

# Emerging Issues: Social Sustainability of Egg Production Symposium

## Values and public acceptability dimensions of sustainable egg production<sup>1</sup>

P. B. Thompson,\*<sup>2</sup> M. Appleby,† L. Busch,‡§ L. Kalof,# M. Miele,|| B. F. Norwood,¶ and E. Pajor\*\*

*\*Department of Philosophy, Michigan State University, East Lansing 48824; †World Society for the Protection of Animals, London WC1X 8HB, United Kingdom; ‡Department of Sociology, Michigan State University, East Lansing 48824; §Lancaster University, Lancaster LA1 4YD, United Kingdom; #Department of Sociology, Michigan State University, East Lansing 48824; ||Cardiff University, Cardiff, CF10 3WA, United Kingdom; ¶Department of Agricultural Economics, Oklahoma State University, Stillwater 74078; and \*\*Department of Production Animal Health, University of Calgary, Calgary, Alberta, Canada T2N 4N1*

**ABSTRACT** The attributes of egg production that elicit values-based responses include the price and availability of eggs, environmental impacts, food safety or health concerns, and animal welfare. Different social groups have distinct interests regarding the sustainability of egg production that reflect these diverse values. Current scientifically based knowledge about how values and attitudes in these groups can be characterized is uneven and must be derived from studies conducted at varying times and using incomplete study methods.

In general, some producer and consumer interests are translated through markets and are mediated by market mechanisms, whereas others are poorly reflected by economic behavior. An array of survey and focus group research has been performed to elicit consumer and activist beliefs about performance goals they would expect from an egg production system. These studies provide evidence that consumers' market behavior may be at odds with their ethical and political beliefs about performance goals.

**Key words:** public opinion, animal welfare, value conflict, ethics, policy

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## INTRODUCTION

This study both connects and augments material presented in the other papers commissioned for the Social Sustainability of Egg Production project. Previously published papers on environmental impact (Xin et al., 2011), economics (Sumner et al., 2011), food safety and human health (Holt et al., 2011), and animal health and welfare (Lay et al., 2011) provide detailed discussion regarding what is known about these dimensions for the major systems available for commercial egg production. These systems include caged (the most commonly used system at present), floor (birds on deep litter), aviary, and enhanced or enriched cage. Floor and aviary systems may or may not include outdoor access as specified by the USDA (2000a) organic production standard. An integrated assessment of sustainability implies an approach that can draw upon information presented

in each of these areas to develop a basis for making comparative judgments of these systems (Swanson et al., 2011b). Each topic area implies underlying values; that is, environmental impact, economic structure, food safety and human health, and animal health are important dimensions of sustainability because they encompass ends or goals that shape decision making. These ends and goals are themselves diverse and are subject to incompatible interpretations. Sustainability thus requires methods for identifying and weighing diverse types of information in arriving at a comparative judgment.

What is more, any system of commercial food production operates not only within a context of formal laws and policies that are imposed by government but also with respect to informal expectations that reflect the attitudes of key interested parties as well as society as whole (Mench et al., 2011). A given approach to production can be understood to be socially unsustainable whenever formal policies or informal expectations are so unstable or uncertain that egg producers are unable to make decisions about facilities or management. Thus, to be sustainable a production system must also be socially acceptable in the sense that it both is, and is generally understood to be, in conformity with commonly accepted social norms. Whereas at one time this

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<sup>2</sup>Corresponding author: thomp649@msu.edu

acceptability might have been easily attained by virtually any feasible method of commercial egg production, rapid cultural change in public attitudes and the mobilization of civil society groups around environmental and animal-related causes has made social acceptability one of the most challenging aspects of sustainability.

## **PUBLIC ACCEPTABILITY, SUSTAINABILITY, AND EGG PRODUCTION**

The concept of public acceptability can be interpreted in multiple ways. Public acceptability often implies that a standard of moral suitability or tolerability has been met. On this interpretation, to deem a practice acceptable implies that no compelling argument for changing the practice exists that can be advanced on moral grounds. In other contexts, public acceptability might imply compliance with social norms that do not rise to the level of morality. For example, acceptability might mean something more akin to fashionable or trendy. In other contexts, the phrase public acceptability is used to make an empirical claim about the prevalence of a phenomenon or the degree to which a given practice, product, or event exists within a larger universe of social possibilities. Thus, to say that a product has been socially accepted may simply mean that it maintains a niche in the marketplace of all goods and services (Thompson, 2001).

Public acceptability becomes linked to sustainability because activities or events that spark social and political movements for reform or change are interchangeably referred to as unsustainable and socially unacceptable. Recent literature on sustainability often identifies social conflict and resistance actions (such as work stoppages, public demonstrations, and campaigns for change) as indicating unsustainable elements in social practice (Barkin, 1998; Power, 1999; Buttel, 2000; Epstein and Wisner, 2001). This approach to social sustainability differs from 2 other theoretical ways of interpreting sustainability. Resource sufficiency presumes that a practice is sustainable if and only if the resources needed to carry out the practice are foreseeably available. Models of resource sufficiency were developed in response to the 1987 Brundtland report, which defined sustainable development as that which “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). In contrast, ecological integrity is an approach that interprets sustainability in terms of the resilience exhibited in systemic interaction. Systems of equations developed to model the stability of ecosystems can be generalized to a broader notion of functional integrity by adding factors intended to model fundamental institutions (such as education or government) or cultural norms (such as truth-telling and cooperation) that must be continuously reproduced in order for society to exist (Thomp-

son, 2007a, 2010). Although it might be possible to link indicators of social conflict and resistance to functional integrity, social scientists working in the area of sustainability have not typically done so. The emphasis on social acceptability in this paper thus differs from economic and accounting-oriented resource sufficiency and systemic or ecological models of functional integrity.

