
The present study compared modifications in whole carcass rinse and bacteriologic culture procedures on Salmonella recovery incidence from processed, post-chill turkey carcasses. In EXP 1, Method A consisted of rinsing post-chill carcasses in 100 ml of sterile Butterfield’s solution and enriching collected rinse fluid in TT broth for 24 h at 41 C. Samples were streaked to BGS and incubated for 24 h at 37 C. Method B used a rinse volume of 600 ml buffered peptone water (BPW). Following rinsing, 30 ml of rinse fluid was collected and combined with an additional 30 ml of BPW and incubated for 24 h at 37 C. Following pre-enrichment, 0.1 ml of each sample was transferred to 10 ml of both TT and RV broth and incubated for 24 h at 41 C. Following enrichment, samples were streaked to BGS and DMLIA plates and incubated at 37 C for 24 h. Salmonella recovery incidence using Method A during EXP 1 was 38% while incidence using Method B was significantly (P<.001) higher at 91%. EXP 2 similarly evaluated Methods A and B on Salmonella recovery from post-chill turkey carcasses with slight modification. For EXP 2, the rinse fluid used for Method A was changed to BPW and Method B was expanded to include reduced BPW rinse volumes of 100 ml (Method C) and 200 ml (Method D). All culture procedures were performed as described above. During EXP 2, Salmonella recovery incidence for each selected method was: Method A (61.7%), Method B (59.6%), Method C (77.6%), or Method D (67.3%). While statistical differences in Salmonella recovery incidence were not observed in EXP 2, data collected suggest BPW may be a more appropriate rinse fluid than Butterfield’s solution for Salmonella recovery and that larger rinse volumes may not be necessary for sensitive detection of Salmonella on processed turkey carcasses using whole carcass rinsing.

Key Words: Salmonella, turkeys, carcass rinsing.

Improving HACCP System Performances And Poultry Operations Using Remote Monitoring And Controls (RMC) Technology And The Wireless System. G. Zeidler*, University of California, Riverside, CA.

Remote monitoring and control (RMC) is a new technology which uses satellites, the internet and the wireless systems to monitor and control processes or events in one or multi locations in real time. While satellite usage has greatly increased in systems such as vehicle locating, guided road map navigation, airplanes navigation, withdrawing funds from ATM machines around the world and smart homes guidance, the utilization of the internet or the wireless systems in this category is just emerging. However, the major advantages of the wireless system, such as eliminating the need to wire the facility, a major breakthrough in price, a substantial reduction in labor costs, multi facility control in real time and the ability to connect to existing systems will make it the choice system of the future. Satellite usage will remain the system to control moving targets. Currently the utilization of this method in food and agriculture is very limited. Zeidler was the first to monitor and control transoceanic steamship transport of chilled meat using satellite in 1993. Our current project deals with controlling HACCP systems in egg operations turning it into reactive system which prevents failures, rather than reacting to historical data. The control of temperature and humidity in egg and chicks transport, improving egg hatchability in incubators, preventing equipment failure, improving maintenance programs and saving energy. Other applications are he control of industrial and foodservice cooking process of various poultry or food products as well as their HACCP requirements. These processes will be discussed.

Current Applications, Future Prospects and Alternatives for the Use of Antimicrobials in Poultry Production

Introduction to Current Applications, Future Prospects and Alternatives for the Use of Antibiotics/Antimicrobials in Poultry Production. F. T. Jones* and S. C. Ricke*, University of Arkansas, Texas A&M University.

For over 50 years antibiotics have been used to treat animal diseases and to improve productivity. Although it has always been an issue, the last decade has seen intensified efforts to reduce antibiotic resistance. This symposium was organized to address the following antibiotic resistance issues: Current practices and regulatory aspects; Monitoring and identifying the key problems; Resistance mechanisms and Potential alternatives to antibiotics.

The current practices and regulatory aspects section will provide historical and current perspectives on antibiotic use in the U.S. poultry industry. A discussion of economics and the future regulatory outlook will be presented.

An outline of assays developed to confirm the presence microbial resistance following antibiotic administration will be discussed. An examination of the molecular tools for studying microbial ecosystems and the use of epidemiological approaches to construct dissemination patterns will be presented.

The symposium will provide the fundamentals of mechanisms of protection by which organisms gain, keep and transfer antibiotic resistance. Presentations will also address interactions between chicken gut microbiota and food-borne pathogens as well as how these interaction influence the dissemination of antibiotic resistance. In addition, presentations will address resistance to microbial contamination in poultry production such as organic acids and disinfectants can also elicit resistance mechanisms in microorganisms.

The following alternatives to antibiotic use will be discussed: prebiotics, probiotics and biologics (bacteriophage, vaccines, and bacteriocins). The advantages, disadvantages and future prospects of these alternatives will be discussed both for pathogen control and improvement of poultry production (broiler growth, egg production, and bird health).

