

ABSTRACTS
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SYMPOSIA AND ORAL SESSIONS

* Author Presenting Paper

Bioethics: Symposium-Ethics and the Cost of Food: What is the Impact of Lessening Food Prices on Citizens, Producers, Animals and the Environment?

347 Cheap food and its impact upon health, safety and security of supply. J. Hodges*, *European Association of Animal Production, Mittersill, Austria.*

During the 2nd half of the 20th century, the pursuit of cheap food has been the prime strategy of animal and agricultural scientists in Western society. Intellectual and organizational resources are shaped to serve this objective. These include disciplinary research in the biosciences, management systems, mechanisms to maximize scale, recycling of waste and by-products, increased capitalization, reduced labor, and the relocation of production sites nationally and internationally. Alternatives are often dismissed as inefficient and unrealistic in the age of Homo economicus. Some non-monetary values have recently appeared in the equation: human health, food safety, gustatory food quality, animal welfare and quality of rural life challenging the monolithic dominance of the cheap food movement. But mainstream Western agriculture, fuelled by the powerful engine of science allied to business, still dominates by seeking ever cheaper food. I argue that this mainstream ideology will not change while the unseen external costs remain hidden and apparently painless. Nevertheless informed people know that the mainstream system is unsustainable in terms of biological resources, the environment, the quality of human life and in the civilized values for treatment of other people and of animals. In this paper, some options are explored by which these hidden costs might be factored into the visible costs of the food chain. Globalization of food production is built upon the cheap food Western model of intensification, capitalization and specialization. But the history and current experience of food in the West finds national governments as major players in regulating health, safety and providing economic support. The prospect of major global food supplies responding solely to market forces holds threats of instability and unsustainability with food shortages, disruption of family farms and rural societies in the developing countries plus health and safety issues outside regulatory control. The paper concludes that food deserves more

care nationally and internationally than the fate of being driven into the 21st century solely by the ideology of low cost.

Key Words: Cost, Safety, Sustainability

348 Considerations of the relationship between food prices and animal welfare. M. C. Appleby*, *The Humane Society of the United States, Washington, DC.*

The proportion of income spent on food has been in steady decline. Most people could readily pay more for food. Indeed, most consumers already pay more than necessary, by buying specialist products or convenience foods. But there are costs associated with cheap food produced from animals that reach well beyond the dollars paid by citizens at the checkout register of a supermarket or fast food restaurant. A morally significant effect of pressure for cheap food production has been modifications to production methods that may have impacts on animal welfare; for example by decreased space allowances. Cheaper food for humans sometimes involves greater pain and suffering for food animals. Yet improvements, possibly even major improvements, in welfare could be achieved with only small increases in price to the consumer. The obstacle to change is in part economic inertia - producers resist change because buyers expect low prices. Deployment of public subsidies and gradual change could avoid these short-term effects, although protection is needed against imports from countries with even lower welfare consideration and environmental standards. From the viewpoint of doing what is appropriate for animal welfare and the environment, free market competition should no longer be the sole determinant of food prices. Animal scientists can serve the long-term interests of animal agriculture by combining efforts to do the right thing for welfare of animals with more traditional goals.

Key Words: Animal Welfare, Economic Competition, Food Prices

349 Interrelationships of animal agriculture, the environment and rural communities. M. G. Hogberg*¹, F. L. Kirschenmann², S. L. Fales³, M. S. Honeyman¹, and J. A. Miranowski⁴. ¹Department of Animal Science, Iowa State University, Ames, ²Leopold Center for Sustainable Agriculture, Iowa State University, Ames, ³Department of Agronomy, Iowa State University, Ames, ⁴Department of Economics, Iowa State University, Ames.

Animal agriculture has an obvious, close interrelationship with both the natural environment and also with human systems such as the rural community. Accordingly, changes in animal agriculture can have broad ranging consequences to other areas. Tremendous change in animal agriculture has occurred during the past 50 years. In general this has involved an increase in size of production units, greater reliance on technology, a corresponding decrease in labor, increased animal confinement, and a general trend toward monoculture or specialized production systems. At least in part these changes were brought about by animal science research in nutrition, breeding, reproduction, growth, etc. A long-term goal of animal scientists has been to increase biological efficiency of production, and the success in reaching this goal could be said to be remarkable with the time to market, growth rates, milk and egg production, etc. per animal increasing as much as 2 to 3 times in the 50 years. The increase in the efficiency has brought about a parallel decline in food prices. But while animal science in one sense has been very successful, new questions or issues have emerged. The scale of animal systems today sometimes concentrates large numbers of animals into areas smaller than can easily handle the animal waste. Stream and ground water pollution is increasingly a concern in some regions. Odor is a nuisance problem that increasingly places urban growth in conflict with confinement animal systems. Possibly one of the biggest issues can be stated in terms of sustainability; i.e., are all current food animal production systems ones that can continue as they currently exist. Additionally, the decline in numbers of producers has impacted the sociology of rural communities and in some cases brought about the closure of small towns. Animal scientists typically contend that they serve the interests of producers and strive to promote practices that are environmentally sound. Bringing about a discussion among animal scientists

Lactation Biology: Symposia: Molecular Mechanisms Governing Mammary Development

351 Emerging genomic technologies for studying mammary development and mammary cancer. D. Porter*^{1,2} and K. Polyak^{1,2}. ¹Dana-Farber Cancer Institute, Boston, MA, ²Harvard Medical School, Boston, MA.

