

are skills that will make an employer take notice; furthermore, they can be achieved via a variety of venues. Teaching and taking classes and conducting research certainly all lend themselves to improving these skills. However, to become an exceptional graduate student, extra effort is needed. Become involved with your department, guest lecture in classes, participate on panels about graduate school, and be involved in departmental or university-wide committees and programs. Be engaged in professional organizations; not only are they a great place to network and raise your visibility to future employers, but often offer opportunities for professional development, such as symposia, workshops, and leadership opportunities. Strive to become a well-rounded individual. In a world of increasing specialization, graduate students and faculty are often isolated in their department or discipline. This specialization isolates us socially and intellectually, and creates an environment in which it is difficult to “think outside the box”. Finally, remember that with the stress and long hours of graduate school, the importance of family, friends, good health, and sleep is often underestimated. Keeping these a priority can improve productivity in the classroom or lab and lead to the formation of a highly successful graduate student, valued by future employers.

801 Opportunities outside of the lab, international experience, networking, and professional societies? J. S. Radcliffe*, *Purdue University, West Lafayette, IN.*

Obtaining a graduate degree in Animal Sciences requires a significant amount of laboratory, animal, and course work. However, often opportunities outside of these traditional settings may be most beneficial to the student and to the advisor’s research program. Individuals seeking a laboratory to complete a graduate degree in are often instructed not to get all of their degrees from one institution. The rationale behind such advice is that it is good to gain different experiences and perspectives by attending more than one University. While this advice seems reasonable, it still usually limits the student’s exposure to labs conducting similar research within the United States. As the globalization of agriculture continues, it is becoming increasingly important for individuals in Animal Sciences to have a global rather than a national perspective of agriculture. International opportunities for graduate students during their degree program are invaluable in helping students to obtain a broader perspective of agriculture and how their research may impact animal agriculture. Providing graduate students with an international opportunity can be as simple as letting them attend an international meeting or as complex as allowing them to complete a portion of their research in a lab based outside of the United States. The advantages and disadvantages of such opportunities will be discussed based on personal experience as a student and advisor.

Key Words: Graduate Education, International Experience

Bio Ethics - Livestock and Poultry

802 Why it is important to understand bioethical concepts. R. D. Reynnells*¹, C. C. Croney², and D. J. R. Cherney³, ¹*USDA/CSREES/PAS, Washington, DC*, ²*Oregon State University, Corvallis*, ³*Cornell University, Ithaca, NY.*

Understanding bioethics helps us discern how food animals ought to be treated, and is basic to our views of animal welfare and animal rights. Few of us were trained in philosophy or ethics. Our ethical training primarily is based on religious concepts or societal expectations. Bioethics, ethics applied to biological systems, increasingly influences decisions by stakeholders and officials. Philosophical attacks on food animal production may first eliminate Judeo-Christian religious concepts, and then dissect secular ethics based on rules of logic. Change is promoted based on these chains of logic that discard current norms for animal use in favor of new found “truths”. Organizations are changed by decision makers’ understanding of issues, structural requirements and goals, desires, political pressure, etc. Agricultural firms are no different. Decision makers may include consumers who make purchasing decisions (drive market demand), voters, government officials, and producers. Historically, cheap food demand has been a major change agent for agriculture, as has the desire of farmers to avoid undesirable situations. It is increasingly difficult, and yet imperative, to balance ethical considerations with economic and practical aspects of animal agriculture. This balance is complicated if production changes are not market driven but imposed by persons apparently attempting de facto management, absent the risks, of farmer’s resources. New standards for change are not restricted to questions about how to efficiently raise food animals, but include concepts of refinement, reduction, and replacement of animal management and care practices. Consideration of whether or not we should use animals for food is a

crucial ethical concept. Several bioethical concepts will be discussed. Should bioethical and animal welfare science considerations be the basis of our management and regulatory decisions? Should a person’s or organization’s vision of ethical behavior be forced on an industry and society, or should changes in agriculture come through true market demand? Also to be discussed is how our awareness of bioethical concepts facilitates our ability to properly address animal welfare issues.

Key Words: Animal Welfare, Bioethics, Societal Expectations

803 The ethical landscape of non surgical embryo-transfer in pigs: An explorative study of public concerns. F. R. Stafleu², D. W. B. Ducro-Steverink¹, and J. W. M. Merks*¹, ¹*IPG, Institute for Pig Genetics B.V., Beuningen, the Netherlands*, ²*Ethics Institute, Utrecht University, Utrecht, the Netherlands.*

Non surgical embryo transfer (nsET) focuses on the development of a technique in pig production to improve genetic preservation and international trade. In modern society however, the public is concerned about ethical aspects of animal production. To get an impression of these “public concerns”, an opinion about the nsET technique was asked of four groups: agricultural professionals involved in nsET, professionals of the Eurogroup for Animal Welfare, volunteers of the Dutch Society for the Protection of Animals and a group of members of the public. An ethical analytical tool (the ethical Matrix) was used to collect these opinions in a standardized way. Rooted in these opinions, an ethical analysis of moral problems possibly connected

with the technique was made, resulting in a description of the “ethical landscape” of the technique. From the results it emerges that, seen from inside the practice of pig breeding, it is a skillful technique with clear economic and animal welfare advantages. But many of the contra arguments come from an outside perspective and are concerned mostly with the “unnaturalness” of the procedure and the negative impact that the technique may have on biodiversity. Also the technique is often associated with intensive farming which has for many a negative connotation. It is concluded that moral criticism is possible. Whether this criticism leads to an overall negative moral judgment remains to be seen; an overall judgment falls outside the scope of this study. It is stressed that in a pluralistic democratic society it is very important that agricultural professionals discuss these issues with the rest of society, each on the basis of their own ethical convictions. In such a discussion the strong and the weak points will emerge and a judgment can be made.