Key Words: Antibiotics, Antibiotic Resistance, Alternatives to Antibiotics


Sub-therapeutic administration of antibiotics to animals is under intense scrutiny since they do contribute to the dissemination of antibiotic-resistant bacteria into the food chain. Studies have shown that there is a link between the agricultural use of antibiotics and antibiotic-resistant human infections. Antibiotic-resistant organisms from animal and human wastes enter the environment and ultimately the re-enter the human and animal populations through a number of pathways including natural waters, irrigation water, drinking water, and vegetables and foods. Antibiotic usage in the United States for animal production (disease prevention and growth promotion) is estimated to be 18 million pounds annually. As much as 25% to 75% of the antibiotics administered to feedlot animals are excreted unaltered in saliva, feces and urine. Since about 380 million tons of livestock and poultry waste is generated annually in the United States, it is not surprising that animal derived antibiotic-resistant organisms are found contaminating groundwater, surface water and food crops. It is extremely important to clearly understand the molecular mechanisms that could potentially cause lateral or horizontal transfer of antibiotic resistance genes among bacteria. Once the mechanisms and magnitude of resistance gene transfer are clearly understood and quantified, then specific waste handling strategies can be instituted to reduce the potential for dissemination of these genes.

Key Words: antibiotic resistance, mechanism, poultry

Antibiotic Transfer Into Poultry Tissues and Eggs: Human Health Concerns? Dan Donoghue* 1, University of Arkansas.

Antimicrobials are used by the poultry industry to enhance the health and productivity of flocks. The use of antimicrobials is strictly regulated by the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) to warrant their safety and efficacy. Prior to regulatory approval, the pharmacokinetics and tissue tolerances of an antimicrobial are determined to set the proper dosage. To ensure proper use, both the FDA and USDA have research, surveillance and compliance programs to develop detection methods and monitor poultry

Key Words: Antimicrobials, Antibiotic Resistance, Alternatives to Antibiotics.
tissues for antimicrobials. Unfortunately, there is the perception among many consumers that meat, milk, and eggs contain high concentrations of drug or hormone residues causing significant health concerns or problems. In fact, foods produced in this country (including poultry) are very safe and meet the highest standards to exclude chemical contaminants.

An overview will be presented on the federal oversight of antimicrobials, method’s development and generation of pharmacokinetic models for tissue depletion. Furthermore, the interrelationship between antimicrobials residues and competitive exclusion bacteria will be discussed.

Key Words: Drug Residues, Food Safety

213 Alternatives to Antibiotics: Organic Acids and Antimicrobials. S.C. Ricke*, Texas A&M University, College Station, Texas.

Antimicrobial alternatives to antibiotics for controlling microbial contamination in poultry production include organic acids and disinfectants. However, some of these compounds can cause overall survival/resistance to a variety of environmental stressors that organisms encounter in pre- and postharvest poultry production. One of the primary stress conditions that can be frequently encountered by foodborne pathogens is exposure to short-chain fatty acids (SCFA) such as acetate, propionate, and butyrate. These organic acids are produced by anaerobic native intestinal microflora and can be present at high concentrations in gastrointestinal ecosystems of animals. Pathogens may also encounter the SCFA in food products where they are widely used as preservatives due to their antibacterial activities. The resistance of salmonellae to various stress conditions associated with food systems or host environments could be greatly increased by exposure to SCFA, and further enhanced by various environmental conditions that can be found in food materials and gastrointestinal tract of host animals. Research studies on pathogenesis behavior of salmonellae after exposure to SCFA indicate that SCFA can stimulate bacterial phenotypic properties associated with virulence expression. Understanding the role of these signals for stimulation of virulence in salmonellae will lead to the development of more optimal strategies to control this foodborne pathogen. This has implications not only for gastrointestinal ecology competitiveness of salmonellae, but in the case of SCFA raises practical issues regarding the use of organic acids in food safety control measures.

Key Words: Organic acids, salmonellae, virulence

214 Application of prebiotics and probiotics in poultry production. J.A. Patterson*, Purdue University, West Lafayette, Indiana.

