been a lot of activity in direct combustion of poultry and turkey litter. A review of on and off farm combustion systems will be presented. Each of the alternatives shown will have their pros and cons and will be discussed.

Key Words: Waste Management, Composting, Organic Fertilizer, Combustion

9 Air quality, PM2.5, and related concerns. F. M. Mitloehner, *Univesity of California, Davis.*

Public concerns related to air quality impacts of intensive livestock and poultry operations have grown drastically over the recent years. Pollutants of concern are particulate matter, ammonia, methane, hydrogen sulfide, volatile organic compounds, and odors. However, there is a general paucity on character, amount, and dispersion of livestock air pollutants. Despite dramatic knowledge gaps, the Environmental Protection Agency (EPA), State and local air quality agencies are mandated to use best available emission factor data for their emission inventories. In serious non-attainment regions like the San Joaquin Valley, pollutants like particulate matter and ozone precursors have to be reduced significantly. New legislation forces livestock producers to reduce emissions using best available control methods that for the most part were never scientifically tested. The US Department of Agriculture (USDA) is mandated to support farmers with scientifically based emission mitigation techniques and technologies but again scientific information is scarce. Both, EPA and USDA appointed the National Research Council (NRC, 2003) to review the scientific basis for current emission estimates and emission mitigation. Major NRC findings were that current emission estimates are largely inappropriate because instead of being based on representative surveys from a class of operations (e.g., dairies) over several seasons, they are predominantly grab-sample measurements conducted on one operation at one time. The committee recommended replacing the current emission factor approach with the use of process-based modeling using nutritional mass-balance approaches. A second major NRC finding was that intensive research is needed into cost effective emission mitigation for livestock and poultry operations.

Key Words: Air Quality, Emission Mitigation, Emission Estimates

10 Water quality concerns–are they real? What needs to be done? T. G. Gunter*, *Oklahoma Department of Agriculture, Food, and Forestry.*

Many states continue to debate the question of whether or not animal agriculture is the cause of water quality pollution concerns. Using Oklahoma as an example, animal agriculture's potential impacts on water quality are often stated as the driving force behind legislative enactments restricting the activities of livestock or poultry operations. While animal agriculture can be a contributor to water quality problems, in many cases the real reason for the changes are related more to social or quality of life issues instead of water quality. Unfortunately, no matter what the state response is and no matter what the real reasons are behind that response, the results are livestock producers feel they are unfairly blamed for the entire problem and are subject to increasing regulation. Producer response to that regulation is ongoing and is likely to shape the continuing evolution of animal agriculture in the U.S. and the world. This paper will provide the reader with an overview of Oklahoma's experience with the evolving world of livestock production, the state's reactions to real and perceived problems, producer reactions, and the future of animal agriculture and water quality.

Key Words: Water Quality, Livestock, Animal Agriculture

11 Urban encroachment and how Extenion can assist farmers. K. S. Kremer, *Wartburg College, Waverly, IA.*

Development in the rural fringe of urban areas has eliminated both farm and timberland. While an assumption is often made that urbanization is destiny, this paper suggests communities, groups, and individuals can act to modify trends. This includes a role for university extension in their work with producers and communities.

Key Words: Urban Sprawl, Agricultural Change, Communities

12 Assimilation vs. accumulation of macro- and micro-nutrients in soils: relations to livestock feeding operations. N. A. Cole*, R. C. Schwartz, and R. W. Todd, *USDA-ARS-Conservation and Production Research Lab, Bushland, TX.*

Amending soils with animal manures is a common practice to increase soil quality and dispose of potential wastes from concentrated animal feeding operations (CAFO). However, improper application of manure can result in runoff of nutrients or pathogens to surface water, percolation of nutrients to ground water, accumulation of nutrients in the soil, or loss of N and C to the atmosphere. The trend toward larger animal feeding operations has resulted in higher rates of manure and litter application in localized areas; thus, increasing the potential for pollution from land applied manure. With the advent of the new clean water regulations, all CAFO and many smaller AFO must have comprehensive nutrient management plans designed for proper utilization of manure nutrients. However, only 20 to 50% of CAFO have adequate land to meet application standards. The capacity of soils to accumulate nutrients, as well as the nutrient composition and phytoavailability of manures, vary greatly. In some cases, nutrients can accumulate in soils to the point of being toxic to plants. Application of manures to pastures is normally not sustainable because less than 20% of the nutrients applied leave the field in animal products. However, when forage is cut for hay or silage, appreciable quantities of applied nutrients can be exported. Areas adjacent to CAFO can receive large quantities of nitrogen via dry or wet deposition. These can be advantageous to some crops, but may be detrimental to plants sensitive to nutrient inputs such as native range or forests. Speciation data indicate that the relatively nontoxic dietary organic form of As (ROX) can be converted to the more toxic As(V) form in soils. For optimal sustainability, fertilization levels need to be balanced with plant requirements. However, even under the best management systems some accumulation or escape of nutrients is inevitable. Therefore, nutrient management plans must recognize the need to deal with nutrients that accumulate in soils or leave the field or production area.

