History and Future of Animal Welfare Science

Jack L. Albright
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RESPONSES TO JOY A. MENCH

History and Future of Animal Welfare Science

Jack L. Albright

Department of Animal Sciences
Purdue University

It is suggested that Mench give credit to the books that started the farm animal welfare movement—Harrison’s (1964) Animal Machines and, arriving 1 year later, Huxley’s (1965) Brave New Victuals. Huxley covered the use of chemicals on the land and “factory farming,” a phrase coined by Harrison. They both discussed the rearing of animals indoors in huge numbers, closely confined, artificially lit, mechanically supplied with food, and treated with drugs and hormones to prevent disease and to speed growth.

Are intensive methods necessarily cruel to animals? Are agricultural and industrial chemical residues contaminating the environment? What is the influence of new methods on the quality of food and what are the effects on the human organism? These were relevant questions back then, and almost 30 years later Harrison (1988, 1993) wondered how much real progress has been made in answering them.

IMPACT OF THE BRAMBELL COMMITTEE

Within weeks of the publication of Animal Machines, the Brambell Committee (hereafter called the Committee) was set up and at the end of 1965, published its report and recommendations (Brambell, 1965).

In principle, the Committee disapproved of confinement of an animal that necessarily frustrates most of the major activities of his or her natural behavior (Brambell, 1965, paragraph 37). Also, for the first time, the expression of inherent behavior was stressed as an important component of welfare.

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Perhaps the most widely quoted passage in the Brambell Report described the "five freedoms" considered to be absolute minima to prevent suffering: "An animal should at least have sufficient freedom of movement to be able without difficulty to turn around, groom itself, get up, lie down and stretch its limbs" (paragraph 37).

The authors of the Brambell Report also wrote:

Welfare is a wide term that embraces both the physical and mental well-being of the animal. Any attempt to evaluate welfare therefore must take into account the scientific evidence available concerning the feelings of animals that can be derived from their structure and functions and also from their behavior. (paragraph 25)

A new act suggested by the Committee came into being, namely the Agriculture (Miscellaneous Provisions) Act in 1968. The definition of suffering was simplified to "unnecessary pain or distress." The term distress was intended to cover discomfort and mental and physical suffering. The act enabled the minister to make regulations governing every aspect of the animal's life and to issue voluntary codes for the guidance of stockmen (Fraser & Broom, 1990; Harrison, 1988).

FARM ANIMAL WELFARE COUNCIL—THE "FIVE FREEDOMS"

In 1979, the British government set up the Farm Animal Welfare Council. This council covers the welfare of animals on the farm, in transit, in markets, and at slaughter. Earlier, in 1967, the Farm Animal Welfare Advisory Committee was set up to provide confidential advice to the ministry. The first Codes of Recommendation for the Welfare of Livestock (pigs, cattle, domestic fowl, turkeys, sheep) were issued in 1971. The council revised the codes to provide animals with the new five freedoms:

- Freedom from thirst, hunger, and malnutrition.
- Freedom from thermal or physical distress (appropriate comfort and shelter).
- Freedom from disease or injury.
- Freedom to display most normal patterns of behavior.
- Freedom from fear.

These five concepts were also incorporated in the welfare codes for various farm animals in the United Kingdom (Ministry of Agriculture, Fisheries and Food, 1983).

FARM ANIMAL WELFARE IN NORTH AMERICA

Mench mentioned that suffering is the primary consideration in evaluating the welfare of animals in intensive confinement systems. So did Fox (1980) when he
published *Factory Farming*. This pamphlet presented, in tabular form, an examination of traditional farm animal species in regard to shortcomings and suffering of farm animals (rearing conditions, transportation, slaughter, and related concerns), and suggested a humane grading system of farm animal products for conscientious omnivores. Mason and Singer (1980) wrote about the mass production of animals for food and how it affects the lives of consumers, farmers, and the animals themselves. In a revised and updated edition, Mason and Singer (1990) discussed what agribusiness is doing to the family farm, the environment, and to human health. Other books espousing ahimsa and veganism appeared in the 1980s (Coats, 1989; Robbins, 1987).

Counter arguments from the scientific community have been brought forward over the last 15 years (Baker, 1981; Baumgardt & Gray, 1993; Curtis, 1988; Curtis & Baker, 1997; Dawkins, 1980; Fraser & Broom, 1990; Gonyou, 1994; Mench & Stricklin, 1993; Moss, 1992; Sainsbury, 1986; Swanson, 1995; Woods, 1982). Although the debate continues, commodity groups have developed voluntary farm animal care guidelines, and scientists with backgrounds in farm animal behavior have undertaken research on welfare-related issues. However, to date, in my view there has been too much talk and not enough action through research or education.