The intestinal microbiota, epithelium and immune system provide resistance to enteric pathogens. Recent data suggests that resistance is not solely due to the sum of the components, but that cross-talk between these components is also involved in modulating resistance to enteric pathogens. Inhibition of pathogens by the intestinal microbial ecosystems has been called bacterial antagonism, bacterial interference, barrier effect, colon- ization resistance, and competitive exclusion. Mechanisms by which the indigenous intestinal bacteria inhibit pathogens include: competition for colonization sites, competition for nutrients, production of toxic compounds and stimulation of the immune system. These mechanisms are not mutually exclusive and inhibition may comprise one, several, or all of these mechanisms. Consumption of fermented foods has been associated with improved health and lactic acid bacteria (lactobacilli and bifidobacteria) have been implicated as the causative agents for this improved health. Research over the last century has shown that lactic acid bacteria and certain other microorganisms can increase resistance to disease, and that lactic acid bacteria can be enriched in the intestinal tract by feeding specific carbohydrates. Increasing bacterial resistance to antibiotics has increased public and governmental interest in eliminating subtherapeutic use of antibiotics in livestock. An alternative approach to subtherapeutic antibiotics in livestock is the use of probiotic microorganisms, probiotic substrates that enrich certain bacterial populations, or symbiotic combinations of pre- and pro-biotics. Research is focused on identifying beneficial bacterial strains and substrates along with the conditions under which they are effective.

Key Words: Antibiotic alternatives, prebiotics, probiotics

O.J. Cotterill Egg Science Symposium

Eggs and Egg Components for Wellness

215 The “wild-type” egg concept - Is this a starting point for functional eggs? F De Meester*1 and J Sim2, Belovo S.A., 1 Department of AFNS, University of Alberta.

Egg protein is still recognized by WHO experts as the reference source for essential amino-acids in human nutrition. A hundred gram edible portion of eggs (two 55-g eggs) provides 12 g (48-Cal) protein and covers human daily needs for essential amino-acids (EAA). The same amount of eggs provides 10 g (90-Cal) fat or egg oil, resulting in twice as much lipid as protein in terms of caloric intake. This 2:1 lipid:protein (L:P) ratio in eggs is also in perfect match with modern dietary guidelines for human nutrition recommending a daily intake of 600-Cal (30%) as lipid and 300-Cal (15%) as protein in a balanced diet (2000-Cal). Essential fatty acids (EFA) in eggs are not genetically encoded; rather they reflect the hen’s dietary fatty acid pattern. In a wild environment similar to that of our modern hen’s ancestor, the hen’s ration is made of spare seeds, greens, insects and worms, which results in an egg characterised by balanced fatty acid ratio’s such as P:S = ω6:ω3 = 1:1. Similar EFA composition can be achieved in modern husbandry through the selection of ω3-rich seeds and greens. Taking the wild fatty acid composition as reference, a hundred gram edible portion of eggs cover ± 30% of human daily needs for essential fatty acids (EFA) in perfect balance with modern dietary recommendations for saturated fatty acids (SFA), ω6 and ω3 PUFA. Structural analyses reveal that “wild-type” egg lipids are hypocholesterolemic and hypo-triglyceridemic and clinical studies show that "wild-type” egg cholesterol is beneficial to health.

Key Words: wild, balance, lipids

216 Health Benefits and Bioavailability of Carotenoids. Steven Schwartz*1, 1 Ohio State University.

Carotenoids are uniquely functional, highly conjugated pigments ubiquitous in nature. The list of known, naturally occurring carotenones (hydro-carbon carotenoids) and xanthophylls (oxygenated carotenoids) has grown to approximately 600. This number is increased several fold when known and theoretically possible geometrical isomers associated with these compounds are considered. Carotenoids are epidemiologically linked with the prevention of several chronic, degenerative human diseases such as macular degeneration, cancer and coronary heart disease. Thus, the identification and quantification of the various carotenoids present in foods and biological tissues have been the object of a great deal of research and continues to be vigorously pursued. Research investigations on the absorption, deposition and bioavailability of carotenoids have identified influences by several dietary factors and characteristics of the food matrix. Evidence indicates that carotenoid uptake, blood levels and tissue deposition can be enhanced by food processing. Results of these studies with an emphasis on the carotenoids present in eggs and poultry products will be discussed.

Key Words: Health, Carotenoids, Bioavailability

217 Egg Yolk Antibodies for Wellness. Ronald R. Marquardt*1, 1 Department of Animal Science, University of Manitoba.

Egg Yolk Antibodies (EYA) belong to the IgG class of immunoglobulins (lgY). The laying hen produces IgY antibodies against antigens and these antibodies are deposited in the egg yolk. The antibodies are able to provide passive immunity against many different intestinal pathogens when administered orally as dried whole eggs, egg yolk powder (IYD), or purified immunoglobulin (IgY) to a wide variety of animals (such as pigs, calves, rabbits, and mice). For example, antibodies against the surface proteins of three strains of enteropathogenic E.coli (EPEC) have been shown to provide complete protection against death in weanling pigs challenged with the microorganisms (EPEC strains K88, K99 and 987P). The pigs did not develop severe diarrhea or lose weight whereas most of the challenged control pigs died. The treatment is highly efficacious as only 5 to 15 g of dried EYA (equal to less than one egg) is required to completely neutralize the ETEC. It is predicted that this treatment would also control the human form of the organism, ETEC...