Key Words: Ethics, Non Surgical Embryo Transfer, Pigs

804 Animal welfare and the ethics of care: Towards a sustainable practice. R. Anthony*, *University of Alaska, Anchorage.*

Recently, the ethics of care has become part of the vocabulary in animal welfare ethics. It has gained momentum in animal welfare circles because the orientation that it takes best suits the apparent progress we've made in understanding animals' capabilities and how they are harmed, and because of its genuine desire to converge toward appropriate and sustainable ethical norms by appreciating the set of cultural and technological practices involved in farming. The ethics of care approach, in contrast with formal rule theories like utilitarian and rights-based approaches, begins not with the “what, if anything, do we owe animals” question, but instead with the context sensitive question of “how can we better meet our care responsibilities, to those who rely on us”. After a brief consideration of the moral, political and technological contexts of agriculture, I attempt to show what it might take for an ethics of care to occupy a central role in our animal farming practices. Following scholars in this area, four key elements of an ethic of care will be delineated (i.e., attentiveness, responsibility, competence, and responsiveness) and applied to farmed animal welfare ethics.

Key Words: Animal Ethics, Animal Well-Being, Ethics of Care

805 Animal biotechnology: where to from here? A. L. Van Eenennaam*, *University of California, Davis.*

Biotechnology is defined as the application of science and engineering to living organisms. From this definition it is obvious that livestock breeders have been practicing animal biotechnology for many years. However, in recent years this term has been increasing associated with the technologies of cloning and genetic engineering. Products of these controversial technologies are slowly starting to move towards commercialization with the first human therapeutic compound derived from the milk of a genetically engineered animal being approved by the European Commission in 2006. The global market for recombinant proteins from domestic animals is predicted to reach US\$18.6 billion in 2013. Similarly, the entry of products from cloned animals into the food supply also moved a step forward with the release of the FDA's draft risk assessment which found that edible products derived from marketable clones posed no additional food consumption risks relative to corresponding products from sexually-derived animals. However, the animal biotechnology industry still faces a variety of scientific, regulatory, ethical, and public acceptance issues. Many polls have concluded that the majority of people are opposed to ‘animal biotechnology’. Closer examination reveals opinions are technology-dependent, with most people being favorably disposed towards the concept of genomics, and less supportive of genetic engineering and cloning. The industry is also faced with uncertainty arising from whether governmental agencies intend to consider moral and ethical factors, in addition to scientific evaluation of risks and benefits, when making regulatory decisions about cloned or genetically modified animals. Perhaps in response to public opposition or decreased funding support, the previously increasing numbers of published papers on cloning and genetic engineering have leveled off in recent years. Additionally, relatively few scientists have actively participated in the public discourse by articulating the science-based risks and benefits, in addition to the ethical issues, occasioned by these potentially-compelling technologies. It is currently unclear what role publicly-funded animal scientists will play in arriving at a societal consensus on the acceptable uses of animal biotechnology.

Key Words: Biotechnology, Cloning, Genetic Engineering

ADSA Production Division Symposium

806 Feeding programs that meet the challenges of heat stress. J. N. Spain* and D.E. Spiers, *University of Missouri, Columbia.*

Increased levels of milk production has increased the metabolic heat load lactating dairy cows must transfer to the environment to maintain thermal balance. As a result of this advanced genetic base, the incidence and severity of heat stress has increased. Heat stressed dairy cattle experience significant adverse responses including decreased milk production, increased incidence of mastitis, decreased fertility and lower reproductive success. Management strategies focus on reducing the thermal stress by decreasing heat load while concurrently increasing heat loss. Nutritional management strategies have been developed to support heat stressed dairy cows. Increased nutrient density and diets with a lower heat increment have been designed to decrease the heat

load. Heat stressed cows have increased nutrient demands associated with higher requirement of electrolytes. Heat stress also alters rumen function. Decreased rumination, lower saliva secretion and lower buffering capacity of saliva increase the incidence of ruminal acidosis. Use of feed additives to help maintain a higher ruminal pH can provide important therapeutic support of the heat stressed cows. In addition, the lower rate of passage also decreases microbial efficiency and flow of microbial protein from the forestomachs. Therefore, the adjustment of protein supplementation can be made to maintain optimal amino acid flow to the small intestine. Therefore, seasonal adjustments of nutritional management strategies can be implemented to help mitigate the negative impact of elevated temperature and humidity on high producing dairy cattle.

Key Words: Dairy, Heat Stress, Nutrition