Social sustainability builds on the idea of social stability: societies plagued by war, rebellion and upheaval, and social practices that cause economic or political instability are said to be unsustainable (O’Conner, 1993; Remmer, 1996). Social stability has itself been the subject of competing analyses dating back to the time of the ancient Greeks (Dahl, 1958). Some analyses focus on a society’s capacity for maintaining economic activities such as production and trade, whereas others emphasize the continuity of institutions such as the family or religion. Studies of stability often concentrate on the continuance of a particular form of government or a regimen. Any analysis of social stability involves subtle interrelationships between instrumental advice (what can leaders or policy makers do to increase stability) and normative ideals (what makes the stability of a given society a good thing). Niccolo Machiavelli, for example, is remembered as a great theorist of political stability who advised leaders that they should pursue the interests of the people over their own personal interests (the normative ideal) but also that their hold on power will be stronger if they are feared rather than loved (the instrumental advice; de Grazia, 1989). Recent social science research on sustainability illustrates a similar tension, with some authors attempting to specify social sustainability as a state of affairs in which the protest or conflict has been addressed in a fair and responsive manner (Agyeman and Evans, 2004), others emphasizing sustainability as a way of manipulating public response (Marcuse, 1998; Laufer, 2003), and others combining the 2 (McKay and Bjornlund, 2001). The ambiguity inherent in the very idea of social acceptability is thus replicated in the literature on sustainability.

In summary, a state of affairs that is unstable is first said to be unsustainable and is then described as something to be avoided. In this manner a factual statement about social conditions is easily translated into a statement expressing a value judgment. In the present case, social conflict or resistance movements can be understood as something to be avoided for many reasons. From the perspective of the egg industry, conflicts and resistance movements complicate their ability to conduct business. Responses that alleviate these complications can then be understood to improve sustainability, and they may do so by manipulating public opinion and the influence of advocates rather than changing production practice. From another perspective, however, the presence of conflict may indicate some feature of either current or expected future egg production that is regarded as something that should not be allowed to

continue (or something that should be avoided in the future). From this perspective, a response to conflict that does not address the underlying problem does not improve sustainability. The approach taken in this paper does not follow the Machiavellian practice of offering advice on how to achieve sustainability. Instead, the approach simply examines how circumstances within or perceptions of the egg industry have the potential to generate social conflict or to be the source of actions intended to affect methods of egg production. The approach is thus consistent with social science that sees conflict and resistance actions as indicators of unsustainability, without making presumptions about the moral, legal, or political legitimacy of these actions.

## EGG PRODUCTION AND COMPETING VALUES

Current opinion and unaddressed sources of dissatisfaction can be measured by social scientists, and such measurements are one of the main sources of insight into the potential for conflict and movements for change. Issues addressed in the studies conducted by the Socially Sustainable Egg Production project include the economic viability of egg production, animal health and welfare, food safety and nutrition, and environmental impact (Swanson et al., 2011b). Each of these topics has dual bearing on the question of sustainability. On one hand, each affects the viability of egg production from a strictly objective standpoint. On the other hand, each has the potential to be a source of dissatisfaction among various sectors of the public. As such, social protests, conflict, and calls for political change can occur when dissatisfaction is mobilized into collective action. This study interprets the potential for collective actions aimed at changing practices in the egg industry as an indicator that those practices are not socially sustainable. The rationale for selecting this indicator could easily become a lengthy treatise in itself, and a few brief remarks must suffice in this context.

### ***Economics, Consumer Prices, and Availability***

Adjustments to egg production systems are one factor that will contribute to production costs and hence will affect the price at which producers are willing to supply eggs to grocery stores and other retail outlets (Sumner et al., 2011). Prices emerge from basic relationships between supply and demand. Fundamental assumptions of economics dictate that as prices increase, demand (i.e., consumption) decreases whereas supply increases. Prices thus represent an equilibrium point in neoclassical economic theory, reflecting the exchange value of the commodity rather than the use value to consumers.

General principles of political economy (Smith, 1937; Coase, 1960) suggest that regulatory or even informal

cultural changes (such as a change in consumer tastes) that increase the costs of egg production will be resisted by egg producers, especially when potential competitors are not affected by these changes. The same principles imply that when increases in production cost cause the retail price of eggs to increase, one can expect some protest not only from egg buyers but also from groups who place special value on the contribution that eggs make to nutrition and healthy diets, especially among resource-challenged consumers. Studies have identified a link between price and availability of fresh food products in urban centers and obesity and poor nutrition among low-income urban residents (Wrigley, 2002; Hamm, 2008). These studies, however, do not focus on eggs. They demonstrate the rational basis for nutrition- and income-based advocacy of affordable eggs, but no direct evidence suggests that nutrition advocates or low-income residents themselves would respond to an increase in egg prices in this manner.

### ***Food Safety, Nutrition, and Human Health***

Significant value is attached to the safety of egg consumption. Like any food product, eggs are potential sources of known food safety problems, especially *Salmonella* (Holt et al., 2011). Animal production can also create opportunities for the spread of diseases that affect human populations. Thus, some pressure to reduce these risks always exists from public health agencies and groups advocating for nutrition and health. However, unlike changes in price, the objective effects of a change in the safety, nutrition, or health aspects of egg production are difficult for the average person to perceive. As such, advocacy for such values is mediated by perceptions formed on the basis of scientific studies (studies that may have significant gaps) and on impressions formed on the basis of media coverage or word of mouth (Miller and Reilly, 1995).

