diets (1.56 vs. 1.73 for VZ vs. C, respectively) but not for pelleted diets (1.60 vs. 1.69 for P vs. M, respectively). In feed assay of keratinase confirmed the presence of the enzyme activity in VZM and VZP feeds, but not in controls. These results indicate that Versazyme™ included diets are not affected by the pelleting process and do retain the previously documented positive growth effects.

Key Words: Broiler, Pelleting, Dietary protein, Protease, Keratinase

Environment & Management III

T105 Changes in trends of commercial poultry productions in Iran. S. Zakizadeh* and M. Sedighi, Hasheminejad High Education Center, Mashhad, Khorasan Razavi, Iran.

The poultry industry has an important role to supply food production by livestock protein in developing countries including Iran. The major sections in poultry production in Iran consists of broiler and laying production, broiler and laying breeder production, hatchery and line breeder production. Commercial productions in Iran have changed more or less during 1999-2003. The number of farms for broiler, laying and breeder productions increased 4, 13 and 49%, respectively. Meanwhile the meat production increased to 1384000 tons, but egg product decreased by 24%. Occupation trend in broiler and breeder production was 49 and 36%, whereas this trend was -4% for laying hens. Although the amount of meat was increased, but only 80% of available capacity was used. This percent for laying industry was decreased from 87% to 71% by end of 2003. Regarding to increment of breeder farms, it was expected to obtain more one-day chickens. It was observed for broiler chickens up to 12%, but it had a negative trend for egg-type chickens. Also, feed conversion and mortality rates have been improved by increasing the knowledge of producers, and controlling the diseases. According to global statistical report in 2004, Iran had the 14th and 17th rank in meat and egg production in the world, respectively. As it is obvious, egg production and its related activities are being decreased. The most important reasons could be the instability of prices to supply feed stuff, lack of a comprehensive program to regulate the price of products, low interest for investment in laying production, and tax for egg exporting.

Key Words: Broiler production, Feed conversion, Laying hens, Occupation trend, Mortality

T106 The effects of egg shape index on incubation results of layer breeders. B. Yilmaz Dikmen*1 and S. Dikmen2,1University of Uludag Keles Vocational School, Keles,Bursa,Turkey, 2University of Uludag, Gorukle,Bursa, Turkey.

The evaluation of some egg quality characteristics has been well documented for poultry species. However, information concerning the evaluation of egg shape index and it is effects on hatchability is limited. The fertile poultry eggs have the highest probability of hatching success when their physical characteristics are average. The present study is carried out to determine the effect of egg shape index on incubation results of layer breeder eggs. A total of 360 eggs were used as study material. The eggs used in this study were obtained from Super Nick white layer breeder flock at 54 weeks of age. All eggs were obtained from the same breeder flock and laid within a 24 h period. The eggs were collected, sanitized and stored at 17-18 °C and 85% relative humidity (RH) for 4 days. Eggs were marked and measured their shape index separately before setting.

T107 Alternative bedding sources for rearing broiler chickens. S. F. Bilkil*1, J. B. Hess, J. P. Blake, K. S. Macklin, and J. L. Sibley, Auburn University, Auburn, AL.

Poultry bedding availability issues are arising rapidly in the broiler industry that may alter the type and quality of bedding available to broiler growers. In the first of a series of planned trials, eight alternative bedding sources [pine shaving (PS); pine bark (PB); ground hard-wood pallets (GP); mortar sand (MS); chopped straw (CS); ground door filler (DF); cotton-gin trash (CT); and chipped pine (CP)] were compared in side-by-side experimental pens (20 birds per pen; 48 pens total). Mixed-sex birds were reared to 42 days of age on a three-phase commercial feeding program. In addition to broiler growth performance (weight gain, feed consumption, and mortality), litter caking scores and moisture (%), the incidence and severity of pododermatitis was assessed.

