

The Five Freedoms in the global animal agriculture market: Challenges and achievements as opportunities



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Implications

- Economic development and the evolution of societal ethical principles are leading consumer demands and pressuring animal agriculture sectors to alter some production practices. This is an undergoing event in developed countries, and is relevant for the future, especially in emerging economies where there is an increasingly fast expansion of intensive confined swine and poultry production. This scenario is foreseen, in the authors' opinions, as a major challenge for the pro-animal welfare public and the scientific community that has a critical role in addressing concerns with impartial, validated, and objective science.
- The current climate towards improving animal welfare has favored diffusion of technologies that seek to minimize suffering of animals, such as immune-castrations in pigs, which is a task best accomplished by well informed and specialized farm animal welfare professionals. Increasing concern with animal welfare has also resulted in gradual banning of certain husbandry practices and housing in many industrialized countries; changes in attitudes and practices have been slower in developing countries, some of which are major meat exporters.
- Legislative actions and voluntary initiatives across the European Union and United States endorse forthcoming rearing practices favoring animal welfare, especially in the pig and poultry industries, and have been a source of international trade controversy among animal protection organizations, the World Trade Organization, and global market players.

Key words: animal welfare, consumer, emerging economies, poultry, sentience, swine

Animal Welfare and Global Demand for Animal-Derived Protein

This review intends to bring an overview of relevant challenges and accomplishments surrounding the farm animal welfare field and identify

gaps that, when fulfilled, may lead to positive outcomes in the present, but especially for the future of the pork and poultry industries. It is not new to animal agriculture sectors, governments, animal protection organizations, and consumers that animal welfare concerns surrounding current industrialized animal production systems have increased within the last decade. Globalization, international trade, and dramatic increases in the demand for animal protein for decades to come may magnify these concerns from both practical and ethical perspectives and thus create a need for objective debates.

Within this global scenario, a major challenge for all parties ought to be implementing a “clean, green, and ethical” animal agriculture, while guaranteeing that food is produced under high animal welfare standards. Sound and objective science must be the basis for establishing on-farm and slaughter standards seeking to promote better animal welfare. Currently, integrating these standards and guidelines may not be a priority for a cluster of leaders in animal production and even for policymakers, as changes are usually associated with significant financial and time investments. Hence, resistance arising from this conflict may weaken opportunities for forthcoming implementation of science-based welfare-friendly production and slaughter practices. Some progress toward improving animal welfare has been observed in situations which these standards are either legislated, verified under a third-party certification program, or are a trade barrier by the importing market where the priority is likely economic benefit (Promar International, 2008; Centner, 2010; Rayment et al., 2010). Direct enforcement and application of penalties for nonconformance to legislated animal care and treatment standards and policies may also be a challenge due to costs of putting infrastructure changes (building or retrofitting) into practice and the lack of resources and trained professionals (Promar International, 2008; Rayment et al., 2010). Thus, in the authors' opinions, one of the greatest challenges facing the scientific communities in the upcoming decades will be to uncover solutions while reconciling the need to safeguard animal welfare within a sustainable farm animal production system, and considering public and governmental deliberations for ethical treatment of animals.

The readiness to overcome these challenges is highly dependent upon consideration of societal moral and ethical values and their influences in driving political and economic policy amendments in countries leading animal production. Two distinct economic and socio-political nations' categories, that may or may not reflect consumer general principles and concepts toward animal welfare, are witnessed globally. One category consists of industrialized developed countries, which are featured by a population that spends a minor portion of its household income on food,

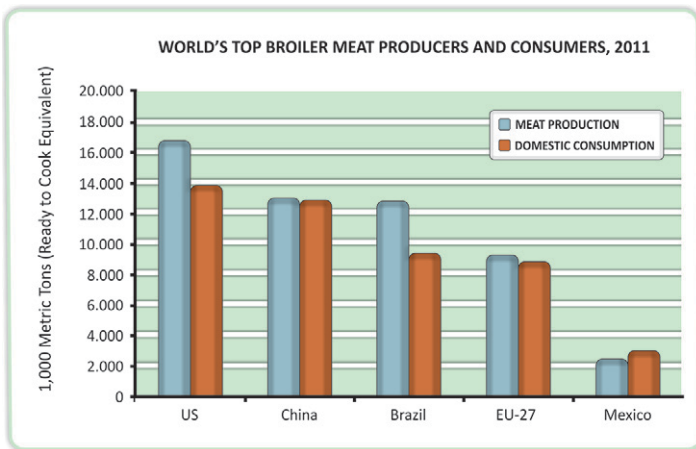


Figure 1. Countries ranked as the leaders in production and domestic consumption of broiler meat. All the countries, but Mexico, produced more than the per capita consumption in 2011. The major broiler meat exporters, in order of significance, are Brazil, US, EU-27, Thailand, and China (source: USDA Foreign Agricultural Service, October 2011).

