handling of the animals and prevent injuries.
Transportation	The animals must be handled carefully to prevent stress and injuries. The use of electric goads is prohibited. The vehicle must comply with the conditions of the Code of Practice for the Transport and Handling of Animals. There must be adequate handling facilities at the point of loading and off-loading.
Housing and environment	There should be no features of the environment that could cause recurring injuries to animals.

Source: Bowles *et al.* (2005).

Conversely, industrial-scale commercialisation of livestock production is associated with declining animal welfare – but this is the trend that appears to be dominating.

> Further intensification and/or scaling-up of livestock systems are projected to continue, if the projected increases in human populations and projected demand for livestock products are realised. This has been the preferred way to feed large urban populations with animal protein. ... Intensification and scaling up have ... been associated with very poor examples of animal welfare, and given the scale of production, poor welfare practices have affected many billions of animals (McLeod and Sutherland 2012: 47).

In reality, the hypothesised trade-off between intensification and animal welfare is complicated and varies from case to case. One example is smallholder dairy production in Kenya, where even moderate commercialisation appears to have caused a deterioration in the welfare of dairy cattle (Box 2).

Box 2 Two perspectives on smallholder dairy production in Kenya

The growth of dairy production by smallholders in Kenya is often cited as a success story, in terms of economic growth, livestock productivity and income generation.

> Dairy production in Kenya has grown rapidly in recent decades, resulting in per capita production double the levels found elsewhere on the continent. Today 600,000 small farmers operating 1 to 3 dairy cows produce 80 percent of Kenya's milk. By 2003, nearly 70 percent of Kenyan smallholders produced milk and it had become their fastest growing income source, with net dairy earnings averaging $370 per year and returns to labor of $3 to $5 per day. Long-term public and private investment in improved dairy breeds, tick control, and improved feeds have resulted in a milk production per cow triple that in neighboring Ethiopia. Kenya's longstanding network of support institutions, many run by private farmer groups, continues to actively support artificial insemination services, livestock disease control, and improved feed and forage practices, all of which contribute to higher productivity and higher incomes for Kenyan dairy farmers. Public marketing controls, abandoned in 1992, have

> triggered rapid growth in raw milk sales, which now account for 85 percent of national consumption.
> (Haggblade and Hazell 2010: 3-4)

However, this economic success might have been achieved at the cost of failure to care for dairy cows, with investment being made mainly in feeding and watering the animals but not in their health care and housing conditions.

> About 70% of dairy production in Kenya is from the smallholder production systems. These production systems are negatively impacted by a number of factors including poor nutrition, substandard husbandry and management practices, lack of appropriate farm inputs, diseases and low incomes. These factors influence the welfare of dairy cattle. Intensification of smallholder dairy production in an endeavour to maximize profits has led to deteriorating husbandry standards with subsequent stressful conditions that affect the welfare of dairy cattle in these smallholder units. Poor welfare conditions have direct negative effects on physiology, behaviour, disease susceptibility and productivity of an animal.
> (Aleri *et al.* 2012: 1-2)

> The observation that sick cows were not attended to promptly in spite of the farmers and stockmen being aware of the sickness, reveals that these farmers and stockmen were unconcerned with animal suffering. This shows poor stockmanship and attitude towards animal welfare from the farmers and stockmen in this study. The poor perspective of farmers and stockmen on matters of animal welfare in the evaluated smallholder dairy units was attributable to the limited value they placed on animal well being. They focused more on benefits they obtained from the cows. This may be the reason they ranked animal feeding and watering highest in their perspective on animal welfare inputs as these have a direct association with milk production.
> (Aleri *et al.* 2012: 13)

3 The economics of animal welfare

As livestock generate economic value, it might seem self-evident that treating these animals well is economically rational. ‘Good animal welfare has a positive effect on production’ (Ndou *et al.* 2011: 1049). ‘If the cow is malnourished, her milk cannot feed the family, if the donkey is lame, the wife or child will carry the water and wood’ (McCrindle 1998: 227). Livestock keepers feed their animals and try to keep them healthy to maximise the economic value they generate, whether as food, working animals or breeding stock, and other measures to protect welfare are also beneficial for both animals and keepers, such as giving the animals shade and ventilation in hot weather. This is enlightened self-interest. But this is not always true; in some circumstances the costs of investing in animal welfare exceed the returns from doing so, for example purchasing an expensive vaccine against an uncommon disease.

The investment that livestock keepers make in the welfare of their animals is largely based on implicit or explicit cost-benefit calculations. If an animal is not adequately fed there is a high risk that it will lose value or even die, so livestock keepers generally prioritise feeding their animals. But if an animal is not immunised against a certain disease, the risk that the animal will actually catch that disease and die might be relatively low, so the livestock keeper

might decide not to immunise the animal, especially if s/he is poor and the cost of immunisation is high. So investment in animal welfare is likely to be limited to the point beyond which it is seen as economically irrational – i.e. where the marginal cost of incremental spending on animal welfare exceeds the marginal return from this incremental investment – as well as by other factors such as lack of money or other resources.

On the other hand, animals also have non-economic value, and this also affects how well they are treated. Livestock keepers might derive psychological gratification from ensuring their animals are comfortable and healthy. Conversely, they might derive psychological distress if their animals are suffering, so they will invest in animal welfare for its own sake, even if this costs money and does not add to the animal's economic value. Effectively, this investment reduces the animal's net economic value by raising the costs of its production.

A third factor that might influence decision-making behaviour is whether legislation or regulation exists to safeguard animal welfare and, if it does exist, whether it is enforced and what are the costs of non-compliance. Livestock keepers might be fined if they do not adhere to minimum standards of care and treatment of their animals. Animals that are injured or undernourished might be rejected by government inspectors at markets and slaughter-houses, or they might be confiscated with no compensation. If livestock keepers perceive the cost or risk of being fined or having their animals confiscated as significant, this provides an incentive to invest in their animals' welfare, up to the level of the perceived cost of non-compliance.