**THE FUTURE?**

In addition to important research yet to be done on farm animal cognition, animal feelings, time budgets, behavioral needs, species-specific behaviors, handling during transport, and slaughter, a special plea should be mentioned for teaching animal welfare. Colleges and universities have an obligation to teach the basics of animal husbandry and welfare and to prepare students so that they can respond effectively to challenges by proponents of the animal welfare and animal rights movements (Albright, 1992; Friend, 1990). Since 1993, a course in applied animal welfare has been offered at Purdue University. Covering historical and current aspects of animal welfare, among the topics it includes are differentiating between animal welfare and animal rights; interpreting, appraising, and measuring animal welfare; resolving welfare problems in variable conditions; analyzing the politics of animal welfare. A separate laboratory course covers proper animal care under laboratory conditions, extensive and intensive livestock production units, slaughterhouses, humane societies, and zoos. The texts for these courses are *Animals and Their Legal Rights* (Leavitt, 1990) and *Farm Animal Behaviour and Welfare* (Fraser & Broom 1990). An undergraduate program in Animal Welfare and Societal Concerns is available, leading to a certificate of achievement in animal welfare.

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Welfare as a Broad Scientific Concept

Donald M. Broom

Department of Clinical Veterinary Medicine
University of Cambridge

I consider that Mench is right when she argues that those who use animals should endeavor to ascertain the quality of life of those animals and provide for them in such a way that their quality of life is good. It is not sufficient to just reduce the likelihood of extreme hardship, and animal welfare research should not be limited to identifying very poor welfare. However, when considering animal welfare, I see more of a necessity for a change of attitude and of emphasis in those who legislate than in scientists studying welfare. I have argued for some time that there should be more research aimed at recognizing pleasure and other aspects of good welfare (Broom, 1988, Broom & Johnson, 1993), but research funding is most frequently directed toward evaluating problems, and those formulating legislation have so far been influenced much more by evidence of poor welfare than by studies indicating what animals strongly prefer. I hope that this situation will change, but arguments against considerable economic pressures have to be perceived to be very strong.

An increase in consideration of positive aspects of welfare does not necessitate a change in the definition of welfare that I have used for the last 10 years: The welfare of an individual is its state as regards to its attempts to cope with its environment (Broom, 1986). This concept of welfare is a broad one that allows measurement separate from moral considerations. Some of the other key aspects of the concept are that welfare is a characteristic of an animal, not something given to it (Broom, 1991a) and refers to how well an animal fares or travels through life (Broom, 1993). Welfare varies on a continuum from very good to very poor (Broom, 1988) and subjective feelings are an important part of it (Broom, 1991b, 1996). Poor welfare may be a consequence of failure to cope with the environment or of having difficulty in coping (Broom, 1986). All of these points and the fact that the concept of welfare embraces that of health are discussed further by Broom and Johnson (1993, pp. 75–85).

Mench suggests that animal welfare science has reached an impasse and that ethical and scientific questions have become hopelessly entangled. In my view, animal welfare research has increased enormously during the last 10 to 15 years and now encompasses a broader area and is more scientifically rigorous that it was formerly. Her “hopeless entanglement” is not present for most researchers and is partly a consequence of the way in which she uses the term, sometimes to refer only
to the good end of the spectrum and sometimes, for example, "positive aspects of welfare" to imply that there is a range. The idea that welfare varies over a range and can be measured using a variety of indicators, as mentioned earlier, has been emphasized by Curtis (1986), Duncan (1987), and many others. If welfare were viewed as an absolute good state that either existed or did not exist, then it would be of little use as a concept when discussing the effects on individuals of various conditions in life or of potentially harmful or beneficial procedures. Even Fraser (1993), who sometimes used welfare to mean just good welfare, referred to scales of how good welfare is and followed Broom (1986) and Broom and Johnson (1993) in drawing a conceptual parallel, with the term *health*, which is encompassed within the term *welfare* and ranges from good to poor. If welfare is to be a broad and usable scientific term, it must refer to a wide range, including bad as well as good states and measured by disease, immunosuppression, injury, and abnormal behavior and physiological indicators of comfort, satisfaction, or pleasure and indications of control and social support. Indeed, many researchers have used a wide range of measurements of welfare, and Mench is quite wrong when she says, "Farm animal welfare science has so far concerned itself primarily with questions about desires."

When people are asked what they mean by good welfare, contentment, or happiness, they usually make reference to absence of problems. There are, of course, good feelings that are also an important aspect of good welfare. However, an important way in which animals know that they have control of their environment is that they have no information coming into the brain that indicates that they are not in control. Some of these indicators of lack of control are interpreted as mild, whereas others signify considerable problems. Indicators of poor welfare must be considered together with positive welfare indicators in our overall evaluation of welfare and, hence, of the more long-term concept of quality of life.

The term *welfare* must be defined in such a way that scientific measurement can be separated from ethical decisions about what is acceptable and what is not. The argument that no consideration of welfare allows separation of what does and does not involve ethics, presented by Tannenbaum (1991) and repeated by Mench, is incorrect for key parts of welfare evaluation when my definition is used. As I have previously explained (Broom, 1996), there are four components of a study of welfare. The first is to decide that there is a problem, and ethical considerations are involved in this. However, the second and third components, which are to select measurements, make them, and analyze them, can and must be carried out independently of any ethical view about the likely results of the study. The fourth component is the taking of ethical decisions once the science is presented. Again, my view is, "Where measurement and ethics are inextricably linked, this is bad science."