Significant (P<0.05) differences in live performance were detected among the sources tested. At 42 d of age, broilers reared on MS were heavier (2415 g) and consumed more feed (4054 g/bird) than those reared on GP (2143 and 3700 g), CS (2079 and 3700 g), and GT (2170 and 3709 g), respectively. Feed conversion (Range: 1.667-1.728) and mortality (Range: 1.85 to 7.33%) were not significant among treatments. Degree of litter caking was highest for CT (87%) and CS (67%), and lowest for PB (27%). MS had the lowest litter moisture (10.5%), followed by CP and GP (29%), whereas CS had the highest (39%). Incidence of pododermatitis ranged from 24 to 55%, with birds reared on CS and CP showing the highest severity scores (21 and 23%, respectively). Overall, PB and MS ranked better than PS. Subsequent trials should provide additional information on long-term durability of each bedding source.

Key Words: Broiler chickens, Bedding sources, Pododermatitis

T108 The cost of winter litter cleanout. K. S. Macklin*1 and B. R. Bock2, 1Auburn University, Auburn, AL, 2B.R. Bock Consulting, Inc, Florence, AL.

Broiler litter clean-out is typically performed in the spring, fall and occasionally over the summer. Cleaning out in the winter is generally not performed, due to concerns over heating costs required to dry and heat the new bedding. We hypothesize that in a house that has built up litter, winter cleanout may make good economic sense. Ventilation required to keep ammonia levels acceptable in a house with built up litter, may be comparable to the costs of heating a house with new bedding. To test this hypothesis two commercial broiler farms in north AL were recruited and the testing began in February 2007. On each farm, two buildings had built up litter and two buildings were cleaned to the pad and had fresh pine saw dust added. Management of the houses was done according to how the grower typically would manage their broiler houses. This management included the use of litter treatment in the brood chamber to help control the ammonia associated with built up litter, no litter treatment was added to the clean bedding. Outside temperatures were relatively cold with some daily lows around 20 °F.

The results of this study showed that farm A used 6,800 ft3/house more natural gas in heating houses with new bedding than on houses that contained built up litter. Farm B used 25 gallons/house more propane heating the new bedding compared to the houses that contained built up litter. Both farms had lower ammonia levels in the houses with the new bedding (29.5ppm) compared to houses with the built up litter (50-44ppm). At the end of the trial, there was approximately 2 times more cake in the houses with the new bedding compared to the ones with the built up litter. In conclusion, the use of new bedding material in the winter did lead to slightly higher heating costs; however the lower fan run times required to control ammonia and lack of needing a litter treatment makes winter cleanout a viable alternative to traditional cleanout times.

Key Words: Ammonia, Energy, Broiler

T109 The effects of enzyme inclusion in feed on some performance parameters and enzyme activity in VZM and VZP feeds, but not in controls. These results indicate that Versazyme™ included diets are not affected by the pelleting process and do retain the previously documented positive growth effects.

Key Words: Broiler, Pelleting, Dietary protein, Protease, Keratinase

T106 The effects of egg shape index on incubation results of layer breeders. B. Yilmaz Dikmen*1 and S. Dikmen2,1University of Uludag Keles Vocational School, Keles,Bursa,Turkey, 2University of Uludag, Gorukle,Bursa, Turkey.

The evaluation of some egg quality characteristics has been well documented for poultry species. However, information concerning the evaluation of egg shape index and it is effects on hatchability is limited. The fertile poultry eggs have the highest probability of hatching success when their physical characteristics are average. The present study is carried out to determine the effect of egg shape index on incubation results of layer breeder eggs. A total of 360 eggs were used as study material. The eggs used in this study were obtained from Super Nick white layer breeder flock at 54 weeks of age. All eggs were obtained from the same breeder flock and laid within a 24 h period. The eggs were collected, sanitized and stored at 17-18 °C and 85% relative humidity (RH) for 4 days. Eggs were marked and measured their shape index separately before setting. The eggs were allocated in to three groups according to egg shape index low shape index (LSI) (shape index<73), normal shape index (NSI) (shape index 73 to 76), high shape index (HSI) (shape index>76). The eggs were incubated in an incubator at 37.2 °C and 55% RH for 18 days. On the 18th day of incubation, all eggs were candled and fertile eggs were placed in a separate chamber in the hatchet cabinet and the temperature and humidity were maintained at 36.7 °C and 60% RH until hatching. At the end of the incubation period, all hatch chick counted, fertility, hatchability of hatched eggs, hatchability of total eggs, embryonic mortality were recorded and measured. Egg shape index was found 71.46 ± 0.02, 75.19 ± 0.01 and 78.51 ± 0.01 for LSI, NSI and HSI groups, respectively (P<0.01). The percentage of hatchability of fertile eggs and total eggs were found 89.03 ± 2.28, 96.39 ± 1.14, 87.42 ± 2.87 and 83.33 ± 6.67, 90.00 ± 2.89, 80.00 ± 2.89, respectively (P<0.01 and P<0.05). The percentage of total embryonic mortality of fertile eggs were found 10.97 ± 2.28, 5.41 ± 0.09 and 12.24 ± 3.04, respectively (P<0.05). These results indicate that eggs with NSI have the highest hatchability result which is one of the most important point for commercial breeder enterprises and hatcheries.