Attempts to study or represent effects in the domain of human health can affect public opinion. Avoidance of human illness is among the least controversial of all values associated with any activity. Although there have been attempts to quantify harms from illness and death for policy purposes, they are inherently controversial because they either place dollar values on life and health or express acceptable trade-offs to life and health (Hapgood, 1979; Schwarz and Thompson, 1990). Thus, approaches to food safety and human health that attempt to use a trade-off approach may run into opposition from groups who either find such quantification offensive or are willing to exploit the fact that others find it offensive. It may be more realistic to presume that food safety and human health impacts must meet a de minimus standard to be ethically and politically acceptable and that the industry must simply reduce such risks to the lowest level that is practically achievable (Young, 1987; Thompson, 2007b). For a different view see Scheuplein (1987).

## **Animal Health and Welfare**

The welfare of all agricultural animals and, in the present case, laying hens, represents a value perspective from which a production system can be assessed. Lay et al. (2011) discuss science-based approaches to assessing welfare with respect to the animals' own interests. From the standpoint of social sustainability, animal welfare attains significance because it motivates producer behavior and has potential to motivate coordinated actions dedicated to promoting animal interests (Jasper and Nelkin, 1992). Although scientific assessment of hen welfare can inform assessments of production systems, the actual welfare interests of laying hens are less relevant to social conflict and protest than perceptions or opinions about animal welfare that are held throughout various segments of the broader public. Public attitudes toward farm animal production have been the target of many studies over the past decade. As discussed at more length below, some of these studies have derived estimates of acceptability either from actual consumer behavior or from studies of potential willingness to pay for increased welfare. Others have been drawn from various types of survey methodologies, whereas still others have been drawn from observation of protest movements or more detailed qualitative interviews with people already involved in conflict situations. In general, methods appropriate for the prediction of consumer behavior (i.e., how price and welfare attributes affect the purchase of eggs) may not yield valid predictions of political behavior (i.e., how people would vote in a ballot initiative) and vice versa.

## **Environmental Impact**

As documented by Xin et al. (2011), key environmental impacts from egg production are associated with animal wastes, whereas less direct impacts are connected with lands used for feed production, infrastructure development, and the construction facilities. Manure can be associated with both air and water pollution. Both forms of pollution are nuisances and can have significant effects on human health. In addition, air and water pollution can be understood as insults to ecosystem functioning that result in harm to wild flora and fauna. Direct measurement of these effects will inform assessments of the environmental sustainability of egg production. However, as with animal welfare, the way in which environmental impacts provide motivation for social conflict and advocacy for political change may have little direct correlation with scientific measures of such impacts (McCarthy and Zald, 1977). As with human health, the attempt to quantify or represent environmental values can itself be controversial. Environmental values can be quantified in terms of economic measures derived from land and housing values or from the economic value of recreational activities such as hunting and fishing. Some environmentalists

reject such approaches as anthropocentric, arguing that they ground all environmental values in human use of the environment. As an alternative, they suggest that wild species and ecosystems have an intrinsic value that transcends these human use values (Hargrove, 1989). What is more, localized environmental impact is widely recognized to stimulate political activism through the NIMBY (not in my back yard) syndrome (Inhaber, 1998). The interaction of environmental impacts from livestock production and social sustainability has been studied for nonpoultry species (Flora, 2001; Mayda, 2001).

## **Other Indirect Values**

Like all economic activities, egg production can be tied to several broader social values including economic opportunity, rights and treatment of workers, and effects (good and ill) on local quality of life. As a form of animal use, egg production also factors into a complex array of attitudes about appropriate use of animals and of human–animal relationships. Constituencies for each of these values exist among the public at large, though they may be less specifically attuned to egg production as a human activity than are constituencies associated with values already surveyed. These additional values have been largely ignored in this study. One should not, however, neglect the possibility that such constituencies may be mobilized when potential changes in law, policy, or industry practice become public knowledge. For example, if mandated changes in egg production resulted in important deviations from existing land use patterns in rural areas, it would not be surprising to find groups dedicated to rural development, farmland preservation, or conservation efforts suddenly taking an interest. Whereas public expectations with respect to broader land use issues have been the focus of some limited studies in Europe (Hermansen, 2003), they have not received detailed study in a US context.

## **INVESTIGATION OF VALUES: AN OVERVIEW**

Traditional problem solving research in agricultural science presumes a given end in view and undertakes analysis of the most efficient means for reaching that end. For example, once control of a specific food safety hazard, such as *Salmonella*, becomes defined as the problem to be solved, technical research is undertaken to understand the hazard better as well as to devise responses to it. In this research model, the value of control is taken for granted. As the above section shows, however, sustainability involves multiple values, not all of which may be fully understood and controlled. What is more, social acceptability depends heavily on human perception as well as on the way that perceived values motivate stasis, change, or instability in a political and cultural environment. Thus, a need exists for research

methods that can identify and characterize values as well as integrate and compare diverse values.

Below, we describe some of the challenges of any investigation of values that attempts to reflect and integrate both the direct evidence on environmental, health, or economic variables typically gleaned through applied agricultural science and studies that assess the way that impacts are perceived, conceptualized, and valued by groups whose participation in a political process affects the social acceptability of egg production. These challenges become particularly difficult as one attempts to integrate the full range of sustainability values that have been identified in the papers discussed above. Different methods adapted from diverse social science disciplines can provide insight into the manner in which goods are valued and can form the basis for predicting behaviors that affect sustainability. As noted above, however, behavior in one context, such as the retail market, may be quite inconsistent with behavior in the voting booth and both may differ from opinions that would be voiced publicly. It is thus important for multiple methods to be applied to the valuation of egg production and its various attributes. A brief review of some key methods that give insight into these domains of social behavior illustrates why it is not only difficult but potentially misleading for social scientists to achieve a consistent picture of public attitudes.

