contributes a major portion of the calories in high-energy rations for broiler birds. These fats are rich in linoleic (n-6) fatty acids and are low in n-3 fatty acids. Long chain (>20-carbon) n-6 and n-3 fatty acids such as arachidonic acid (20:4n-6) and eicosapentaenoic acid (20:5n-3), derived from linoleic (18:2n-6) and alpha-linolenic (18:3n-3) acids, respectively, are the precursors for eicosanoids. Eicosanoids derived from n-3 fatty acids are less proinflammatory than those derived from n-6 fatty acids. The author's previous research demonstrated a total depletion of long chain n-3 fatty acids in cardiac and liver tissues and an increase in arachidonic acid in hepatic and cardiac triglycerides of birds succumbing to sudden death when compared to control birds. Developing dietary strategies in poultry that enhance the n-3 fatty acid content of tissues during growth may lead to better health by reducing inflammatory disorders and metabolic disease-related pathologies. However, increasing long chain n-3 fatty acids in broiler chickens is also associated with lipid oxidation and issues of muscle product quality. Therefore, alternative strategies for enhancing tissue n-3 fatty acid content without affecting growth and product quality must be devised. The role of maternal (yolk) fatty acids in modulating the long chain n-3 fatty acid content of vital tissues and eicosanoid production in growing chickens fed a diet lacking in long chain n-3 fatty acids was investigated. Up to day 35 of growth, the cardiac and hepatic tissues of chicks hatched from hens fed a high n-3 diet retained higher levels of docosahexaenoic acid (22:6n-3) and total n-3 fatty acids than those of chicks hatched from hens fed a low n-3 diet. The effect of maternal diet on eicosanoid production was evident up to day 14 of growth. Chicks hatched from hens fed a high n-3 diet produced less proinflammatory eicosanoids than chicks hatched from hens fed a low n-3 diet. Modulating maternal dietary n-3 fatty acids enhances tissue retention of n-3 fatty acids during growth and reduces proinflammatory eicosanoid production in chicks, which could lead to fewer metabolic and inflammatory-related disorders in poultry.

Key Words: n-3 fatty acids, metabolic diseases, eicosanoids

Poultry Welfare Symposium: Poultry Welfare Symposium: Realistic Views Concerning Poultry Welfare

272 Historical perspective on the development of poultry welfare. A. J. Pescatore*, *University of Kentucky*, *Lexington*.

Domestic animals are dependent on man for their existence and their well being. Well being is the satisfaction of basic physical needs and the encouragement of necessary behaviors. Societal involvement in welfare began in the 1860's as local societies for the prevention of cruelty to animals were being created to prevent the abuse of horses, this continued with the passage of the 28-hour law in 1873 which required animals to have feed, water and rest every 28 hours. In 1926 the transportation of poultry was addressed when shippers agreed to uniform coops and standards. This was an era that centered on protection of the birds from the elements. This was also a time for documenting many disease conditions. Pullorum Disease and protozoan diseases were major concerns in the 1930's. Many great nutritional discoveries were made at this time. The post WWII era saw the movement of birds into poultry houses. Space allocation, heat stress and cannibalism were welfare topics. The 1950's saw the refinement of the housing systems. Social aggression was a concern with numerous prevention strategies including tranquilizers. In 1958 the Humane Slaughter Act took effect and even though it did not apply to poultry it encouraged research on the humane slaughter of poultry. The understanding of the interaction of stress and disease began in the 1960's. This was the time that pharmaceuticals had a role in poultry welfare. The next decade introduced social indexes and multi focus studies. Blood parameters became a common measure of well being. The late 1970's saw the emergence of metabolic diseases as welfare issues. In the 1980's there was more emphasis on social rank and stressors and less emphasis on productivity. Measures of welfare involved the interaction of behavior with physiology and immunity. The late 1980's and 1990's enter an era of increase emphasis on behavior especially the fear response. Alternative systems for housing and processing were topics of concern. Cellular immunity was used as an indicator of stress. In the current decade consumer pressure is the driving force for poultry welfare. Consumer perception and independent audits characterize current trends.

Key Words: poultry welfare, animal well-being

273 Animal care guidelines and future directions. A. B. Webster*, *The University of Georgia*, *Athens*.

Two views are broadly accepted in developed societies which have made animal care guidelines inevitable. These are that domestic animals are sentient, and that humans are responsible to ensure the proper care of domestic animals. Despite these common views, people, having differing moral understandings of the human-animal relationship, are sharply divided over how these views should be applied to domestic animal care. Animal care guidelines have been developed in different nations at several organizational levels to represent a compromise that is acceptable to a majority of people. These organizational levels include individual poultry companies, national poultry associations, individual customers of the poultry industry, national associations of customer companies, national governments, and international organizations. Animal care guideline development has typically included input from producers and scientists, and depending on the sponsoring organization, animal advocates and government representatives as well. Animal advocacy groups have also sought to influence domestic animal care by campaigning against animal production practices, or by offering their preferred guidelines for poultry companies to adopt in the hope that the endorsement of the welfare group would add value to the product. Originally, animal care guidelines were only recommended, with little or no requirement for compliance. In recent years, the need for retail companies to assure certain welfare standards has led to animal welfare auditing of poultry facilities. Animal care guidelines primarily have sought to establish standards for handling and husbandry in existing production systems. Future guidelines may call for adoption of alternative management practices or housing systems based on the combined assessment of welfare improvement, feasibility and market access. International animal care guidelines are now being developed on two levels, i.e., among national governments to create a common standard for trade in animal products, and within international retail companies to create company-wide animal care standards. These initiatives may eventually unify animal care standards world-wide.

