

H10N7 isolate from Alabama aquatic wild birds. The resulting gene (1.8 kb) was cloned into *Schizosaccharomyces (S) pombe*. The H gene expressed a 62.2 KD protein as demonstrated by Western blotting. This protein was purified and its expression efficiency was 0.1% of the total soluble protein. We plan to optimize protein expression to increase its immunogenicity prior to work in chickens.

**Key Words:** AIV, Poultry, Yeast, Recombinant vaccine

**T93 Role of different genes in the pathogenesis of H5N1 avian influenza virus in chickens.** J. L. Wasilenko\*<sup>1</sup>, C. W. Lee<sup>2</sup>, L. Sarmento<sup>1</sup>, E. Spackman<sup>1</sup>, D. L. Suarez<sup>1</sup>, and M. J. Pantin-Jackwood<sup>1</sup>, <sup>1</sup>*Southeast Poultry Research Laboratory, Athens, GA*, <sup>2</sup>*Department of Food Animal Health Research Program, Wooster, OH*.

The determinants of pathogenicity of Avian Influenza (AI) virus are not totally defined. Previous studies have pointed towards the importance of different influenza virus genes in determining virulence in various hosts. We used reverse genetics to generate recombinant viruses in order to better understand the role of recombination in AI pathogenesis and to determine which viral genes contribute to the virulence of AI viruses in chickens. A recombinant virus, Ck/Indonesia/03, displayed 50-75% mortality in chickens. Single genes in this virus were then replaced with those from a rEgret/HK/02 virus which displays 100% mortality and high viral titers in tissues. Exchange of the HA gene considerably affected virulence which was reflected in increased mortality, increased viral replication and spread in tissues, demonstrating the importance of the HA gene in pathogenesis of the virus. The HA genes had identical cleavage sites however there were 11 amino acid differences, 5 located in the receptor binding site of the glycoprotein, which could explain the difference observed in pathogenicity of the viruses. Exchange of the NS, NP or M genes also resulted in decreased mean death times (MDT), increased viral replication and spread of the virus in tissues compared to the rIndonesia/HK/02 parent virus. Replacing the NP gene resulted in a virus with the shortest MDT and increased viral spread in tissues, surpassing that of the HA gene recombinant. Exchanging either the PB2 or PB1 genes did not result in increased virulence suggesting these polymerase genes may function more effectively as a unit derived from the same viral strain.

**Key Words:** H5N1, Influenza, Pathogenesis, Virus, Chickens

**T95 Utilization of poultry production information among poultry farmers in Ibadan metropolis, Nigeria.** J. O. Oladeji\* and E. O. Uwagboe, *University of Ibadan, Ibadan, Oyo State, Nigeria*.

Ibadan is a prominent area for poultry production in Nigeria. Increase in poultry production information in this era of Information Communication Technology (ICT) is an issue that needs to be addressed. A multistage random sampling technique was used to select 3 Local Government Areas (LGAs) out of the 9 LGAs in Ibadan Metropolis while systematic random sampling technique was used to select 120 poultry farmers out of a population of 200 registered farmers and questionnaire was used for data collection. Frequency counts and percentages were used for descriptive statistics while Chi-Square was used for data analysis. The result shows that all (100%) of the respondents are educated and majority (82%) has above secondary school level. Few (14%) of the respondents obtained information from Extension agents and all (100%) rear less than 1,500 birds. The Chi-Square result revealed that significant relationship exists between education ( $X^2=21.66, P\leq 0.05$ ), level of production ( $X^2=11.870, P\leq 0.05$ ) and level of information utilization. In conclusion, poultry farmers in the study area are educated but have inadequate poultry information hence operate at small scale level. There is a need for an intensive animal husbandry extension services to facilitate adoption of improved poultry production practices and enhance farmers income generation.

**Key Words:** Utilization, Information, Poultry, Farmers, Nigeria

**T94 *In ovo* administration of a novel vaccine expressing putatively universal and protective epitopes for avian influenza.** G. Gaona-Ramirez\*, S. L. Layton, A. D. Wolfenden, R. E. Wolfenden, N. Pumford, G. Tellez, Y. M. Kwon, W. G. Bottje, and B. M. Hargis, *University of Arkansas, Fayetteville*.

