Animal Welfare and Livestock Production in a Postindustrial Milieu

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Structural transformation, food safety, and environmental risks pose challenges to livestock producers. Adjustments to livestock production systems to improve animal welfare will be made in an economic and political milieu characterized by these challenges. However, competing assumptions about contemporary society provide different frameworks for formulating the problems faced by industry and government decision makers. The assumption that industrialization is the key problem in livestock production leads to an application of science that does not adequately address the role of public participation and trust.

The aim of this article is to examine not the welfare of animals on the farm but the social, economic, and environmental parameters under which problems and deficiencies in nonhuman animal welfare must be addressed. If the science of animal welfare is to be applied to livestock, it will be useful to have some general understanding of the circumstances in which livestock are kept. Fraser, Mench, and Millman (2001) provided an overview of the global trend toward industrial livestock production and summarized some of the key welfare issues associated with it.

People who raise livestock for food and fiber must derive a sufficient financial return from their efforts. Thus, the prospects for modifying the care that animals on the farm receive or the environments in which they live are subject to constraints. These constraints are dynamic. Industrial livestock producers in Europe and North America face an array of challenges to their current production, transport, and processing practices. Among them are broad structural transformations.
in the food system, pressure to increase the assurance of safe food supplies, and growing demands for environmental quality (Curtis, 1994; Kunkel, 2000).

Any attempt to address welfare issues must compete with these other problems for resources and for the attention of researchers and policymakers. The following review of these issues is not an apology or defense of the treatment animals receive in existing livestock production systems. It is, instead, an inventory for the conceptualization of what is problematic about contemporary livestock production, and it will not be new to those who are knowledgeable about animal agriculture. The main aim of this article is to compare and contrast two overarching ways to conceptualize the competing issues and challenges that affect livestock production: industrial versus postindustrial society. In contrast to the premises of industrialization, livestock producers are increasingly subjected to an array of forces characteristic of what Beck (1992) called a “risk society.” In the postindustrial risk society, both private and public decision making are shaped by a heightened sense of being at risk from the actions of others and a greater willingness for citizens to mobilize politically around issues of risk. The final section of the article illustrates how these two competing ways frame and interpret problems in livestock production—especially including animal welfare.

BROADER CONTEXT OF LIVESTOCK PRODUCTION AND PROCESSING

Contemporary livestock producers and meat processors operate in an economic and political environment that can be characterized by three broad trends: First, production and processing have been undergoing a long-standing structural transformation in the patterns of ownership and control of the primary factors in the production of meat, milk, and other animal products. Second, food safety regulation, which has influenced animal production and processing practices for almost a century, has undergone a period of rapid evolution during the last 2 decades, and more changes may be on the horizon. Third, livestock production recently has been the target of criticism on environmental grounds, and this criticism continues to affect both the regulatory and the political environment for animal agriculture. Each of these three trends is discussed briefly.

Structural Transformation

Any analysis of the broad economic and political environment for livestock production must be set against a backdrop of long-standing trends in ownership and control in the livestock production and processing industries. Any discussion of the way these trends have operated on a global scale would be extraordinarily
complex (Wallerstein, 1974). North American structural transformation can be described as a gradual shift away from an ownership structure in which the vast majority of American farms were owner operated, with most of the farm labor coming from family members. Such small, family-run farms have faced increasing pressure for survival in North America (Gebremedhin & Christy, 1996). Before 1900, U.S. and Canadian farmers tended to operate diversified operations producing both crops and animal products. Throughout the 19th century, these were predominantly commercial operations producing commodities for sale on both local and national commodity markets, as opposed to subsistence farms, although many farm families derived a large portion of their diet from their own farm production. Cows, pigs, chickens, sheep, and a goat or a small flock of ducks or geese often were kept mostly outdoors in pens or pastures (though with access to a barn in cold weather). Sales of meat, milk, and eggs each might have contributed a share to family income, although animal products might be just as likely to wind up on the family dinner table (Fite, 1981).