Key Words: Manure Nutrients, Soil, Assimilation

Growth and Development: ASAS-Emerging Roles of Gut Peptides in the Regulation of Appetite and Metabolism

13 Role of PYY in Appetite Regulation during Obesity. C. W. le Roux*[1], S. Shurey[2], R. P. Vincent[1], M. A. Ghatei[1], and S. R. Bloom[1], [1]*Department of Metabolic Medicine, Imperial College London Hammersmith Hospital, London, UK,* [2]*Experimental Surgery, Imperial College London Northwick Park Hospital, London, UK.*

PYY is present throughout the gastrointestinal tract, with the highest tissue concentrations in distal segments. PYY is released into the circulation following food intake and postprandial concentrations is proportional to meal size, with peak plasma levels appearing in the second hour. PYY reduces gastric emptying and delays gastro intestinal transit. Chronically elevated PYY have been described in several gastrointestinal diseases associated with loss of appetite. More recently, PYY has been demonstrated to have a physiological action inhibiting food intake through its action on the NPY Y2 receptor in the arcuate nucleus. Bariatric surgery remains the most effective treatment for obesity. In a rodent model of intestinal bypass PYY was elevated in the bypass compared to the sham bypass group. Humans following Roux-en-Y gastric bypass surgery for the treatment of obesity also have higher postprandial PYY responses and this might contribute to their increased satiety. In contrast, obese subjects treated with gastric banding had equivalent initial weight reduction, but do not demonstrate similar hormonal changes. The weight loss following gastric banding is not as long lasting as that observed after gastric bypass. Obese humans and diet induced obese mice have reduced fasting and an attenuated post-prandial PYY response. A greater meal calorie content is required to achieve similar PYY concentrations in obese compared to lean humans; postprandial satiety was also less in the obese. Infusions of exogenous PYY at increasing doses across the physiological range produced a graded increase

in satiety and reduced food intake in humans. These findings suggest that the lower postprandial PYY levels observed in the obese subjects might account for their reduced satiety response. Obese subjects may have a weaker PYY induced satiety signal for an equivalent meal, which could reinforce obesity. Current findings are consistent with PYY being a factor in appetite regulation.

Key Words: PYY, Obesity, Weight Loss

14 Proglucagon: A gene with diverse metabolic functions. D. Burrin*, *USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, Houston, TX.*

The proglucagon (PG) gene is expressed in the gastrointestinal tract (GI) and brain in several animal species. The PG gene is differentially translated in the GI tract by specific endocrine cells to produce glucagon in the pancreas and glucagon-like peptides 1 and 2 (GLP-1/GLP-2), glicentin, and oxyntomodulin in the intestine. These PG-derived peptides have diverse functions involving insulin secretion, motility, and tissue growth within the GI tract, but also have systemic actions on glucose homeostasis and appetite regulation. There is considerable interest in the therapeutic potential of GLP-1 and GLP-2 in respective treatment of type-2 diabetes and intestinal dysfunction, including short-bowel syndrome and inflammatory bowel disease. GLP-1 and GLP-2 are co-secreted from the gut in response to enteral nutrition, particularly fat and carbohydrate, but are suppressed by total parenteral nutrition. GLP-1 and GLP-2 secretion are also stimulated by short-chain fatty acids that are produced by colonic fermentation of malabsorbed carbohydrate and dietary fiber. GLP-1 is a key incretin hormone that increases insulin secretion, islet neogenesis, b-cell proliferation. GLP-2 is a potent intestinotrophic hormone that increases intestinal mucosal cell proliferation, blood flow and suppresses apoptosis and inflammation. The GLP-1/2 receptors are G-protein-coupled membrane proteins that signal via intracellular cAMP release. The GLP-1/2 receptors are expressed in the brain and GI tract; however, the cellular localization is poorly understood. There is limited information on the biological function of GLP1/2 in the growth and development of domestic animals. However, these hormones may be possible therapeutic targets for modulation of feed intake and intestinal dysfunction in production animals.

Key Words: Gut Hormone, Proglucagon, Metabolism

15 Gut peptides and feed intake regulation in lactating dairy cows. C. K. Reynolds*[1] and J. A. Benson[2], [1] *The Ohio State University, Wooster,* [2] *The University of Reading, Reading, UK.*

