

## STRESS AND ANIMAL WELFARE: AN UNEASY RELATIONSHIP

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### ABSTRACT

Stress and its detrimental effects on animal welfare has been examined in this paper. Stress refers to a state of threatened homeostasis. Animal welfare refers to well-being and care in its biological sense. The highly dynamic patterns of the homeostatic mechanisms activated during stress make it difficult to deduce any simple relationship between stress and welfare. Thus, the closely associated concepts of stress and welfare may be considered as opposites since welfare cannot be achieved under stress and vice versa. Thus, attending to welfare is an issue of biology. Recently, interest in and concern about animal well-being has been increasing because of changing views towards non-human animals, societal attitudes, legislation and conduct of quality scientific research and testing. One way of determining practices that promote the best welfare of livestock is defining and measuring physiological welfare. Physiological measurements and other measures may help measure an animal's state of care and stress or distress, as good production does not prevent an animal from being subjected to distress or stress. Therefore, animal agriculturists usually take the position that they are practicing Animal Welfarist because of their continuous concern about the well-being and care of livestock (good husbandry) and a well-cared-for animal performs better and thus is more profitable. Then, producers would be compensated for providing improvements in the welfare of their livestock, consumers would absorb the costs and production would continue. Moreover, improving animal welfare is necessary to reduce sufferings in line with the requirements of Government, NGOs and consumers, who are becoming concerned about welfare of food animals.

**Keywords:** Stress, animal, welfare, uneasy, relationship.

### INTRODUCTION

Since the 1980s, no other animal-related social issue has generated as much emotion, rhetoric, and ill will as the discussion surrounding animal welfare (Damron, 2009). Animal welfare is defined as the treatment and well being of animals while they provide for human needs; human use. Animal welfare issue affects sentient animals used for every conceivable purpose, including those used for food, research etc. Animal welfare concerns began with the first domesticators of animals and have continued to the present with progressively responsible animal husbandry practices. The animal welfarist is concerned with an animals treatment and well-being while the animal provides for human needs. The basis of the Welfarist position is the idea that using animals obligates people to tend to basic needs considered to be good husbandry. These needs include feed, water, protection, shelter, health care, alleviation of pain and suffering, and other similar needs. Most would call these the necessary elements of humane care. In agriculture, providing for animal welfare determines whether or not animal production system makes money. Attending to welfare is an issue of biology. Providing for welfare of animal does not necessarily require giving it right. An argument by Bernard Rollin (1993) reflects attempts to constrain how animals can be used, so as to limit their pain and suffering. In this regard, as a 1993 Beef Today article points out, the thrust for protection of animal natures is not at all radical; it is very conservative, asking for

the same sort of husbandry that characterized the overwhelming majority of animal use during all of human history, save the last fifty or so years. It is not opposed to animal use; it is opposed to animal use that leads to friction and suffering (Damron, 2009). In *Rain without Thunder*, Gary Francione (1996) states, “The welfare seek the regulation of animal exploitation”. Thus, animal agriculturist usually take the position that they are practicing animal welfarist because a well-cared-for animal performs better and thus is more profitable (Damron, 2009) whereas exposure of an animal to stress compromises welfare (Dobson *et al.*, 2001). Therefore, this paper examined stress and its detrimental effects on animal welfare.