As is well known, animal production is rarely done under such circumstances today. The typical livestock farm is far less diversified, and most livestock producers have specialized in a single commodity. Whereas animals once were kept outdoors in small herds or flocks, many animals now are housed indoors for their entire lives, although both beef and dairy cattle often are kept in open lots. Citing global figures for 1996, Sere and Steinfeld (1996) reported that 79% of poultry, 39% of pork, and 68% of eggs are produced in intensive animal production systems. The primary exceptions to this trend are in sheep and cow–calf production, which have changed far less than other sectors of the livestock industry. Sheep for wool and cattle for beef (and to a much lesser extent for dairy) may continue to be bred and kept on pasture for most of their lives, with beef cattle spending only a few weeks in feedlots for fattening before slaughter. Although beef and dairy cattle and sheep and goats continue to be raised under extensive conditions, industrial practices of early weaning, castration, and dehorning are becoming increasingly common, as is artificial insemination (Fraser et al., 2001). The use of equipment and buildings for confinement and care of animals on the farm simultaneously has increased the economic efficiency of animal production and increased the capital investment required to operate profitably in this sector (Kunkel, 2000).

Contrary to popular misconceptions, most U.S. and Canadian livestock farms continue to be owner operated. However, although families continue to supply most of the labor for many Midwestern grain farms, animal production increasingly depends on the availability of low-wage hired labor, although there is considerable variation in this dependence from region to region and commodity to commodity. Furthermore, although individuals may own their animals, as well as the land and buildings where animals are produced, many of these owner operators are under contract to large corporate entities, especially in the poultry sector. These contracts offer producers relatively little latitude in decision making with
respect to the production process, and many who do not produce on contract must follow a very structured feed and husbandry regimen if they are to find a market for their animals. However, these financially small-scale operators typically do bear capital risks associated with the obsolescence of their buildings and equipment. Thus, changes in regulations for animal production—including changes intended to improve welfare—that require replacement or refitting of capital equipment can lead to financial losses for these operators (Kunkel, 2000; Martin, 1997).

Within the processing industry, structural transformations have been underway for many years. The creation of a national railroad network for live transport of animals and refrigerated transport of rendered carcasses led to the development of major centers for assembly and slaughter of animals in Cincinnati, Chicago, and across the Midwest in the latter half of the 19th century (Cronon, 1993). The transport, slaughter, and packing industries have continued to undergo consolidation for decades, although independent packers continued to operate side by side with well-known national firms well into the 1950s and 1960s. The last decades of the 20th century saw the emergence of vertical integration, especially in the poultry sector, with packers supervising and effectively controlling every phase of the production process, down to the specification of and contracting for animal feeds with grain producers. Today, only a few national firms dominate meatpacking in all the major animal commodities. Mergers and acquisitions among these firms now are supervised for antitrust violations (Fink, 1998).

The animal welfare issues associated with livestock transport and slaughter have been the subjects of well-known studies (Grandin, 2000). It is important to recognize that there are also human issues associated with this aspect of animal agriculture. Meatpacking traditionally employed unskilled and low-skill workers and was the site of bloody and contentious unionization activities in the 1920s. After the principal national packing companies signed union contracts, labor relations settled into a period of relative stability through the 1960s. However, during the last 3 decades, labor relations again have become contentious in the packing industry as packers have introduced new technology and work rules, in effect deunionizing the industry. Human rights activists again criticize labor practices in the industry as unsafe, underpaid, and exploitative of ethnic minorities and women. Recent immigrants of Hispanic origin now hold many low-wage packing jobs. The influx of a non–English-speaking workforce has strained schools and government services in Midwestern cities where plants are located and, in some instances, has inflamed racial passions (Fink, 1998).

Food Safety and Nutritional Quality

The safety and quality of meat and milk products were a topic for some of the first consumer-interest advocates. Authors such as Sinclair (1906/1981) raised
public consciousness about poor standards in the meatpacking industry, which led eventually to the formation of the Food and Drug Administration and the Food Safety Inspection Service in the U.S. Department of Agriculture. These regulatory actions had little direct impact on animal producers, but they did play a role in early consolidation of the packing industry. Meeting these regulatory standards required modern equipment and trained personnel, giving relatively larger and better capitalized firms an advantage over local butchers and small abattoirs.