For the modern dairy cow to achieve her potential for production with minimal body energy loss, nutritionists seek to maximize feed intake in early lactation. In contrast, a goal of modern human nutritionists is to reduce obesity by limiting appetite and energy intake in excess of requirement. In both cases, a clearer understanding of the factors regulating short- (meal size) and long-term (body fat) appetite and nutrient intake is needed. In future, new findings regarding the role of gut and hypothalamic peptides in rodents will undoubtedly prove relevant to the dairy cow. The portal-drained viscera (gut, pancreas, spleen and associated fat) produce a number of peptides which are demonstrated regulators of appetite, intake and nutrient utilization, and for many their release to peripheral tissues is modulated by liver removal. Insulin regulates acute and chronic intake in part through effects on nutrient use and the hypothalamus. Insulin secretion is modulated by a variety of nutrients, as well as 'incretin' peptides from the gut, such as glucose-dependent insulinotropic polypeptide and glucagon-like peptide 1 (GLP-1). In cattle, over half of immunoreactive glucagon released by the PDV is of gut origin (presumably oxyntomodulin and glicentin). Other products of proglucagon processing released by the PDV include pancreatic glucagon, GLP-1 and GLP-2. The active form of GLP-1 (7-36 amide) is one of an emerging group of gut peptides that inhibit intake through effects on gut function and the hypothalamus, which include cholecystokinin-8 (CCK8) and peptide YY (PYY). Evidence suggests an increase in CCK8 may be responsible for decreased DMI in lactating dairy cows fed fat, but in lactating cows abomasally infused with vegetable oils decreased DMI was associated with increased net PDV release and arterial concentration of GLP-1, while portal vein CCK8 concentration was reduced. Considering effects in other species, it is highly likely that PYY regulates intake and gut function in lactating dairy cows as well, but further research on the roles of gut peptides in ruminants is needed.

Key Words: Glucagon-like peptide-1, Cholecystokinin, Insulin

Antibiotics in Animal Feeds: Are There Viable Alternatives?

16 Novel preharvest strategies involving the use of inorganic and nitro-based compounds to prevent colonization of food producing animals by foodborne pathoge. R. C. Anderson*, Y. S. Jung, J. A. Byrd, K. J. Genovese, T. R. Callaway, T. S. Edrington, R. B. Harvey, and D. J. Nisbet, *USDA-ARS, Food & Feed Safety Research Unit, College Station.*

Foodborne diseases caused by enterohemorrhagic *Escherichia coli, Salmonella* and *Campylobacter* are of public health and economic significance. Shedding of these pathogens during production and slaughter are critical risks for contamination of products for human consumption. Consequently, strategies are sought to prevent or reduce the carriage of these pathogens in food animals before slaughter. Experimental products containing chlorate salts have been proven efficacious in reducing, by several hundred-fold, concentrations of *E. coli* and *Salmonella* in the gut of cattle, sheep, swine and poultry when administered as feed or water additives. Mechanistically, chlorate selectively targets bacteria expressing respiratory nitrate reductase activity, such as most members of the family *Enterobacteriaceae*, as this enzyme catalyzes the reduction of chlorate to lethal chlorite. Most beneficial gut bacteria lack respiratory nitrate reductase activity and thus the technology appears compatible with many bacteria exhibiting competitive exclusion capabilities. Research and development of the chlorate technology continues and a much improved product has been designed to increase passage of the active ion to the lower gut. More recently, select oxidized nitrogen compounds are being investigated as potential feed additives and while these nitrocompounds significantly reduce pathogens on their own, evidence indicates that they may most effectively be used to complement the bactericidal activity of chlorate. A particular attractive aspect of the nitrocompound technology is that as potent inhibitors of ruminal methanogenesis, they may allow producers the opportunity to recoup costs associated with their use. At present, neither chlorate nor the nitrocompounds have been approved as feed additives by the U.S. Food and Drug Administration and consequently, they are not yet available for commercial use.

Key Words: Food Safety, Foodborne Pathogen, Nitrocompound

17 Alternative to Antibiotics - Utilization of bacteriophage to prevent foodborne pathogens. W. E. Huff*, G. R. Huff*, N. C. Rath, J. M. Balog, and A. M. Donoghue, *USDA/ARS/PPPSRU Poultry Science Center, University of Arkansas, Fayetteville.*

Bacteriophage are potentially a safe alternative to antibiotic therapy. Bacteriophage lytic to a non-motile, serotype O2 isolate of *Escherichia coli* were isolated from municipal waste water treatment plants and poultry processing plants. This *E. coli* isolate is pathogenic to poultry, causing a severe respiratory and systemic infection. Two bacteriophage isolates were selected to use in studies designed to determine the efficacy of these bacteriophage to prevent and treat severe colibacillosis in poultry. Colibacillosis is induced by injecting 6 X 10^4 cfu of *E. coli* into the thoracic airsac when the birds are 1 week of age. Initial studies demonstrated that mortality was significantly reduced from 85% to 35% when the challenge culture was mixed with equal titers of bacteriophage, and the birds were completely protected when the challenge culture was mixed with 10^8 pfu of bacteriophage. In subsequent studies, we have shown that an aerosol spray of bacteriophage given to the birds prior to this *E. coli* challenge could significantly reduce mortality even when given 3 days prior to the *E. coli* challenge. Our research on treating colibacillosis in poultry has demonstrated that an intramuscular injection of bacteriophage given 24 or 48 h after the birds were challenged rescued the birds from this severe *E. coli* infection. Our research has