## STRESS AND STRESSORS OF ANIMALS

Stress is defined as an organisms total response to environmental demand or pressures (ILO, 2006; Naturanimal, 2012). Stress can lead to the fight or flight response so an animal can experience faster pumping lungs, racing heart, higher blood pressures, endorphins flooding the body. The appetite, libido and immune system shut down in order that energy is diverted to muscle to prepare for flight. Blood clotting time is also shortened, the bladder relaxes and blood vessels are constricted. This is a natural instinct and is very useful in certain circumstances. According to Lee (1993), environmental stressor is not limited to climatic factors but extends to nutrition, housing and any stimuli that demand a response from the animal to adapt to new circumstances. The main stressors in an animal's life are: danger, illness, pain, accidents, synthetic chemicals, inappropriate diet, weaning, confinement, isolation, over-crowding, boredom, changes in routine/environment, over-stimulation which is the opposite of boredom (Naturanimal, 2012). According to Grandin (1997) and Etim *et al.* (2013) animals can be stressed by either physiological stress: restraint, handling or novelty or physical stresses: hunger thirst, fatigue, injury or thermal extremes. ILO (2006) reported that high noise can result in stress and contribute to cardiovascular, circulatory problems and digestive problems; psychological disturbances and symptoms such as nervousness, sleeplessness and changes in social behaviour in the inflicted. Blanchard *et al.* (2001) documented that social interactions serve as an evolutionary important source of stress, and one that is virtually ubiquitous among mammalian species. Fear is a very strong stressor. Fear and pain are very strong causes of stress in livestock and stress affects the quality and value of meat from affected animals (Chambers and Grandin, 2001).

## ANIMAL WELFARE/WELL-BEING

Animal welfare has to do with the feelings experienced by animals: the absence of strong negative feelings, usually called suffering and (probably) the presence of positive feelings, usually called pleasure (Duncan, 2005). Francione (1996) stated that animal welfare refers to a state of well-being and care in its biological sense. Clark *et al.* (1997) reported that recently, interest in and concern about well-being has been increasing because of changing views towards non-human animals, societal attitudes, legislation and conduct of quality scientific research and testing. Animal well-being is a vague concept that can neither be viewed in a purely objective manner nor simply described, defined or assessed. It is not a scientifically or technically precise state, but rather a dimensional one. Factors such as animal needs and perspective, critical anthropomorphism and human social and individual values are involved. There are limitations in determining the overall well-being of an animal and comparing well-being in disparate environments. Nevertheless, there is an extensive and ever-growing list of complex factors thought to affect homeostasis, sensitivity, interrelationship and feedback mechanisms. Clark *et al.* (1997) reported that research data from a variety of fields, such as animal biology and behaviour, stress biology and psychoneuroimmunology, increasingly

support a holistic view of well-being. Existing data suggest an interactive system linking internal psychologic, neurologic, physiologic, immunologic, endocrine and biochemical events with the external psychosocial and physical environment (Clark *et al.*, 1997). An animal's state of well-being or homeostasis is determined by a multitude of external (psychosocial and physical stimuli) and internal (mental and biological responses) factors and interacting variables and by other aspects such as ethology, genetics, individual variation, social milieu, coping style and intensity, duration and frequency of stimuli.

## DEFINING AND REGULATING CARE OF AGRICULTURAL ANIMALS

Currently, agriculturists choose management practices based on economic principles (i.e. they choose the production practices that will yield the most profit within their constraints). If government is to regulate care of agricultural animals by passing agricultural animal rights legislation, then an acceptable definition of humane care must be developed within the context of agricultural production systems. The methods for handling, transporting and confining animals will need legal definition. Presumably, the development of such definitions would be a part of legislation aimed at restricting and directing animal management practices within production systems (Damron, 2009).

Regulation may involve establishment of boards and commissions that would define humane care and management and then interpret, oversee and arbitrate the legislative mandates. Alternatively, laws could be written through public hearing process and enforced through regular law enforcement mechanisms. Still another alternative might include a system of labeling for food products that describes the production practices under which they were manufactured, allowing consumers to make informed spending choices (Damron, 2009).