Key Words: Egg shape index, Hatchability, Embryonic mortality, Layer breeder
**T109 Evaluation of probiotic and phytogenetic products on the development of Necrotic enteritis in poultry.** J. L. McReynolds*, J. A. Byrd1, R. Beltran2, and D. J. Nisbet3. USDA-ARS-SPARC-FFSRU, College Station, TX, 2Biomin USA Inc., San Antonio, TX.

In the commercial poultry industry there are many management tools used to control enteric pathogens including antibiotics, vaccines, probiotics, and competitive exclusion cultures. The evaluation of probiotics and phytogenetic products as alternatives to antibiotics are becoming more appealing to the commercial industry because of consumer demands to remove antibiotics. Our laboratory is interested in using these products to control *Clostridium perfringens* (CP), a Gram positive organism associated with lower levels of performance and health.

Controlling this organism will also help prevent the development of Necrotic enteritis NE in commercial poultry. The present investigation evaluated a probiotic culture (BiomIn PoultryStatTM) and a phytogenetic product that were administered to birds from day of hatch until termination (d 25) via the drinking water or through a wheat/corn diet respectively. Birds were administered CP (10² cfu/mL) daily via oral gavage for three consecutive days starting on d 17. When evaluating the intestinal lesions, mortality, and log₁₀ values of CP, birds in the probiotic and phytogenetic treatment groups were significantly lower (P < 0.05) than the controls. The log₁₀ values of CP were not significantly reduced in the phytogenetic treatment group. These experiments suggest that this probiotic culture and phytogenetic product could be used as a potential alternative to help control this costly disease.

**Key Words:** Necrotic enteritis, *Clostridium perfringens*, Chickens, Probiotic, Phytogenetic

**T110 Effect of 10% dietary DDGS on laying hen manure ammonia emissions, pH, and solids content.** E. C. Hale III*, Rose Acre Farms, Seymour, IN.

120 Hy-Line W36 hens were housed in cages containing 5 hens/cage, which were further grouped into units of 20 hens/unit. 3 units were fed an industry standard diet consistent with the nutritional requirements of the bird, and the remaining 3 units were fed a nutritionally equivalent diet containing 10% DDGS. The diets were fed for a total of 6 weeks. At the end of each week, freshly excreted manure (less than 4 hours post-excretion) was collected and analyzed for manure pH, solids content. Additionally, the amount of ammonia emitted per day was determined for a total of 4 consecutive days.

Manure ammonia emissions were reduced by an average of 16.9% over the period of the study, manure pH was reduced by 0.25 SU, and manure solids content was increased by 2.36%.

**Key Words:** DDGS, Manure, Laying hen, Ammonia emissions, Diet

**T111 Affect of photoperiods and light intensities meeting US and European guidelines on measures of psychological stress and mobility in broilers.** R. J. Lien* and J. B. Hess, Auburn University, Auburn, AL.