This means that three pathways to satisfactory animal welfare can be identified when resources are sufficient for investment: (1) economic rationality (2) non-use value and (3) government-enforced compliance. The effects of resource limitation in practice, on African smallholder farms, will be discussed in the next section. The decision-making process in the absence of such limitations can be summarised in a set of scenarios.

Scenario 1: The cost of achieving an acceptable level of animal welfare is less than the economic returns to this investment. The investment will be made and animal welfare will be satisfactory.

Scenario 2: The cost of achieving an acceptable level of animal welfare exceeds economic returns to this investment,[2] but the livestock keeper attaches high non-use value to welfare. The investment will be made and animal welfare will be satisfactory.

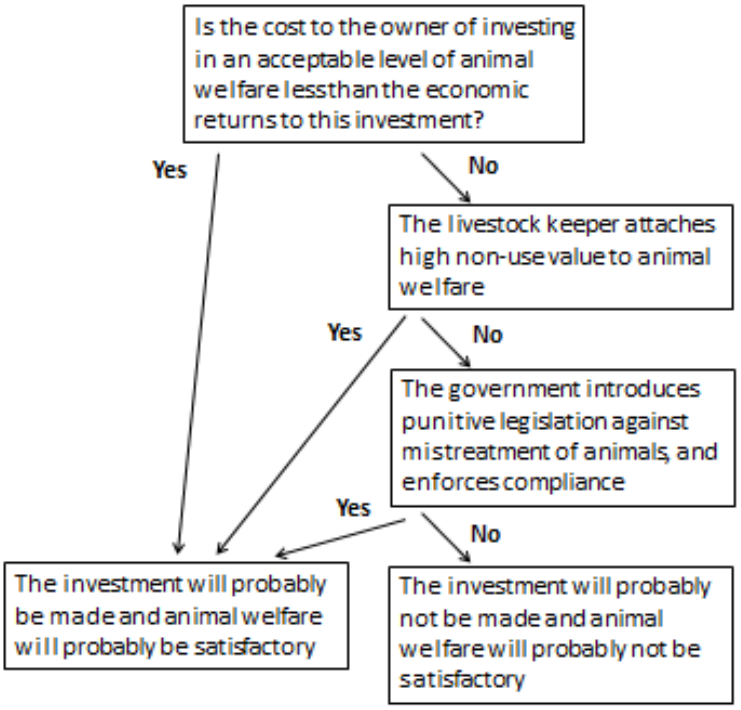
Scenario 3: The cost of achieving an acceptable level of animal welfare exceeds economic returns to this investment, and the livestock keeper attaches low intrinsic value to animal welfare. However, the government introduces punitive legislation against mistreatment of animals, and enforces compliance stringently. The investment will be made and animal welfare will be satisfactory.

Scenario 4: The cost of achieving an acceptable level of animal welfare exceeds economic returns to this investment, and the livestock keeper attaches low intrinsic value to animal welfare. There is no government legislation against mistreatment of animals, or if there is legislation, it is not enforced. The investment will not be made and animal welfare will not be satisfactory.

[2] This does not mean the animal costs more to produce than it generates in economic value (e.g. say it costs £50 to rear and is sold for £40) – this would be economically irrational. Instead it implies a reduced return on investment. For example, say a cow costs £50 to rear and will be sold for £100. A profit-maximising livestock keeper might pay £10 to send the cow to market in an overcrowded truck, causing distress and danger to the cow, but a livestock keeper who attaches intrinsic value to animal welfare might be willing to pay £20 to transport the cow in comfort, thereby reducing his/her profit from £40 to £30.

Whether animal welfare outcomes will be satisfactory or not in any specific context, given resources for investment, could also be modelled as a decision-tree analysis (Figure 1). The determinants of an animal's welfare are (1) the use value of the animal; (2) the non-use value of the animal; (3) the costs of non-compliance with animal welfare legislation, which is zero if there is no legislation or it is not enforced. A "win-win" situation occurs if the use value of the animal increases by more than the cost of investing in the animal's welfare.

Figure 1 Animal welfare: a decision-tree analysis



Source: Author's own.

How do we define a satisfactory level of animal welfare? Animal welfare is a normative ethical concept with scientific input. Animal welfare has been defined as 'the ability of an animal to interact comfortably with its environment through its physiological, psychological and behavioural systems' (Aleri *et al.* 2012: 1). McInerney (2004: 7) cites Broom (1991): 'the welfare of an animal is its state as regards its ability to cope with its environment', and Webster (1995): 'the ability of the animal to sustain fitness and avoid suffering, i.e. to stay fit and happy'. For animals that live under the care of people, it may also be appropriate to outline what that care should involve. This has been done, for example, by the Council of Europe (1976): 'Animals shall be housed and provided with food, water and care which – having regard for their species and to their degree of development, adaptation and domestication – is appropriate to their physiological and ethological [behavioural] needs, in accordance with established experience and scientific knowledge.' One formulation that expresses both what is desirable for animals and how this should be achieved by people is the "Five Freedoms" (Table 2).

Table 2 Five Freedoms

1. **Freedom from hunger and thirst** – by ready access to fresh water and a diet to maintain full health and vigour
2. **Freedom from discomfort** – by providing an appropriate environment, including shelter and a comfortable resting area
3. **Freedom from pain, injury and disease** – by prevention or rapid diagnosis and treatment
4. **Freedom to express normal behaviour** – by providing sufficient space, proper facilities and company of the animal's own kind
5. **Freedom from fear and distress** – by ensuring conditions and treatment which avoid mental suffering

Source: FAWC (2009).