Applied economics provides many tools for the investigation of values associated with supply and demand for eggs. The most important may be the theory of consumer behavior itself (Friedman, 1957). From the perspective of consumers, an increase in the price of eggs represents a reduction in their overall buying power, though this seemingly simple observation is conditioned by an enormous array of variables that affect consumer incomes and the price of various goods that compete for the consumer's dollar. Generally, any increase in food prices is presumed to be of greater significance to the poor than to consumers with significant discretionary income. Expenditures on staple foods such as eggs are particularly significant because they are now viewed as necessities. As income increases, increases in food costs may require fewer adjustments in other spending than would be the case for low-income households. It is possible to augment this theoretical tool with empirical studies on actual consumer expenditures. However, household expenditure on raw foods represents such a relatively small proportion of average household budgets for US consumers that the effect on spending power has become increasingly insignificant (Adrian and Daniel, 1976). This was not always the case. *Angela's Ashes* (McCourt, 2000) notes how in the mid 1930s the author was scolded for eating an entire egg. Indeed, it is large-scale conventional cage production that made eggs an inexpensive source of protein. In 1920 to 1924, the average price of eggs in the United States was \$0.406/dozen (1 dozen = 12 eggs; Michell, 1935). Clearly, a \$0.40 carton of eggs represented a much greater relative household outlay in the 1920s

than does \$1.20 today. Shortfalls in the availability of eggs have been exceedingly rare in US retail markets since World War II. As such, comparatively little recent empirical evidence exists on which to base an estimate of the value that consumers attach to a stable and reliable supply of eggs.

Applied economists also use a combination of indirect economic indicators and surveys to estimate the value consumers associate with goods that cannot be directly purchased in markets. Indirect indicators are especially useful in the context of valuing environmental amenities. The value of clean air or water and relatively unspoiled environments may be estimated by sophisticated analyses of land values that disaggregate multiple factors contributing to real estate prices. Such studies have been conducted to estimate environmental values associated with livestock production (Subak, 1999; Coelli et al., 2007), although we did not find research that compares alternative methods of egg production. Contingent valuation surveys ask consumers what they would be willing to pay if they could be assured that amenities or attributes that are not available in markets could be guaranteed. Both environmental and animal welfare attributes are amenable to this method of study. In their research, Bennett and Blaney (2003) found that consumers had ethical concerns about the treatment of animals and recognize animals as capable of experiencing pain and pleasure. They report that 79% of UK respondents supported a European Union ban on cages. The action then under consideration by the European Union was to ban housing systems lacking certain enrichments, and the possibility of replacing existing cages with enriched cages may not have been widely understood. The study also reports that 86% of UK respondents were very concerned that farm animals may suffer or be mistreated, and 61% reported that they acted on their concerns in their purchasing choices. Their first concern was the production of veal, and their second most important concern was cage egg production (Bennett and Blaney, 2003).

Recent studies in the United States have been conducted using experimental methods to measure consumer willingness to pay for egg products from different production systems. More than 100 individuals from diverse backgrounds and 3 cities participated in an egg auction where they submitted bids for the eggs. The auction allowed participants in the experiment to make bids for different levels of hen welfare, and subjects paid money out of their own pockets for the eggs. On average, participants in this experiment were willing to pay 53 to 66% higher prices for eggs raised in a barn or aviary system compared with a conventional cage (Norwood and Lusk, 2011). Although this finding provides useful information on consumer preferences for animal welfare, it is impossible to measure true preferences except in large-scale test markets. The mere act of asking survey or experimental questions influences subjects' preferences (Morwitz and Fitzsimons, 2004), and even economic experiments entailing real purchases

can overestimate values for public goods because of social desirability bias (Lusk and Norwood, 2009).

Americans' willingness to pay higher prices for perceived increases in animal welfare has also been measured in recent telephone surveys by applied economists. Given the choice of strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, and don't know in response to the prompt "low meat prices are more important than the well-being of farm animals," 76% of Americans state that they disagree. However, when asked how the average American feels, the percentage falls to 24% (Lusk and Norwood, 2008). That is, respondents report believing themselves to value animal welfare over price much more frequently than they report the average American to hold this value. However, other results from social science make it difficult to interpret the significance of this finding. It is commonly observed that subjects misrepresent their true beliefs, likely to present observers with what they believe to be a favorable impression. Asking subjects what they think other people would do can correct for this social desirability bias by providing a more accurate assessment of the values most likely to determine the behavior of the person being asked (Vazire and Mehlman, 2008). The report of what others think would be a more accurate indicator of a subject's own values when social desirability bias is distorting the findings of research on values. However, a phenomenon known as the third person effect can suggest the opposite. People consistently overestimate the extent to which others are influenced by misinformation, effectively underestimating others' ability to critically evaluate information (Perloff, 1999). If a third person effect is influencing a subject's response, the different relative values placed on animal welfare in the studies cited above would not be indicative of the subject's true values.

Economic research adapting survey methods developed in political science has also provided some detailed data on how consumers prefer animals to be raised. These methods look for statistical patterns in the way that respondents answer unrelated questions, and they have been used in sociology and political science to determine how individuals with opinions on one issue would be inclined to vote or act with respect to another issue. In a nationwide survey of the US public, responses clustered into 3 groups, which the research team refers to as naturalists, price seekers, and basic welfarists (Prickett et al., 2010). Naturalists composed 46% of the population and placed a great emphasis on allowing farm animals to exercise outdoors and exhibit normal behaviors, such as nest building. A smaller portion of the population, 14%, cared mostly about price, and would willingly sacrifice animal welfare in exchange for lower prices. The second largest group, basic welfarists, composed 40% of the population, and although they were willing to pay higher prices to ensure animal well-being, they believed adequate animal welfare could be obtained simply by providing ample food, water, and health care. Thus, it appears that conventional

cages meet the preferences of about 54% of consumers, as they are adept at providing the animals' basic necessities (e.g., food, water) at low prices. However, such facilities raise animals in a manner not consistent with the preferences of the naturalists (Prickett et al., 2010). A 1994 random sample of US adults used a similar methodology to identify statistically significant correlations between attitudes toward animals and other political values. The researchers identified an altruistic values cluster in which respondents believed that dietary choice could prevent cruelty to farm animals (in addition to benefiting the environment and easing world hunger); those classified as holding traditional values were less likely to believe that their dietary choice had any impact on the environment (Kalof et al., 1999).

