
ANIMAL WELL-BEING RESEARCH PRIORITIES: FAIR '95 AND SOME PERSONAL OBSERVATIONS

Joy A. Mench

Associate Professor

Department of Poultry Science

University of Maryland

Introduction

Nearly 30 years ago the British government issued a landmark report on farm animal welfare (Brambell, 1965). This report stimulated the establishment of farm animal welfare policies and advisory bodies throughout Europe (Spedding, 1993), as well as a scientific research effort designed to address basic questions about how animal well-being could be defined and measured. Research attention was also directed toward the development of alternative production systems for laying hens, sows, and calves, largely in response to government recommendations.

During this time, however, attention to this issue in the United States languished. Although the USDA funded a number of short-term projects in 1981, no long-term targeted funding has subsequently been made available from any source for farm animal well-being research. While the European data have been valuable, many questions about animal well-being remain unanswered. In addition, it is important to conduct research which is directly applicable to animal husbandry practices in the United States and which takes into account our own particular areas of scientific expertise and our unique economic, political, and social circumstances. A significant step toward implementing such a research agenda was made in October of 1992 when the Food Animal Integrated Research (FAIR '95) meeting was held in St. Louis.

The goal of the FAIR '95 meeting was to delineate research priorities for funding under the 1995 federal budget for animal agriculture in three general areas: competitive and sustainable animal agriculture; safety, nutrition, and quality of food; and animal and environmental well-being. The meeting, which was sponsored by the Federation of American Societies of Food Animal Sciences and the Forum for Animal Agriculture, attracted approximately 250 participants.

The meeting was structured to facilitate the building of a consensus among the participants, who represented diverse constituencies and areas of expertise. Speakers addressed each of the topic areas, and participants were then divided into discussion groups. The reports from the discussion groups were

consolidated by Rapporteurs and presented not only to the meeting as a whole but to a smaller consensus group.

This Consensus Committee further refined the suggested priorities, integrated them across the different topic areas, and developed broad goal and objective statements. The Writing Committee then prepared a document, successive drafts of which were reviewed by the members of the FAIR '95 Consensus, Executive Planning, Program, and Steering Committees. These efforts culminated in the publication of the brochure "Linking Science and Technology to Societal Benefits: Research Priorities for Competitive and Sustainable Food Production from Animals."¹

My role at the FAIR '95 meeting was to act as the Rapporteur for the discussion groups on animal well-being and to participate in the consensus process and in the writing of the final report. The two overall objectives for animal well-being research delineated by the Consensus Committee were to: 1) determine scientific measures of well-being in food-producing animals and 2) develop long-term management options and short-term production practices based on scientific research findings about animal well-being. These objectives are elaborated briefly in the FAIR '95 brochure. In the present paper, however, I will provide the more detailed information that resulted from the discussion groups, which I think provides an excellent basis for further dialogue about focused research priorities.

FAIR '95 Priorities

The 12 groups that met to discuss animal well-being were asked to address questions about the research approaches necessary to define well-being and determine if (and how) current measures need to be refined. Participants were also asked to consider the relationships between animal well-being and economics, societal concerns, biotechnology, and human health. Despite the fact that these groups contained participants of many different interests and backgrounds, there was a striking degree of similarity in terms of the issues that were raised and the approaches proposed. The following general research areas were identified as having a high priority.

1. *Bioethics and conflict resolution.* Our current level of understanding of public attitudes toward food animal well-being is inadequate, and research should be directed toward assessing these attitudes. In addition, methods need to be developed to improve communication and resolve conflicts among the various interested parties. One important component of improved communication is improved education about animal well-being, ethics, and animal agriculture in general at all educational levels.
2. *Responses of individual animals to the production environment.* Arriving at meaningful and interpretable measures of well-being is critical. Research is needed to determine what constitutes normal

¹ The brochure is available from Association Headquarters, 309 W. Clark Street, Champaign, IL 61820.

behavior and to analyze the interrelationships among normal and abnormal behaviors and immunological, neuroendocrine, production, and health indicators of well-being. The influences of genetic background and previous experience on the animal's responses to the production environment also need to be assessed.

3. "*Stress.*" This term is used here in the broadest possible sense to include the evaluation of any practices that might result in physical or psychological discomfort or pain to the animal. Examples are the so-called "special" categories of standard agricultural practices (e.g., beak-trimming, dehorning), genetic selection or bioengineering to improve performance, transportation, slaughter, handling, feed or water restriction, limitation of movement, and social isolation.
4. *Social behavior and space requirements.* Although the research described above will yield information about factors affecting the well-being of individual animals, most food animals are managed in groups. Studies are needed to investigate the effects of group size, group composition, and the expression of social behaviors like aggression and play on well-being, and to determine how these factors affect the use of space by agricultural animals.
5. *Cognition.* Objectively designed studies to determine subjective feelings of animals are necessary. One method of accomplishing this is to allow animals to tell us how they perceive the environment and what their needs are by using preference testing.
6. *Alternative production practices and systems.* The information derived from basic studies can be used to evaluate current management practices and production systems and develop alternative or modified systems where necessary. However, a large variety of factors need to be weighed when evaluating production systems and determining their costs and benefits. A partial listing of some of these is provided in Table 1. They include not only animal well-being, but human health implications, economic and environmental impacts, policy issues, and consumer acceptability. Complex modelling approaches will be required to accomplish this analysis.