McInerney (2004) points out that these definitions are not precise. What levels of comfort, fitness and ability to cope are considered acceptable, and who should make that judgement? What levels of provision of housing, food, water and care are considered "appropriate"? Presumably, minimum thresholds need to be set, but 'it is not stated what level of any one of these variables (or what levels of some combination) needs to be achieved to avoid welfare being "bad"' (McInerney 2004: 7).

A further complication is that animals cannot articulate their needs and preferences, even if selected outcomes can be measured, so all judgements about animal wellbeing are based on human standards and perceptions. McInerney (2004: 10) argues that 'there is no such thing as "animal welfare" in any definitive or independent sense; there are only human perceptions of the welfare of animals'. Also, animal welfare is a composite outcome that is determined by many variables; it cannot be measured by a single indicator. Trade-offs are inevitable, but is an assessment possible of whether an animal's welfare is improved more by "better housing" or by "better disease control"? Instead of assessing whether a single indicator or some composite index of animal welfare has surpassed a certain threshold, McInerney (2004) proposes analysing the cost or value of marginal increments in animal welfare – i.e. whether a specific change is "better" or "worse", not whether welfare overall is either "good" or "bad".

These are valid arguments, but it is also true that guidelines for good treatment of animals have been produced – for example by Humane Society International (Table 3) – that outline minimum acceptable levels of care (e.g. 'Provide your cattle access to shade and water at all times'). Livestock keepers, handlers and traders could be held to account against these guidelines. In a report written for WSPA, Serpell (2008) has provided a checklist of empirical measures that can be used to assess progress in animal welfare, both outcomes and inputs: "Direct animal-based measures of welfare" (e.g. 'Obvious signs of poor health that can either be counted (e.g. numbers of lesions) or scored reasonably objectively and repeatably using standardized rating scales') and "Environmental parameters that are likely to affect animal welfare" (e.g. 'Space available per animal', and 'Exposure to extreme temperatures or weather conditions').

It might be suggested that animals in African smallholder farming contexts could enjoy a good quality of life, because they are free ranging browsers and grazers often living in their natural environment. By contrast, the commercialisation of livestock production is associated with intensification and hence with declining animal welfare, as their mobility is restricted, and so on. In fact the relationship between commercialisation of production and animal welfare is more complex, and animals in smallholder production systems certainly do not enjoy maximal welfare – they typically lack access to veterinary services, they suffer seasonal

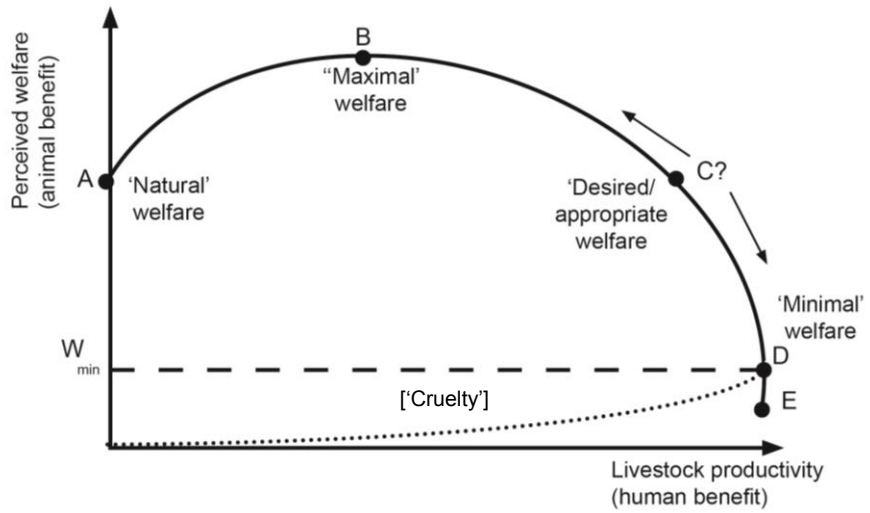
hunger, they are sometimes tethered to stop them eating crops, etc. This relationship between commercialisation or productivity of livestock and animal welfare has been characterised as an “n curve”.

McInerney (2004: 2) postulates:

> a generalised relationship between the productivity of livestock and their (perceived) welfare. This suggests there is complementarity at low levels of output, with increases in production from better husbandry (nutrition, housing, disease control, etc) bringing better welfare. However, ultimately and inevitably a point is reached where further productivity increases will come at increasing welfare cost as ‘intensity’ rises and husbandry techniques seek to exploit further the biological potential of the animal. Animal science and technology makes such developments possible, and commercial pressures cause them to be adopted.

This is the “n-curve” (Figure 2): initial efforts at raising livestock productivity benefit both animals and humans, but further productivity gains can be made only at the expense of animal welfare, so human welfare outcomes and animal welfare outcomes are then in conflict.

Figure 2 Synergies and conflicts between animal welfare and livestock productivity



Source: McInerney (2004).

In Figure 2 point A represents the welfare of animals living in their “natural” state, or being reared under free range conditions. The trajectory between A and B represents “win-win” gains: ‘As husbandry inputs are employed to feed and house the animals, protect them from predators, control disease and so forth, it is generally believed their welfare increases as well as their economic productivity’ (McInerney 2004: 18). Beyond point B, increase of production (for example by intensification) is only possible by reducing animal welfare, up to point E, where the animal can no longer sustain itself. The problem for animal welfare is that the economically optimal level of productivity is at point D, where the level of “perceived welfare” is minimal, and falls far below either B or A.

McInerney further explains that government intervention to regulate treatment of animals is motivated by a tension between individual benefit (the profit-maximising objective of livestock owners or traders) and social benefit (collective concerns about the welfare of animals). The role of government is to legislate, regulate and enforce compliance to find a balance between

individual and collective preferences with respect to the treatment of animals. Depending on how each society negotiates this trade-off (for each livestock species at each point in time) the outcome is likely to lie in the range between B and D. From an animal welfare perspective, any point to the right of B is sub-optimal, and so there is always scope for improvement.