Since 1970, however, a number of practices have introduced controversy into animal production at the farm level. Meat consumption itself became the focus of concern as health-conscious consumers attempted to reduce their intake of fat and cholesterol. There has been a shift from red meats to poultry and fish in the United States and Canada. Feed rations have been adjusted, and both breeding and use of genetic markers have been deployed in search of low-fat meat alternatives. Animal producers lobbied to influence government dietary guidelines and discouraged recommendations to lower meat consumption (Levine, 1986). However, dietary changes also have placed producers into sharp, and sometimes acrimonious, competition with one another. Poultry has been touted as preferable to beef, and pork has been advertised as “The Other White Meat.” This competition sometimes has made it difficult for producers of different animal commodities to cooperate with one another, even in areas of mutual interest (Kunkel, 2000).

The issues that have been of greatest concern have to do with health risks associated with animal drugs, including antibiotics and hormones, and with food-borne diseases. Livestock producers use pharmaceutical products for both preventative and therapeutic purposes. Although the Food and Drug Administration regulates these uses, they have become somewhat controversial. In particular, producers have been criticized for the nontherapeutic use of antibiotics and of hormones to spur growth rates (Kunkel, 2000; Schell, 1984). Controversy over the use of hormones has been at the root of a long-standing dispute between U.S. producers and the European Union. The approval of recombinant bovine growth hormone in dairy production sparked a heated political debate before U.S. approval, and the product still is not approved for use in Canada or in many parts of Europe. For the most part, scientific support for consumer fears over the use of these products generally is weak and, at best, mixed. Livestock producers and their advocacy organizations generally consider these consumer concerns to be misplaced (Kunkel, 2000).

There is no doubt, however, that a number of serious food-borne diseases have been associated with animal products. Outbreaks of microbial diseases (Salmonella, E. coli O157:H7) have been associated both with failures in the processing and preparation of animal food products and with production practices. Disease outbreaks cause a great deal of economic instability in consumer demand for animal products. Although government guidelines promote that care in the handling
and proper cooking of meats is the most effective means for minimizing the risk of microbial diseases, animal producers take precautions to reduce pathogens at all stages of the production process. European problems with new variant transmissible spongiform encephalopathies such as so-called mad cow disease hypothetically are linked to feeding practices introduced in England in the 1970s and 1980s (Brouwer, 1998). Given the array and seriousness of these legitimate food-borne risks, it is not surprising that members of the public are wary of all novel practices, including those that currently appear safe (Thompson, 1997).

Environmental Issues

Animal production has been linked to a number of contentious environmental issues in recent decades, including soil erosion, the production of global greenhouse gases, and the devastation of tropical rainforests (M. A. Fox, 1999). These issues are not trivial, but they relate less to animal welfare than to pollution associated with waste from confined animal production. Animal scientists have undertaken research to address the production of greenhouse gases through adjustment of feed rations and remediation of animal waste (Council for Agricultural Science and Technology, 1992).

The fragility of western rangelands makes many current livestock grazing practices unsustainable throughout much of the western United States. Range scientists calculate that current stocking rates will deplete fragile soils on western rangelands within the lifetime of the current generation of ranchers. In this context, these issues are primarily relevant insofar as they indicate that livestock producers face criticism on environmental grounds wholly apart from the issues of intensive animal production.