Previously, an attenuated  $\Delta$ aroA *Salmonella enteritidis* strain ( $\Delta$ SE) expressing two M2e epitope sequences with an immune-enhancing CD154 sequence on the cell surface provided high and persistent titers against several influenza serotypes and produced neutralization titers in embryos and cell culture when administered post-hatch. Presently, we evaluated *in ovo* (air cell) administration of this vector on hatchability, seroconversion and performance. Embryos (240, 18 dE) from a commercial broiler hatchery were divided into 2 groups: .25 mL PBS containing  $3.25 \times 10^3$  cfu  $\Delta$ SE/embryo into the air cell or vehicle alone (control). Liver/spleen and cecal tonsils were aseptically cultured for  $\Delta$ SE strain recovery, and blood samples were obtained for determination of M2e and  $\Delta$ SE specific IgG antibody response. The hatchability for the treated group was 91.52% vs. 86.55% for vehicle-treated controls.  $\Delta$ SE (positive/total) recovery was as follows: liver/spleen: Day 1 20/20 (100 %); d 7 10/20 (50 %); d 14 5/20 (25 %); d 21 2/10 (20 %); and d 28 0/10 (0 %). For cecal tonsils: Day 1 20/20 (100 %) with an average of  $1.87 \times 10^{11}$   $\Delta$ SE/gram of cecal contents; d 7 20/20 (100 %); d 14 18/20 (90 %); d 21 3/10 (30 %); d 28 4/10 (40 %). No  $\Delta$ SE was recovered from control chicks. The M2e serum antibody levels (S/P ratio) were higher at day 7 and decreased weekly (day 7, .8; day 14, .2; day 21, .15; and day 28, .1). The  $\Delta$ SE serum antibody levels showed a low response at 7 d in the vaccinated group and decreased during the 4 weeks of the study. Weekly body weights during the experimental period did not show any statistical difference between the vaccinated embryos when compared with control embryos ( $P>.05$ ). These data suggest that *in ovo*  $\Delta$ SE administration does not affect the hatchability of broiler embryos nor the performance of the chickens. A strong immunological response was observed during the first week of age against the M2e. The clearance of the  $\Delta$ SE in liver and spleen was observed at day 28 (0/10). Further studies to evaluate secondary immune response and clearance from the cecal tonsils are currently being conducted.

**Key Words:** Embryo, Vector, Avian Influenza, M2e

## Nutrition V

**T96 Influence of endogenous phytase activity on exogenous phytase pellet stability evaluation.** S. Dalsgaard\*<sup>1</sup>, M. F. Isaksen<sup>1</sup>, M. Hruby<sup>2</sup>, and T. Gravesen<sup>1</sup>, <sup>1</sup>*Genencor, Danisco, Denmark*, <sup>2</sup>*Danisco Animal Nutrition, St. Louis, MO*.

Today, a large proportion of monogastric feed is enriched with microbially derived phytases to improve the digestibility of phosphorus. Phytate is the major phosphorus source in wheat and corn, and approximately 75% of all phosphorus in the grains is bound within phytate molecules. Phytate cannot be degraded by the animal itself, and the animal needs exogenous phytase to degrade the phytate *in vivo*.

The exogenous phytase pellet stability is an important topic for the feed industry. The primary way of evaluating exogenous phytase thermostability is by running pelleting tests in commercial feed mills. However, endogenous phytase from the raw materials can influence the outcome of the test results. The endogenous phytase originates mainly from wheat or wheat by-products, which are, in many markets, ingredients used at high levels in animal feed. The presence of endogenous phytase can then cause an incorrect interpretation of thermostable phytase product thermostability.