4 Animal welfare within African smallholder farming

This paper discusses five aspects of animal welfare in African smallholder farming, which can be related to the Five Freedoms (Table 2):

1. Food and water (Freedom 1)
2. Living conditions – housing, company, etc. (Freedoms 2, 4)
3. Health – including immunisation, access to veterinary services (Freedom 3)
4. Transport – e.g. if animals are traded and transported to markets (Freedom 5)
5. Slaughter – humane or cruel (Freedom 5).

It will become apparent that the welfare outcomes discussed above in the scenarios and decision-tree analysis are affected in practice by the availability of money and other resources. They are also affected by awareness or understanding of the consequences of different treatment of animals, which are often limited. As such, one of the priorities given in the Discussion, below, is the need for Animal Welfare Education.

4.1 Food and water

Animal owners often claim that they treat their animals well, not least because this is usually in their own best interests: healthy animals are productive and valuable. However, this care often does not extend beyond feeding and watering their animals to ensure they are well nourished so they can work hard or grow well to produce more milk or meat. In contexts where pressure on natural resources is high and feeding and watering animals is a significant cost of production, even meeting these subsistence needs can be challenging and animal welfare is often compromised. This is especially likely in poor households where scarce resources must be allocated between feeding animals and feeding people. Thornton (2010: 2859) concludes that 'most of the world's livestock, particularly ruminants in pastoral and extensive mixed systems in many developing countries, suffer from permanent or seasonal nutritional stress. Poor nutrition is one of the major production constraints in smallholder systems, particularly in Africa.'

When communal livestock producers in South Africa were asked what constraints they faced in raising cattle, shortage of feed ranked first (Mapiye *et al*. 2009).[3] The body condition of their cattle deteriorates during the winter months, due to lack of grazing. About half of communal and small-scale farmers interviewed in a survey reported that they practice supplementary feeding, mainly crop residues (70 per cent of these farmers) or hay (20 per cent), but only a small minority purchased supplements (10 per cent) – most farmers could not afford to buy supplements (Mapiye *et al*. 2009).

[3] The full list of constraints (ranked) was: (1) feed shortage; (2) disease and parasites; (3) poor breeding practices; (4) lack of production skills; (5) poor infrastructure; (6) theft; (7) inadequate veterinary services; (8) inadequate marketing services; (9) poor extension services (Mapiye *et al.* 2009).

Ethiopia provides another case in point (Box 3). A recent survey in rural Oromia Region found that: 'The major constraints limiting livestock production in the study area were feed shortage, animal health, labour scarcity and lack of capital. Shortage of feed was indicated as the first most important constraint for livestock production' (Duguma *et al.* 2012: 478).

Box 3 Challenges of feeding livestock in Ethiopia

Ethiopia has the largest livestock population in Africa. However, household ownership of livestock has steadily declined since the 1970s, mainly due to shocks and stresses that have reduced the availability of food and water for animals. Severe droughts (in 1971–1975, 1984, 2000, 2003 and 2011) resulted in heavy livestock losses in drought-affected highland and lowland regions. During the protracted drought of the early 1970s, 50 per cent of livestock in the Wollo and Tigray areas either died of starvation and thirst, or were sold to finance food purchases following crop failures.

Livestock in Ethiopia feed mainly by extensive grazing and browsing, supplemented by crop residues and hay. There are shortages of food and water in the annual wet season due to intensive cropping, and in drought years. A slow-onset stressor has been the declining availability of grazing land due to human population growth and the associated expansion of land under settlement and crop cultivation. Because of this land pressure, farming households have adopted practices such as oxen-sharing: instead of keeping a pair of oxen for ploughing, neighbours keep one ox each. The recent commercialisation of smallholder land, including a growing incidence of "land-grabbing", has further reduced the amount of pasture and water available for livestock.

As the availability of communal grazing land has declined, so the use of crop residues and purchased feed as substitute sources of food for animals has increased. But purchased feed costs money and raises the cost of keeping animals. In poorer households, the numbers of livestock kept is falling further, and those animals that are kept are at risk of being under-fed.

Source: Benin *et al.* (2006).

Studies of zero grazing regimes in Africa have found evidence that feed provided to the animals is typically inadequate, in both quantity and quality. In Malawi, smallholders who keep dairy cows in a zero grazing system cannot produce enough grass and maize bran to feed their cows all year round. An average size smallholder farm could produce enough Napier grass to feed one lactating cow for about nine months. Also, 'the quality of the feed available was insufficient to meet the nutritional requirements of dairy cows ... The feeding of mostly maize bran and grasses may also mean that important nutrients such as protein and some minerals may be inadequate in the diets' (Banda *et al.* 2012: 718).

Similarly, a study in Kenya found that the quantity of forage fed to dairy cows was inadequate on more than half of smallholder farms surveyed. 'The average land holding in the study area is 0.5 ha and this is hardly adequate to sustain crop and forage production to satisfy both human and livestock needs respectively. Frequent drought further diminishes the quantity of feed available for dairy cattle' (Omondi and Meinderts 2010: 1313).

