minimizing nutrient excretion by horses is the use of commercially manufac-
tured feeds that complement specific forages. For example, when alfalfa hay is used, the amounts of protein and calcium included in the concentrate can be significantly reduced. However, horse owners often have difficulty distinguishing among forages, making the successful application of this approach difficult. The approach with the most potential to reduce nutrient excretion by horses would be enhanced education of horse owners to improve their understanding of how to effectively match feed characteristics with the nutrient requirements of horses.

Key Words: Equine, Waste Management, Nutrient

703 Development of on-farm treatment of animal waste. J. B. Carey*, Texas A&M University, College Station.

Development of new and alternative on-farm systems to manage waste must address several obstacles or issues in order to have significant potential for adoption by producers. A primary obstacle is time. The new or alternative method must involve a reduction in the amount of time needed for waste management or at least no increase in time re-
quired to address waste management duties. Another issue to address is cost. Obviously, any method that actually reduces costs would be con-
sidered favorably. However, it is essential that all costs be considered including any potential costs of marketing final products. Additionally, new or alternative methods must prove effective and reliable under field conditions. If extensive training, monitoring, or non-traditional skills are needed for success then the applicability to commercial settings will diminish. Reliability also includes the assurance of consistent perfor-
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mance and accomplishment of the waste management tasks under all field conditions utilizing the skill sets available among producers and farm workers. It is also important that the new or alternative method produce an advantage or benefit, economic or otherwise to the producer. This can range from reduced pressure on existing methods to financial returns. If producers are expected to adopt new technology or change practices, they must perceive a benefit. While this list includes obstacles that is not exhaustive, it provides a basis for consideration of new and alternative waste management technologies. Methods such as on-farm composting and marketing of manure or litter require full considera-
tion of these issues. Mortality management alternatives such as acid or alkaline preservation, in-vessel composting and similar technologies require broad cooperation among a wide range of scientific and profes-
sional disciplines in order to adopt a research concept to a workable on-farm solution to waste management issues.

704 Alternative uses and value added processing of animal waste products. C. M. Williams*, North Carolina State University, Raleigh.

Traditional animal waste treatment generally involves on-farm land application of manure as a source of plant nutrients. Although cost effec-
tive, such practices may not be sustainable in some regions that produce large quantities of meat, eggs and milk. Technologies that provide eco-
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nomically feasible alternative strategies for processing large quantities of manure and generating marketable value-added products are needed. Some processes identified as potentially effective include centralized pro-
cessing of manure to generate bio-based energy (methane), diesel fuel, and ash for a granular fertilizer product. Examples of work in progress to accomplish these objectives include high solids anaerobic digestion (HSAD), bio-methanol production, and fluidized bed combustion. The HSAD produced approximately 12 decatherms of methane per ton of feedstock and post-processed material met Class A biosolids require-
ment for fecal coliform bacteria. The bio-methanol plant capacity is approximately 7,500 gallons of methanol daily from a manure feedstock from 12 farms containing 12,000 finishing pigs each. The methanol is railed to a refinery for biodiesel fuel blending. A combustion study pro-
cessing approximately 90 tons of combined swine biosolids and turkey litter showed that the fluidized bed technology at combustion temper-
atures above 1,600° F resulted in efficient combustion and low emis-
sions of carbon monoxide, and minimal emissions of criteria pollutants. Collectively, these technologies demonstrate potential new and off-farm alternatives for processing animal waste products.

Food Safety: Alternatives to Antibiotic Use

705 Control of Salmonella in poultry production, the European experience - can it be adapted to the US? J. S. Bailey¹ and T. Roberts², ¹Agricultural Research Service, USDA, Athens, GA, ²Economic Research Service, USDA, Washington, DC.

Sweden and Denmark have instituted programs which have significantly controlled Salmonella in broiler chicken production. Sweden's program was initiated about 15 years ago and Denmark's program was started about 10 years ago. In both programs, extensive testing programs are in place, no Salmonella positive feed is allowed, and all breeder birds that test positive for Salmonella are eradicated. In Sweden the program is continued for final grow-out and no Salmonella positive birds are al-
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loved to be sold to the consumer and any Salmonella positive flocks are killed and disposed of. In Denmark, Salmonella positive grow-out broi-
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lers are processed separately, but can be sold to the consumer. Initially the costs of implementing the programs in both Sweden and Denmark were paid for by the government. Sweden has moved to a program that is self insured through industry check-offs. Denmark is attempt-
ing to implement a similar insurance program.

706 Use of competitive exclusion to control enterotoxigenic strains of E. coli. R. B. Harvey*, R. C. Anderson, K. J. Genovese, T. R. Callaway, and D. J. Nisbet, Food and Feed Safety Research Unit, ARS-USDA, College Station, TX.