This would no doubt increase the costs associated with food production and the cost of the products and reduce the returns to the agricultural sector. Reduced supplies and increased consumer prices could result. The addition of new policies would also lead to regulatory bureaucracies, added taxes, and other forms of public support. However, some analysts argue, quite persuasively, that if all producers are required to make the same changes in production techniques, thereby raising costs to all and giving advantage to none, that consumers would then absorb the costs. It was further argued that those cost would be so little per consumer as to be inconsequential to all but the very poorest (Webster, 2001). If these arguments are correct, then producers would be compensated for providing improvement in the welfare of their livestock, consumers would absorb the costs, and production would continue (Damron, 2009). As reported by Ladewig and Ellendorf (2000), large differences exist in the world in the acceptance and the assumption of the necessity of animal welfare; prevailing notions in rich countries are often perceived as efforts to raise trade barriers. Therefore, it is necessary to establish mandatory international standards of animal welfare for worldwide trade agreement. These standards must be based on established scientific knowledge and practical experience. The animal farmer works to produce income. If animal production is to continue, the additional costs incurred by animal welfare provisions must be covered. Farmers and trade organizations will be the driving force behind animal welfare to the degree that consumers are willing to pay for animal welfare (Ladewig, 2000).

It must be pointed out that certain avenues for defining animal welfare do not require broad consensus or even majority opinion and methods of enforcing adherence to the definition, even if not all agree with the rubric assigned. Food companies have been facing mounting pressure to develop animal welfare plans, which their suppliers of animal products are then

expected to follow. This gives the food companies a way to assure their consumers that the food animals are treated in a fashion they are willing to defend to their consumers. Several high-profile companies have taken this step. There seems little doubt that others will do the same. One is forced to consider the possibility that the market place may be the ultimate arbitrator and that laws will be unnecessary (Damron, 2009).

Webster (2001) offers the following view of welfare, “the welfare of a sentient animal is good if it can sustain fitness and avoid suffering: i.e. stay fit and happy”. An avenue for supporting that definition can be found in the “five freedoms” (Table 1) put forth by the Farm Animal Welfare Council, an independent advisory body established by the British government in 1979. Ultimately, a consensus will be reached through one or more avenues.

**Table 1: The Five Freedoms of the Farm Animal Welfare Council**

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The welfare of an animal includes its physical and mental state and we consider that good animal welfare implies both fitness and a sense of well-being. Any animal kept by man must at least be protected from unnecessary suffering.

We believe that an animal’s welfare, whether on farm, in transit, at market or at a place of slaughter should be considered in terms of five freedoms. These freedoms define ideal states rather than standards for acceptable welfare. They form a logical and comprehensive framework for analysis of welfare within any system together with the steps and compromises necessary to safeguard and improve welfare within the proper constraints of an effective livestock industry.

- 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 or 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 that avoid mental suffering.

**Stockmanship – The Key to Welfare**

Stockmanship, plus the training and supervision necessary to achieve required standards, are key factors in the handling and care of livestock. A management system may be acceptable in principle but without competent, diligent stockmanship, the welfare of animals cannot be adequately safeguarded. We lay great stress on the need for better awareness of welfare needs, for better training and supervision.

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**Source:** Farm Animal Welfare Council. <http://www.fawc.org.uk/index.htm>; Damron, 2009.

**STRESS AND ANIMAL WELFARE**

Wiepkema and Koolhaas (1993) reported that the highly dynamic patterns of the homeostatic mechanisms activated during stress make it difficult to deduce any simple relationship between stress and welfare. The closely associated concepts of welfare and stress may be considered as opposites since welfare cannot be achieved under stress and vice versa (Veisser and Boissy, 2007). The concepts of stress and distress are integral parts of consideration of animal well-being. Stress was first considered as an unspecific response to any challenge taxing the organism’s resources where the HPA (Hypothalamus-Pituitary-Adrenal) axis plays a central role (Veissier and Boissy, 2007). Generally, stress refers to a state of threatened

homeostasis, but precise clinical definitions, causes and biological measurements have been controversial and confusing. A persistent threat may lead to prolonged hyperactivity of the neuroendocrine system, which impairs rather than contributes to well-being (Clark *et al.*, 1997). Along the same line, welfare was considered as the state of an individual on a continuum between poor and good depending on efforts required to adapt to the environment (Broom, 1991). Both failure to cope with environment and difficulty in coping are indicators of poor welfare. Suffering and poor welfare often occur together, but welfare can be poor without suffering and welfare should not be defined solely in terms of subjective experiences. The indicators of poor welfare include the following: reduced life expectancy, impaired growth, impaired reproduction, body damage, disease, immunosuppression, adrenal activity, behaviour anomalies and self-narcotization (Broom, 1991). The need to make direct measurement of poor welfare as well as to use sophisticated studies of animal preferences is emphasized (Broom, 1991).