Because of the nature of well-being research, it was recognized by the discussants that both disciplinary and multidisciplinary approaches would be required. Many disciplines that could make a contribution to studies of animal well-being were mentioned, including behavior, epidemiology, genetics, immunology, neurobiology, pathology, philosophy, and physiology. Many possible indicators of animal well-being were also mentioned.

While I endorse the idea of a multidisciplinary approach, I think that we need to be wary of relying too much on the elaboration of new indicators of well-being. Instead, we need to focus our attention on refining our present indicators and determining the central questions and issues that we need to address.

Table 1.

| Criteria for Evaluating Production Practices and Systems. | |
|--|---|
| Consumer Acceptability | Ethical acceptability Product safety <i>Residues, Pathogens</i> Product quality <i>Appearance, Nutritional value</i> Product cost |
| Animal Well-Being | Behavior Health Growth and reproduction Pain and distress Physical comfort |
| Worker Health and Safety | Indoor air quality <i>Dust, Ammonia, Molds</i> Zoonotic diseases Hygiene Noise Hazards Psychological acceptability <i>Human/animal interactions</i> <i>Ease of management</i> |
| Environmental Impact | Air pollution Water pollution Land availability Impacts on wildlife Sustainability |
| Economics | Domestic markets International markets Niche markets |
| Policy Considerations | Policymaking <i>Regulations, Guidelines</i> Economic impacts <i>Costs of implementation</i> <i>Subsidies</i> Impact on farm structure <i>Large vs. small farms</i> Impact on rural communities |

What Is the Question?

Conflicts over this complex issue could be resolved quite simply, of course, if only we had an indicator or indicators that would tell us decisively whether or not an animal is in a good state of well-being. While the idea of such a litmus test is very appealing, it is my opinion that research designed simply to discover indicators will not prove to be the most fruitful approach. All of our current indicators are plagued by problems of interpretation. What is a “normal” behavior or a “normal” level of glucocorticoid or antibody production? To what extent, and for how long, must parameters vary from this “normal” state before we can reliably infer that the animal’s well-being is compromised? What does it mean when several indicators are out of the “normal” range but other indicators are not? The interpretation of any new indicator, regardless of how sensitive or sophisticated it is, will likely pose similar difficulties.

Our strategy for addressing animal well-being questions has sometimes been analogous to the approach taken by the famous blind men of Hindustan, who each examined one part of an elephant and then attempted to describe the whole animal. Even if these learned men had engaged in a great deal of discussion, it is improbable that they would have been able to construct the physical likeness of an elephant simply by scrutinizing a leg, a tail, and an ear, much less arrive at an understanding of the true “elephantness” of the elephant.

Animals are (to borrow some jargon from the new physics) “complex adaptive systems” that are in a continuous state of interaction with their environment (Figure 1). At any point in time an animal is exposed to a wide variety of different environmental stimuli (e.g., food, a predator). At the same time the animal may be experiencing a number of different internal states (e.g., hunger, sexual drive). These external and internal stimuli may well send conflicting messages: eat, flee from a predator, and perform a mating display. It is the integration of these messages in the brain and their comparison with memories of previous experiences that result in the initiation of the behavioral and physiological responses that enable the animal to respond to its environment in an adaptive manner.

Adaptation, then, is a dynamic process during which many of the indicators that we are attempting to measure are changing simultaneously. How, then, to arrive at the elephantness of the elephant? Two methods suggest themselves. The first is to measure a very large number of variables in animals of different ages, sexes, and genetic backgrounds under many different rearing and management conditions, and then try to use our understanding of biological function to piece these elements together in a meaningful way. The second is to examine more limited (but carefully selected) subset of variables and then determine in a systematic way how those variables interact with one another to influence the ways in which the animal responds.

I believe that this latter approach will be the more useful one, providing that we use this approach to address the broad underlying questions that are central to an understanding of animal well-being. Four of these underlying questions are about animal emotions, sensations, motivations, and level of awareness. The

FAIR '95 discussants touched on these when they emphasized the importance of research on "cognition." However, this term, as well as the terms "motivation," "emotion," and "sensation," are difficult to define and therefore sometimes misunderstood. I will attempt a brief description here which I hope provides some clarification; more detailed discussions can be found elsewhere (Dawkins, 1990; Duncan and Petherick, 1991; Mench, 1993).

There is now substantial evidence from behavioral and neurophysiological studies that mammals and birds can experience both emotional states (like fear) and sensations (like pain), although these experiences may differ in important respects from human experience (McNaughton, 1989; Rose and Adams, 1989). Emotions and sensations are accompanied by changes in hormone levels and brain function, which in turn will influence the animal's motivation to carry out particular behaviors. The extent to which emotions, sensations, and the satisfaction (or thwarting) of motivated behaviors will be perceived as positive or negative by the animal will depend at least partly on cognitive factors.