Finally, traditional practices for harvesting food from live animals can seem detrimental to the animal's welfare. One example is bleeding animals for blood, though whether this causes pain or distress to the animal is not clear, and probably depends on how it is done:

> Tools, ranging from needles to arrows are used to collect the blood (via venipuncture) that is used as food. The resulting wound is not fatal and is bandaged afterwards. While this may appear cruel, extra care is taken to avoid unnecessary harm to the animals.
> (Masiga and Munyua 2005: 580)

4.2 Living conditions

Many reared animals and birds are confined to a pen or kraal or coop or cage, especially at night but also under zero grazing or industrial farming conditions. A basic indicator of animal welfare is how much space each animal or bird has when it is confined or housed. The most extreme deprivation of animal movement occurs in industrial farming, such as battery cage systems in poultry farming, and this is one reason why industrial agriculture is considered to be detrimental to animal welfare. Commercial or large-scale livestock producers are generally believed to have less concern for the welfare of their animals than smallholder producers:

> The operators do not have the same relationship with their livestock as traditional farmers, as the main production objective of these new enterprises is to maximise profit. Intensive and semi-intensive production systems, which range from simple zero-grazing (tethering animals or keeping them indoors) in ruminants and pigs to deep litter and battery cage systems in poultry, are characterised by varying degrees of limitation of animal movement and access to natural grazing.
> (Masiga and Munyua 2005: 580)

But semi-commercialised production systems can also involve restriction of animal mobility. For example, animals kept under zero grazing conditions are never free to roam and graze naturally. 'In the zero grazing system, cows are kept in pens throughout the year, and feed is always provided for them' (Banda *et al*. 2012: 718). A study of smallholder dairy farming in Kenya explained why housing units for livestock are often too small, and the consequences of this for animal welfare:

> The housing systems in the smallholder units in this study, greatly restricted the cows from freely expressing their normal behavior and enjoying free movement. The restricting sizes of the animal units in these farms are normally due to the small pieces of land owned and the financial constraints by these smallholder farmers, which makes it difficult for them to build cattle housing units with recommended dimensions ... The restriction of movement is likely to predispose the cows to lameness ... All these housing factors predisposing the cows to body injuries and lameness are associated with causing pain and suffering, hence poor welfare.
> (Aleri *et al.* 2012: 6)

Dairy cattle are also susceptible to mastitis (an infection of the udder), which is spread by slurry on the floor of housing units that are not kept clean. So poor housing conditions lead directly to poor health outcomes. Another example is if outdoor pens or kraals do not have roofs, such that animals are exposed to heavy rains during the rainy season which turns the ground into mud and can cause diseases such as foot rot (Ndou *et al.* 2011). Other health risks can be caused by inappropriate flooring, or by housing different species together. Injuries resulting from poor housing can be detected by bruising or limping. Body condition score is one way of assessing animal welfare (Aleri *et al.* 2012).

Another practice detrimental to animal welfare is branding, which could be replaced with alternative identification methods that are less painful to the animal:

> The need to identify animals for cultural or commercial purposes has, in the past, resulted in the development of branding patterns that range from simple lines to complex designs. The branding process, which is accomplished using a hot iron or coals, is not only painful and stressful for the animal, but it also lowers the quality of the hides and skins and, thus, should be actively discouraged. It is important that African

> countries adopt more modern methods of animal identification, which are acceptable in accordance with international standards and are less painful to apply.
> (Masiga and Munyua 2005: 584).

4.3 Health

There are often direct positive linkages between animal wellbeing and human wellbeing. Where livestock are used for production, a well-nourished, healthy and happy animal will generally be more productive than a malnourished, unhealthy and unhappy animal. A study in Burkina Faso and Mali found that farmers trained in the use of drugs to treat or prevent livestock diseases incurred higher costs but earned higher revenues (Liebenehm *et al.* 2011). Conversely, a study in Kenya found evidence of a failure to treat sick animals, because smallholders had no willingness (or perhaps ability) to spend money on veterinary services (Aleri *et al.* 2012). Not treating sick animals, or waiting too long before reporting diseases, undermines disease control and animal welfare (Banda *et al.* 2012).

As noted above, specific health problems face dairy cows in smallholder production systems in Africa. 'Health-related problems seem to be one of the greatest problems faced by Malawian dairy farmers' (Kawonga *et al.* 2012: 1429). In Kenya, mastitis was reported by 2/3 of smallholders surveyed. This high prevalence was explained by poor housing conditions (e.g. 2/3 of dairy farms had floors made of earth), and inadequate training of farmers (only 25 per cent had been trained on hygienic procedures for milk production) (Omondi and Meinderts 2010).

Access to veterinary services is important for both livestock productivity and animal welfare. 'Animal diseases impair cattle productivity. To minimize disease losses, to ensure efficacy of disease management and to avoid negative externalities, adequate supply of veterinary inputs and appropriate advice on their use are required' (Liebenehm *et al.* 2011: 212).

> In two areas of Sudan, for example, average mortality in sheep flocks is moderate, at 6-11 percent, but mortality during outbreaks of peste des petits ruminants (PPR) and sheep pox can be very high, and more than 60 percent of flocks can be affected during a major outbreak. In 2005, the average loss per household due to diseases was US$766, 74 percent of which was due to loss of animals. Both PPR and sheep pox are preventable through vaccination. Markets to the Middle East, an important export destination for the Horn of Africa, are vulnerable to livestock diseases. Saudi Arabia refuses to import from any country experiencing an outbreak of Rift Valley Fever. (McLeod and Sutherland 2012: 45).

Structural adjustment programmes were associated with the privatisation of veterinary services throughout Africa, which concentrated these services in the commercial livestock sector and denied access to poor smallholders who could not afford to pay full market prices for veterinary consultations and drugs. 'Over the last two decades, particularly in Africa ... there has also been a general decline in the quality of veterinary services' (Thornton 2010: 2860).

