262 Working Dog Challenges: The interplay between genetics, environment and training. P. Mundell*, *Canine Companions for Independence*, *Santa Rosa, CA*.

While dogs do not fall within the traditional agricultural focus of animal science, their ever growing role in modern life offers unique challenges and opportunities for the discipline. The rapid increase in ecomonmic importance of the pet industry in recent decades has obvious and well-understood significance. A more recent phenomenon, and one that is perhaps not as well appreciated, is the proliferation of both the number of dogs that are trained and placed into working roles and the types of tasks that these dogs are being asked to perform. In addition to the functions of livestock herding and guarding, finding game, and the other purposes for which dog breeds were originally developed, dogs are currently working with blind, deaf and physically disabled people, serving as narcotic and explosive detectors, patrolling with the police and military and detecting the presence of certain medical disorders such as cancer and diabetes. The many programs worldwide that employ dogs in these and other capacities face a wide variety of challenges to meet the demand for suitable and well-trained animals. After presenting an overview of some of the ways in which dogs are currently employed, the types of challenges common to working dog programs are explored, as are the approaches being adopted to address these challenges.

Key Words: Working dogs

263 Companion Animal Science: State of the discipline. G. Aldrich*[1], N. A. Irlbeck[2], and R. L. Kelley[3], [1]*Pet Food & Ingredient Technology, Inc*, *Topeka, KS*, [2]*Colorado State University*, *Fort Collins*, [3]*The Iams Company*, *Lewisburg, OH*.

The U.S. pet industry has seen steady growth with sales of companion animal products of $35.9 billion, $14 billion from food alone, and more than 140 million dogs, cats, and other pets. From an economic prospective, this segment is larger than the revenues of the more traditional animal science segments like sheep, goats, and horses combined. The demographics at the academic level have also changed from rural, male students interested in food animals to a majority of suburban, female students interested in small (companion) animals with aspirations for veterinary medicine. In response, some animal science departments have developed companion animal coursework. Companion animal research has made substantial advancements in the past decade. On the broader social level, research has begun to demonstrate the direct value of companion animals on human health by such things as stress reduction, human socialization, and even cancer detection. At the animal level, completion of the canine genome map, dedicated pet imaging centers, improved diagnostic tools, joint replacement, better therapeutic nutrition, species specific cell lines and molecular kits have all become a reality. While this truly marks great strides within the discipline, it is not without challenges. Each year there are over 330,000 dog bite incidents, with a loss of life for more than 300 people between 1979 and 1996. Each year more than 4.3 million pets are relinquished to animal shelters with most euthanized (63%). The scientific community within the discipline stands at a crossroads. Since there is very little direct public funding, most scientific advancements have occurred within closed industrial communities (food and pharmaceuticals), veterinary schools, breed associations, and service dog programs. Examples of collaboration are available, but not prevalent, and far too much research goes unpublished. To fill the gaps and remain relevant, Companion Animal Sciences must demonstrate the value of the discipline to the economy, its importance to society and public health, and demonstrate to prospective students that careers in companion animal science are worthy of pursuit.

Key Words: Companion Animals, Academia, Industry

Extension Education: Profitability of Dairy Farming in a Global Economy

264 Financial records for dairy farms from across the USA. W. T. Cunningham*, *Genske, Mulder & Company, LLP*, *Rancho Cucamongo, CA*.

Benchmarking within dairy production financial records is an important management tool. Information within and between states, regions, genetics, and herd size can be used to improve dairy profitability. Income and expense information will be provided for dairies that average over 1500 head milking that are located in the following states and geographic regions of the United States: Arizona, California (Southern, Central, and Northern), Idaho, Midwest, New Mexico, Texas (Central and Panhandle), and Washington. Information and analysis will also be provided separately for certain 'top 25%' performers and for Jersey cow operations. Key financial areas that will be discussed include sources of income, feed expenses, herd maintenance and replacement costs, and various other operating expenses such as financing, labor and veterinary. Limited production data will also be disclosed, with discussion of the correlation of production and profitability. The data presented is from the client records of Genske, Mulder & Co., and is from financial statements, prepared in accordance with Generally Accepted Accounting Principles, from approximately 250 dairies.

Key Words: Dairy production, Financial management

265 Determinants of regional profitability on dairy farms. J. Miller*[1,2], [1]*USDA Economic Research Service*, *Washington, DC*, [2]*Retired*, *Harrisonburg, VA*.

Relative profitability of dairy farms across regions depends on a number of natural and market factors, as well as the managerial ability of dairy farmers. Some of these factors are truly regional in nature, such as climate, forage production and markets, taxes, local fluid markets, and environmental sensitivity. Other factors are not really regional, although large regional differences may exist. These factors include farm size, dairy infrastructure, availability of human capital for dairy production, and a dairy friendly business climate. In all of these factors, local differences may be greater than regional differences.

Key Words: Dairy, Profitability, Region

266 Northeast Dairy Profitability. D. Rogers*, *First Pioneer Farm Credit*, *Enfield, CT*.

The Northeast Farm Credit ACA's publish an annual report on the Dairy Industry. For short, it is called the Book Book or Dairy Farm Summary. In 2004, 549 Dairy Farm financial records were compiled

on an accrual basis. Highlights include: 5 year trends showing the Dairy Profitability Cycles, farms split into profit quartiles to see what the top 25% do to make so much money, also are broken down into different size groups that show the impact of various herd sizes and costs are shown on a per cow and per cwt. basis. In this 30 minute presentation, we will cover the key factors that contribute to successful farms. Herd size, productivity, efficiency, cost control and internal herd growth (IHG). The average dairy farm return on assets (ROA) over the past 5 years has ranged from 1.9% to 7.5%. This is not very high for the risk involved. It is not financially wise to just be average. Dairy farmers today must step up their management intensity if they want to make progress. My one liner is "To have a quality of life, you have to run your farm as a business". The Northeast summary covers 9 of the 12 states that Hoards defines as the Northeast region. There are about 18,000 commercial dairy farms with New York, Pennsylvania and Vermont having the major dairy concentration. Almost all of the farms grow their own forages with a trend of smaller ones utilizing intensive grazing. The farms in our summary average 230 cows. The Region averages 80 cows per farm.