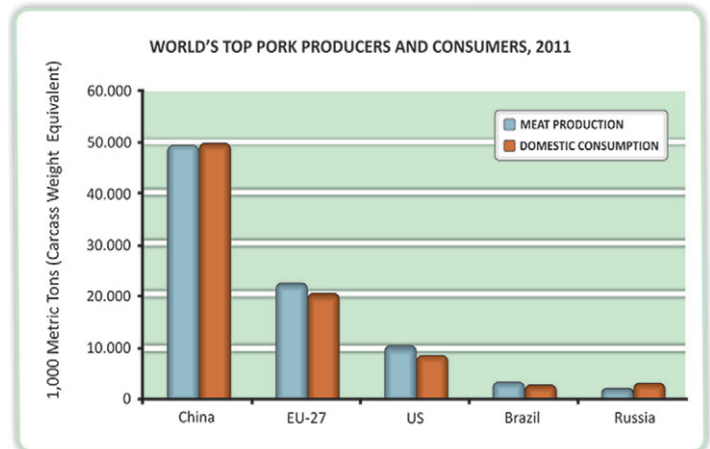


Figure 2. Countries ranked as the leaders in production and domestic consumption of pork. China and Russia produced less than the per capita consumption in 2011. The major pork exporters, in order of significance, are US, EU-27, Canada, Brazil, and China (source: USDA Foreign Agricultural Service, October 2011).

including animal protein. For example, in 2007 the average US consumer spent 9.8 % of disposable personal income (income available after taxes) on food, accounting for US\$4,016 annum per capita expenditure in 2010 (USDA Economic Research Service, 2011). The average consumption expenditure of households on food and non-alcoholic beverages for all European Union (EU) countries in 2006 was 12.7% (Eurostat, 2006). People living in these countries have reasonably easy access to governmental aid for higher level education and have agriculture and animal production as one of their economic bases.

From the animal welfare standpoint, these countries have been targeted for the last decade by public protests led by animal protection organizations and intervened by state or country legislative actions; as a consequence, they are undergoing drastic adjustments in farm animal production systems. Classic examples include the ban of barren restrictive gestating sow crates and lying hen battery cages (Figure 3) across some of the US (Centner, 2010) and member states of the EU (Rayment et al., 2010). The industry and producers in the developed countries have followed the animal welfare “rules”; in some instances, this is due to legislation and penalties they can be subjected to, while in other cases, there is a genuine concern about animal welfare and potential implications on productivity. There are also some active supporters of these rules, which take actions either for ethical or moral purposes. In general this is the public’s and consumers’ approach. However, even though consumers express concern for the welfare of farm animals, when presented with the option of purchasing the same product at different prices and animal care, they may not always be willing to pay extra for improved animal welfare standards (Krystallis et al., 2009; Centner, 2010). A common explanation for this discrepancy is the fact that the general public (i.e., consumers) prefer to delegate responsibility of assuring animals are reared in conformance with welfare standards to government and policymakers, as through legislation and enforcement, industry, or food suppliers/retailers (EC, 2007; Lusk and Norwood, 2008). To a lesser extent, some consumers lacking strong opinions may adopt a “politically correct” attitude to minimize exposure to criticism and being misjudged by others (Krystallis et al., 2009).