Foodborne diseases, morbidity, and mortality in food-producing ani-
mals, associated with pathogenic strains of Escherichia coli, are of pub-
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lic health and economic significance. Increasingly, E. coli have become resistant to most antibiotics and alternative control measures are sought. Our laboratory developed a defined culture of commensal bacteria of porcine G1 tract origin, maintained it in continuous-flow culture, and designated it as RPCF. When administered to neonatal gnotobiotic pigs, immunoglobulin levels were increased 20- to 100-fold. In vitro labora-
tory studies have shown that RPCF prevented colonization of O157:H7 and E. coli O111 strains of E. coli. Other laboratory studies demonstrated that RPCF-treated pigs had decreased mortality and bacterial shedding com-
pared to controls when challenged with enterotoxigenic strains of E. coli.

In field trials involving five geographically separated nursery farms with a history of high mortality from F-18 strain of E. coli, piglets were orally administered 10⁵ CFU of RPCF within 24 h of birth, were monitored throughout the nursery period, and the performance of RPCF-treated pigs were compared to a similar number of untreated pigs on the same farms. A total of 34,676 pigs were included in these trials. We observed decreased medication costs and a 3.53% decrease in nursery barn mor-
tality in RPCF-treated pigs compared to controls. There was an annual cost benefit of $22,196 per farm due to improved livability and reduced medicated. Results from the present studies indicate that under lab-
oratory and field conditions, RPCF was effective in controlling disease induced by enterotoxigenic E. coli and may be a viable alternative to
the use of antibiotics.

This work was funded in part by a grant from the National Pork Board (NPB #02-196), Des Moines, IA USA

Key Words: Pathogenic E. Coli, Alternative to Antibiotics, Mortality

Key Words: Broiler, Salmonella, Control

In the context of poultry production, Clostridium perfringens (Cp) represents both a potential food borne pathogen as well as a significant poultry disease. As a human food borne disease agent, this spore forming pathogen has accounted annually for over 248,000 total cases of food borne disease in the United States alone. As illnesses caused by this pathogen are not part of an active surveillance program in the U.S., the aforementioned figure is estimated to be a tenfold under reporting. Within the context of production, C. perfringens necrotic enteritis (NE) is a peracute disease associated with predisposing factors including coccal infections, feed types and environmental stresses. Complete withdrawal of antibiotic growth promoters from feed is one factor strongly associated with NE. This presentation will present newly initiated research to both develop alternatives to antibiotics to control Cp in the live bird but also research into our current understanding of gut microbial ecology preceding this disorder. Our lab has been successful in isolating a number of bacteriophage lytic for Cp. These virions display a highly narrow spectrum of activity against different Cp strains however; it is noteworthy that they show a high level of variation in plaque morphology. Work is ongoing to isolate, purify and clone the phage lytic enzyme responsible for the lysis activity and for potential use as either a therapeutic or prophylactic agent in live production. Work is also underway to identify and characterize bacteriocins for the purposes of Cp control. This effort has so far resulted in strains of Cp which produce bacteriocins against other non-producing strains. The quantitative profiling of the gut flora during growout is a goal so far achievable only on a small sample basis. Work is underway to develop sets of tools based on non-cultural methodology that can be applied to large numbers of samples thereby enhancing the diagnostic and accuracy of a general gut microbial profile. Results from other antibiotic alternative strategies to control Cp, e.g. sodium chlorate, as well as a review of the potential role of quorum sensing in gut modulation of specific pathogens will be presented.

**Key Words:** Clostridium perfringens, Lytic Bacteriophage, Bacteriocins

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**Women and Minority Issues in Animal Agriculture Symposium**

**707 Strategies to reduce Campylobacter.** Norman J. Stern1, E. A. Svetch2, B. V. Eruslanov2, Y. N. Kovalev2, L. I. Volodina2, V. V. Perelygin2, E. V. Mitevich2, I. P. Mitevich2, V. D. Pokhilenko2, V. N. Borzenkov2, V. P. Leuchuk2, O. E. Svetch and T. Y. Kudriavtseva2, 1 USDA-ARS-Russell Research Center, Athens, GA, 2State Research Center for Applied Microbiology, Obolensk, Russia.