The breast cancer genetics lab at the Dana-Farber Cancer Institute is currently using genomic approaches to understand the biology of the mammary gland and breast tumorigenesis. This work has involved global gene expression profiling of normal and cancerous mammary tissue to identify diagnostic, prognostic, and therapeutic targets in breast cancer as well as follow-up experiments on candidate genes to more fully characterize gene expression and physiological function. SAGE (Serial Analysis of Gene Expression) is an expression profiling method that allows for global, unbiased, and quantitative characterization of transcriptomes. The expression of thousands of genes can be analyzed simultaneously without prior knowledge of their sequence, thus leading to the discovery of novel transcripts. Importantly, this makes SAGE a particularly useful tool for use in species with incompletely characterized genomes like the dairy cow. We have used SAGE to characterize normal and malignant gene expression patterns in the human breast, and we have identified genes involved in mammary epithelial cell differentiation, proliferation, and survival that may be involved in the initiation and/or progression of breast cancer in humans. In addition, we have combined immuno-magnetic cell sorting and SAGE to describe the comprehensive gene expression profiles of individual cell types composing breast tissue thus providing a molecular portrait of potential autocrine and/or paracrine interactions among cell types in the mammary gland. The application of these technologies in the dairy cow will lead to the discovery of important new genes and has the potential to yield important insights into the molecular basis of developmental processes in the mammary gland.

Key Words: Genomics, Mammary, SAGE

as to whether these goals are always met, or could be better met, is considered to be a worthwhile endeavor.

Key Words: Animal Agriculture, Food Prices, Environment

350 Ethics and low-priced meat, milk and eggs: Too much of a good thing? R. J. Burkhardt*, University of Florida, Gainesville.

There can be little doubt that decreases in food prices are generally thought to be in consumers best interests. If we wish to base judgments about the ethical soundness of practices designed to reduce food prices on a human welfare-optimization, or utilitarian, ethical norm, then those practices are seemingly right. One assumption that has to be made in this regard is that prices are high enough to keep producers in business. Assuming that is true, one question that arises is whether lower prices are ethically sound for all foodstuffs. It could be argued, for example, that low wheat or corn or rice or vegetable prices are ethically sound because these are food staples, and in some form consumed by people from every socioeconomic and demographic category, both domestically and around the world. When we consider food from animals, the argument is not so easily made. It could be, for example, that lower meat, milk and egg prices means that more ostensibly "free" resources such as water are being consumed by the respective industry, and additional animal wastes are being introduced into the environment. These "hidden costs" are not to be ignored in a long-run utilitarian assessment of the ethics of lower animal-based food prices. However, the more significant ethical concern is whether lower prices encourage more consumption, and given connections between animal fats and risks to human health, should additional meat, milk and egg consumption be encouraged? This is made all the more important when we think about what economists call "substitution effects": will lower prices for animal products encourage the substitution of meat, milk and eggs for other food products, also essential to human well-being?

Key Words: Applied Ethics, Animal Agriculture, Food Costs

352 Hormonal regulation of mammary growth, morphogenesis, and breast cancer. R. C. Hovey* and J. F. Trott, University of Vermont, Burlington.

Mammary development in all species is regulated by a complex interplay of hormones that reflects the reproductive state of a female, ultimately in preparation for lactation. These changes translate to phases of ductal development with associated branching and lobulogenesis, alveologenesis, secretory activation, and subsequent involution. Separately, breast cancer can arise as a function of dysregulated growth by normal mammary epithelial cells. Notably, these changes occur in a tissue microenvironment that can act as a site of local mediation for hormonal cues. Our lab has addressed questions concerning the hormonal regulation of normal mammary gland development and the local changes that mediate this input during processes associated with cell proliferation, morphogenesis and breast cancer. In particular, we have addressed the combinatorial regulation that occurs with alterations in the pituitary-ovarian axis in several species. Our data demonstrates that hormonal cross-talk and its local mediation by autocrine and paracrine factors is a key determinant of specific proliferative and morphogenic events. It also serves to regulate changes in supporting tissues such as the vascular endothelium and surrounding stromal. Currently we are delineating some of the transcriptional mechanisms underlying these changes with the objective of defining key pathways downstream of hormonal regulation during mammary development and breast cancer progression.

Key Words: Mammary Gland, Hormones, Gene Expression