The second economic and socio-political nations’ category consists of developing countries, specifically countries considered emerging market economies.¹ These countries are met with global interest for their availability of natural resources and their growth capabilities toward expansion of animal agriculture and increasing consumer purchasing power (Euro-monitor International, 2010). A relevant example is the economic group known as BRICS, which is represented by Brazil, Russia, India, China, and South Africa. Given the authors’ experience with the Brazilian role in national and international scenarios, some examples provided in this report refer to Brazil. The emerging economies, key players within the ranking of grain and animal production and exports (Figure 1 and 2), are undergoing advanced economic developments. However, these populations still spend much of their household incomes on food compared to developed countries’ consumers. For example, in the years of 2002 and 2003 the food expense in Brazil accounted on average for 21% of a family’s income and ranged from 9% to 33% for those with monthly incomes of R\$400,00 (US\$232.00) or more than R\$6,000,00 (US\$3,500.00), respectively (IBGE, 2006). On average, products of animal origin (meat, eggs, and fish; milk and milk products) accounted for 30% of the total amount spent on food. This same Brazilian census also showed that the poorest spent proportionately more on food and relatively even more on products of animal origin, but purchased lower-quality products (IBGE, 2006). Nonetheless, this scenario is undergoing significant changes in current years as the previous lower income population is the new emerging middle class, an increasingly demanding crowd of consumers with a more relevant bargaining power. Average income expenditure on food in Brazil has dropped to 18.2% in 2010; consumer expenditure on food and non-alcoholic beverages in the 25 key emerging market economies, as in

¹ Emerging market economy: A nation’s economy that is progressing toward becoming advanced, as shown by some liquidity in local debt and equity markets and the existence of some form of market exchange and regulatory body. Emerging markets generally do not have the level of market efficiency and strict standards in accounting and securities regulation to be on par with advanced economies (such as the United States, Europe, and Japan), but emerging markets will typically have a physical financial infrastructure including banks, a stock exchange and a unified currency (definition from Investopedia.com).



Figure 3. Lying hen battery cages have been banned across some of the US and member states of the EU (source: Source: Wikipedia/רמתאי, ITamar K).

China and Brazil, is projected to represent 21% of total consumer expenditure in 2020 (Euromonitor International, 2010). Furthermore, although university level degrees are still accessible to only a small percentage of the population, growing opportunities to attend higher education are also on the horizon for youth and adult groups.

In practice, despite this economic boom, conceiving the real meaning and importance of animal welfare and its contribution toward productivity is still at an early stage within the emerging economies. In addition, awareness of issues regarding animal care and well-being linked with purchasing welfare and organic certified products belongs to a highly selective consumer group, usually living in metropolitan areas. Policies and regulations ruling animal production and processing with emphasis on animal welfare are scarce (e.g., Brasil, 2000, 2008). Yet large corporations control a significant portion of the market share, thus having enough drive to influence policymaking. This may become more evident due to economic instability and recurrent global economic crises that can also affect animal welfare directly, particularly for economies which rely upon international markets and regulations. Nutrition, genetics, health, and qualified handling are likely the first victims of short-term solutions to reduce production costs, a strategy also used to overcome economic crisis.

The general dictum bouncing in the background, especially among the developing countries, is to produce animal protein at the lowest cost possible; this is taken seriously as a great majority of animal agriculture is subjected to high demand for inexpensive animal protein. According to a FAO report (2009), meat consumption in the developed countries is expected to increase by about 15 million tons over the 20-year period (1995-2015) in contrast with 75 million tons forecasted in the developing world within the same time frame. By 2030, an increase in meat demand by an additional 50 million tons among the developing countries is foreseen, mainly the emerging economies, due to increases in population and per capita income (FAO, 2011). To meet this global demand, world agriculture production needs to increase 70% until 2050 (FAO, 2011). Brazil, one of the world's largest grain and meat producers and an important player

as meat exporter, is expected to supply a great share of the demand for animal protein. Latin America, where Brazil is the largest country, is the most abundant worldwide region in agricultural land and water reserves with potential for raising crops and animals (FAO, 2011). Opportunities for expansion of animal protein production are a direct outcome from this scenario (e.g., Brazilian broiler meat exports are projected to grow 5% in 2012 after an expected 6% increase in 2011; USDA Foreign Agricultural Service, 2011). Increase in international visibility is likely a parallel outcome from this process that may attract new markets that demand more welfare friendly products, but also may bring attention from animal protection organizations, as has occurred elsewhere (e.g., Centner, 2010).