## ASSESSMENT/MEASUREMENT OF ANIMAL WELFARE

“Welfare” refers to a state of an individual in relation to its environment and this can be measured (Broom, 1991). Scientists have searched for objective ways to evaluate welfare. As part of this evaluation, various ways to measure stress have been proposed. According to Kumar *et al.* (2012), a single measure of stress might not be a reliable indicator and it is usually more informative to combine multiple indicators of stress to assess animal welfare. Popular measures of stress such as alterations in hormonal profiles can be complemented with behavioural and immunological changes. Animal scientists need a reliable measure of behavioural stress in domestic animals if they are going to be able to assess the stress of various management practices and to answer questions of public concern about well-being of animals used in agriculture (Moberg, 1987). The extent that handling farm animals cause them to suffer is a central concern when assessing their welfare. “Suffering” is a mental state resulting from different causes and effects on the animal’s behaviour and physiology (Rushen, 1996). What is common is that they are aversive; animals will seek to avoid such experiences. The degree of aversiveness can be measured using behavioural techniques, which are based on an animal’s ability to learn the predictive relationship between events. Compared with physiological stress responses, aversion learning techniques are more easily interpreted in terms of animal suffering and are more able to discriminate between handling treatments. They can sometimes be used to predict physiological responses to handling. The outcome of experiments in aversion learning can be affected by factors influencing the learning ability and memory of animals and researchers need be aware of potential confounding in experimental design (Rushen, 1996). Such techniques have been used to compare sheep handling practices, examine which components of transport are aversive for pigs and poultry and examine the relationship between animals and handlers. From a model developed by Moberg (1987), it was proposed that the best indicator of animal suffering from stress is the development of a pre-pathological state, i.e., a stress related change in biological function that threatens the animal’s well-being. Examples of such pre-pathological states would be a suppression of the immune system, the loss of reproductive events critical for normal reproduction, or the development of behaviours that would lead to such undesirable acts as tail-biting or excessive fighting. Although, determining the existence of such pre-pathological states is not convenient, their existence is currently the only defensible indicator of an animal suffering from behavioural stress (Moberg, 1987).

Furthermore, since welfare has to do with feelings, in any assessment of welfare, it is these feelings that should be assessed. Because feelings are subjective, they cannot be assessed



directly. However, there are indirect methods by which animals can be 'asked' what they feel about conditions under which they are kept and the procedures to which they are subjected (Duncan, 2005). These methods involve preference tests, followed up by motivational tests to assess how important the animal's choice is. Improvements of animal welfare should focus on the ways animal react to their environment and not only on changes in the environment (Moberg, 2000). Measurements of impaired biological functioning, particularly those connected to decreased health and increased physiological stress responses, can provide good corroborating evidence that welfare is compromised (Duncan, 2005).

According to Damron (2009), one problem with determining practices that promote the best welfare for livestock is in defining and measuring physiological welfare. Often, the production of useful product is measured. The supposition that if the animal is gaining well or producing milk at a high level, its needs are being met. However, modern animal production systems are not always designed to measure individual production at all and, if so, only at the end of the production phase. Another problem is that good production does not prevent animals from being subjected to distress or stress. Other indicators such as physiological measurements (blood parameters, and so on), animal behaviour, preference tests, or other measures, including simple observation, may help measure an animal's state of care and distress. Measuring the psychological well-being of animals is an even more challenging task. Ultimately, a combination of measures will probably be used to measure the welfare provided in various management systems. Currently, the research needed to make such determinations is not receiving the funding and the effort it sorely needs. Even though precise systems for measuring animal welfare need further development, those who work with animals have been developing guidelines for animal use rapidly and working to educate and implement standard practices (Table 2).