In conclusion, to limit the term *welfare* to the good end of the range and omit much of what we can measure would narrow it considerably rather than broadening it. We have a usable definition of welfare, but Mench’s central point that we should pay more attention to recognizing good welfare is an important one and should be addressed especially to legislators and those who fund research.
In my view, Mench takes an overly pessimistic view of animal welfare science. Compared with any new area of study, animal welfare science has made tremendous progress in the last 30 years. I see no impasse. I do see divergence of opinion—but surely that is a healthy sign in a growing and evolving science?

Many animal welfare scientists would probably share Mench's impatience at the slow rate of improvement in farm animal welfare. However, the reluctance of animal industries to adopt more welfare-friendly systems and procedures can hardly be blamed on the scientists. Ever since Brambell, an increasing number of welfare scientists have done their job, struggling at first with definitions and methodology,
but gradually building an impressive body of evidence on farm animal welfare. However, it takes more than scientific evidence to bring about change—it takes societal pressure and it takes political will. There is no doubt that societal pressure is building; it has built quickly in certain European countries such as Switzerland and Sweden, more slowly in other countries, and downright sluggishly in the United States. Whatever the reason for the slow awakening to farm animal welfare matters in the United States, I am confident that American society will, within the next few years, take animal welfare on board and demand change.

I think that the relations among welfare, suffering, and behavioral needs are more straightforward than Mench’s description suggests. In this commentary, I try to address the questions posed by Mench about these terms.

What is “suffering”? I favor a broad working definition such as “a wide range of unpleasant, emotional states” (Duncan & Dawkins, 1983, p. 15). These states would include pain, frustration, fear, various states of deprivation and, in some phylogenetically higher species, boredom. It might be possible to subdivide these categories; for example, anxiety might be considered a subset of fear.

With regard to suffering, where should we draw the line? I would argue that common sense should prevail. In many cases with farm animals, we are talking about severe states of suffering. Many laying hens without access to a nesting site are severely frustrated in the hour before they lay an egg (Duncan, 1970; Wood-Gush, 1972). A broiler breeder hen maintained at 45% to 50% of her ad libitum body weight by food restriction is desperately hungry (Mench, 1991; Savory, 1989; Savory, Seawright, & Watson, 1992). A calf that is separated from his mother and branded and castrated without anesthetics is frightened and in great pain (Lay, Friend, Randel, Bowers, Grissom, & Jenkins, 1992; Mellor, Molony, & Robertson, 1991). A gilt that is placed in a dry-sow stall for the first time is extremely distressed by the restraint (Cronin, Wiepkema, & Hofstède, 1984).

These were the types of situation that worried the Brambell Committee, and these are the situations that have been proved without doubt to cause suffering by 30 years of applied ethological research. There are other cases in which the evidence is less clear-cut. Do hens deprived of dustbathing material suffer? Do milking cows tied by the neck for most of the day suffer? Do turkey hens deprived of contact with turkey stags suffer? These and many other cases await definitive evidence. As has been pointed out recently, animal welfare scientists should pay less attention to “measuring” animal welfare and instead concentrate on identifying, solving, and preventing animal welfare problems (Fraser, 1995).

What is the connection between suffering and welfare? I would argue that absence of suffering is necessary but not necessarily sufficient for welfare to be assured. Therefore, it seems to me that Dawkins (1980) was correct in concentrating attention on suffering; if suffering could be abolished, welfare would be improved enormously.
Where do behavioral needs fit in? If an animal has a strong tendency to behave in a particular way and is prevented from doing so by the environment, this leads to a state of frustration and the animal suffers. Behavioral needs are no different in this respect from other needs; if thwarted, all lead to a state of suffering. However, Mench is correct in pointing out that they are a frequent and important source of suffering in farm animals, one which Americans have been slow to accept.

What about the fact that studies of human welfare now concentrate on positive aspects of quality of life? I think that this is true in Western societies simply because the worst states of suffering have been abolished here. However, until her recent death, Mother Teresa was still improving welfare in Calcutta by relieving suffering. I applaud Mench for moving beyond suffering. I agree that this is a fertile field with lots of opportunities for improving the quality of life of farm animals in the future. I just wish that it implied that suffering had been dealt with and was no longer an issue.

However, even with this reservation, I am much more optimistic about the future than is Mench. In my view, welfare scientists working with farm animals have tackled the thorny problem of animal welfare with vigor and imagination. They have developed new theories and techniques that were undreamt of 30 years ago. The soundness of these theories and techniques is attested to by how quickly they have been adopted by researchers trying to solve welfare problems of animal in zoos, where there is not the same resistance to change or financial constraints as in animal agriculture. I am confident that the consuming public will quickly force animal agriculture to follow suit, even in North America, and that the concerns of the Brambell Committee will, after 30 years, soon be put to rest.