Traditional veterinary medicine is still practised in parts of Africa, especially in communities where formal veterinary services are either inaccessible or unaffordable. Whether or not they are effective, some of these traditional practices can cause pain and distress to animals:

> Over the years, livestock keepers in Africa have perfected the art of ethnoveterinary medicine (animal health care that is based on folk beliefs and traditional knowledge and practices) such that they are able to perform surgical and obstetrical procedures on domestic animals with relative ease. Some of the most common procedures

performed are castrations of various species, episiotomies, anatomical alterations to increase virility, surgery to prevent repeat uterine prolapses, and the treatment of fractures ... While animal handlers in Africa are proficient at performing these techniques, analgesics and anaesthetics are not used, which results in pain and suffering for the animals.
(Masiga and Munyua 2005: 583)

Box 4 Health issues in smallholder poultry production in Ghana

The backyard or village poultry production system produces 60-80 per cent of the national poultry population of Ghana, which is dominated by the indigenous scavenging domestic fowl. Typically, chickens are free to scavenge during the day and are housed in coops at night. Their diet is supplemented with kitchen left-overs, bran and sometimes with purchased supplementary feed.

> There is no biosecurity system in place in village poultry and this constitutes a serious hazard for disease spread. They are in contact with wild birds and other poultry, as well as with other species of animals. The major health constraint to village chicken production is Newcastle Disease, vaccination against which has been recently introduced using the I2 vaccine intraocular. This may be performed by the trained farmer or Community Health Workers, who are active in some communities. VSD [Veterinary Services Directorate] para-veterinarians are present in or accessible by many communities to provide health care for backyard producers.
> (Aning *et al.* 2008: 30)
>
> The outbreaks of Highly Pathogenic Avian Influenza (HPAI) in the country have occurred on commercial poultry farms in Tema (Greater Accra Region) in April 2007, and later in May in the Brong Ahafo Region. These outbreaks were successfully contained through a policy of slaughter and quarantine, which could not have been effectively applied on village chickens, had the outbreaks spread to those.
> (Aning *et al.* 2008: 2)

Since the number of trained veterinarians is inadequate and formal veterinary services are inaccessible to most smallholder livestock keepers in African countries (Box 4), an alternative to formal veterinary services and informal ethno-veterinary practices was developed in the 1990s, called “community-based animal health workers” (CAHWs), also known as “barefoot vets”. As the following case studies reveal, CAHWs have demonstrated positive impacts on livelihoods and on livestock health in several African countries (Leyland and Catley 2002).

- In **Kenya**, annual mortality rates of camels, cattle and sheep/goats were estimated at 20 per cent, 17 per cent and 18 per cent respectively in CAHW project sites, significantly lower than the 31 per cent, 32 per cent and 25 per cent recorded in non-CAHW project communities.
- In **Tanzania**, introduction of CAHW services for Maasai pastoralists was associated with reductions in calf mortality of between 59 per cent and 93 per cent. This led to increased sizes of milking herds and more cows milked per household – on average from 5.3 to 24.2 cows.
- In **Somaliland**, CAHWs achieved 95 per cent vaccination efficiency (per cent of ear-notched cattle which are sero-positive for rinderpest antibody) using heat stable rinderpest vaccine – the highest efficiency reported in Africa since the Pan African Rinderpest Campaign began.

- In **Ethiopia**, CAHWs carried out rinderpest vaccination more effectively and more cheaply than government veterinary services. A CAHW project vaccinated 70,000 cattle in the Afar region with 84 per cent efficiency, using 22 CAHWs, 2 Ethiopian Veterinary Service Staff, 1 vehicle and no cold chain (temperature-controlled storage and transport of veterinary supplies). At the same time, the government's veterinary team vaccinated 140,000 cattle with 72 per cent efficiency, using 14 vehicles, 56 staff and a full cold chain.

4.4 Transport

Because transporting live animals is unnatural it is stressful for the animals. The level of stress depends on the time spent in transit, the distance covered, the quality of the roads, and the conditions on the vehicle. There are four stages of any journey: handling, loading, transit, unloading. Animal welfare can be compromised at each stage. Appleby (2008: 3) argues that all of the Five Freedoms 'are likely to be compromised during long-distance transport.' Indicators of poor animal welfare during transport include: food deprivation, dehydration, physical exertion, fear, motion sickness, and hypothermia or hyperthermia (Broom 2008).

In Africa, livestock are frequently transported long distance (at least one day), mainly for trade or to slaughter, sometimes in search of grazing or water (especially in drought-prone areas). 'Trekking and motorized overland transport are most common; motorized transport is most often by vehicles not designed to carry livestock' (Menczer 2008: 183).

Livestock face a range of stressors during transport in Africa. They are typically not fed or watered in transit, and are sometimes deprived of food before loading to reduce defecation in transit. Because most vehicles used by informal carriers are not designed to carry livestock, they risk being bruised and injured during loading, transit and offloading. Poor quality roads increase the risk of injury and distress. Drivers often speed, raising the risk of accidents, or drive recklessly with no consideration for the animals they are transporting. Trucks are invariably overloaded, different species are sometimes mixed together, there is no protection against extreme heat during the day or cold at night, and slippery floors cause animals to fall and get trampled or break legs and horns. Animals are sometimes exposed to cruel treatment during loading and offloading, such as being beaten, having their tails twisted, being poked with sticks or prodded with electric goads (Menczer 2008).

Livestock that are moved by foot ("trekking") also face threats to their welfare *en route*:

> Animals that are transported by foot to the market often walk for days without adequate rest, water, or feed. The drivers of the animals, who are often paid per number of animals delivered to the final destination, beat the animals to force them to move faster. By the time the animals reach the slaughter facilities they are exhausted and their physical condition has greatly deteriorated.
> (Masiga and Munyua 2005: 582)

For this reason, Grandin (2008: xiii) argues that: 'The worst way to pay animal handlers is based on how many they can move per hour.'

One reason why livestock are treated badly during long-distance transport is because traders do not have the same relationship to the animals that producers do. Even if livestock owners look after their animals well, once they sell the animal to a trader or middleman, this changes. Most traders and middleman have no training in animal handling or animal welfare, and have no compunction in moving animals with no consideration for their comfort or safety. 'It is common to see birds being transported upside down or pigs and dogs tied to the back seat of bicycles' (Masiga and Munyua 2005: 582).