The evaluation dealt with two aspects of how endogenous phytase influences the outcome of pelleting trials. First, a commercial pelleting trial, where the endogenous phytase is inactivated at 90°C and second, a test of endogenous phytase thermostability over a temperature range of 75°C to 95°C. The results show 85% inactivation of the original endogenous phytase activity at 95°C. The

overall conclusion is that the endogenous phytase is not thermostable; however, it is present and active in mash feed before pelleting and if the recovery of added (exogenous) phytase product is calculated based on the activity in mash feed, the recovery and thereby the thermostability of the added phytase can be underestimated.

**Key Words:** Endogenous phytase, Thermostability, Corn, Wheat

**T97 Evaluation of heat stable phytases in pelleted diets fed to broilers from day 0 to 35.** J. R. Timmons<sup>\*1</sup>, R. Angel<sup>1</sup>, J. M. Harter-Dennis<sup>2</sup>, W. Saylor<sup>3</sup>, and N. Ward<sup>4</sup>, <sup>1</sup>University of Maryland, College Park, <sup>2</sup>University of Maryland Eastern Shore, Princess Anne, <sup>3</sup>University of Delaware, Newark, <sup>4</sup>DSM, Parsippany, NY.

Broiler rations are typically pelleted to promote improved broiler performance. Before advent of heat stable (HS) phytase product forms, phytases (Ph) were generally added post-pelleting to prevent Ph inactivation from high pelleting temperatures. The objective of this study was to evaluate retained Ph activity of two HS phytase enzymes (PhA and PhB) in pelleted diets fed to 0-35d old straight run Ross 708 broilers. Ph diets were deficient in non-phytate phosphorus (NPP) (0.28, 0.185, and 0.11% NPP, starter (S), grower (G), and finisher (F) diets, respectively) and all treatments (TRT) were pelleted at 93.3 °C. A RCB design was used and percent retained Ph activity (RPhA), weight gain (WG), feed efficiency (F/G), and percent tibia ash (TA) were measured. TRT included a positive control (PC) (0.45, 0.40, 0.35% NPP, in S, G, F diets, respectively), negative control (NC) (0.35, 0.25, 0.16% NPP in S, G, F diets, respectively), 0.5XPhA, 1XPhA, 2XPhA, 0.5XPhB, 1XPhB, and 2XPhB (TRT 1-8, respectively). Manufacturer recommended enzyme level was 1X. RPhA (averaged over 3 diet phases) was not different (P=0.07, SEM 4.15) between TRT 3-8 (64.3, 69.8, 80.0, 81.0, 73.2, and 69.5 %, respectively) suggesting heat stability of both PhA and PhB are similar. No differences (P>0.05) between TRT were detected in WG (average 659.2; d21 and 1,618.5 g; d35). F/G of 35 d old birds fed TRT 5-7 was 3% lower (P≤0.05) than F/G of birds fed NC. Differences were detected in TA at d 21 and 35. Day 21 TA of TRT 1 (51.0%) was higher (P≤0.05) than TA of TRT 2-8. However, no differences (P>0.05) were detected in TA of birds fed 1XPhA and 1XPhB (49.4 and 49.1%, respectively). Day 35 TA values were 50.51<sup>a</sup>, 47.95<sup>c</sup>, 48.90<sup>bc</sup>, 48.95<sup>bc</sup>, 49.60<sup>ab</sup>, 48.87<sup>bc</sup>, 49.51<sup>ab</sup>, and 50.10%<sup>ab</sup> for TRT 1-8, respectively. TA of birds fed the PC diet was 5% higher (P≤0.05) than TA of birds fed the NC diet. However, TA of birds fed TRT 2XPhA, 2XPhB, and 1XPhB were not different (P>0.05) than the TA of birds fed the PC diet, and no differences in TA were detected between any Ph TRT. Results suggest that supplementing NPP deficient diets with a pre-pelleting HS Ph will improve TA of birds fed pelleted diets.

**Key Words:** Phytase, Phosphorus

**T98 Impact of a bacterial phytase on broiler chickens when fed simple or complex diets.** T. M. Parr<sup>\*1</sup>, R. Upton<sup>1</sup>, C. L. Wyatt<sup>1</sup>, and S. W. Davis<sup>2</sup>, <sup>1</sup>Syngenta Animal Nutrition, Research Triangle Park, NC, <sup>2</sup>Colorado Quality Research, Wellington, CO.