Debate over the polluting effects of large-scale intensive animal production is more pertinent in this context, because these are the same industrial production systems that often are the target of criticism by advocates of animal interests. Intensive production systems produce large amounts of animal waste. Nutrients are concentrated in animal waste and are toxic at high levels (Donham, 1998). In extensive production, nutrients from animal waste are cycled back into soils and re-incorporated in plant growth. However, nitrogen and phosphorus in animal wastes from industrial production systems often cannot be absorbed readily into soils immediately adjacent to these facilities. The result is a potential for soil and water pollution, and—even under the best of circumstances—animal wastes can produce noxious odors. Possible solutions involve some combining of storage and drying, trucking solid waste away from the facility, and composting. However, these systems are costly to varying degrees and subject to failures that can cause pollution events. Notoriously, flooding can swamp animal waste holding tanks, leading to a release of nutrients. After such events, local water supplies temporarily have con-
tained levels of nitrogen and phosphorous exceeding U.S. Environmental Protection Agency limits (Jackson, 1998; Letson, Gollehon, Breneman, Kascak, & Mose, 1998).

Beyond the pollution hazard created by animal waste, intensive animal production facilities have created public outrage over their environmental impact. Outrage over environmental risk often is a complex mixture of protest against odor and pollution combined with frustration over aesthetic and demographic changes in local communities. Animal production facilities may enjoy favorable zoning because of their farm status, but intensive production facilities may have an appearance and aesthetic more typically associated with heavy industry than farming. In many parts of the United States, a dozen or more intensive production facilities may cluster in a particular community. Clustering can create a significant increase in heavy truck traffic, resulting in congestion and increased highway expenses. As noted previously, communities may be poorly prepared for the influx of a Spanish-speaking workforce. Although these are not strictly environmental problems, environmental regulation may be the only outlet for local community members to express anxiety and frustration over these negative impacts on their communities (DeLind, 1995; Purvis, 1998).

LIVESTOCK ISSUES IN CONTEMPORARY SOCIETY

The preceding overview is a very brief summary of challenges facing the livestock sector. Each of these challenges involves elements of risk. Structural transformation of animal agriculture poses financial risk to animal producers. The industry’s response to financial risks has led to the intensive production systems that are the primary focus of research on livestock well-being today. Intensive, mechanized livestock production systems in the pork and poultry sector almost entirely have replaced extensive family-run operations and diversified farms. These new production systems are pejoratively referred to as “factory farms.” Like factories, they depend heavily on capital investment, technology, and a mix of professional managers and low-wage laborers. The technology deployed in intensive livestock production, however, gives rise to both real and perceived risks associated with food safety and environmental quality. Food safety and environmental risks are borne by food consumers and residents of rural communities. As these risks emerge and are recognized, more people see themselves as affected by, and having, an interest in the choice of methods for animal production. As consumers, rural residents and animal welfare advocates defend interests affected by the deployment of technology in animal production. Their involvement creates uncertainty about the future economic and regulatory environment for livestock producers. This, in turn, introduces still more finan-
cial risk into their planning horizon, as both capital investments and profitability can be affected by food safety or environmental or animal welfare regulations.

Many questions remain, however, after placing the issue of animal welfare alongside those of structural transformation, food safety, and environmental impact. Why have these particular risk issues emerged in concert? What should be done about them? Who are the key actors—government, citizen activists, animal producers, other agribusiness and food system firms, or scientists—who should take responsibility in responding to this complex situation, and what are their respective roles? The answer to the first of these questions is particularly sensitive because it advances a given problematization of animal welfare within the nexus of livestock production risks. Problematization is a term used by Foucault (1984) to indicate the way that material realities intersect with cultural beliefs to create a particular conceptualization of a situation as problematic, as a source of anxiety or irritation, and as needing some sort of response. Any diagnosis of the problem situation will involve a mixture of science and philosophy. Although such diagnoses or problematizations have a profound influence on the type of research that is developed to address issues associated with animal welfare, their complexity, scope, and philosophical dimensions make them difficult to address using standard scientific methods.

It is possible to contrast the two themes that emerge in alternative conceptualizations of the problem situation for the welfare of agricultural animals. On the one hand, there are analysts who diagnose the emergence of multiple risk issues associated with animal production as a symptom of industrialization. The metaphor suggests that industrialization is a disease and that responses either must treat the symptoms or seek a cure. On the other hand, there are analysts who take these risk issues to be characteristic of postindustrial society. For them, a response to these risks demands the innovation of new institutions that will accommodate the diversity of interests affected by animal production. The difference between these two ways of conceptualizing the multiplicity of risks involved in livestock production easily might be overstated. Each overlaps the other in many respects, and one can find elements in the work of most analysts that fit either approach. Nevertheless, it is useful to overdraw the distinction between an industrial and a postindustrial analysis to discuss the indications and possibilities of each.