We evaluated anti-Campylobacter activity among 11,790 isolates of lactic acid bacteria from poultry production environments. We measured zones of C. jejuni inhibition surrounding the candidate strains and observed 279 isolates exhibiting antagonism. A Lactobacillus salivarius strain PVD32, was identified and deposited under provisions of the Budapest Treaty (NRRL B-30514). The cell-free, ammonium sulfate fraction from the culture was termed the crude antimicrobial preparation (CAP). A zone of C. jejuni growth inhibition surrounding 10 ul of the CAP was observed. C. jejuni growth resumed when the CAP was pre-incubated with protease enzymes, thus demonstrating the peptide characteristic consistent with bacteriocin definition. The bacteriocin was further purified using a combination of ammonium sulfate precipitation, CM-Sepharose, Superose, and ion exchange chromatography. SDS-PAGE electrophoresis provided an estimated molecular weight of 6 KDAs. MALDI-TOF analysis refined the molecular weight as 5,123 Da. The isoelectric point of the active fraction was determined at a pH of 9.0. The amino acid sequence of the bacteriocin was determined. The bacteriocin activity was stable following exposure to 90oC for 15 minutes. The moiety was purified and encapsulated in polyvinylpyrrolidone (PVP), and added to feed at levels of 250 mg/Kg feed. Day of hatch chicks were colonized with C. jejuni: log 10 cfu/gm fees mean levels untreated, 7-day old control chicks were colonized at a mean of 8.99 and treated, 10-day old control chicks were colonized at a mean of 8.99 and treated birds were colonized at 0.61. Among an additional 14 trials, comprised of 290 chickens, of varying ages, with varying amounts of bacteriocin administered, and challenge strains of C. jejuni, we consistently observed at least a one-million fold reduction in cecal levels among treated birds. The bacteriocin from this L. salivarius appears useful to control C. jejuni in poultry.

**Key Words:** Campylobacter, Poultry, Bacteriocin Therapy

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**708 Strategies to reduce Clostridium perfringens.** G. R. Siragusa*, Agricultural Research Service, USDA Russell Research Center, Athens, GA.

Animal Health - Growth and Immunity

**711 Preliminary evaluation of the efficacy of halofuginone lactate (Halocur®) as an aid in the prevention of cryptosporidiosis in Ontario dairy calves.** B. D. Jarvie, K. E. Leslie*, A. S. Peregrine, T. F. Duffield, and J. Scott Weese, University of Guelph, Guelph, ON, Canada.

*Cryptosporidium parvum* is a common cause of diarrhea in neonatal calves. The incidence of shedding of *C. parvum* and clinical disease is high on many dairy farms. There are currently no approved products in North America for the prevention of cryptosporidiosis. In Europe, halofuginone lactate (Halocur®) is marketed for the prevention of cryptosporidiosis. The objective of this study is to evaluate the efficacy of halofuginone lactate as an aid in the prevention of cryptosporidiosis in dairy calves. Commercial dairy farms participated in this study from February to July 2003. A total of 509 replacement heifer calves from 24 farms were enrolled and randomly assigned to one of two groups.

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**710 A respect for the land.** A. J. King*, University of California - Davis.

Historically, Japanese, Chinese and Mexican Americans have made valuable contributions to farming in the West. Today, many Hmong families have leased lots of a few acres in Washington and California to raise specialty crops that are sold at local farmers markets. There are also populations of East Indians growing several different types of row and fruit crops in Northern California. The number of African American farmers is significant when focusing on the West and the Midwest. Minority groups (African Americans, American Indians, Chinese, East Indians, Hispanics, Hmong, Japanese, Laotians and women) who choose farming as careers continue to face obstacles while contributing in several ways to the ample and diverse food supply produced in the Western United States. What are these obstacles, their similarities and differences? What unique contributions have been made to farming processes and distribution related specifically to animal agriculture? How are minority farmers defining the profile of animal agriculture and engagement by grassroots organizations?

**Key Words:** Minority Farmers, Animal Agriculture, Obstacles and Contributions

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**709 Gender and animal agriculture.** C. Sachs*, Rural Sociology and Women's Studies, Penn State University, University Park.

Women have become increasingly involved in agriculture in the U.S. in recent years. Many women are farming on their own, while others are more involved in decision-making with their spouses or other agricultural partners. Women farmers are more likely to be involved in animal agriculture than in crop production. Also, women on farms extensively participate in farm tasks and decision-making, and decision-making is involved more than decision-making is. The paper will use data from a national survey of 2,661 farm women collected in 2001 to understand the extent of women's involvement in farm tasks, farm decision-making, and off-farm work. This study will report differences in women's involvement in tasks and decision-making in live stock production by type of farm, type of livestock, and geographic characteristics of farm women, and region.

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**Women and Minority Issues in Animal Agriculture Symposium**

**710 A respect for the land.** A. J. King*, University of California - Davis.

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**Key Words:** Minority Farmers, Animal Agriculture, Obstacles and Contributions