> Animals raised on-farm in Africa are often handled well, considered symbols of wealth, and may even be treated as part of the family ... however, once an animal is sold to middlemen the bond is broken between the animal and the primary producer. Typically, the middlemen, other livestock brokers and livestock transporters view the animal as a commodity, and there is no longer an animal husbandry aspect in the human–animal relationship.
> (Menczer 2008: 194, 198)

4.5 Slaughter

Slaughtering practices in much of Africa raise many animal welfare concerns. Typical practices at slaughter facilities include crowding animals into small holding pens, hitting them with sticks and prodding them with sharp objects to control their movement. Cruel and violent treatment of animals is not unusual at slaughter-houses or abattoirs. Investigations in Africa have found cases of animals having their Achilles tendons cut to restrict their movement, animals having their eyes gouged, animals being stunned by being hit with hammers or axes, animals being killed in the presence of others, chickens being strangled, and animals and birds having their throats slit without being stunned (Menczer 2008; Masiga and Munyua 2005).

Some of the cruellest practices occur during traditional ritual slaughtering ceremonies:

> During ritual slaughtering in the Zulu culture, such as at funerals (*Umngcwabo*), coming of age (*Umemulo*) and at weddings (*Umshado*), a group of people surrounds the animal (usually a bull) to be slaughtered in its visual field and cattle are slaughtered in the pens without stunning or appropriate handling. The beast is then stabbed using a spear and the animal is not expected to be killed instantly to encourage multiple stabbing, thus, raising animal welfare concerns due to pain caused by frequent stabbing and not rendering the animal unconscious before slaughtering.
> (Ndou *et al.* 2011: 1054)

Such unacceptable incidents of cruel treatment of animals need to be addressed by exposing bad practices to public awareness, introducing legislation to regulate slaughtering procedures, and monitoring and enforcing these laws and regulations to ensure compliance. Civil society intervention can also play a role. In South Africa, animal rights groups took the Zulu king to court to stop the ritual slaughtering of animals in Zulu culture (Ndou *et al.* 2011). ‘It is difficult to see any long-term solution to this problem other than a change in the religious, cultural and traditional practices of religious and ethnic population groups’ (Wilkins *et al.* 2005: 628).

5 Discussion

This paper has argued that, for livestock reared by smallholders and (agro-)pastoralists in Africa, animal welfare outcomes are determined by: (1) economic return; (2) non-use value; and (3) government-enforced compliance; but also by (4) resources for investment; and (5) awareness or understanding. It follows that improvements in animal welfare in Africa can be achieved by interventions that will raise the level of any of these five variables. This section discusses the first three. Some interventions discussed below can be characterised as “carrots” (e.g. economic incentives), while others operate as “sticks” (e.g. government legislation and regulation). Most are applied directly to livestock keepers, handlers and traders, but results can also be achieved by raising public awareness or by collective action.

5.1 Economic return

'Economic incentives are likely to be one of the most effective ways of raising animal welfare standards' (Maria 2008: 95). Economic incentives can be either positive (higher prices for delivering good quality livestock and livestock products, or bonus payments for adhering to animal welfare standards) or negative (reduced payments for delivering poor quality livestock or livestock products, or fines for failing to adhere to animal welfare standards).

For example, a livestock trader might choose a method of transporting animals to markets that is damaging to the animal's welfare, because this is cheaper than alternative transport options that minimise damage to the animal's welfare. If the trader believes there is a trade-off between investment in animal welfare and the economic value derived from this investment, s/he is unlikely to invest in more expensive transport options. But if incentives are introduced so that delivering animals in good condition is rewarded with higher prices or bonuses, the livestock trader will realise that there is a positive synergy between investment in animal welfare and the economic value derived from this investment, and the investment in better quality transport is more likely to be made. Examples of good practices that could be adapted to African contexts come from the United States, Brazil and the United Kingdom:

> Making transporters financially accountable for bruises, poor meat quality and loss of animals has improved handling during transport in the USA and Brazil – in one example in Brazil, bruising in cattle was reduced from 20 percent to 1 percent through this measure. Paying a bonus to animal handlers for low levels of bruises, injuries and deaths, and limiting the speed at which people work in slaughterhouses and the length of their shifts have also proved effective, and repaid by the additional value of the carcases.
> (McLeod and Sutherland 2012: 45)

> Give animal handlers who load animals extra pay for low levels of injuries and deaths. In the US and British poultry industry, broken wings were reduced from 5% to 1% by paying a bonus to the chicken loaders when broken wings were 1% or less. The same system has also worked well for people handling pigs and cattle. The worst way to pay animal handlers is based on how many they can move per hour.
> (Grandin 2008: xiii)

There are also examples of negative incentives being applied in Africa:

> In the Southern African subregion, if there is quality control and good meat inspection at registered abattoirs, bruised, injured and diseased animals will be condemned. This will be an incentive, coupled with action by traffic authorities and animal welfare inspectors, to use recommended (more humane) transport methods.
> (Menczer 2008: 208)

Humane Society International (HSI) encourages several "win-win" practices that improve animal welfare and farmers' livelihoods simultaneously (Table 3).

As commented above, though, investment for economic return may often be constrained by lack of resources. As just one example, chickens on smallholdings usually get most of their feed from scavenging (Box 4). Most of the chicks do not survive. Penning them for the first couple of weeks would greatly increase survival, food supply and economic return, but the cost of supplementary feed is frequently prohibitive. There may be a large potential for microfinance projects to address this sort of problem in African smallholder livestock production, to benefit both animal and human welfare.