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From Negative to Positive Animal Welfare: Obstacles and Opportunities

Marlene K. Halverson
Department of Applied Economics
University of Minnesota

Mench provides a highly useful review of issues in farm animal welfare science and its contributions to our understanding of determinants and prevention of animal suffering. I agree with Mench that the positive approach is the way forward for this discipline. However, I do not believe that the Brambell Committee's prescriptions can be faulted for having directed those scientists who now feel themselves or their profession to be at an impasse (Brambell, 1965). The Committee's emphasis on both physiological and psychological well-being, its frequent references to the need to study animal behavior, its descriptions of the continuity between behavioral repertoires of wild and domestic counterparts of the same species, its acknowledgment that human and animal well-being have important similarities, and its deep concern with animal suffering provided a wide latitude for subsequent researchers to approach their research from the positive perspective.

I also do not think that all scientists consider farm animal welfare science to be at an impasse. In some places, farm animal welfare science is generating fresh discussions and practical solutions for housing and management. From my observations, that is largely because, in these places, scientists studying animal welfare are already operating from the positive welfare perspective.
RESPONSES TO MENCH

THE CALL FOR POSITIVE ANIMAL WELFARE

Harrison (1988a, 1988b) described an important obstacle to improving animal welfare: that “officialdom thinks in terms of negative rather than positive welfare” (Harrison, 1988b, p. 21). She paid tribute to ethologists Stolba and Wood-Gush for addressing, in a theoretically sound manner, the Brambell Committee’s challenge by conducting research on the behavior of domesticated pigs in a seminatural setting (Harrison, 1988a). Harrison challenged scientists and policy makers to refocus their attention from negative welfare, or the “absence of clinical manifestations of injury, disease or distress” (1988a, p. 10) to positive welfare. She defined positive welfare as a “state or condition of ... happiness or well-being, thriving” (1988a, p. 10), which could be attained only by providing “an environment to which [the animal] can adapt without suffering ... and ... (citing Carpenter, 1980, p. 23) in which as many as possible of the [animal’s] natural behaviour patterns can be expressed” (1988a, p. 10). “After all,” she stated, “if we insist on clinical manifestations ... we are taking the animal beyond its limit of tolerance” (1988b, p. 21).

Mench, too, cites the Stolba and Wood-Gush research as an example of the positive approach. Research in Sweden by ethologists Jensen, Algers, and colleagues on maternal behaviors of domesticated sows in a seminatural environment also illustrates the benefits of the positive approach (Jensen, 1988). Data collected by numerous scientists during the Stolba and Wood-Gush and Jensen and Algers studies supported positive welfare research long after the “pig parks” were dismantled. Both studies led to technical designs for production systems. In Sweden, enriched farrow-to-wean piglet production and growing systems have been in commercial use for several years. Today, these systems are attracting the interest of public officials, scientists, and farmers from other countries. Animal welfare science continues to enjoy broad public approval in Sweden.

In short, not everywhere is animal welfare science at an impasse. There did and do exist scientists who have made the ethical leap that Mench suggests scientists make, that is, scientists who adhere to “a broader operational definition of animal welfare which incorporates ... a high level of biological functioning, freedom from suffering, and positive experiences.” However, formidable challenges do exist to scientists who would now break with the minimalist, negative welfare approach that is predominant in the United States.

THE UNRECOGNIZED CHALLENGES

Scientists and industry leaders controlling the farm animal welfare dialogue in the United States appear reticent to afford exposure to accomplishments of scientists or industry leaders operating according to a nonminimalist paradigm, seldom acknowledging advances in positive animal welfare science, such as those made
by Jensen, Algers, and their colleagues. Good science cannot be exclusionary. It must be based on cooperation, and it must always be open to unfamiliar viewpoints.

Scientists who feel that they are at an impasse with respect to farm animal welfare research may be in a box of their own (or their predecessors’) construction. Early on, many U.S. scientists aligned themselves with a highly defensive agricultural industry against constructive efforts by animal protection leaders to improve the lives of farm animals. Misrepresenting welfare organizations’ positions as antiagriculture, these scientists created a highly negative environment for positive farm animal welfare research. The following examples could be supplemented by many others.

In a beef industry trade magazine article “Animal Welfarists Seek Your Demise” (Anonymous, 1986), Curtis was quoted as saying “Welfarists’ desire to see the demise of animal agriculture isn’t realistic…. animal producers are at least as humane as members of society in general. And any representation to the contrary comprises a calumny” (p. 39).