This increased demand for meat, resulting in more bulk production of meat globally, deserves the attention and mobilization by animal welfare experts, legislators, policymakers, and most importantly, consumers. Consumers in both developed and emerging countries should be made aware that the expansion of the modern confined intensive animal production systems may result in overlooking the most critically basic requirements for a proper animal welfare state, especially psychological and physical needs. In the authors' opinions, if this ascending global demand for animal protein results in intensifying production systems, there will be a further compromising of the "Five Freedoms" and animal welfare (Brambell Committee, 1965; FAWC, 1993) unless early interventions are taken. Perhaps, the organizational nature of the intensive industrial system that has presented the opportunity for countries to be competitive in the global market (availability of less expensive labor, high production of grains, access to technology, along with other segments of production) offers the opportunity for implementation and monitoring of welfare production guidelines and quality control. Conversely, the low education level of the workforce that goes hand in hand with inexpensive labor costs may also be a limiting factor for improvements of animal well-being otherwise achieved.

Criticisms to the rearing methods commonly adopted for pork and poultry, which are typical but not exclusive to large-scale industrial sys-

tems, are largely the origin of the animal welfare debate and the grounds for many animal welfare issues tackled in the last decades (Rollin, 1995). Nonetheless, this picture for animal production is not likely to change but instead is expected to broaden. For example, the highly publicized and cited UN FAO report “Livestock’s Long Shadow” (Steinfeld et al., 2006) concluded that “there is a need to accept that intensification and perhaps industrialization of livestock production is the inevitable long-term outcome of the structural change process that is ongoing for most of the sector.” It is noteworthy that this same report fails in entailing animal welfare within the scope of production systems, illustrating how more pressing issues like impacts of livestock production on the environment, human health, and society may be taking precedence of animal welfare in the political and scientific spheres.

The reality of dealing with issues of farm animal welfare and access to international markets should be seized side-by-side by both developed and developing nations as an opportunity to address the ethical debate on a broad scale. Just as the debate on the environmental impacts of livestock should not ignore the animals, the center of the production system, an ethical debate of animal welfare in this century needs to include other externalities of agriculture, including its impacts on environment, human health, and nutrition, and on the quality and life expectancy of rural workers. To achieve this level of democratic discussion, it is necessary to inform and empower all those concerned, from consumers and farmers to industry employees and politicians, including them all in the debate.

The Five Freedoms: A Scientific and Practical Perspective

Factors such as the marked global socio-economical trend, rising public concerns for the treatment of animals, the movements of non-profit organizations, and broad scientific evidence have all played an essential role in emphasizing the importance of maintaining proper states of animal well-being in animal raising methods (Figure 4). Furthermore, logical concern for animal welfare has strengthened under the awareness that animals are sentient beings (Duncan and Dawkins, 1983) and that consideration should be given to their well-being, especially when raised under human control and for human consumption (Figure 4). In support of all these deliberations, in the last decade animal welfare science has gained space and recognition within international organizations as the World Organization for Animal Health (OIE). In 2004, the OIE integrated animal welfare as part of its Terrestrial Animal Health Code and has published the OIE Guiding Principles on Animal Welfare (OIE, 2004).

As defined by the OIE, animal welfare is characterized by how an animal copes with the conditions in which it lives. An animal is in a good state of welfare if, as indicated by scientific evidence, it is healthy, comfortable, well nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear, and distress.



Figure 4. Conflict between consumers’ perception and current animal production systems.

Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling, and humane slaughter/killing. Animal welfare refers to the state of the animal (Broom, 1991); the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment (OIE, Terrestrial Animal Health Code, 2011). All the descriptions of animal welfare were written to meet at the very least the Five Freedoms (FAWC, 1993), stated as valuable guidance in sustaining animal care and welfare: freedom from hunger, thirst and malnutrition; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behavior.

Challenges and Accomplishments Critical for Swine and Poultry Welfare

Public concern regarding farm animal intensive confinement systems has driven drastic changes to sow and laying hen housing and can be considered an achievement and a challenge for the farm animal welfare field (EU, 2007; Lusk and Norwood, 2008; Molento and Calderón, 2009; Centner, 2010; Rayment et al., 2010; Mench et al., 2011). Complexity of all elements surrounding rearing of an animal in an intensive confined system has challenged and limited scientific and technological advances in animal welfare, as in some instances it has been easier to scientifically identify a problem than to offer feasible solutions.