In its simplest form, cognition refers to the individual's ability to form mental representations of the environment and to be aware of its own sensations, emotions, and motivations. Cognition is an important element of subjective experience in humans. Pain, as we all know, can be much more intense and disturbing if it is associated in our minds with fears about a possible lingering illness. At present, our understanding of cognitive processes in animals, particularly agricultural animals, is extremely limited. As Duncan and Petherick (1991) have clearly shown, the animal's level of awareness will be an important consideration in evaluating well-being.

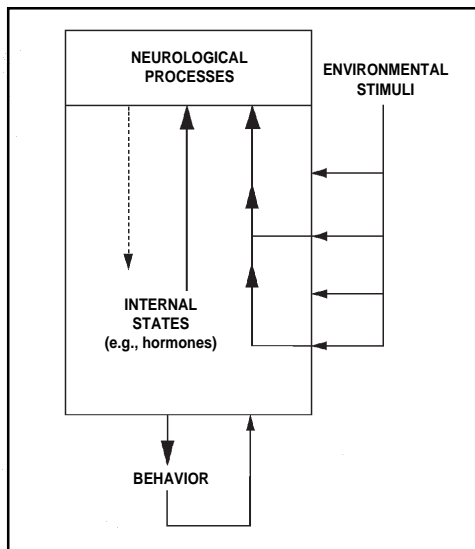


Figure 1.

A scheme of the animal's interaction with its environment. Animals are continuously exposed to a variety of environmental stimuli. Many of these are simply "background noise," while others will be sensed and attended to by the animal. At the same time, animals may be experiencing a number of different internal states. The integration of external and internal stimuli results in adaptive behavioral and physiological changes, which in turn feed back to further modify the animal's responses.

What Is the Answer?—Defining Well-Being

Ultimately, any measures or indicators will need to be placed within the framework of a definition of well-being. A number of scientists have attempted to devise workable definitions of animal well-being. These range from definitions that emphasize the need for the animal to maintain some type of behavioral or physiological stasis (Moberg, 1987; Fraser, 1989) or to cope (Broom, 1991) or be in harmony (Hurnik, 1988; Wiepkema, 1985) with its environment, to those that state that the animal's "feelings" are of primary importance (Dawkins, 1990; Duncan and Petherick, 1991).

However, as Rollin (1993) has pointed out, our perceptions of animal welfare are not value-free. For this reason, the FAIR '95 participants recognized that it was unlikely that there would ever be a single definition of animal well-being that would be accepted by all members of society. However, they also agreed that any scientific definition of well-being should incorporate a consideration of both physical and psychological factors, and also take into account positive aspects of well-being in addition to the reduction or elimination of distress. This would seem to be a reasonable starting point for us to use as we begin the task of formulating researchable problems in animal well-being.

References

- Brambell, F.W.R. 1965. *The report of the technical committee to enquire into the welfare of animals kept under intensive livestock husbandry systems*. HMSO Command Report No. 2836, London, England.
- Broom, D.M. 1991. Animal welfare: Concepts and measurement. *Journal of Animal Science* 69:4167-4175.
- Dawkins, M.S. 1990. From an animal's point of view: Motivation, fitness and animal welfare. *Behavioral and Brain Sciences* 13:1-61.
- Duncan, I.J.H. and J.C. Petherick. 1991. The implications of cognitive processes for animal welfare. *Journal of Animal Science* 69:5017-5022.
- Fraser, A.F. 1989. Animal welfare practice: primary factors and objectives. *Applied Animal Behaviour Science* 22:159-176.
- Hurnik, J.F. 1988. Welfare of farm animals. *Applied Animal Behaviour Science* 20:105-117.
- McNaughton, N. 1989. *Biology and Emotion*. Cambridge University Press, Cambridge, England.
- Mench, J.A. 1993. Assessing welfare: An overview. *Journal of Agricultural and Environmental Ethics* 6 (Special Edition, Volume 2):68-75.
- Moberg, G.P. 1987. A model for assessing the impact of behavioral stress on domestic animals. *Journal of Animal Science* 65:1228-1235.
- Rollin, B. 1993. Animal welfare, science and value. *Journal of Agricultural and Environmental Ethics* 6 (Special Edition, Volume 2).
- Rose, M. and D. Adams. 1989. Evidence for pain and suffering in other animals. In *Animal Experimentation*, edited by G. Langley. Chapman and Hall, New York, NY.
- Spedding, C.W.R. 1993. Animal welfare policy in Europe. *Journal of Agricultural and Environmental Ethics* 6 (Special Edition, Volume 1):110-117.
- Wiepkema, P.R. 1985. Abnormal behaviours in farm animals: Ethological implications. *Netherlands Journal of Zoology* 35:279-299.