Industrial Paradigm

The model of industrial society that has held sway in Europe, North America, and in certain regions of Asia for at least 200 years assumes that human social relations are progressively organizing processes of industrial production. Industrial production organizes labor, capital, and technology into the most efficient configuration for production of commodity goods for human consumption.
The process of organization for efficient production has at least two basic sources of dynamism. One is the historical shift from a social structure characterized by landed wealth, hereditary aristocracy, and feudal obligation to the current system of capital markets, centralized states, and wage labor. The other is the growth of science and the emergence of technology that introduces a seemingly endless stream of innovations calling for constant reorganization of production in pursuit of increased efficiency. In industrial society, social problems are thought to have their roots in conflict that emerges out of individuals’ need to secure a steady stream of monetary income. In a simplistic portrayal of this conflict, people are organized into social classes according to whether their income derives from capital returns and profits or compensation for labor. Political alignments evolve out of these conflicts, as the interests of capital favor laissez-faire politics and open markets, but the interests of labor favor state control of capital and industrial regulation. In their crudest form, the politics of industrial society reduce to capitalism versus socialism.

Obviously, animal production is undergoing a process of reorganization and technological transformation parallel to processes that occurred much earlier for other sectors of the economy. However, the paradigm of industrialization plays a role in framing the problems of animal agriculture in several ways. One way of conceptualizing this process sees the transformation from village life and agrarian society as deeply problematic—a kind of disease in itself. Traditional societies are thought to embody healthful and appropriate social relations that are broken down in the process of industrialization. Alienating and exploitative relationships are thought to emerge as naked economic exigencies replace the traditional moralities of family and village life. The idea implicit here is that people may have been poor in the preindustrial world but were not exposed to the risks of poisoned food or water, and their animals were not abused.

What must be done, on this view, is to restore the more proper and natural social relations of the past without sacrificing the beneficial aspects of modern technology. The vision that, to varying degrees, may underlie many communitarian and socialist beliefs is particularly influential with respect to agriculture. It becomes possible to see the decline of family farming as emblematic of all that has gone wrong in the industrial age (Thompson, 1998).

These are, of course, extremely broad characterizations that portray the application of the industrial paradigm in oversimplified terms. For example, many who sharply criticize industrialization are not inclined to such a favorable interpretation of agrarian society or family farms. Fink (1998) found family farmers every bit as insensitive to the plight of the working classes as are industrial capitalists. However, Thu and Durrenberger (1998), along with the other contributors to their book, combined a leftist orientation to the politics of industrialization with expressions of solidarity for the decline of the family farm. Maurer (1995) analyzed both health-oriented and animal welfare-oriented vegetarianism in similar terms, as did ANIMAL WELFARE AND LIVESTOCK PRODUCTION
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M. W. Fox (1997). Daniel (1993) also placed the animal welfare issue squarely into a context defined primarily by the expanding power of corporate capital and the declining role of small, family farms.

Tweeten (1993) laid out an alternative way to frame the problems of industrialization in explicit fashion. Tweeten saw structural change in agriculture as a progressive process in view of its capacity to provide a higher quality of life for a vastly increased number of people. Nevertheless, the process of industrialization does not occur without cost or in a smooth and seamless way. At any given time, there will be losers as well as elements in the existing organization of labor, capital, and commodity markets that could be made more efficient. As such, there are two possible responses to complaints voiced in response to industrialization. One is to conclude that those who complain about food safety, environmental impact, or animal welfare—as well as those farmers who go under because of structural transformation—are losers. When viewed from the perspective of society as a whole, the benefits of industrial technology may more than offset these losses. The other possibility is that the costs borne by consumers, animals, and the environment are externalities. They are real costs that should have been taken into account in the drive toward more efficient production but were omitted because of an imperfection in the structure of labor, capital, or commodity markets. If so, then there may be a proper role for government regulation that will lead to an internalization of these costs and their eventual reflection in the prices paid for animal products.