More conventional survey methods developed by social psychologists are intended to reflect the views held by a representative sample of the general population. These methods use sophisticated sampling techniques to ensure that those questioned provide a statistically valid representation of the total population, controlling for standard demographic characteristics such as age, gender, income, and race. Such studies have been used to elicit opinions and attitudes about food and food production. They show dietary choice is determined by social psychological factors, such as beliefs, attitudes, norms, and values (Guseman et al., 1987; Briedenstein, 1988). Survey research also indicates that food choice is heavily influenced by the composition and dynamics of an individual's social framework. The traditional assumption underpinning survey research on attitudes about food is that food consumers are primarily concerned with price and perceived quality or taste. Annual surveys by the International Food Information Council (IFIC) continue to probe expressed consumer motivation, and most respondents in these studies confirm that price and quality are their top criteria, though significant percentages of respondents also report concern with the healthfulness of foods. The IFIC surveys suggest that consumers are generally satisfied with the safety of the US food supply and that they tend to regard food safety as a personal responsibility to be discharged during food preparation (International Food Information Council, 2008). However, whereas these IFIC surveys provide a basis for concluding that food safety is, in fact, of significant interest to consumers, they were not designed to measure consumer attitudes toward animals or environmental concerns. As such they do not provide a basis for comparing the significance of these distinct concerns. Recent survey research on food consumption has involved several new approaches that do reflect attitudes beyond price and quality. Economists have undertaken studies indicating that consumers can express a measurable willingness to pay for perceived food safety qualities (Lusk and Fox, 2002) and that they do in fact adjust consumption behavior in accordance with a wide variety of personal values (Lusk and Briggeman, 2009). In a similar vein, new studies focused on consumer food safety concerns

document relatively lower levels of satisfaction with food safety than have IFIC studies (Knight et al., 2008).

The Eurobarometer is a series of large surveys commissioned by the European Commission's Health and Consumer Protection Directorate General. It is conducted regularly and produces reports of opinion representative of the European public on certain issues relating to the European Union across its member states. A 2005 survey on the attitudes of consumers regarding the welfare and protection of farmed animals focused on 3 main themes: 1) the relative importance of farm animal welfare, 2) purchasing behavior and the welfare of farm animals, and 3) the current status of farm animal welfare within Europe. This was followed by a second survey in 2006 that probed these questions further and provided a basis for determining whether opinion was trending in one direction or another. The surveys demonstrated 2 major findings: 1) "distinct realities" exist in the consideration of animal welfare in various member states, and 2) a great deal of interest exists in animal welfare and animal welfare standards. The data clearly show that values and concerns about animal welfare vary across countries and cultures (European Commission, 2005).

The surveys discussed above are peer reviewed studies intended to characterize robust trends in public opinion. Similar survey methods are used by marketing firms that are commissioned by clients to ascertain public opinion on points of interest to client groups. Several of these commissioned surveys have been conducted to elicit measures of opinion on animal welfare and livestock production. Surveys commissioned by the Animal Industry Foundation (now the Animal Agriculture Alliance) in 1993 and 1998 asked respondents whether they believed farmers and ranchers treated their animals humanely; 77 and 80%, respectively, answered yes (Swanson and Mench, 2000). Other surveys have been commissioned by animal protection groups such as Compassion Over Killing and People for the Ethical Treatment of Animals. Compassion Over Killing has reported results from a nationwide Zogby poll in 2000 showing that 86% of US adults consider the crowding of hens in commercial egg production unacceptable. The question was as follows: "please tell me if you find the practice totally acceptable, somewhat acceptable, somewhat unacceptable, or totally unacceptable: crowding 8 to 10 chickens in cages, about the size of an open newspaper, so tightly that they cannot stretch their wings?" In summary, by more than 8 to 1 (86.2% unacceptable to 10.2% acceptable), adults nationwide found the practice of overcrowding chickens into cages where they cannot spread their wings to be an unacceptable practice, with 69.8% saying it is totally unacceptable; cutting off part of the beaks of chickens to prevent injury to other birds was unacceptable to 60.4% (Compassion Over Killing, 2010).

A 2003 Zogby Poll commissioned by the Animal Welfare Trust found 82% of respondents in favor of fed-

eral legislation to protect farm animals, and a 1995 Caravan Opinion Research Corporation poll conducted for an undisclosed client found that approximately 90% of respondents disapproved of the standard practices of confining hens, veal calves, and pigs (Matheny and Leahy, 2007).

Data generated by these privately commissioned surveys should be treated carefully but should not be disregarded. Although these specific results of the polls cited above have not been subjected to peer review, populations sampled by private firms have been found to be representative of the US public and their methods were statistically sound (Welch, 2002; Martin et al., 2005). The methods used provide valid data on response rates at the time of the survey for those questions or items for which a response was solicited. However, the conflicting results from these surveys show that these percentages are often sensitive to changes in the context and wording of questions. The extent to which any of these survey results indicate the public acceptability of existing housing systems or of possible alternatives remains open to debate.