Key Words: animal care guidelines, poultry welfare

274 Welfare of poultry in non-cage housing systems. R. C. Newberry*, *Center for the Study of Animal Well-being, Washington State University*, *Pullman*.

A non-cage housing system is one that allows caretakers to walk inside the system. From a poultry welfare perspective, significant features of non-cage versus cage systems include sturdier flooring, larger group size, increased enclosure space, and greater structural complexity. Flooring sturdy enough to support people carries a risk of increased exposure to pathogens, ammonia and dust but, when covered by litter, reduces the risk of leg deformities and breast blisters in heavy birds, and facilitates foraging and dust bathing behavior. Large group size may benefit a majority of flock members by lowering aggression, providing a perception of security in numbers, and increasing opportunities to find resources through social learning, but at a cost of increased disturbance while resting, an increased risk of hysteria, and, unless birds are beak trimmed or of a non-cannibalistic strain, a greater risk of cannibalism. Increased enclosure space reduces plumage wear and enables greater movement, promoting bone strength and reducing the risk of fractures when handled. Greater structural complexity can increase the risk of fractures and bruises due to collisions and falls but also provides birds with refuge from perceived danger. Given the diversity of non-cage systems, the dichotomy between cage and non-cage systems has been over-emphasized in debates over poultry welfare. Welfare can be very good or very poor in non-cage systems and is strongly influenced by early rearing conditions, specific housing design features, genetic selection, and management factors. The available evidence suggests that, although there are risks to poultry welfare when managing large groups in non-cage systems, these risks are balanced to varying degrees by environmental enrichment effects that enhance the ability of poultry to cope with challenges.

Key Words: animal welfare, housing, environmental enrichment

275 Molting layers – alternative methods and their effectiveness. K. W. Koelkebeck*[1] and K. E. Anderson[2], [1]*University of Illinois*, *Urbana*, [2]*North Carolina State University*, *Raleigh*.

The molting of commercial layers has been under increased scrutiny by animal rights groups who have said that this practice is highly stressful, and one which negatively affects the welfare of the hen due to the initial period of fasting that has been used to stop egg production. In recent years, there has been a recognized need to develop practical alternatives to molting layers other than the use of fasting. Thus, the Univ. of IL (IL), Univ. of NE (NE), NC State Univ. (NC), and Univ. of CA (CA) have all researched this area. In the IL, NE, NC, and CA studies, the methods involved comparing a normal fasting method (i.e., 5 to 13 d), to feeding low energy/protein diets using ingredients such as wheat middlings, soybean hulls, and corn, or diets with graded levels of added salt and without salt (NE, CA). The molt period (28 d) included full-feeding these diets. In these studies, post-molt production performance for the non-feed withdrawal techniques was comparable to the fasting method. Several researchers have also evaluated the behavioral repertoire of laying hens which includes feeding, drinking, comfort, social, reproductive, and anti-predator behaviors. In addition, related behaviors such as aggression, escape/avoidance, and submission have been of particular interest as potential indicators of welfare during molting. In these studies, genetic selection, strain, density, or molt program do not appear to adversely influence the behavioral patterns during the molt. The behavior patterns displayed during a molt program appear consistent with the response to physiological changes that layers experience and did not appear to compromise the welfare status of the hens. Appetitive behaviors were not affected by strain, but were affected by production phase and molting. Strain or production phase did not influence the frequency of aggressive and submissive acts. Thus, the use of alternative non-feed withdrawal molting methods, provide comparable laying hen well-being and may enhance the transition from a productive to a resting state.

Key Words: molting, laying hens, behavior

276 Density allowances for broilers, turkeys and layers: Where to set the limits? I. Estevez*, *University of Maryland*, *College Park*.

Stocking density has critical implications for the poultry industry as higher returns can be obtained as number of birds per space unit increases. Assigned densities have been primarily driven by cost-benefit analysis, but economic profit may come at the cost of reduced bird performance, health and welfare if the system is overly forced. These negative effects have raised consumers' concerns regarding maximum density, and are now included in most poultry welfare guidelines. The question is what should be the maximum density that will insure welfare while still allowing a profitable production? And, can we scientifically establish what this number should be? We can determine the extremes with no difficulty, but there is a whole spectrum of conditions that are more difficult to determine. This is so because the effects of density are not in simple linear relation to the number of birds. Factors such as management practices, environmental control, or quality of bird care has been proven to have major effects on poultry health and welfare. We should take a more imaginative look at the issue of density. In some instances it may be that, all things considered, maintaining high densities it may not be as profitable for industry as initially thought, especially as new environmental regulations come into play. For broilers, turkeys and ducks we use a bi-dimensional space while heat, cool and ventilate in three dimensions. A better environmental design may allow birds to use this third dimension, allowing increasing floor densities while improving welfare. It would also make more sense to base density on a 'range' rather than on a fixed number, so that farmers can keep higher or lower densities depending on their welfare scores. This approach would not only work as an incentive to good care with subsequent benefits to the birds but also may result in a more positive attitude towards welfare issues by industry. For caged layers the situation is different because they do not normally have enough available space to perform most basic behaviors. Based on research a minimum of 750cm^2 should be allowed to meet this requirement. Can industry be up to this challenge?

Key Words: densities, welfare, performance