Tweeten (1993), however, also argued that anyone who sees animal welfare as a market failure has rejected traditional Judeo-Christian values. He bases this claim on the assumption that the Judeo-Christian tradition in ethics limits moral consideration to other human beings. Under this assumption, harm to animals is not morally significant and should not be reflected in the balance of costs and benefits associated with an animal production system. Thus, Tweeten rejected the possibility of regulating animal production in a way that would force producers to internalize costs borne by animals in the form of suffering and deprivation. It is worth noting that this aspect of Tweeten’s argument is logically separable from his general analysis of industrialization.

Because there are a number of alternative ways to understand the link between ethics and the welfare of livestock (Fraser, 1999), it should be possible to interpret adverse impact on animals as a “cost” that would be justified only under a framework that weighs all costs and benefits equitably.

Postindustrial Paradigm

The idea of “risk society” is a construct intended to conceptualize human social and political relations in a broad and comprehensive way. Beck (1992) offered it as an alternative to the conceptualizations of industrial society that are implicit
in many forms of social organization and political action and that serve as the
explicit foundations for social and political theory. In Beck’s formulation, the
industrial paradigm has been eroding steadily over the last 50 years. Although
certainly it still is true that capital and labor find themselves at odds over many
aspects of industrial production, Beck argued that no longer is it plausible to see
this opposition as the root of all social problems. Rather than having the form of
an industrial class society where sources of income define virtually all economic
and political issues, Beck argued that the advanced democracies are becoming
postindustrial risk societies. In a risk society, people place one another at risk in
diverse and extraordinarily complex ways.

Certainly, conflicts over sources of income serve as one of the ways to be at risk
or, through one’s actions, to place someone else at risk. Beck (1992), however, ar-
gued that this relationship is only one of many that define social issues today.
There are, in fact, many sources of potential instability in peoples’ lives in contem-
porary society, including changes in gender and family roles. In particular, people
are placed at risk from unintended consequences of technologies introduced either
to increase efficiencies in the production process or to mitigate other risks. Beck’s
point is that these risk relations tend to be discrete and unstructured. One may be
placed at risk by the actions of one’s spouse, the industrial plant next door, or tech-
nological developments taking place around the globe. Indeed, one may place one-
self at risk through certain consumption activities.

An approach that sees all issues in terms of left and right or that assumes consis-
tent political solidarity based on one’s economic position will founder with such
issues. There is no clear way to align all the interests at risk in contemporary soci-
ety in a coherent and stable way. Furthermore, any adequate response to risk de-
mands that those who take themselves to be at risk must have confidence in the
actors and the processes that are undertaken in making the response. Lacking such
confidence, the feeling that one is at risk fails to be alleviated, whatever the likeli-
hood that a hazard actually will materialize. Thus, responses to risk must involve
potentially affected parties and their spokespersons. Thus far, institutions for ac-
complishing this involvement and engendering trust are highly experimental and
ineffective. Beck (1992) recommended that those beset with risk-oriented prob-
lems should undertake negotiations and political action designed to develop new
institutions that make the creation and maintenance of trust their highest priority.
Involvement of affected and interested parties is presumed to be a prerequisite.

There are analysts of the animal welfare issue who have begun to apply the type
tegrated analytic approach to structural transformation, food safety, environment,
and animal welfare issues in animal agriculture that is derived, in part, from Beck’s
work. He noted that any successful approach to these issues will need to be sensi-
tive to the interests of all affected parties. Kunkel argued that each of these chal-
lenges facing animal producers presumes a specific context and that solutions
demand integrative research sensitive to diverse value perspectives. Verbeke and Viane (2000) discussed animal welfare and food safety as dimensions of “consumer concern.” Their point was not to displace animal interests with economically driven consumer interest. Rather, “consumer concern” was a phrase offered by Rippe (2000) and Brom (2000) to indicate a forward-looking program of public debate and negotiation related to the food system that acknowledges the validity of cultural values not amenable to scientific measurement. The call to frame issues in light of consumer concern was an attempt to develop institutions that will allow a broader set of perspectives to influence the evolution of the food system (Hamilton, 1996; Stamen & Brom, 2000).