In addition to the quantitative measures generated by economic analysis and surveys, qualitative methods can be applied to values assessment. Sociologists have developed research approaches that interpret consumer food choice as a form of politics. According to this view, consumers consciously participate in the formation of industry practices both through purchase behavior and through activities such as letter writing, actions at stockholder meetings, and public protests. Consumers' trust in the industry and in advertising is an essential motivating factor in their desire to affect industry practice. Individuals who participate in these actions evince low confidence in industry representatives' representation of the effects of industry practices (DuPuis, 2000). Some studies in this research tradition emphasize attitudes toward animals in dietary choices. They show that people's attitudes toward animals and dietary choices are multilayered and often in conflict, and animals are commonly recognized as subjects with agency (Kalof, 2000; Blecha, 2007).

Recent research approaches have applied multiple methods to perceptions and attitudes with studies that combine assessments of animal welfare (such as those discussed by Lay et al., 2011) with studies on consumer attitudes to develop industry standards. Over the last few years, the European Union Welfare Quality project has developed animal-based welfare assessment protocols for farm animals, derived from scientific findings from several European research groups (Blokhuis et al., 2003). A variety of mechanisms were built into the project for distilling the opinion of the public regarding the construction of animal welfare standards and promoting a sustained dialog between animal scientists and social scientists (Miele et al., 2011).

The European Union Welfare Quality project used a research method that combined a large telephone sur-

vey in 7 EU countries (Kjaernes et al., 2007), detailed conversations with focus groups (Evans and Miele, 2007), and a large number of in-depth interviews with farmers, retailers, certifying bodies, and nongovernmental organizations (Roe and Murdoch, 2006). Finally, in the last stage of the project a new research method was adopted to gauge the opinion of the public about the standard developed by the Welfare Quality scientist: citizen juries. A citizen jury convenes a relatively small sample of the public for an extended period in which they have an opportunity to ask questions of experts, then deliberate among one another on their findings (Hamlett, 2003). In this case the juries highlighted interesting similarities and differences between scientific and societal understandings of the quality of life of farm animals and explored how jurors' lay opinions about farm animal welfare changed over time after they were exposed to different expert input. This task was designed by the social scientists in the project, but was executed by both social and animal scientists. A parallel investigation, the farmer's workshop, was conducted with farmers. To date, no similar studies or activities have been conducted in the United States.

In summary, the methods discussed above represent only a fraction of the research methodologies that have been used to study features relevant to egg production sustainability. However, as noted at the outset, sustainability encompasses multiple dimensions. As one attempts to combine studies on the economic viability of the industry, consumers' willingness to pay, survey respondents' expressed preferences, and results from public health, animal behavior, or environmental science, the traditional model of problem solving research becomes untenable. One source of the difficulty is simply complexity, but a more intractable problem for applying the linear kind of problem solving research model is that when so many diverse types of values formulate a problem, there are bound to be inconsistencies that point to very different and incompatible types of solutions.

## INCOMPATIBLE VALUES

Several sources of incompatibility can exist in the values that articulate ends to be sought or that determine why a situation is viewed as problematic. One source is that different parties have different interests, and it is not always possible to satisfy all interests with a single solution. In effect, each of the key values relevant to egg production is associated with a set of individuals, commercial enterprises, and social groups (henceforth "publics") that can be expected to seek a role in influencing changes in egg production. A second source of incompatibility can arise from the way that values are conceptualized. Different individuals within publics organized around a given interest may view what is important about that interest (or how it is to be pursued) in incompatible ways.

## Multiple Publics

It is obvious that inherent conflicts exist among the interests of the multiple publics currently or potentially advocating action on egg production, but the way that these conflicts are structured can be subtle. The basic structure of economic exchange dictates conflicts of interest between each economic actor in the supply chain: low prices are good for some, bad for others. As Smith (1937) argued, the tensions created when each pursues their own interest can in some cases lead to spontaneous changes that may be understood as a bargain where all parties' interests have been reflected. For example, food retailers currently provide little information regarding environmental impact or the well-being of animals raised for food, making it difficult for consumers to demonstrate their preferences for animal welfare through their purchases. However, new markets are emerging, such as the Humane Certified label, and a variety of food labels differentiated by animal treatment (Mench, 2003). These changes in the retail supply chain have been undertaken without significant government encouragement or support. They can be seen as one component of a larger trend toward nonstate governance mechanisms that have been developed to provide consumer assurance of food attributes that relate to the production process rather than to the final product. Organic, fair trade, and regional labels may be a response to similar shifts in market structure (Thompson et al., 2007). A more extensive discussion of the standards underlying these kinds of public assurance programs follows below.

In other cases, the inherent tension between incompatible interests is resolved through well-established political processes. Among them are proposals for new laws or legislative actions and court actions that force reinterpretation or stricter enforcement of existing laws or mandates. Several animal advocacy organizations have formed to bring about political change to the regulation of methods of raising animals. These include ballot initiatives such as Proposition 2 in California and those in states that have banned gestation crates. Changes such as Proposition 2 represent classic forms of government regulation being applied to address dimensions of sustainability. Regulatory mandates have been the primary form of response to both environmental and animal welfare dimensions of sustainability in Europe (Appleby, 2003).

Still other types of incompatibility are expressed in public discourse: newspaper or magazine articles, advertising, and other forums (including the Internet; Thompson, 1999). Here groups express value positions through arguments, narratives, and images that are intended to persuade or motivate bystanders who may not be currently involved in or aware of issues in egg production. Public discourse influences the climate in which nominally uninvolved people make decisions, and new information can provide incentives for publics to

reevaluate the interests at stake in terms of the public acceptability of egg production. The United Egg Producers, for example, began an ongoing effort to address animal welfare issues in the egg industry about a decade ago. Chain restaurants, wary of concerns from their consumers, have also undertaken efforts to achieve standards for sustainability, including both environment and animal welfare dimensions, through auditing programs and specification inserted into contracts with suppliers (Mench, 2008).