The most evident example of changes in animal production towards benefiting animal welfare comes from the EU legislation, stating that gestating crates for sows are to be effectively banned from production in all member states by January 2013 (Council Directive 2001/88/EC and 2008/120/EC). The effectiveness of this directive has also brought anxiety among the main pork exporting countries that target the European market share, as transition time and cost to retrofitting facilities or building new ones are perceived as highly challenging (Buhr, 2008). The unanswered question among government, industry, and market players abroad is not whether this requirement will arrive for the pork industry in other nations, but when.

The directive defines strict facility specifications for housing groups of gestating female pigs (gilts vs. sows) and requires they be housed in groups for the duration of time starting four weeks post-service to one week prior parturition. The answer to which system, crate or group pens, functions best will vary depending upon one’s perception of the term “function”, whether it refers to performance, behavior, physiological responses, health, or labor-cost relationship within each system, as well as ethical values. Implementing such regulation presents an apparent trade-off to sows’ well-being, but the key decisions of which is a better sys-



Figure 5. Piglet castration, a common practice in swine production, is usually carried out at the first days post-birth without the use of analgesics and local anesthesia.

tem should be based on differentiating between which threats to welfare are inevitable to the sows (e.g., keeping sows permanently in crates) and which are due to poor management (e.g., gestating group housing). On one hand, freeing sows from stalls is of extreme benefit to their physical and psychological states, but group housing may lead to temporary excessive aggression when resources such as feed, space, and enrichment are scarce (D'Eath and Turner, 2009). Normal dominance aggression happens during the formation of the social hierarchy (D'Eath and Turner, 2009), but need not involve welfare threatening aggression unless available knowledge on pen design, space, resources, and management is ignored.

Likewise, banning of battery cages (Figure 3) as a housing system for egg-laying hens through legislative action seems quite far from happening in several countries, especially the emerging economies. Eggs are among the cheapest sources of animal protein and the high hen housing density enabled by the caging system is a major contributor for keeping prices low. Alternative housing systems, such as furnished cages and free-range that should allow birds to perform innate behaviors such as wing flapping and dust bathing, increase production costs considerably (Mench et al., 2011). The abolishment of battery cages through legislative actions has occurred in the EU since 1999, and was required as an effective ban across all European countries by January 2012 (Council Directive 1999/74/EC), and in one state of US as of January 2015 (California Health and Safety Code, 2009). Entailed costs associated with building and maintaining alternative housing systems range from 35 to 65% higher of that required by battery cage production (Promar International, 2008; Centner, 2010), an unsustainable investment for economies with narrow profit share, consumers with limited household income, and no subsidies to agriculture.

This current climate towards improving animal welfare has favored the diffusion of readily available technologies that seek to minimize unnecessary suffering of animals. The approval of immune-castration in pigs

in several countries is a technology that has contributed widely to animal welfare. This is a relatively painless and non-invasive method compared to surgical castration (Figure 5) and, additionally, immune-castrated males have similar feeding and social behaviors to those surgically castrated (Cronin et al., 2003). This practice is increasingly being approved and adopted by the pork industry and is currently used in Brazil, Japan, the EU, and more recently in the US and Canada. Surgical castration without the use of anesthesia and analgesics, a routine procedure in pig production (Figure 5), compromises even if only temporarily, the freedoms of fear and pain, and may lead to the animal refusing feed (Rault et al., 2011).

Despite availability and acceptance of immune-castration, the EU has also taken an alternative step to preserve animal welfare which has led to an initiative that would ban surgical castration of pigs. An agreement has been reached to stop castration without anesthesia by 1 January 2012, and a total ban has been scheduled by 2018 at the latest (EU Declaration, 2010). This proposal is not so much a part of European legislation as it is a voluntary agreement involving the European Commission who had initiated the discussion, and private and public organizational signatories to the European Declaration on alternatives to surgical castration of pigs (i.e., European farmers' organization Copia-Cogeca, the European organization for the meat sector UECBV, retailers, veterinarians, the European animal welfare organization Eurogroup for Animals). Perception of farm animals as sentient beings has favored dissemination and use of technologies that cause less pain and stress to animals, such as immune castrations in pigs, while sustaining productivity.