An evolved, thermo-tolerant bacterial phytase (Quantum Phytase™; QP) has been evaluated in many broiler studies which utilized diets typically composed of a commercial corn-soya-animal protein base. With increasing ingredient prices, more non-traditional feedstuffs are being considered thus the objective of this study was to compare the response of feeding QP to broilers in a simple corn-soya, semi-complex or a complex diet (containing corn, soybean meal, canola meal, rice bran and sunflower meal). The phytate content in the corn-soya averaged 0.23% whereas the phytate levels increased in the complex diet (average 0.38%). For each of the diets AvP, Ca, ME and aa were lowered to result in a negative control (NC) which matched the positive control (PC). Phytase was added to the NC diets at 200 or 300g/mt (equivalent to 500 or 750FTU/kg, respectively) and fed as pellets for 42d. Body weight, feed intake, FCR and mortality were recorded over the trial period. At 42d, left tibias were collected for bone ash analysis. The addition of phytase at either inclusion level improved body weight and bone ash in broilers fed NC diets achieving performance equivalent to the PC

group. Increasing dietary phytate levels by including non-traditional feedstuffs negatively impacted performance within the NC groups only. This study demonstrates the ability of QP to effectively reduce the negative effects of dietary phytate regardless of diet complexity.

**Key Words:** Phytase, Thermo-tolerant, Phytate, Complex diet

**T99 Performance of broilers fed commercial forms of phytases with different biochemical characteristics: *P. lycii*, *A. niger* and *E. coli*.** P. W. Waldroup<sup>1</sup>, F. Yan<sup>1</sup>, N. E. Ward<sup>\*2</sup>, and J. Wilson<sup>2</sup>, <sup>1</sup>University of Arkansas, Fayetteville, <sup>2</sup>DSM Nutritional Products, Parsippany, NJ.

Phytases have unique and different biochemical characteristics. This 42-day floor pen trial compared four commercial phytases with substantially different biochemical properties.

Three control phosphorus (P) trts (low, intermediate, high) were supplemented with defluorinated phosphate to provide added P, resp.: starter (1–18 d), 0.15, 0.225 and 0.3%; grower (19–34 d), 0.125, 0.2 and 0.275%; and finisher (35–42 d), 0.075, 0.15 and 0.225% P. Added P in the low control was 0.05% higher than in the 9 phytase diets.

Six replicates of 60 Cobb 500 male broilers were randomly assigned to one of the 12 trts. Body weight (BW), feed conversion (F/G), feed consumption and mortality were determined for each period. On d 18, tibia ash was determined for three random birds per pen. Phytase R (two product forms), N, O and Q were supplemented according to manufacturer recommendations. Diets were nonpelleted corn/SBM, met NRC (1996) for all nutrients except P, and phytase trts were prepared from one basal.

BW increased (P<0.0001) with added P in all periods. Starter: with the exception of Phytase N, phytases increased (P<0.05) BW over the lowest P. Grower: only Phytases N and Q underperformed (P<0.05) the intermediate control. Finisher: BW of birds fed phytases exceeded (P<0.05) the low P, but not the intermediate or high. Phytases improved (P<0.05) F/G, but were not different from intermediate or high P. Mortality of low P was higher (P<0.05) than for intermediate or high. Phytases decreased (P<0.05) mortality relative to low P in all periods. Only Phytase Q increased (P<0.05) mortality.

Low P birds had less (P<0.05) tibia ash % than intermediate or high P. At recommended levels, tibia ash across phytases was similar, with the exception of Phytase N, which underperformed (P<0.05) all phytases but was not different (P>0.05) from Phytase Q. Phytase R and Phytase O at levels higher than recommended by manufacturer outperformed (P<0.05) all other phytases.

Biochemical properties of phytases differ, and depending on the commercial formulation and recommendations, could impact broiler performance.