Value conflicts arising from multiple publics can feed into relatively orderly processes of social change, such as those described here. Yet uncertainties about the eventual direction of change can be intolerable to some decision makers while the changes are in the process of maturing. What is more, it is always possible for an apparently orderly change process to conceal dissatisfaction or resentment among publics that feel that the interests they were pursuing were inadequately served by the changes. Achieving more equitable and enduring ways to reconcile value conflict arising from multiple publics is one of the overarching goals of social sustainability (Daily and Ehrlich, 1996).

### ***Conceptual Incompatibilities***

The multiple ways in which people understand values and the process of deriving or justifying values is also a source of inconsistency and incompatibility. For example, Lay et al. (2011) summarizes recent scientific work on the interests of hens, but it is important to recognize that the views of nonscientists on laying hen welfare will be at least as influential in determining the supply chain and regulatory environment for egg production. Although it is reasonable to assume that the views on how animal interests should be understood are broadly diverse, it is useful to summarize some of the public attitude research that has been conducted by scholars advocating for renewed sensitivity to animal interests beginning in the 1970s. Writings by philosophers and animal activists argued that animal interests are unjustifiably overlooked and ignored in many areas where human conduct affects the well-being of animals. Much of this work stressed the concept of animal suffering in a manner that would be roughly consistent with scientific work intended to measure experienced or felt stress, frustration, or discomfort of animals (Singer, 1975, 1993; Rollin, 1995). However, many authors and commentators moved quickly to the idea of animal rights. The term covers a wide variety of possible meanings. For some it clearly implies only that animal interests should be taken into consideration whenever they are affected by human decision making. For others, the term is used to single out the importance of paying attention to health and welfare conditions for each individual animal, in contrast to approaches that quantify death, disease, or welfare impacts for entire flocks and weigh these against economic benefits to humans

(Rollin, 1981). Regan (2004) became known for arguing that the term should indicate a commitment to forego all uses of animals that were incompatible with animals living free from domination and interference by humans. This view precludes any use that involves slaughter and has often been interpreted to be incompatible with any agricultural use of animals. However, Pluhar (2004), who defends Regan's general approach, argues that use of hens for egg production would be compatible with an animal rights view, so long as they are allowed to live a natural life cycle. The concept of animal rights is also advocated specifically within the context of law. Wise (2000) has argued that an extension of legal rights to nonhuman animals would provide substantive backing to the type of ethical position long advocated by Regan.

Another set of conceptual incompatibilities can be seen in the results of studies intended to measure or articulate public acceptability or public attitudes. For example, currently only about 5% of table eggs sold are labeled as coming from noncage systems (Sumner et al., 2011). Because such eggs are readily available this could be taken as evidence that willingness to pay for noncaged eggs is relatively low. Yet responses to surveys, contingent valuation studies, and other opinion instruments discussed above suggest a high degree of dissatisfaction with crowding or caging hens, indicating that willingness to pay should be much higher. The incompatibility is rooted in the difference between a research approach that infers the relative strength of consumers' feelings about welfare from their purchasing behavior as opposed to approaches that elicit opinions under more hypothetical circumstances. It is difficult to ascertain which approach should be taken to provide a more realistic portrayal of how the public feels about caged versus noncage egg production.

The inconsistency noted could be rooted in any of several so-called cognitive biases. For example, research has identified a phenomenon called diffusion of responsibility. People will readily make significant personal sacrifices to achieve ends they find morally important when it is clear to them that the ends will be achieved only if they take action personally. Research has been conducted where subjects are placed in situations where they alone can respond to calls for help, and where either of 2 or more subjects might respond. When the action might be undertaken by any of several parties, research subjects are much less likely to respond, suggesting a cognitive bias that effectively dilutes perceived moral responsibility (Mynatt and Sherman, 1975). Other findings suggest that this dilution becomes even greater when people feel a sense of anonymity with respect to the possible action to be taken (Diener, 1977). Still other research suggests that people are far more likely to make sacrifices when they feel assured that their actions will have concrete effects. Small responses to large problems are, in such cases, seen as futile, even when the additive effect of many small actions might resolve the larger problem (Bandura, 1991).

These biases might explain why people express strong support for egg production systems that they believe are more humane yet fail to act on such beliefs when purchasing a carton of eggs in the grocery store. Some analysts have argued that this incompatibility can be resolved by recognizing the distinction between 2 roles that people can understand themselves as occupying. As consumers, people are willing to engage in economizing behavior that is inconsistent with what they, as citizens, take to be important and appropriate political goals. They view the political realm as a place to enact rules and restrictions that force them to live up to the better natures that they envision when they view their own consumer behavior from the perspective of citizenship (Korthals, 2001; Sagoff, 2008). In contrast, applied economists are more likely to take actual purchasing behavior as indicative of the preferences that should be assumed to be least biased and therefore use that basis for drawing inferences on social sustainability.

This is only one of many examples where a given set of analytic approaches might be incompatible with another. The term framing refers to assumptions, biases, and past experiences that are implicit in the way that a situation or issue is described or presented. Frames influence an individual's evaluation of the situation or issue. To some extent framing assumptions may vary from one individual to another, but other tendencies are more robust. Aversion to losses has been shown to be a robust cognitive bias: people respond differently depending on whether the language used to describe a situation is framed as losses (e.g., deaths, harms, or morbidity) than when the same information is presented in terms of gains (e.g., lives saved, satisfaction, or health; Kahneman et al., 1991). Surveys (such as the above-cited Zogby poll) that frame questions in terms of losses or harms may elicit opinions that have been influenced by aversion to losses, but they may also reflect what people feel deeply in their role as citizens.