In a 1988 magazine for swine farmers, Curtis was quoted as saying:

When this issue [animal welfare] first appeared, we all thought it was a passing fancy…. Eventually, Congress is going to get tired of getting all that mail and will hold hearings. If you have any understanding of the political process, you have to be worried. We have a problem, because we really don’t have anything new to say. Our knowledge base is used up. Research shows contemporary systems of livestock production are not inhumane, but the welfare advocates won’t accept our evidence … We’ve neglected research and this has played into their hands, because many of the questions they ask are not answerable. (Oppedal, 1988, p. 35)

In a pork industry trade magazine article, McGlone (1989) declared,

When we have to, we can muster great support for our side of the animal welfare issue. That lesson was learned in the defeat of the Massachusetts animal welfare referendum. Going into that battle, the polls were heavily stacked against modern agricultural practices. In the end, through public education, the bill was defeated. … Animal welfare activists feed and grow on ignorance. The swine industry only grows from a sound knowledge base. (pp. 14, 15)

In a 1989 joint hearing, House subcommittees weighed testimony on legislation to require adding enough space to individual crates so that calves raised for veal could turn around. In contradiction to testimony from other scientists present who had conducted and published numerous studies directly applicable to the subject (including Saville, University of Bristol), Curtis testified: “No conclusive scientific evidence exists to indicate that veal calves residing in crates typical of the U.S. veal industry are being deprived of behavioral needs.” (Report of the Joint Hearing, 1989, p. 34). Under questioning by subcommittee members, McGlone stated that
the bill’s provision to give calves space to turn around “would hurt the calves, potentially” (Report of the Joint Hearing, 1989, p. 44) and that, whereas the industry’s resistance to the bill was economic, “among some scientists...the resistance is we don’t know how much space to provide them” (p. 45).

One interpretation of what, viewed in its entirety, appears to be an active antiwelfarist campaign, is that a cadre of scientists was trying to assure its members, far into the future, of an exclusive research program consistent with its own perspective and training. However, the outcome may have been the opposite. By repeatedly telling U.S. agriculturalists that there is no scientifically valid challenge to industry practices, these and other scientists have created an impression that there are no welfare problems in U.S. animal agriculture. Thus, it is hardly surprising that most U.S. agriculturalists see no reason to try anything different just to appease animal welfarists. Moreover, the poultry and swine industries, where welfare problems are pressing, became virtually locked into an industrialized, intensive confinement structure during the decades when change would have been most possible (if welfare minimalists had not also been most active then). It will be very costly and difficult to move these industries from this structure, over which positive animal welfare science can exert little, if any, influence.

Animal scientists can often view animals as bundles of separate parts and systems rather than as whole individuals, which the concept of positive welfare orientation demands. It may not pose any particular conflict, then, for the average animal scientist to propose a minimalist solution and feel that this is a welfare advance. The turnaround crate, with its swinging gate separating adjoining gestation stalls so that pregnant sows can turn around one at a time, is an example of this minimalist approach (Mcfarlane, Boe, & Curtis, 1988).

My guess is that some scientists may be experiencing, at least in part, a crisis of professional relevance due to the legacy of decades during which they or their predecessors joined the industry in presenting industry practices as scientifically justified and concerns about animal welfare as insubstantial, dangerous, and based on emotion and ignorance. Overcoming this legacy of governmental, academic, industrial, and societal prejudice against animal welfare will be a greater challenge to these scientists than changing their own philosophical research approach.

Since 1970, the funding base for U.S. university scientists shifted from state and federally supported to state assisted. Although states supply scientists’ base salaries and perhaps some support funds, an aggressive researcher must find outside funding. In many universities, scientists may not get tenure unless they bring in substantial funding. The entities in animal agriculture with the most resources to fund research are producer organizations, drug companies, or other large, commercial groups. Only in the last 4 years has the U.S. Department of Agriculture Competitive Grants Program considered projects on animal well-being, and the program has a very small budget. Hence, to be a successful researcher, it does not hurt to maintain good industry connections and a reputation for supporting the status quo.
Mench also expresses concern that animal welfare science and ethics "have become hopelessly entangled." She states that animal welfare science is "bounded not only by ethics, but by complex economic and social constraints, including profitability, worker health and safety, food cost and safety, policy considerations, consumer acceptance and sustainability." I prefer the thought that animal welfare science and ethics are "entangled" to the thought that animal welfare science is "bounded by" economic and social constraints if, by this, Mench means that scientists are not justified in recommending optimal welfare solutions if they happen not to be the cheapest way of doing things (a conclusion that also reflects an ethical stance).

Ethics play an integral, foundational role in all human endeavors, including scientific inquiry, discovery and reporting, politics, and economics. It seems that the only way that scientists might legitimately be bounded by economics, is by their need for project funding. Scientific truth does not change depending on price. The best and purest role for scientists is to do their work and provide optimal solutions from the perspective of the animal. Industry and government can then, in turn, determine how to implement solutions. This means that animal welfare scientists, ideally, would base their recommendations on scientific findings and not on political or economic value judgments. Political scientists and economists can speak to the desirability of a particular piece of legislation from the political and economic perspectives. As neither economics or politics is a "hard" science, one economist or political scientist is not likely to agree with another. However, only animal welfare scientists have the means to evaluate housing systems on the basis of welfare for animals. If they condition their scientific judgments on political or economic considerations, there will be no one left to speak authoritatively on behalf of animals.