**Key Words:** Phytase, *P. lycii*, *E. coli*, *A. niger*, Broilers

**T100 Evaluation of a bacterial phytase on nutrient metabolism and performance in broiler chickens.** C. Wyatt<sup>\*</sup>, R. Upton, T. Parr, and W. Rieping, Syngenta Animal Nutrition, Research Triangle Park, NC.

Previous research clearly demonstrates that the addition of a phytase liberates phytate-bound phosphorus in poultry diets. However discussion still remains on the effects of phytate, and ultimately a phytase, on energy and nitrogen retention. The objective of the current experiment was to evaluate the inclusion of a bacterial phytase (Quantum™, QP) on bird performance from 1-40d and on nutrient metabolism. 1250 male, Ross broiler chicks were randomly distributed among 5 treatments. There were 10 replicates per treatment, in floor pens containing 25 chicks per pen. There were three basal diets consisting of a positive control (PC); a negative control (NC1) formulated to contain a nutrient reduction of 0.12% av. P, 0.077% Ca, 0.003% Lys, 26 kcal ME, 0.12% protein; and a negative control 2 (NC2) formulated to contain a nutrient reduction of 0.13% av. P, 0.10% Ca, 0.01% Lys, 45 kcal ME, 0.36% protein. QP was added at 100g/mt (equivalent to 250FTU/kg) to NC1 and 200g/mt (equivalent to 500FTU/kg) to NC2. Supplementing QP in NC1 and NC2 diets returned BW, FI, and FCR in broilers to equal that of the PC-fed birds. At day 19-23 ileal samples were collected from broilers to determine nutrient digestibility values. Feeding QP significantly improved the energy values of 30 and 57 kcal DM/kg, respectively

for the NC1 and NC2 diets. QP increased ileal digestibility of phosphorus and retained phosphorus (mg/b/d). Thus, excreted phosphorus was reduced and phosphorus deposition was improved in tibia ash content, especially for birds fed NC2 containing 200g/mt QP. The inclusion of QP at 200g/mt showed the best results for nutrient digestibility, phosphorus retention, and lower phosphorus excretion and similar performance and tibia composition to the positive control.

**Key Words:** Phytase, Nutrient metabolism, Broiler

**T101 Effects of feeding a series of doses of Quantum™ phytase on broiler chicken performance and tibia ash.** M. E. Persia<sup>1</sup>, J. Offer<sup>2</sup>, and T. Acamovic<sup>2</sup>. <sup>1</sup>Syngenta Animal Nutrition, RTP, NC, <sup>2</sup>Scottish Agricultural College, Ayr, Scotland, United Kingdom.

The effects of feeding a series of doses of Quantum phytase (QP) on the performance and bone ash content of broiler chickens from 0- to 42- days-of-age were investigated. In the experiment QP was added to the starter phase (0-21 d) and finisher phase (21-42 d) diets at target activities of 250, 500 and 2500 FTU/kg diet. The dietary treatments included a positive control (PC) and negative control (NC) as well as the three QP treatments. The PC diet was generated to be adequate in all nutrients. The NC diet and all QP containing diets were generated from a basal diet adequate in all nutrients except P for both the starter and finisher phases. In the starter phase, the PC diet was formulated to contain 1.0% Ca and 0.45% non-phytate-P (NPP) and the NC diet and all QP containing diets were formulated to contain 1.0% Ca and 0.30% NPP. In the finisher phase, the PC diet was formulated to contain 0.8% Ca and 0.37% NPP and the NC and all QP containing diets were formulated to contain 0.8% Ca and 0.24% NPP. One day-old, chicks were feather-sexed before placement on experimental treatments. Male and female chicks (192 of each) were utilized resulting in four replicate pens of eight separately penned male and female chicks (total of eight replicate pens) for each of the six experimental treatments. Over the 42-day period, the NC resulted in chicks gaining on average 84% of the weight gain realized by the chicks fed the PC. Treatment of the NC diets with 250, 500 and 2500 FTU QP/kg resulted in weight gains reaching 94, 100 and 97% of the PC, respectively. Femur ash percentage was determined and 250, 500 and 2500 FTU of QP increased ash percent (in comparison to the NC) by 69, 97 and 125%, respectively. These data demonstrate the consistent ability of QP to liberate P and improve weight gain and femur ash in chicks fed diets low in P.