Broilers were subjected to photoperiods and intensities which independently meet US National Chicken Council (NCC) or proposed European Union (EU) guidelines to determine effects on psychological stress or fear responses and mobility. Seventy broilers were placed in each of 12 light controlled rooms. Six rooms were subjected to NCC photoperiods (long) (wk 1, 23L:1D; wk 2-6 20L:4D; wk 7, 23L:1D) and six to EU photoperiods (short) (d 1-3, 23L:1D; d 4-46, 14L:4D:2L:4D; d 47-49, 23L:1D). Half of the rooms of each photoperiod treatment were subjected to common US intensities (dim) (wk 1, 0.25 footcandles [FC]; wk 2-7, 0.025 FC) and half to EU intensity (bright) (wk 1-7, 2 FC). Photoperiod and intensity treatments made up a 2x2 factorial arrangement with 3 replicate rooms of each interaction treatment. TI, perching on stair-stepped perch poles, sitting or standing on 15 cm high raised platforms (decking), mobility as judged by the ability to climb onto the raised platforms to feed, and reactions to the introduction of a black chicken into the room (intrusion) were determined during wk 4 and 7.

Neither photoperiod nor intensity affected TI. The incidence of perching averaged less than 0.2%, was increased by bright intensity during wk 4, and unaffected by treatment during wk 7. Decking averaged over 6%, and was increased by bright intensity during wk 4 and 7. Mobility was increased by bright intensity during wk 4 and 7. Reactions of fear and aggression in response to intrusion were greater under bright intensity during wk 4 and 7. These results indicate that psychological stress or fear responses may be increased by bright intensities specified by EU guidelines, but appear unaffected by photoperiod. Mobility also is increased by brighter intensities but unaffected by these photoperiods.

**Key Words:** Broiler chicken, Photoperiod, Light intensity, Stress, Welfare

**T112 Validation of a gait scoring system for field assessment of walking ability of commercial broilers.** A. B. Webster*, B. D. Fairchild1, T. S. Cummings2, and P. A. Stayer1. 1University of Georgia, Athens, 2Mississippi State University, Starkville, 3Sanderson Farms, Laurel, MS.

A 3-category US gait scoring system used to evaluate broiler walking ability in welfare audits of commercial flocks was compared with the 6-category Kestin system. In two university trials, 6-wk-old broilers were gait scored by two observers for each scoring system (n=681 broilers). A sub-sample of birds was rescored and used in latency-to-lie (LTL) tests. Too few birds had significant walking difficulties to allow for comprehensive statistical comparison of the two scoring systems, but the data were encouraging despite sampling limitations. There was a significant association between the two systems and both had substantial inter-observer agreement. Both scoring systems had significant correlations with latency-to-lie but the variation of LTL was too high to give gait score or LTL much predictive value for each other. For the field observations, two teams of observers scored broilers 47 to 61 days of age on 5 commercial farms each (n=1381 broilers). Two pairs of observers scored the same birds, each pair using the US system or the Kestin system. Broilers with evident walking problems were oversampled to generate adequate numbers in each gait score category. Weighted kappa statistics showed substantial inter-observer agreement in each system, but more so in the US system (κ=0.65 vs 0.78, Kestin vs. US, respectively), suggesting that the application of the US system was more consistent between observers. Spearman correlations between US and Kestin scores for individual birds had high statistical significance (P<0.001) and indicated strong correspondence between the two systems. The simplicity of the US gait scoring system aids inter-observer agreement, making it preferable to more complex systems for use in commercial welfare audits. The strong correspondence between the US and Kestin systems validates the 3-category system in light of the well-known 6-category system.

**Key Words:** Broiler, Gait score, US gait score system, Kestin gait score system, Animal welfare

**T113 Fungi collected from market-age broilers under commercial conditions.** J. A. Byrd*, M. B. Farnell2, M. X. Sanchez2, J. L. McReynolds1, H. M. Scott1, M. A. Davis2, D. J. Caldwell2, and D. J. Nisbet1. USDA-ARS-SPARC-FFSRU, College Station, TX, 2Texas A&M University, College Station.