Table 3 Practices that simultaneously improve animal welfare and animal productivity

On the farm *Animal Welfare can make your job easier and improve your yields* • Branding the cattle in the correct place is less painful and ensures the animal can recuperate quicker. • All procedures (dehorning, castration, branding) must be carried out on very young calves. • Provide your cattle access to shade and water at all times. • Inject in the correct location. • Provide your animals with enough food and water. • Control parasites regularly.
Handling *Animal Welfare can make animal handling easier and more efficient* • Do not use prods, sticks, sharp objects or harm the animal in any way. • Give the animal a few seconds to study shadows, contrasts and obstacles. • Remove unnecessary objects from the chutes where the animals are handled. • Limit the number of people working the animals. • Work the animals in small groups.
Transport *Animal Welfare can increase your earnings and make your job easier* • Transport cattle in trucks that are in good condition. • Trucks should have non-slip floors. • Trucks should be kept clean. • Do not transport sick or injured animals. • Use the correct density and appropriate group divisions to load trucks. • Use well designed trucks. • Ensure trucks are driven sensibly.
Slaughter *Animal Welfare can increase your profits* • Provide water for the animals in waiting pens. • Appropriate handling of the animals avoids carcass losses. • Place the stunner in the correct location during stunning. • Verify that the animal is properly stunned before it is bled. • Keep the stunning equipment dry, clean and in an appropriate place.

Source: HSI (2008: 19-22).

5.2 Non-use value

Animals do not only have use value. The higher the non-use value attached to animals by their keepers or handlers, and by the wider society in which they live, the more those individuals and societies will be willing to invest in maintaining acceptable levels of animal welfare (if they have resources to invest), even if this investment generates no economic returns.

An important way to raise the non-use value of animals is sensitisation – e.g. drawing attention to cases of animal neglect or abuse, and instilling a sense of the importance of treating animals well into all members of society, whether they are directly engaged with animals or not. Some ideas for achieving this are provided in Box 5.

Box 5 Animal Welfare Education (AWE)

- Education through formal curricula is the long-term approach to changing attitudes in the next generation of policy and decision makers. This could be achieved by developing partnerships with government ministries such as the Ministry for Education to achieve the inclusion of animal welfare language into national curriculum documents for children in the 5–16 age range. Animal welfare organisations have educational resources that could assist with this.
- Changing the formal curricula of universities to build in an understanding of the importance of animal sentience and the ethics of animal welfare can change attitudes in a range of disciplines. Veterinary medical science, animal science and agriculture are some of the most obvious academic entry points, but zoology, law, philosophy and journalism also provide relevant platforms.
- Formal training in the form of Continuing Professional Development in relevant animal welfare areas should be available for those in direct contact with animals, such as stockpersons, veterinarians, veterinary technicians and slaughter personnel. This should be available in the form of short, certificated courses recognised by the relevant professional association.
- Informal education from knowledgeable veterinarians is an ideal way to target ordinary citizens with suitable animal welfare messaging and suggestions of how to improve the lives of the animals they encounter, for example, youth clubs, farmers and the owners of companion and draught animals.
- Public awareness campaigns can be successful in changing the attitudes held by society in a relatively short space of time. Bringing relevant animal welfare issues to the attention of the public enables public discussion and debate, which results in greater awareness and lower tolerance of unacceptable behaviour.

Source: RSPCA (2009)

5.3 Government-enforced compliance

Most African countries do not have any policies or laws pertaining to animal welfare. There is an urgent need for African countries 'to develop and implement policies and legal frameworks that address animal welfare issues and, at the same time, encourage compliance' (Masiga and Munyua 2005: 581) if animal welfare is to be improved for the benefit of both animals and people.

A review of 15 countries in the Southern African Development Community (SADC) region found no mention of animal welfare in any national Constitution, nor in the SADC Treaty, various SADC Protocols or even the Regional Agriculture Policy. 'National sector policies on agriculture, natural resources including fisheries, wild animals and the environment exist in all the countries but with little or no reference to animal welfare' (OIE 2011: 2). Only Tanzania`s National Livestock Policy (United Republic of Tanzania 2006) includes a section specifically addressing animal welfare. Five countries out of 15 – Namibia, South Africa, Tanzania, Zambia and Zimbabwe – have animal protection or animal health Acts, while South Africa and Zimbabwe have animal welfare codes of practice. 'Four countries i.e. Angola, DRC, Madagascar and Mozambique have literally nothing significant on animal welfare legislation' (OIE 2011: 2). For more details on the state of animal welfare legislation in Africa, and recommendations for improvements, see McInerney (2004: 51-59); Masiga and Munyua (2005: 584), Menczer (2008: 190-191, 209-211); and McLeod and Sutherland (2012: 38-39).

Specific policies, legislation and regulations – and campaigning to ensure they are enforced – should be introduced around areas related to the Five Freedoms (Table 2), especially in those aspects where animal welfare is known to be compromised. Priority areas for such interventions could include the transport and slaughtering of farm animals. 'There is an urgent need for African countries to develop, implement, and enforce transport and pre-slaughter handling procedures and to improve handling facilities' (Masiga and Munyua 2005: 582). For instance, Grandin (2008) makes an argument for reducing long-distance transport of live animals, and instead slaughtering and processing animals near their region of origin, to reduce the stress and risks of injury that animals face in transit. Such a shift in animal handling procedures would need to be backed up with economic incentives, but also with legislation that is properly enforced.

5.4 Conclusion

It is axiomatic that human and animal welfare in Africa are closely interrelated. Nonetheless, animal welfare problems in Africa are numerous and severe, with widespread violations of all "five freedoms". This is for several reasons, including resource constraints, low economic returns to investing in animal welfare, low non-use value of animals, and absence or non-enforcement of animal welfare regulations. Several examples of good practices have been identified in this paper, but a great deal more work needs to be done to create the necessary awareness, economic and non-economic incentives, and regulatory frameworks, to achieve the optimal balance between human welfare and animal welfare.

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