**Key Words:** Broiler, Nonphytate phosphorus, Phytase, Femur ash

**T102 Influence of dose of a novel xylanase on performance of broilers fed a corn or corn/wheat based diet.** M. R. Bedford\* and H. Graham, *AB-Vista Feed Ingredients, Marlborough, Wilts, United Kingdom.*

Xylanases are used universally in wheat-based broiler diets and are also employed in corn-based diets, although their use is not as widespread. This is because responses obtained in corn-based diets are not as large and less frequent than that seen with wheat. The present study investigated the scale of response of variable doses of a novel, highly thermostable xylanase (Econase XT™) on the performance of male broilers fed energy deficient diets (NRC -100kcal/kg to 14d, -125kcal/kg 14-28d of age) where the cereal base was either corn, or 35% Wheat: 30% corn. Each diet base was supplemented with the xylanase at 0, 2000, 4000, 8000, 16000 or 32000 BXU/kg diet. A corn based positive control was included for comparison. All diets were pelleted at 85C. Enzyme recovery from pellets was consistently 90% of that found in the mash or greater. There was a significant reduction in gain and deterioration in FCR on feeding the negative controls compared with the positive control diet at 28d (>60g and ~10 points respectively). Addition of the xylanase lead to a dose dependant, quadratic improvement in both gain and FCR in both cereal-based diets. The rate of improvement in both parameters was almost identical for each diet base and there was no suggestion of any negative effect at the highest dose used. At 28d, gain was equilibrated with the positive control at 16,000 BXU whereas optimum FCR, achieved at approx 20,000 BXU, did not quite equilibrate with the positive control, suggesting that the 125kcal/kg downspecification was marginally excessive. The data suggest that this enzyme able to withstand pelleting at 85C and that it is equally able to

recover energy from both wheat/corn and corn based diets, with the likelihood that it is able to recoup approx 100kcal/kg.

**Key Words:** Corn, Xylanase, Enzyme, Energy

**T103 Response to combined amylase-phytase-protease-xylanase supplementation when 8 week broiler males had received corn-soybean meal feeds devoid of antimicrobials with/without alfalfa meal and/or DDGS.** E. T. Moran\* and R. Lehman, *Auburn University, Auburn, AL.*

Omitting antimicrobials from broiler feed is favorable for consumer marketing. Supplemental enzymes represent a GRAS alternative. Chicks were vaccinated for coccidiosis prior to placement then reared to 8 weeks of age. Feed coccidiostat and all other antimicrobials were not employed. Males were fed corn-soybean meal feeds having nutrients at accepted levels through intervals 0-3, 3-6 and 6-8 wk, and when ME together with available P were reduced by 80kcal and 0.10% at each age. Combined enzymes guaranteed per kg of final feed were amylase 800u, protease 8000u, xylanase 600u (Avizyme 1502, 0.05%), phytase, and 500 fu (Phyzyme XP, 0.01%). Alfalfa meal (3%, Alfalfa Supreme, Toledo OH) and/or distillers™ dried grains solubles (10%, Dakota Gold, Souix Falls SD) were incorporated on the basis of label composition to provide equivalent nutrition as with sole use of corn-soybean meal. Reducing ME-aP adversely affected final live weight, regardless of combinations with or without alfalfa meal and/or DDGS were employed. Recovery of weight loss occurred when the enzyme combination was supplemented to the reduced ME-aP feeds while a weight gain advantage was obtained when included at accepted nutrient levels. Advantage in BW gain from enzymes was greatest when DDGS had been used while feed conversion benefitted most with alfalfa meal inclusion. Carcass abdominal fat decreased uniformly when ME was reduced and increased with all treatments in response to enzymes. Fillets, tenders and skinless boneless thigh meat increased when enzymes had been supplemented while femurs had additional weight, length and breaking strength. Inclusion of combined amylase-phytase-protease-xylanase into broiler feeds without antimicrobials over an 8 weeks led to favorable responses in live production, skinless boneless meat yield and skeletal integrity, regardless of alfalfa meal and DDGS inclusion and whether ME with aP were sub marginal.