Keeping animals well-nourished and free from discomfort, unnecessary pain, and stress are essential to sustain a good welfare state (Brambell Committee, 1965; Broom, 1991; FAWC, 1993). However, this task can only be accomplished with success if on-farm staff and professionals can understand animal behavior and are well informed on basic animals' needs and conditions required to maintain an adequate welfare state (Broom, 1991; Hemsworth and Coleman, 1998). Inadequate stockmanship has been shown for a long time as an "aggressor" to the physical and psychological states of the animals' well-being (Hemsworth and Coleman, 1998) and is an issue that deserves special attention mainly among the emerging countries. The shortage of people eager to live and work in rural areas, caring for animals and crops, is becoming more evident among the developing countries (FAO, 2006), a movement in the past experienced by developed countries. This scenario is expected to worsen as people seek out work opportunities and better wages in urban areas and access to a better level of education.

Regular replacement of animal caretakers and handlers hinders implementation and efficacy of training programs. Furthermore, there are several elements contributing to this problem: on one side, it is costly for the animal agriculture sector to train someone whom is perceived as unlikely to stay in the job for long; on the other, animal caretakers and handlers may feel unmotivated to do what is right if they do not have sufficient training and their wages are lower than those they can get in an urban job. Advanced technological systems that can provide better welfare for animals, as is the case of electronic sow feeders proposed for group housing of gestating sows, usually require fewer staff to care for the animal; however, they demand skills to work and comprehend a computerized system and take proper actions based on outcomes. Thus herein we reiterate the initial argument that enhancing the education of those responsible for animal care and treatment is a key aspect in the discussion toward improving animal welfare.

Awareness of Animal Welfare among Animal Agriculture Professionals

The urgent need for improvements in education in the context of improving farm animal welfare is not restricted to rural workers. Along this trajectory, the speed at which global socio-economical and political changes in animal agriculture are taking place have not allowed education of undergraduate students or information to be transferred to active professionals at the necessary rate. The likely unintentional unpreparedness of current industry technicians and professionals working directly with producers regarding animal welfare challenges the communication lines across animal welfare sciences, the industry, and the general public.

Field professionals and industry technicians, who could be future animal production leaders, lack knowledge and misunderstand animal welfare principles, especially in developing countries. Our group is currently conducting a survey investigating attitudes and perceptions of animal welfare with field professionals (veterinarians, agronomists, animal scientists, and agriculture technicians) working for both private and public sectors and acting directly with producer assistance in animal production. We have identified so far that only 11% of the respondents have received specific information on animal ethology and welfare, and have a good understanding about the topics. The remaining declared a need for further information and training either because they have not received enough during their training (48%) or because they were not exposed to information on animal ethology and welfare (39%). Based on these results, it can be stated that universities hold an important share of responsibility

over this problem, for instance in Brazil. Although animal sciences and veterinary medicine curriculums have recently been restructured and have included disciplines on animal welfare and applied ethology that in some cases are elective classes (Molento and Calderón, 2009), there is a lack of professionals to provide high quality education in these fields.

Availability of online animal welfare educational tools and courses are scarce and the material used is targeted to English speakers. This latter factor is unquestionably a major limiting issue for veterinary and animal science students from various non-English speaking geographic locations, as is the case of students from developing countries that are in need of further information on animal welfare. When credible and well developed, these online courses are a fast and efficient means of transferring information, as they are usually complemented with interactive media. A reference on educational web-based course was created by faculty from Michigan State University (US) and an international group of experts in animal behavior and animal welfare (Siegford et al., 2005). The course presents information following a problem-based approach, teaching students to assess animal welfare from a scientific perspective. This course has reached attendees across the US and abroad. Other on-line animal welfare tools are currently being developed and coordinated by the Scottish Agricultural College, in collaboration with a broad team of experts including representatives of universities in South America, named Animal Welfare Indicators (AWIN, 2010). In addition to a wide variety of information and publications, this tool offers a link to a Learning Objects Portal with videos and scenarios intended to educate the public and students about



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animal welfare states and conditions, and is planned to become available in non-English languages such as Portuguese.