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**Table 2: Some Important Guidelines for Care and Use of Animals**

**American Association for the Accreditation of Laboratory Animal Care (AAALAC):** A voluntary accreditation body that requires compliance with the guide for the care and use of Laboratory Animals and the Guide for the Care and Use of Agricultural Animals in Agricultural Research and Training. Peer evaluation is used to ensure proper care and use of research animals, as well as to protect people from dangers associated with conducting research with animals, and minimizing variables that can negatively affect the quality of the research.

**Guide for Care and Use of Laboratory Animals** (NIH Publication 86-23, revised 1965, 1968, 1972, 1985 and 1996). The Guide sets forth recommendations on policy, veterinary care, husbandry practices and requirements for research facilities and the animals used for research in them. It further emphasizes that the responsibilities for animal care is with the institution. Published by the National Institutes of Health, the Guide is the resource explaining the requirements enforced under the Public Health Service Policy on Humane Care and Use of Laboratory Animals.

**Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching.** This guide was first published in 1988. It is voluntary but has received wide acceptance, support and use by those who use agricultural animals in research and training. It includes guidelines for institutional policies, general husbandry guidelines, health care, physical plant, beef cattle, dairy cattle, horses, poultry, sheep, goats, swine and veal calves.

**Policy on Personnel Ethics in Youth Livestock Activities.** Oklahoma Cooperative Extension Service. This is an excellent example of policy designed to retain and promote what is good about youth livestock programs. Many states have adopted policies on youth livestock programs relating to exhibitions. Such policies spell out unethical and illegal practices and penalties for infractions.

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**Reports for the AVMA Panel on Euthanasia, 1993.** Presents acceptable methods of euthanasia. Public Health Service Policy requires methods of euthanasia to be consistent with this report and all regulatory agencies recognize it as the standard for selecting and evaluating methods of euthanasia.

**Guidelines for Ethical Conduct in the Care and Use of Animals.** Developed by the American Psychological Association's Committee on Animal Research and Ethics.

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**Source:** Compiled from Bennett *et al.*, 1994, pp. 3-10; Katz, 1999; Guither and Swanson, 1999 and Damron, 2009.

## CONCLUSION

Stress is a state of threatened homeostasis. Stress in general is looked upon as a symptom resulting from exposure of an animal to a hostile environment. The natural environment is composed of various potential hostile stressors. Environmental stressor is not limited to climatic factors but extends to nutrition, housing and any stimuli that demand a response from the animal to adapt to new circumstances and Animal Welfare refers to the state of an animal in relation to its environment. Exposing an animal to stress compromises welfare. Thus, welfare cannot be achieved under stress. Obviously, the best way to deal with stress is to avoid it. Improving animal welfare is necessary to reduce suffering in line with requirements of Governments, NGOs and consumers, who are becoming more concerned with welfare of food animals. Better condition of livestock operations will also improve safety of workers in the livestock and meat industry. The need to make direct measurement of poor welfare as well as to use sophisticated studies of animal preferences is emphasized.