THE PRACTICAL WAY FORWARD

I believe it will take a new generation of scientists, such as Mench, to effect a transition from negative to positive farm animal welfare science. The question is: Has the atmosphere in the U.S. agricultural industry surrounding animal welfare been so affected by their predecessors as to make this transition impossible?

There are plenty of causes for concern. For example, approximately 28 state legislatures have exempted from state anticruelty statutes "accepted," "common," "customary," or "normal" farming practices that would be illegal if applied to nonfarm animals (Wolfson, 1996). Because there is no biological reason why a farm animal should suffer more than a companion animal, our ethical responsibility to the farm animal can be no different from that to the companion animal. The weakening of state anticruelty statutes is clearly based on politics, economics, or ignorance, or all three. Excluding farm animals from cruelty statutes institutionalizes cruel practices and allows industrialization of U.S. animal agriculture to proceed unimpeded.
CONCLUSIONS

Where then is hope? Although the first Swedish deep-straw, group systems for piglet production were based on results from research parks, the concept did not become popular until a farmer discovered that pigs weaned on deep straw did not contract weaning diarrhea. Implementing a lower stress production method, then, became a way of solving another problem occasioned by a law that had been requested by Swedish farmers to protect humans—banning subtherapeutic use of antibiotics in animal feeds. Without these antibiotics, piglets on many farms contracted weaning diarrhea. Deep-bedded group nursing—growing pens provided a natural solution. As the former Swedish minister of agriculture stated, “when we could no longer use them [subtherapeutic antibiotics], we had to devise systems for the animals that were natural” (Karl-Erik Olsson, May 1992, personal communication).

In the United States, factories producing hogs are coming under public pressure to change how they handle hog wastes. In North Carolina, a 1996 act authorized funds to help producers test alternative animal waste handling methods, including European models of solid handling (Blue Ribbon Study Commission on Agricultural Waste, 1996; Harris, 1996). In Sweden, farmers found that efficient solid manure handling requires managing swine herds, in groups, in loose confinement. Successful loose handling in groups, in turn, requires high standards of stockmanship based on principles of positive animal welfare.

Other analyses suggest that intensive, industrialized animal farming is not any better for people than it is for animals (Donham & Thu, 1993; Mickley & Fox, 1987; Strauch & Ballarini, 1994; Warrick & Stith, 1995; World Health Organization, 1988). By recognizing and acting on a commonality of human and animal interests, society, as a whole may adopt a more positive approach to farm animal welfare. Scientists who have mastered the positive welfare approach will be ready to point the way to systems that work for animals and people.

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I wholeheartedly endorse Mench’s main thesis that welfare concerns must move toward a greater focus on positive states of animal well-being instead of limiting themselves to the minimization of pain and suffering. However, I do fear that she is also correct in thinking that there is still some concern about the scientific validity of concepts such as suffering and that such concerns will be even stronger about attempts to apply concepts concerning the notion of positive well-being to animals. Such moves will almost certainly provoke suspicion and resistance among those who might find the relevant concepts (e.g., happiness or contentment) too vague and unscientific.

A first step toward progress would involve a better understanding of scientific objectivity to justify the use of more flexible approaches that have long been accepted in physics, chemistry, and other scientific disciplines. There are at least...
three such approaches that could fruitfully be added to the ethologists' "toolbox" without compromising scientific rigor and objectivity: (a) carefully controlled arguments from analogy, (b) inference to the best explanation, and (c) the use of intersubjective agreement. One might also take note of the fact that these are the very same techniques we use when judging, predicting, describing, and responding to the psychological states of other humans.

First, let me say a bit about the need to preserve scientific objectivity. The ultimate goal is not necessarily to be able to operationalize definitions and quantify results: These are merely some very effective ways to ensure that our scientific inquiries actually identify some real phenomena in the world as untainted as possible by the biases, expectations, presuppositions, hopes, and fears of the individual investigator. If what is detected is "really out there," other properly trained and situated observers should be able to replicate the study. The techniques generally accepted in studies of animal behavior are designed to do that, but other techniques often succeed in preserving objectivity, too. It is precisely these techniques (as well as the more traditional ones, with sufficiently ingeniously designed studies) that will allow us to gain new insights into the areas Mench recommends. Let us see, for example, how the three new "tools" introduced in the previous paragraph will allow new insights into concepts contributing to a positive understanding of well-being while preserving scientific objectivity.