Fungi collected from two commercial broiler houses without a history of mycotoxicosis was studied under normal production conditions. Normally, fungi are generally ignored unless clinical signs are reported. Probiotics have demonstrated that beneficial bacteria can play a role in improving productions parameters while most have ignored the impact that fungi may have on production. The goal of the present study was to record changes in fungi recovered from a commercial broiler house during production and relate these changes to foodborne pathogens. Using an automated repetitive sequence based PCR (rep-PCR) methodology to track changes fungal changes during successive grow-out flocks, different fungal and yeast genera were identified including: *Rhizopus spp.*, *Aspergillus spp.*, *Fusarium spp.*, *Trichophyton spp.*, *Coccidioides spp.*, and *Curvularia*. The relationship between these fungi and environmental parameters are presented for each sampling point throughout production and within the processing plant. Generalized fungal growth patterns found in the litter and recovered from the broilers are described and the relationship between environmental factors and foodborne pathogens on these patterns are described.

**Key Words:** Fungi, Chickens, Broiler

Experience and research demonstrated that the quality of the day-old chick has a big influence on the growth and final performance of the broiler. Describing and measuring chick quality is considered to be very difficult. Visual score, Tona or Pascar score, day-old chick weight and chick length are commonly used for measuring chick quality. Visual scoring include color of the chickens, navel quality, feather development, the firmness of legs, the size of beak and eyes etc. Although visual scoring gives a good estimates on the quality of the day old chicks, it is a subjective measuring. Usually chick weight is used as an indicator for chick quality. But measuring yolk free body mass is rather laborious and has limited practical for field evaluation. One of the practical way employed to measure chick development is to determine the length of the chicken. By the present study, we planned to compare different methods in order to determine the optimal one as chick quality indicator. For this reason; 480 day old male chicks were used. Chicks were classified into two groups on the basis of feather color: deep and light yellow. Then, chicks in each group was further divided into three groups as small, middle and large according to their body length. The length of the middle group birds was varied between 18.0-18.3 cm, while that of the largest group was greater than 18.3 cm and the small group was less than 18.0 cm. A positive correlation between chick length at day 0 and chick weight at subsequent days was observed. On the other hand there was no significant differences when the chicks were evaluated by taking into account their colors, except for first week. The measured body weight of chicks in deep yellow groups was greater compared to light yellow ones during the first week. Consequently; chick length was determined as an important criteria to evaluate chick quality since longer chicks exhibited better growth potential.

Key Words: Chick quality, Visual scoring, Chick length, Growth

Nutrition VI

T115 An estimation of the energy value of B-Mannanase (Hemicell® Feed Enzyme) in turkey toms under practical conditions using varying energy levels. M. E. Jackson1, K. R. Stephens1, M. W. Greenwood2, and G. F. Mathis3, 1ChemGen Corp., Gaithersburg, MD, 2Akey Inc., Lewisburg, OH, 3Southern Poultry Research, Athens, GA.

Five dietary treatments consisting of four energy feeding programs (Low Metabolizable Energy (LE), LE + 45, LE + 135, and LE + 180 Kcal/kg) and the LE program with a target β-mannanase added at 100 MU/ton (LE+M) were provided to 8 replicate pens with 8 Nicholas male turkeys per pen. Diets were corn-soybean meal based containing 3-7.5% animal by-product meal. All diets were assayed for proximate composition and B-Mannanase activity. The feeding programs consisted of 7 diets provided from 0-3, 3-6, 6-9, 9-12, 12-15 18-18 and 18-20 weeks of age. Liquid enzyme or water was applied to all pelleted diets. Body weight was determined at 0, 3, 6, 9, 12, 15, 18, and 20 weeks of age and feed consumption was determined between these ages. The LE treatment varied from 2910 Kcal/kg from 0-3 weeks to 3329 Kcal/kg from 18-20 weeks of age. Improvements in weight gain and feed conversion were observed with each increase in energy level during all periods demonstrating that the birds consistently responded to energy density. B-Mannanase improved feed conversion from 0-20 weeks by 20.7 points, (P<0.05) and improved final weights by 5.8% (P<0.05). Weight-adjusted feed conversion at 20 weeks of age for the LE+M treatment was between the LE+135 and LE+180 Kcal/kg ME treatments suggesting that the energy uplift of the enzyme lies between these values under the practical conditions of this study.

