management to industry, becoming more involved with applied research, demonstration and technology transfer on feed management, and looking for ways to provide incentives, both monetary and non-monetary, for the adoption of feed management practices.

Key Words: Feed Management, Environment, Industry Nutritionists

644 Development of rapid methods for assessing nutrient bioavailability. S. C. Ricke*, V. I. Chalova, and W. K. Kim, *Texas A&M University*.

Accurate assessment of nutrient bioavailability is critical for achieving an optimal balance between sufficient and excess for major feed components such as protein sources. Optimizing feed protein sources for farm animal amino acid (AA) requirements is difficult to achieve given the variations in protein quality. Feeding excess protein to meet AA requirements contributes to excess nitrogen (N) environmental pollution. To avoid productivity losses from an improper AA balance, feeds can be supplemented with pure AA to reduce animal N excretion. This requires AA bioavailability assessment by animal bioassays prior to supplementation. However in addition to the time commitment and costs, activism interests are beginning to restrict routine animal tests. Ideally the animal feed industry needs alternative rapid methods for quantifying AA availability during feed processing. Rapid assays would allow animal nutritionists to adjust AA addition after assessing basal diet AA bioavailability. *In vitro* microbial bioassays for AA and other nutrients have been examined as a rapid alternative for a number of years. Such assays have the advantages of biological similarity to animal responses while retaining the flexibility and reproducibility capabilities of a conventional chemical test. Although several microorganisms have been examined, *Escherichia coli* has become the assay organism of choice because it is well studied, has simple growth requirements, and genetic modification is relatively easy. Given the molecular techniques currently available *E. coli* can easily be genetically engineered to provide an array of rapid whole cell AA biosensors. General application of this technology opens the door for more precise formulation at the feed mill and avoidance of unnecessary supplementation that result in animal production generated environmental problems.

Key Words: Nutrient Availability, Environmental Excess, Whole Cell Biosensors

Bioethics

645 Culture, values and ethics of animal scientists. John Hodges*, *European Association of Animal Production*.

Culture is defined as the shared worldview of a sub-set of humanity: race, nation, or professional group. In practice Culture means The way we do things around here. Values are the objectives that matter most to a person or to a cultural group to which priority of interest is consistently given in decisions allocating time, energy, resources, wealth and education. Ethics defines the moral component of each decision reflecting self-interest and/or concern about the well-being of other individuals or groups in society. Thus, in any sub-set of humanity, including professional animal scientists, Culture, Values and Ethics are closely linked. The normative cultural assumptions and commonly-held values of animal scientists guide group and individual decisions on the research and application of scientific knowledge. Strong links between animal scientists and business interests mean that the culture and values of commerce also inform and steer decisions by animal scientists. The food chain is increasingly watched by society as a whole, by governments and by special interest groups to determine the extent to which our behaviour is ethical or serving only our special interest group. The changing culture and values of societies in Europe and North America and Developing Countries are examined and compared with those of animal scientists. It is proposed that more radical changes in the culture and values of animal scientists are needed to match the assumptions of all societies for their food supply.

Key Words: Culture, Values, Ethics

646 An Argument that Animal Quality of Life Must be Central to Any Moral Justification of Animal Agriculture. W. R. Stricklin*, *University of Maryland*.

Personal experience has led to my belief that the majority of professional animal scientists have not seriously considered how they would construct a full moral justification for animal agriculture. And current graduate programs in animal science commonly do not specifically challenge students regarding the moral basis of animal agriculture - or the implications of the student's research to this question. It is common for animal scientists to generally defend animal agriculture from a basis inclusive of premises such as 1) there is hunger in the world today, 2) the world population is expected to double in the next 30-50 years meaning more food must be produced, 3) animals utilize food stuffs not suited to human consumption, etc. However, rarely do animal scientists contend that food animals do - or can - benefit from their existence as sentient beings, i.e., having lived and experienced a reasonable quality of life. Singer originally argued in _Animal Liberation_ that it is acceptable to produce food from animals provided they experience a quality of life comparable to that of a wild counterpart, but he subsequently argued that this is not possible with today's modern production systems. There is considerable agreement among the survey data on public attitudes indicating no trend toward vegetarianism or desire to move in that direction. However, there is very strong evidence in these same data sets indicating that the public seeks assurance that animals experience a reasonable quality of life. A utilitarian, or costs and benefits, moral argument for animal agriculture is strongest, possibly only defensible, when the quality of animal life can be predominantly placed into the benefits category - not included as a cost as many persons contend today. Incorporating consideration of the quality of the life experienced by animals into animal science teaching and research activities is in the best long-term interests of animal agriculture. It is also the right thing to do which further promotes the interests of all parties involved.

Key Words: Bioethics, Animal Sentience, Animal Science

Breeding and Genetics

647 Evaluation of Dorset, Finnsheep, Romanov, Texel, and Montadale breeds of sheep: Reproduction of F_1 ewes in spring mating seasons. K. A. Leymaster*, E. Casas, and B. A. Freking, *USDA-ARS, U.S. Meat Animal Research Center, Clay Center, NE*.

Objectives were to estimate effects of sire breed (Dorset, Finnsheep, Romanov, Texel, and Montadale), dam breed (Composite III and northwestern whiteface), mating season (March and May), ewe age (4, 5, and 6 yr) and their interactions on reproductive traits of F_1 ewes. A total of 1,099 F_1 ewes produced 1,754 litters from 2,330 exposures to Suffolk rams during 42-d mating seasons. Litter size and weight at birth were recorded and litter size and weight at weaning and 20 wk of age were analyzed separately for dam- and nursery-reared lambs. Total productivity from 4 to 6 yr of age for each ewe entering the breeding flock was calculated as the sum of 20-wk weights for dam-reared lambs. Interactions of sire breed x mating season, ewe age x mating season, and ewe age x dam breed were often significant. Interaction of sire breed x dam breed on conception rate ($P < 0.01$) was due to change in rank as well as magnitude. Averaged over mating seasons, Romanov x Composite III ewes had the greatest conception rate (93%) and Montadale x Composite III the lowest (64%). Interactive effects of sire breed and mating season on conception rate ($P < 0.001$) were due to differences in magnitude, with Romanov-sired ewes being most consistent between seasons (92% in March and 89% in May). Sire breed affected litter size at all ages ($P < 0.001$), ranging from 1.40 lambs at birth for Texel to 2.09 for Romanov. Differences between dam breeds in total productivity of dam-reared lambs were not detected, whereas ewes exposed in March (78