Arguments from analogy are notoriously subject to abuse and often lead to problems usually lumped together under the charge of anthropomorphism. However, we need to recognize (a) that virtually all scientific reasoning involves analogies—statistical inferences work because we have carefully designed an experimental group that is analogous to the population to which we want to apply our conclusions and (b) that we can—as we do in statistical analysis—distinguish weaker from stronger analogies. If good, carefully defined analogies are legitimate in science, as they must be, then they can be used if they are available. Mench's overview of Dawkins's and Moberg's analyses of suffering provide a good basis of legitimate arguments from analogy in that relevant similarities (e.g., suppression of immune function, threats to intactness or functioning) are identified and irrelevant factors (e.g., amount of vocalization) are ignored.

Second, consider "inference to the best explanation." Inference to an explanation is probably the most effective tool for the generation of hypotheses: We ask "What could explain this puzzling effect?" When we try to identify the best explanation, we use that explanation to generate new predictions to be tested and also evaluate its fit with other known phenomena and expected theories, but history constantly reminds us that even the most well-confirmed theories may eventually be refuted or superseded. Thus "best explanation" anywhere in science must always mean "the best we have come up with so far." In the area under consideration, the hypothesis that animals feel pleasure when they satisfy certain desires or nonbasic needs ("luxuries") is a proposed explanation that can be evaluated—perhaps in conjunction with arguments from analogy—as any scientific hypothesis would be.
Last, we come to intersubjective agreement: admittedly the weakest of the three tools, but still capable of recognition as a legitimate tool in the pursuit of objective truth. The objectivity in such cases is established in two ways: predictive success and a high degree of intersubjective agreement among skilled, trained, experienced practitioners even when they have different backgrounds and goals. These two features provide good epistemic warrant for believing that observers are accurately detecting an objective feature of the world, something that is really “out there.” Both features can often be found in judgments about an animal’s emotional and mental states.

Predictive success in judging an animal’s inner states, including happiness, comes down to whether we can interact as we want to with animals: They do what we want, do not attack us, settle down calmly, thrive without developing vices, and so forth. That is why books on dog training and horseback riding are so filled with talk about the need to recognize when an animals is happy or contented. Learning to recognize these states increases one’s success at working well with the animal.

Intersubjective agreement (assuming objective, knowledgeable observers) is less obvious in the case of animal happiness because heavily influenced by preconceptions and the fact that we have been taught to talk about animals in more “rigorous” and “scientific” ways. However, if we focus on people who work and live with animals, the strength of intersubjective agreement even in diverse contexts soon becomes apparent. Good dog handlers will usually agree about whether a dog is enjoying herself or himself; two shepherds will pick out the same ewe as the one who is uncomfortable, and so on. This agreement can be used to confirm the objective nature of many judgments of an animal’s suffering, contentment, fear, and so forth, even in the absence of a precisely operationalized definition of those terms.

As noted at the outset, these “tools” are widely used in other scientific fields and have a solid grounding in the history and philosophy of science; they are also the way we decide other people’s psychological states. Perhaps it is time that animal behavior and ethology used them more fully as well.
Is the science of animal welfare humming along nicely or is there an impasse? Broom and Duncan do not believe there is an impasse, but point the finger at the animal industries, societal will, funding agencies, and politicians for slow progress. Halverson says she believes that an impasse does not exist everywhere, and accuses U.S. animal scientists of creating a particularly adversarial atmosphere. Albright laments that there has been too much talk and too little action and rightly stresses the importance of education in furthering the dialogue about animal welfare.

Just to set the record straight: I never said that there is an impasse, I said that there is a sense of impasse. Duncan claims that I am pessimistic. On the contrary, I am optimistic. I believe that perceived impasses are good because they cause scientists to back up and take a fresh look at their underlying assumptions. In the process, new approaches like those described by Russow will be evaluated. Some will succeed and some will fail. And even the successes will probably eventually lead to (a different) perceived impasse, but by then, additional progress will have been made.

Am I then blaming scientists (or perhaps the Brambell Committee) for a lack of significant change in animal agriculture? Of course not. As I state in my article, animal welfare science has made many important theoretical and practical contributions, which is particularly impressive given the relatively short period during which scientists have been working in this challenging area (Dawkins, 1997). Complex sociopolitical factors, mentioned by the commentators and others (Mench, 1993), clearly play a significant role in the development and adoption of new farming practices. However, I think that it is a mistake for scientists to underestimate the influence that prevailing scientific views can have on the politics of animal welfare.

The U.K. Farm Animal Welfare Council recently sent out a survey, the purpose of which was to determine how legislation to improve the welfare of laying hens should be crafted. Scientists and others were asked to give their opinion as to whether particular hen behaviors were needs or not, so that the proposed legislation could stipulate which behaviors hens should be allowed to perform. The needs concept (and the needs–suffering link) elaborated by scientists has thus become integral to public perceptions about legislative priorities in animal welfare. But is this concept a sufficient basis for legislation?
As I discussed in my article, Jensen and Toates (1993) argued that it will be almost impossible to separate behavioral needs from nonneeds using motivational criteria. If they are correct, the only real behavioral needs are those (like being able to ingest enough nutritional food) that, when not fulfilled, lead to obvious signs of poor health or distress. Duncan seems to take a similar view when he claims that common sense should prevail in determining where we draw the line with regard to suffering. But if we can draw the line using common sense, what is the point of animal welfare science? Do we really need complicated scientific assessment (Rollin, 1995) to demonstrate that the calf branded and castrated without anesthesia is in pain or that a hen deprived of food for days to induce a molt is hungry?