Key Words: B-Mannanase, Hemicell, Body Weight, Feed Conversion, Energy Uplift


European broiler diets based on wheat and soyola normally contain only xylanase and β-glucanase enzymes. A very large broiler pen trial was conducted to evaluate the effect of a commercial endo-β-D-mannanase (Hemicell®) on the technical performance of broilers from 0 to 37 days of age. A one-factorial, block-designed experiment was set up with 13,680 hatched Ross 308 chicks. The trial was executed at the practical trial facilities of the Schothorst Feed Research. Starter (0-10 days), grower (11-27 days) and finisher (28-37 days) diets were formulated with wheat as the main cereal. Narasin/nicarbasin (50/50 ppm) and salinomycin (65 ppm) were used in the starter and grower diets in order to control coccidiosis. Aromabiotic was added as an alternative growth promoter in the starter and grower diets, and a commercial xylanase was included in all diets. The treatments were: (1) control diet and (2) control diet with 0.05% endo-β-D-mannanase added in the grower and finisher diets. Eight replicate pens per treatment were used, with 855 broilers in each pen. Mash feed and water were available for ad libitum consumption. Endo-β-D-mannanase supplementation resulted in a significantly higher body weight compared to the control diet (2173 g vs. 2138 g) (P<0.05) and a significant improvement in feed conversion (1.615 vs. 1.636) (P<0.05). The litter score, determined on day 23, was significantly better (P<0.05) for the endo-β-D-mannanase-supplemented diet. These results indicate that endo-β-D-mannanase (Hemicell®) supplementation improves the technical performance and litter conditions of broilers fed wheat/soya-based diets.

Key Words: Enzyme supplementation, B-mannanase, Broiler, Wheat, Soyala

T117 The effect of β-mannanase (Hemicell®) on broiler weight gain, feed conversion, mortality, and litter traits in a reduced energy, wheat-soybean meal-based feeding program. E. B. Helmes1, H.-Y. Hsiao1, M. E. Jackson*1, and A. Knox2, 1ChemGen Corp., Gaithersburg, MD, 2Roslin Nutrition Ltd., Midlothian, Scotland.

The goal of this pen trial was to study the effects of the enzyme β-mannanase in broiler rations typical of central and northern Europe where wheat (average 64%) and soybean meal (average 27%) are the primary ingredients. Energy was reduced by 3-4% to test the hypothesis that β-mannanase compensates for lower dietary energy. To date, most studies using β-mannanase were conducted in corn-based rations. Three treatments, normal energy (NE), low energy (LE), and LE+β-mannanase (LE+M) were tested with four diets and each treatment was comprised of 16 randomly blocked pens (40 birds/pen) of Ross 308 males; measurements were taken at 3 and 6 weeks. A commercial xylanase was used in all treatment diets. Litter quality was scored at 6 weeks by visual inspection and moisture analysis of random samples. The observed results included lower weight-adjusted feed conversion (WAFC) for the LE+M group (1.685) versus the LE group (1.752) (P<0.05), and a trend to lower WAFC for LE+M group compared to the NE group (1.698). Average weight gain was similar for the LE+M group (2730 g) and NE group (2724 g); both of these groups showed significantly higher weights than the LE group (2640 g) (P<0.05). Mortality and litter quality results did not differ among the treatment groups. One may conclude that β-mannanase significantly improves broiler growth and feed conversion in reduced-energy wheat/soybean meal-based diets containing xylanase, but has no effect on mortality or litter quality.

Key Words: Enzyme, Wheat, B-mannanase, Soybean meal, Broiler

T118 Effects of ultraviolet light irradiation on hatchability of floor eggs from White Leghorns. C. Coufal*, J. Wells, H. Parker, and C. McDaniel, Mississippi State University, Mississippi State, MS.

Eggs laid on the floor that appear nest-clean are often collected and sent to the hatchery along with eggs laid in the nests. However, the microbial load of eggs laid on the floor can be much greater than that of eggs laid in the nest. It is generally assumed that, because floor eggs are heavily contaminated with bacteria,