The Way Forward for Animal Welfare in Practice

Consumer demands have and will continue to drive changes in animal production practices and animal production systems. The most successful and broad changes with benefit to the animals' welfare are those that result in legislative actions subjected to penalties for nonconformance and are under scrutiny from developed communities (Centner, 2010; Rayment et al., 2010). Nonetheless, it is important to mention that parallel to this process, a positive animal welfare movement and show of interest is being observed in the animal agriculture sectors in emergent developing countries. In Brazil, the animal welfare debate is now present in the industry and courses are being taught that raise and discuss the topic in universities (Molento and Calderón, 2009). Furthermore, animal protection organizations have embraced actions to improve the welfare of farm animals and are working side-by-side with poultry, pork, and beef production sectors and government. The so called "Steps" program is a result of collaboration between the World Society Protection of Animals (WSPA) and the Ministry of Agriculture, Livestock and Food Supply of Brazil (MAPA) and focuses on theoretical and on-site training on pre-slaughter and humane slaughter practices.² Although specific legislation on the care of farm animals is still limited to transport and slaughter (Brasil, 2000), the MAPA had a policy in place since 2008 (Brasil, 2008) which recommends general procedures regarding farm animal welfare, and has recently appointed a committee to deliberate on standards and technical recommendations of good practice for animal welfare (Brasil, 2011). Thus, there are expectations that the country soon will have specific regulations. Other examples of this tentative movement are requests for animal welfare consulting in production, transport, and slaughter, and conferences led by the industry requesting seminars on practical and economical implications of improving the welfare of agriculture animals.

On the other hand, when the swine and poultry industries are challenged or questioned with proposals to change modern industrialized animal production systems to improve welfare, the first answer heard is, "Who is going to feed the world?" and, "Who pays for the aggregated costs of better state of animal welfare?" To some extent, these questions seem difficult to contest as still a large percentage of communities in developing countries, for instance, have limited household incomes to spend on food (FAO, 2011). Nonetheless, there is a lack of research and documentation on the economics of the "extra cost" of more welfare-friendly practices for new production systems in developing countries, as these reports are published for countries such as the US and EU (Buhr, 2008; Centner, 2010; Rayment et al., 2010). The extra cost, or investment, is somewhat true in industrialized countries, but may be often exaggerated since retailers increase the price to be paid by consumers for "niche products" and do not compensate the farmers [see Olynk (2012) for a discussion on consumers' willingness to pay and producers' attitudes toward change].

Another controversial point has been brought up by a recent article published in *Nature* (Rosset, 2011), arguing that agribusiness uses land in poor countries for exports, driving off local food producers and poor con-

sumers, whom become dependent on imports to feed themselves. According to this article and as glanced over by the FAO report "How to feed the world in 2050" (FAO, 2011), global hunger is not caused by insufficient food supply, or lack of grains and animal protein, but is a consequence of fluctuations in international trading prices. The price instability is an outcome of governmental deregulation in global food reserves, which instead are controlled by the private sector; as such, "productionism" and current trade regimes exacerbate rather than alleviate hunger (Rosset, 2011).

International Trading Challenges to Animal Welfare

Global trade barriers implicating animal welfare standards are a product of ongoing changes in consumer perception and demands, driven initially by internal policies, especially within key developed economies [see the review by Matthews and Hemsworth (2012) on how the development of local standards can influence national policy]. One should keep in mind that meeting trade requirements relative to animal welfare with the goal of attending demands of the importing country is not always consistent with the reality of production systems and animal products sold to internal markets. Highlighting this discrepancy has led to concern of local scientists and consumers and has kept the attention of animal protection and rights organizations (Eurogroup Briefing, 2011). The European trading system is being scrutinized for multilateral trade liberalization of animal products imported from developing countries, which technically must comply with World Trade Organization animal welfare Green Box terms (WTO, 2004). The concern raised by animal welfare lobbyists and protection organizations is that trade should respect animal welfare specificities that correspond to societal cultures and values. In other words, trade rules stated by environmental, social, and domestic policies should meet regulations of the importing country. These should manage to differentiate or restrict imports on the basis of production methods and have the power to ban the import of production unilaterally (Eurogroup Briefing, 2011). These statements have relevant implication on production practices in countries with high animal product export ranking, but lacking standardized internal animal welfare policies. A major criticism for compliance with welfare actions and legislations are the lack of support, incentives and production subsidies for farmers that have to comply with regulations and directives, a reality not exclusive to the EU (Promar International, 2008; Centner, 2010; Rayment et al., 2010).