## REFERENCES

- Bennett, B. T., Brown, M. J. and Scofield, J. C. (1994). Essentials for animal research: A primer for research personnel. Washington, DC: Animal Welfare Information Center, United States Department of Agriculture, National Agriculture Library.
- Blanchard, R. J., McKittrick, C. R. and Blanchard, D. C. (2001). Animal Models of Social Stress: effect on behaviour and brain neurochemical systems. *Physiol. Behav.* 73(3): 261-71.
- Broom, D. M. (1991). Animal Welfare: Concepts and measurement. *Journal of Animal Science*, 69(10): 4167-75.
- Chambers, P. G. and Grandin, T. (2001). Guidelines for humane handling, transport and slaughter of livestock. FAO Corporate Document Report and Humane Society International.
- Clark, J. D., Roger, D. R. and Calpin (1997). Animal well-being. I. General Consideration. *Lab. Anim. Sci.*, 47(6): 51-9.
- Damron, W. S. (2009). Introduction to Animal Science. Global, Biological, Social and Industry Perspective. Pearson International Edition. Fourth Edition. Ch. 29.
- Dobson, H., Tebble, J. E., Smith, R. F. and Ward, W. R. (2001). Is stress really all that important? *Theriogenology*, 55(1): 65-73.
- Duncan, I. J. (2005). Science-based assessment of animal welfare: Farm animals. *Rev. Sci. Tech.* 24(2): 483-92.
- Etim, N. N., Williams, M. E., Evans, E. I. and Offiong, E. E. A. (2013). Physiological and behavioural responses of farm animals to stress: Implications for animal productivity. *American Journal of Advanced Agricultural Research*, Vol. 1, Issue 2, pp. 53-61.
- Farm Animal Welfare Council (2004). The five freedoms. Available at: <http://www.favc.org.uk/index:htm>.

- Francione, G. L. (1996). Rain without thunder. Philadelphia: Temple University Press.
- Grandin, T. (1997). Assessment of stress during handling and transport. *Journal of Animal Science*, Vol. 1, 15:249-257.
- Guither, H. D. and Swanson, J. (1999). Animal rights and animal welfare. University of Illinois and Kansas State University. Available: <http://unlvm.unl.edu/aniright.htm>.
- International Labour Organization (ILO) (2006). Taking hazardous child labour in Agriculture. Guidance and Policy and Practice. ILO Publications, International Labour Office, Ch. 1211, Geneva 22, Switzerland. Pp. 45.
- Katz, L. S. (1999). Animal rights vs. animal welfare. Publication No. F5753. New Brunswick, NJ: Rutgers Cooperative Extension Service. Agricultural Extension Service.
- Kumar, B., Manuja, A., Aich, P. (2012). Stress and its impact on farm animals. *Front Bio Sci. (Elite Ed.)*. 1; 4:1759-67.
- Ladewig, J. (2000). Communication of the welfare status by the Animal. institute of Animal Science and Animal Behaviour, FAL Mariensee.
- Ladewig, J. and Ellendorf, F. (2000). Animal Welfare. Institute of Animal Science and Animal Behaviour, FAL Mariensee.
- Lee, C. N. (1993). Environmental stress effects on bovine reproduction. *Vet. Clin. North America. Food Anim. Pract.* 9(2): 263-273.
- Moberg, G. P. (1987). A model for assessing the impact of behavioural stress on domestic animals. *J. Anim. Sci.* 65(5): 1228-35.
- Mormede, P. (2000). Stress and Welfare, a Psychoendocrine Perspective. *Neurogenetique et stress*, INSERM-NRA.
- Naturanimal (2012). Stress and animals. Available at: [www.naturanimals.com/stress-and-animals](http://www.naturanimals.com/stress-and-animals).
- Report of the AVMA Panel on Euthanasia (1993). *Journal of the American Veterinary Medical Association*, 202(2): 229-240.
- Rollin, B. E. (1995). Farm animal welfare: Social, bioethical and research issues. Ames: Iowa State University Press.
- Rushen, J. (1996). Using aversion learning techniques to assess the mental state, suffering and welfare of farm animals. *Journal of Animal Science*, 74(8): 1990-5.
- Veissier, I. and Boissy, A. (2007). Stress and welfare: Two complementary concepts that are intrinsically related to the animal's point of view. *Physiol. Behav.*, 92(3): 429-33. Epub.
- Webster, A. J. F. (2001). Farm Animal Welfare: The five freedoms and the free market. *The Veterinary Journal*, 161: 229-237.
- Wiepkema, P. R. and Koolhaas, J. M. (1993). Stress and Animal Welfare. *Animal Welfare*. 1(3): 195-214 (24).