Key Words: Profitability, Dairy, Business

267 Profitability of pasture-based versus confinement dairy farming. G. Benson* and S. Washburn, *North Carolina State University*, *Raleigh*.

Purpose: To review and integrate existing information on the relative profitability and longer term viability of pasture-based dairy farming. Evidence from several studies shows that profit margins for pasture-based farms are higher than for confinement farms. Most data are from north central and northeastern states. A recent study using 2000-2003 data showed an advantage in annual net farm income from operations for pasture-based farms of $243 per cow in Wisconsin and $210 per cow in New York. Compared to the confinement farms, the advantage to pasture-based farms is 64% and 92% higher, respectively. Data for other regions is limited but is supportive of the competitiveness of pasture-based dairy farms. Reliance on pasture and pasture management practices can vary widely and are seldom well defined in these studies. Data show wide variation in profitability among farms of a similar type, whether confinement or pasture based. Dairy farm numbers are declining, particularly small farms, and reported average sizes of pasture-based farms are small, although herds of > 300 cows exist. In the short run, the observed financial advantage enhances survival relative to similarly sized confinement farms. However, the income potential for any small dairy farm is limited and the trend in profit per cow is down, which is an obstacle for the long-run viability of some pasture-based farms. The distance milking cows can walk to pastures, acreage and farm layout affect herd expansion opportunities on a specific site. Some pasture-based dairies have options to add income by supplying a growing market for specialty products produced by methods valued by consumers. These include homestead cheese, farm bottled milk, pasture-raised, and certified organic. The transition to organic likely is simpler for pasture-based dairies because the pasture requirements are already in place and reported herd health problems are fewer. Well managed pasture-based dairies create fewer environmental impacts and are more likely to be socially acceptable, thereby reducing external threats to farm viability.

Key Words: Pasture-based dairy, Profitability

Food Safety: Ruminant and Nonruminant Foodborne Pathogens

268 Development of a cost-effective method to enumerate *Escherichia coli* O157 in cattle feces. J. T. Fox*, D. G. Renter, M. W. Sanderson, and T. G. Nagaraja, *Kansas State University*, *Manhattan*.

Our objective was to evaluate the application of the most-probable number (MPN) enumeration technique to quantify *E. coli* O157 in cattle feces. Cattle (n = 10) were inoculated orally with a mixture of three strains of *E. coli* O157 (1.4×10^{10} per animal) that were made resistant to nalidixic acid. Feces were collected twice a week for three weeks (60 samples) beginning 3 d post inoculation. A known amount of feces (2.0 ± 0.5 g) was diluted in 18 mL of gram-negative broth (1:10 dilution) containing cefixime, cefsulodin and vancomycin (GNccv). Serial 10-fold dilutions (200 µL in 1.8 mL GNccv) of 1:10 dilution were then made, in triplicate, in a 96 well (2.5 mL capacity) dilution block to yield dilutions of 10^2 to 10^6. Diluted samples were direct plated onto sorbitol-MacConkey agar containing cefixime and potassium tellurite (SMACct) plus nalidixic acid to establish a gold standard for the concentration of *E. coli* O157 in the sample. Following 6 h enrichment at 37°C, a loopfull of each dilution was streaked onto SMACct. Also, 1 mL of 10^1, 10^2, 10^4 and 10^6 dilutions were subjected to immunomagnetic separation (IMS) and plated on SMACct. On the next day if needed 1 mL of 10^3 or 10^5 was subjected to IMS and plated on SMACct. Diluted samples in each well that yielded sorbitol negative colonies (direct streak or plating after IMS) which were positive for indole production and latex agglutination were considered as positive for *E. coli* O157. Concentration of *E. coli* O157 in the original sample was determined by MPN procedure. Mean concentration of *E. coli* O157 in samples, as determined by the gold standard method was 16,635 cfu/g. Both direct streak MPN (r = 0.81) and IMS MPN (r = 0.52) values correlated ($P < 0.01$) with the gold standard. Because IMS is expensive and labor intensive, the direct streak procedure of the diluted and enriched sample offers a simple and cost-effective method to enumerate *E. coli* O157 shed in the feces of cattle.

Key Words: *E. coli* O157, Enumeration, Cattle feces

269 Effect of vaccinating against type III secreted proteins of *E. coli* O157:H7 on its pre- and post-harvest occurrence on cattle hides. R. E. Peterson*, D. R. Smith, R. A. Moxley, T. J. Klopfenstein, and G. E. Erickson, *University of Nebraska*, *Lincoln*.

A trial was conducted to test the effect of vaccination against type III secreted proteins of *E. coli* O157:H7 (EC) on the probability to detect EC on hides of vaccinated and nonvaccinated cattle and on hides pre- and post-harvest. Steers (n=336) were stratified by weight and assigned randomly to one of two vaccination treatments. Vaccination treatments included vaccinated or non-vaccinated pens of steers (n=42 pens; 21 vaccinated and 21 not vaccinated). Two doses of vaccine (2 mL dose) were given to vaccinated steers. Placebo was given to nonvaccinated steers. Eighty-four days post treatment a hide sample was collected from each steer at the feedlot the day they were sent to harvest (pre-harvest) and from each steer at the packing plant (post-harvest). Steers were loaded onto clean trucks at the feedlot, held in lairage,