**Key Words:** Alfalfa meal, Antimicrobial feed additives, Broiler production, Distillers dried grains solubles, Enzyme supplementation

**T104 Evaluation of versazyme stability in pelleted broiler diets.** C. R. Stark, B. E. Spencer, C. G. Chewning, and J. C. H. Shih\*, *North Carolina State University, Raleigh.*

Versazyme™ (VZ) is a keratinase-based feed additive produced naturally as a fermentation product of *Bacillus Licheniformis PWD-1*. VZ supplementation in corn/soy broiler diets has resulted in improved growth performance and feed efficiency across a range of nutrient densities with maximal benefit in low or marginal crude protein diets. The corn/soy broiler diets supplemented with VZ were previously in the form of mash as VZ had not yet been tested in pelleted feed. This study was designed to test the efficacy and recovery of VZ pelleted under typical feed industry conditions. The pelleted diets were conditioned to 85°C for 30 sec and pelleted using a 4 mm x 32 mm die. The cooled pellets were crumbled and fines were included. The experimental design was a randomized complete block with a 2 x 2 factorial of 4 treatments: VZ at 0.0% (C) and 0.1% (VZ) w/w; feed form of mash (M) and pellet (P). A total of 192 male broiler chicks were randomly assigned to 24 pens and fed a corn/soy starter diet formulated at 19.3% CP to 21 d of age. There were 6 replicate cages per treatment. The birds were given *ad libitum* access to feed and water. Body weight and feed consumption were determined at 21 d of age. Results of growth performance showed positive effects of VZ supplementation on BWG and FCR with no interaction effects ( $P > 0.01$ ). Birds fed VZ diets had significantly ( $P < 0.01$ ) higher BW (798 VZM and 878 VZP) than those receiving the non-supplemented diets (743 CM and 823 CP). Birds fed diets supplemented with VZ had better overall FCR (1.57 VZM and 1.55 VZP) than those fed corresponding diets without VZ supplementation (1.81 CM and 1.65 CP). FCR was significant ( $P < 0.01$ ) for VZ supplemented

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 roll 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 tones, 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\*<sup>1</sup> and S. Dikmen<sup>2</sup>, <sup>1</sup>*University of Uludag Keles Vocational School, Keles, Bursa, Turkey,* <sup>2</sup>*University 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 its 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 hatcher 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 hatched chicks counted, fertility, hatchability of hatched eggs, hatchability of total eggs, embryonic mortality were recorded and measured. Egg shape index was found  $71.46 \pm 0.02$ ,  $75.19 \pm 0.01$  and  $78.51 \pm 0.01$  for LSI, NSI and HSI groups, respectively ( $P < 0.01$ ). The percentage of hatchability of fertile eggs and total eggs were found  $89.03 \pm 2.28$ ,  $96.39 \pm 1.14$ ,  $87.42 \pm 2.87$  and  $83.33 \pm 6.67$ ,  $90.00 \pm 2.89$ ,  $80.00 \pm 2.89$ , respectively ( $P < 0.01$  and  $P < 0.05$ ). The percentage of total embryonic mortality of fertile eggs were found  $10.97 \pm 2.28$ ,  $5.41 \pm 0.09$  and  $12.24 \pm 3.04$ , respectively ( $P > 0.05$ ). These results indicate that eggs with NSI have the highest hatching 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

**T107 Alternative bedding sources for rearing broiler chickens.** S. F. Bilgili\*, 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\*<sup>1</sup> and B. R. Bock<sup>2</sup>, <sup>1</sup>*Auburn University, Auburn, AL,* <sup>2</sup>*B.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 for 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 ft<sup>3</sup>/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 (50.4ppm). 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