ROLE OF ANIMAL WELFARE SCIENCE:
A CONCLUDING NOTE

As indicated, the framing of problems and risks in livestock production is a complex business. The development of a problematization for livestock production blends what is known about biological processes and socioeconomic systems with elements of common sense and judgments about how people tend to see themselves, their problems, and the realistic chances of doing anything about them. If most people tend to see their problems in terms of the industrial paradigm, then solutions that radically depart from that paradigm are unlikely to find an audience. Yet, there are reasons to think that the industrial paradigm may not be the most propitious way of framing the nexus of issues facing livestock production, including animal welfare. As Stricklin and Swanson (1993) argued, animal welfare science does not support the belief that intensive methods associated with industrial animal production are unilaterally inimical to animal welfare. Industrial technology both helps and harms animal interests. As such, it is difficult to argue a positive association between welfare and family farming.

The industrial paradigm also provides a rationale for measuring the impact of current production methods on the well-being of livestock. Such measurements could be used to justify regulations or to defend a production system that met standards deemed to indicate acceptable levels of animal welfare. Clearly, animal welfare science might be deployed as a basis for making such measurements, but it is important to recognize that valid scientific measures of welfare, in themselves, would not resolve the problems associated with industrialization. For one thing, scientific measurements would need to be combined with value judgments to derive a standard of acceptable welfare. For example, a cost–risk–benefit analysis might be conducted to (a) discover whether benefits of existing production systems offset compromises to the welfare of animals or (b) determine the cost of regulations intended to improve animal welfare. The persuasiveness of the cost–risk–benefit approach depends, however, on the assumption that one is mak-
ing net improvements in efficiency. Because a decline in one dimension could off-
set an improvement in another, one also must include costs and risks associated
with structural transformation, food safety, and environmental quality. All of these
interests must go forward together. Like animal welfare, each of these dimensions
involves qualitative and contentious value judgments. Thus, it is doubtful that this
approach will produce uncontested or noncontroversial recommendations for live-
stock producers or policymakers.

The animosity associated with attempts to measure the efficiency of livestock
production is not conducive to the formation of public trust in science. To the ex-
tent that Beck (1992) was right in saying that people see their problems less and
less in the terms offered by the industrial paradigm and more and more in terms of
risk and trust, the use of science alone to justify industrial practices may exacer-
bate feelings of mistrust. The postindustrial paradigm suggests that welfare sci-
ence will be more successful in addressing problems if affected parties can
understand clearly how results are being used to mitigate the risks and harms that
concern them. This suggests that, whenever possible, research should be con-
ducted with participation and involvement by interested parties—with an eye to-
ward the communication and integration of results into an open process of debate
and decision in every case. Having precise and rigorously defensible measures of
welfare may be less valuable than having a way to convince all interested parties
that a particular strategy represents an improvement over the status quo.

As Curtis (1994) and Kunkel (2000) noted, successful welfare science for agri-
cultural animals, in any case, will demand an integrative approach sensitive to the
broad array of problems and constraints facing livestock producers. This demands
sensitivity to empirical research on the economic, food safety, and ecological di-
-mensions of livestock farming as well as a critical and reflective approach to the
way that issues in livestock production are thought of as problematic. The interpre-
tation of risk will play a crucial role in the problem formulation. An affected
party’s confidence in the actors and information presented to them contribute in a
particularly significant way to the sense of being at risk. Assumptions commonly
made in connection with the observation that animal agriculture is undergoing a
process of industrialization may lead analysts to neglect opportunities to build
confidence.

REFERENCES
Brom, F. W. A. (2000). Food, consumer concerns, and trust: Food ethics for a globalizing market. The
Journal of Agricultural and Environmental Ethics, 12, 127–139.