In order to overcome trade barriers and access specific markets that grant "visibility", some companies in emerging economies have raised a fitted-to-export portion of animals that meet standards or specifications required by importing countries. An example is the Brazilian swine industry, which makes efforts to attain competitive markets by raising pigs at selected premises free of ractopamine hydrochloride feeding. This growth promoter is fed to pigs in the final three to four weeks prior to slaughter, and is a current pork international trade controversy affecting the US, EU, and recently Russia, China, and Brazil (Anson, 2009). The EU and China, important players in the pork market share, among other economically relevant countries, have banned pork meat imports from animals fed ractopamine. Although the main reason for limiting import concerns residues in meat and organs (EFSA, 2009), it is relevant to note that this growth promoter also negatively affects pigs' well-being. Ractopamine mimics actions of the stress hormones adrenalin and noradrenalin, increasing heart rate, catecholamine blood concentrations, alertness, and difficulty

² <http://www.confinamentoanimal.org.br/conteudos-on-line/animais-de-producao.asp> and <http://www.wspabrasil.org/trabalhoWSPA/animaisproducao/default.aspx> (verified Apr. 27, 2012).

of handling, resulting in greater incidence of hoof lesions and greater aggressiveness (Marchant-Forde et al., 2003; Poletto et al., 2009, 2010a,b). As an assurance of import compliance, animal welfare audits are carried out by international commissions organized from importing countries, a routine for industry under this trading condition. Nonetheless, domestic markets do not have the option to buy pork without ractopamine, as products carry similar labels and consumers are uninformed of the compound use and its actions. Herein, the question to be raised is whether given the alternative, consumers would buy this product from a grocery store shelf. Most importantly, policymakers and industry representatives should ask themselves for how much longer it will be sustainable to keep differences in methods of raising and caring for animals that are designated for export versus internal markets, once consumers in emerging countries are paid better wages, becoming more critical and demanding of animal products they eat.

An additional problem is that if changes in animal welfare related husbandry and housing practices are made exclusively to meet importing market requirements, the industry will not prepare for greater scale changes. The main reason is that if most adaptations and changes to improve animal welfare are made to enable trade agreements between the industry of emerging nations and retailers in importing countries, it is less likely that transition periods will be negotiated as if a larger international agreement were in place. The EU has allowed producers at least a decade to adjust the system (e.g., the ban of gestation stall housing for sows, conventional laying hen housing, and piglet castration) and the US has delayed for periods ranging from 3 to 10 years (Centner, 2010). Without such transition periods, which are generally aimed at reducing the socio-economic impacts of compliance, the most likely outcome is the emergence of different segments within the industry dedicated to meeting the domestic and the international market.

Conclusion

Justification for advances in favor of animal welfare among key players in animal agriculture (citizens, government, industry, and stakeholders) must not be taken only as a challenge, but as an opportunity to ethically advance while employing production practices that are socially responsible and sustainable. Theoretically, it is not difficult to have an agreement from some of these players on the beneficial outcomes associated with improving animal welfare, both from the ethical and the productive standpoints. Nonetheless, a significantly wide gap still exists between thinking and approaching ethically correct actions, and effectively exercising animal agriculture practices that address this concern. Sharp and visible economic return has been and is expected to continue being the main engine driving maximization of farm animal production. This scenario will be maintained unless government and policymakers take control of this primary challenge facing animal welfare: the confinement and intensification of systems to raise animals for food. Historically, we have set the stage and witnessed events where animal protection organizations unveiled practices commonly adopted for raising pigs and producing eggs that were unfamiliar to general public communities. These movements have been successful in leading a chain of consumer reactions and demands that are capable of “moving mountains” surrounding the safeguarding of farm animals’ well-being. Societies evolve ethically, especially when provisions for access to education and information are increased, a process currently taking place among the emerging economies. Realizing that farm animals

are sentient beings has been the key to revolutionizing animal welfare science and the impetus for changes in production practices and methods that until recently were considered acceptable by societies.

The pressure to comply with animal welfare standards in order to become competitive in the international trade context can be used by developing countries as an end in itself (i.e., as a niche market opportunity for a few stakeholders, or as an opportunity to bring about significant changes to the animal industry). Global animal markets should seize this opportunity to reflect on which food quality, food safety, environmental, and animal welfare standards should be followed by the animal industry. The large-scale animal industry attains support from government for being a source of inexpensive food, jobs, and revenues. But the pork and poultry industries may need to prepare for rising expectations from a coming generation of more prosperous domestic consumer public and rural workers. More stable international, as well as internal, markets may be conquered and maintained based on a reputation of reliability and the ethical quality of animal derived products, rather than by low-cost food alone.

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