Just how difficult and contentious it has been to try to decide which behaviors are needs is made apparent by the question Duncan raises in the next paragraph: Do hens deprived of dustbathing material suffer? Dustbathing in hens has been studied extensively (Hogan, 1997; Vestergaard, 1982; Vestergaard, Damm, & Abbott, 1995). It occurs regularly and with a predictable rhythm even when litter material is not present and is performed at higher rates after periods of dust deprivation. It is increased by the presence of fatty material on the feathers and improves feather condition by removing excess lipids, but occurs even in genetically featherless chickens. However, dustbathing can be stimulated by the sight of food when litter material is absent (Petherick, Seawright, Waddington, Duncan, & Murphy, 1995), and the evidence as to whether hens will work for litter material is ambiguous (Dawkins & Beardsley, 1986).

Is dustbathing a need that should be provided for because its deprivation is linked to suffering? Would the answer to the question about providing dustbathing opportunities be different if we instead asked whether the quality of the hen’s life was diminished by not being able to dustbathe properly in her cage? I think it might. Behaviors can be important to animals for many reasons, not just because they are needs. I suggest that rather than focusing on needs, we should focus on the consequences to the animal of being able to perform particular behaviors (Mench, in press).

How we define welfare has an important bearing on the types of questions that we ask, the measures that we select to arrive at the answers, and our interpretation of the outcome of our research. Broom suggests that I use the term welfare confusingly and that I should instead discuss the range from poor to good welfare. But as Broom pointed out elsewhere (Broom & Johnson, 1993), welfare means to fare well or to be well. Because it is not difficult to conceptualize what poor being well might mean, I instead use welfare to refer to a general sense of well-being that can be reduced by the experience of suffering and a decreased experience of pleasure or both. This is consistent with the dictionary definition, which equates welfare with happiness, health, and prosperity. My reference to positive aspects was meant to distinguish pleasure from simply the absence of suffering, which I admit is cumbersome phrasing. But this is really just semantic quibbling, and I fully
agree with Broom that an animal can experience a range of states (welfare to badfare, perhaps?).

But Broom and I do have a more substantive disagreement, and that relates to his definition of welfare as the animal’s state as regards to his or her attempts to cope with the environment. Back to my dictionary, in which cope is defined as (a) Strike, hit; come to blows with; engage or meet in battle, or (b) Contend successfully with an opponent, difficulty, situation. In other words, “I am managing, thanks”—but happily? Broom and Johnson (1993) also emphasized the maintenance of homeostasis in their discussion of welfare, but again this seems to me to be problematical when discussing pleasure, which can be accompanied by disturbances of homeostasis (one of the problems with using increased cortisol levels as indicators of reduced welfare). But I do not mean to single out Broom. In general, I do not think that most one-sentence definitions of welfare are particularly helpful. Listings of important components of welfare seem more useful for generating hypotheses. The five new freedoms mentioned by Albright are a good start in developing a list of relevant aspects of welfare, although we now have enough knowledge about animal welfare to flesh that list out considerably. Using the tools identified by Russow, several of the attributes discussed in the article that are known to contribute to human welfare appear to be good candidates for inclusion on such an expanded list to stimulate investigation.

I agree with Duncan that the welfare of animals used in agriculture would be improved if suffering were abolished. But this is impossible to achieve, although the amount of suffering that the animal experiences can certainly be decreased. We can improve animal transport, for example, but it will still always cause some suffering. I am not advocating that we stop trying to determine the causes of suffering and to devise methods to alleviate that suffering whenever possible. I am advocating that we think beyond behavioral needs to consider the ways in which performing behaviors can contribute to a quality of life that consists of more than just the minimization of suffering. This is, of course, not a new idea. As both Halverson and I pointed out, some scientists have already taken this approach, although it has not received as much attention as behavioral needs.

In this regard, I thank Halverson and Albright for emphasizing the important contributions made by Harrison. Perhaps the thought-provoking points that Harrison makes need to be reiterated by someone every 10 years or so, and it just happens to be my turn this time. But in the end, I agree with all of the commentators that collective political will must come into play. No one and everyone is to blame for the lack of progress that Duncan refers to because society still has no unified, consistent ethical view about how animals should be treated, or how costs to animals should be weighed against benefits to humans. The dialogue did become particularly polarized in the United States, although I strongly suspect the causes are less one-sided than Halverson claimed (they usually are). But attitudes toward animals in general in the United States have changed a great deal since those early days of
the debate, and there is more common ground than ever before between the animal science and animal welfare communities. If nothing else, broadening our approaches to welfare assessment and improvement could help to create a new dialogue.

REFERENCES