The prospects for reconciling all these sources of incompatibility in values are daunting. What is more, specific research methods tend to lend implicit support to one set of (or approach to) values rather than another. Given this, it becomes possible for competing interests to select from those approaches in the scientific literature that are most consistent with their own preferred orientations. One of the key challenges for sustainability is to gain a better understanding of what science can reasonably be expected to achieve in terms of serving as an "honest broker" in reconciling or at least fairly representing the multiple sources of incompatibility in value judgments (Pielke, 2007).

## VALUES AND STANDARDS

Marketing, production, regulatory, and technical standards become the key interface where value conflicts are decided. In industrial societies, we employ (in addition to habits, customs, and traditions) a plethora of formal, written standards so as to allow us to auto-

mate some actions, thereby leaving us free to engage in others (Brunsson and Jacobsson, 2000; Bingen and Busch, 2006). But the very notion of a standard is somewhat ambiguous. The standard may refer to the best (e.g., the industry standard, the ideal egg), to an exemplary measure or reference (e.g., the grade AA egg), to a rule or norm to be followed (e.g., for an AA grade, the white must have "a Haugh unit value of 72 or higher when measured at a temperature between 45 and 60° F" according to USDA, 2000b), or to a degree of tolerance (e.g., consumer grade AA eggs must be of at least 87% AA quality; USDA, 2000b). However, in each case, standards are the rules we (must) follow, or the categories from which we (must) choose. As such, the ability to set the rules or define the categories is a form of power. Prior to USDA involvement, standard setting took a somewhat different form (see Holden, 1928). However, unlike other forms of power, standards tend to become anonymous once put into use. Indeed, once standards are established, it is often difficult to determine who actually established them and under what circumstances. They become so taken for granted as to be considered natural.

Some standards (such as the egg standards noted above) are set by governments, whereas others are set by industry associations, private firms, or nongovernmental organizations (Henson and Reardon, 2005; Fulponi, 2006). Furthermore, standards may be created for people (proper behavior in handling of birds), processes (cleaning of eggs), products (USDA egg standards), and practices (management of poultry houses). However, each of these types implies the other. Therefore, a standard for a person implies standards for the things with which that person works; conversely, standards for products imply standards for the persons who produce the product.

Some standards are employed globally, whereas others are more local in nature (World Trade Organization, 2005). Some are publicly available for open markets, whereas others are designed for particular value chains (Ponte and Gibbon, 2005) and may even be proprietary. Some standards are even designed to govern the use and enforcement of other standards (International Organization for Standardization, 2004). Of direct relevance to egg production is the World Organization for Animal Health (**OIE**), which was initially created in 1924 and included 28 countries. Its main mission was to develop standards to combat the outbreak of animal diseases. Over its history, the OIE has grown to 172 member countries. Recognizing the link between animal diseases and the welfare of animals, the OIE received a mandate to develop animal welfare standards in 2002. The aim of the OIE is to produce animal welfare standards that can be used for international trade and serve as a foundation for legislation in countries that currently do not have legislation in animal welfare. The OIE insists that their guidelines be science based and their efforts are guided by certain principles, including the 5 freedoms (freedom from hunger and thirst; freedom from discom-

fort; freedom from pain, injury, and disease; freedom to express normal behavior; and freedom from fear and distress), the recognition that value assumptions are inherent to the very idea of animal welfare, and the belief that animal-based criteria rather than design criteria should be the basis for comparing standards. To date, the OIE has developed codes dealing with land and sea transport as well as the humane killing of animals for disease control and human consumption. The future activities of the OIE include developing standards for the housing and production of farm animals. Given the scope of the OIE standards, significant discussion and compromise are required. At a 2008 meeting in Cairo, expression of value positions of various member countries was a key component to the meeting's success.

Eventually, standards must necessarily involve a compromise, perhaps one that is frequently revisited, among competing values. Standards for cage size, for example, represent a compromise among values intended to produce an optimal balance among market values associated with the cost of the cage and the cost of production per egg, the values associated with ease of use by workers in layer facilities, and values associated with the welfare of the laying hens. Attempts to optimize or maximize any of these values at the expense of others are likely to fail. Such a compromise has never been easy to reach (Warne, 1967).

Put differently, standards are located at the interface between facts and values. Standards form a kind of moral economy defining what is good and what is bad (Busch, 2000). Standards simultaneously prescribe and describe; that is, they tell us what should be the case and, once in widespread use, they tell us what is the case. Hence, one can talk of organic agriculture only to the extent that organic standards exist that simultaneously define what is organic and describe what is in the fields and supermarkets. Similarly, when standards for cages for layers were developed, they were recommended as the desired approach for producing eggs; once established and in widespread use, they tell us what is the case. The current attempt to incorporate consumer concerns about the welfare of layer hens adds another set of values to the compromise among values central to standards development.

## CONCLUSIONS

An integrated assessment tool for developing sustainability standards will eventually require some method for combining or at least in some way reflecting all the values discussed above. Because each dimension of sustainability represents one or more types of value determination, taking values that reflect distinct scales and classes of value into account becomes one of the main challenges for decision making. Traditional quantitative methods do not permit the optimization of more than one variable at a time. Although a very large body of literature discusses alternative theoretical proposals

for integrating diverse value scales in a decision making process, very few attempts have been made to validate or apply these methods to the comparison of alternative livestock production methods. Several approaches to this problem are discussed in the Swanson et al. (2011a) study focused on synthesizing research results that pertain to each domain of sustainability.

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