
A floor pen study was conducted to determine the efficacy of vitamin D source and level on performance and bone mineralization of broilers fed dietary treatments for six weeks. Dietary treatments included: 1) Basal diet supplemented with NRC recommended levels of vitamin D3 (200,000 ICU/ton); 2) Basal plus 2.5 million ICU (MUC) D3/ton; 3) basal plus 2.5 MUC D3/ton plus 62.5 mg Hy-D/ton; 4) basal diet plus 5 MUC D3/ton diet; and 5) basal plus 62.5 mg Hy-D/ton diet. Diets were fed from day 1 to 42, and nutrient concentrations were adjusted at the end of week 3 according to NRC recommendations. For both experiments, pens of 20 chicks were fed each treatment from day 1 to 21. On day 21, 6 chicks from each pen were removed for sampling, leaving 4 replicate pens of 14 chicks from day 21 to 42. Compared with chicks fed diet 1, chicks fed all other treatments consumed more feed and gained more weight (P < 0.05) at both weeks 3 and 6. Feed intake and body weight gain were similar (P > 0.05) for chicks fed treatments 2-4 at both weeks 3 and 6. Feed conversion was not affected (P > 0.05) by dietary treatments at either week 3 or 6. Compared with chicks fed diet 1, chicks fed all other treatments had a higher (P < 0.05) percent tibia ash at week 3, whereas at week 6, chicks fed diets 1 and 5 had a lower (P < 0.05) percent tibia ash compared with other dietary treatments. However, on an absolute bone ash weight basis (mg bone ash), bone ash was not affected (P > 0.05) by dietary treatments at either week 3 or 6. Bone breaking strength was also not affected (P > 0.05) by dietary treatments at either week 3 or 6. Results indicate that supplemental vitamin D3 above NRC recommendations was effective in improving chick performance and bone mineralization, and 62.5 mg Hy-D/ton feed was as effective as industry vitamin D3 levels in improving chick performance.

Key Words: Vitamin D, Bone Ash, Broilers

824 Influence of large doses of vitamin C on performance, plasma and bone calcium and phosphorus, bone characteristics and egg quality of local Dandarawi hens exposed to cold stress. M. M. Metwally*, Department of Animal and Poultry Production, Assiut University, Assiut, Egypt.

An experiment was conducted to investigate the effect of large doses of vitamin C (0 to 2,000 ppm) on performance, plasma calcium and phosphorus, bone characteristics and egg quality of Local Dandarawi Hens exposed to low environmental temperatures in Winter season (December, January and February) of upper Egypt. A total of 192 local Dandarawi hens (32 wks of age) were fed diets containing vitamin C (ranging from 0 to 2,000 ppm) for 4 months. Body weight changes, egg production, weight, egg quality and bone characteristics were determined. Plasma and tibiae were analyzed for total calcium and phosphorus. Results indicated that body weight loss and mortality rate (%) were significantly (P < 0.05) lower in groups fed high doses of vitamin C. Egg laying rate (%) was significantly (P < 0.05) higher by 20% during the period of cold stress in birds fed the highest level of vitamin C than control birds. Egg weight increased up to 6% and egg specific gravity was improved in hens fed 2,000 ppm of vitamin C which also had increased calcium and phosphorus in the bone and blood plasma. Egg quality criteria was enhanced by high doses of vitamin C. Improved in both feed consumption and feed conversion with groups fed the highest level of vitamin C. Results recommend that large doses of vitamin C in the diets of laying hens influence calcium metabolism, affecting bone and shell mineralization and improved egg production and quality of laying hens under cold stress.

Key Words: Laying Hens, Performance, Vitamin C


Europe and Saudi Arabia require that broiler grown for their market are not fed animal by products. The so-called vegetable feeds are largely formulated with an increased inclusion of soybean meal, which usually leads to increased excreta viscosity. An experiment was designed with 8 treatments: four ingredient formulation varying in ingredient inclusion and optimizing or not the dietary electrolyte balance (DEB) to 250 mg/kg of feed. Feed treatments were: corn and soybean meal, corn and soybean meal plus meta glucanase, inercial peptinase + beta glucanase, vitamin D source and level on per- formance, plasma and bone calcium and phosphorus, bone characteristics and egg quality of local Dandarawi hens exposure to cold stress. M. M. Metwally*, Department of Animal and Poultry Production, Assiut University, Assiut, Egypt.

An experiment was conducted to investigate the effect of large doses of vitamin C (0 to 2,000 ppm) on performance, plasma calcium and phosphorus, bone characteristics and egg quality of Local Dandarawi Hens exposed to low environmental temperatures in Winter season (December, January and February) of upper Egypt. A total of 192 local Dandarawi hens (32 wks of age) were fed diets containing vitamin C (ranging from 0 to 2,000 ppm) for 4 months. Body weight changes, egg production, weight, egg quality and bone characteristics were determined. Plasma and tibiae were analyzed for total calcium and phosphorus. Results indicated that body weight loss and mortality rate (%) were significantly (P < 0.05) lower in groups fed high doses of vitamin C. Egg laying rate (%) was significantly (P < 0.05) higher by 20% during the period of cold stress in birds fed the highest level of vitamin C than control birds. Egg weight increased up to 6% and egg specific gravity was improved in hens fed 2,000 ppm of vitamin C which also had increased calcium and phosphorus in the bone and blood plasma. Egg quality criteria was enhanced by high doses of vitamin C. Improved in both feed consumption and feed conversion with groups fed the highest level of vitamin C. Results recommend that large doses of vitamin C in the diets of laying hens influence calcium metabolism, affecting bone and shell mineralization and improved egg production and quality of laying hens under cold stress.

Key Words: Laying Hens, Performance, Vitamin C

826 Effects of salmonella typhymurium lipopolysaccharide challenge on the performance and zinc metabolism in laying hens supplemented with zinc from different sources. T. Cheng*, Y. Guo, and J. Yuan, College of Animal Science and Technology, China Agricultural University, Beijing, P.R. China.

The study was conducted to determine the effects of Salmonella Typhymurium lipopolysaccharide (LPS) challenge on egg production, egg composition, inflammatory response, and zinc metabolism in layers fed diets supplemented with organic or inorganic zinc since 3-week-old. The three dietary treatments were corn-soybean meal basal diet without supplemental zinc or with zinc at 60 mg/kg from ZnSO4 or zinc amino acid complex(ZnAA). At the age of 58-week-old, twelve hens from each treatment were allotted into two sub-groups. On day 1, 3, 5, 7 of the 58th week of age, six birds of one sub-group were injected intraperitoneally with LPS or sterile saline. Neither effect of zinc source/LPS challenge interaction nor zinc source on egg production performance was observed. LPS-challenge decreased egg production (p < 0.04) and increased percentage of cracked eggs (p < 0.01). With LPS challenge, the fever response of hens fed ZnAA tended to peak and subsidize also earlier than fed ZnSO4 or basal diet, serum IL-1 level at 3h was higher (p < 0.01), but lower at 12 h post-challenge (p < 0.001) in hens fed ZnAA than ZnSO4. In saline-injected groups, serum IL-1 was higher in hens fed ZnAA than the basal diet at 3-h post-injection (p < 0.01). LPS-challenged birds had lower serum zinc and higher zinc sequester in liver and spleen (p < 0.01). Supplementation of 60mg/kg zinc from either ZnAA or ZnSO4 significantly (P < 0.05) elevated nSGOT and nSGPT (MT) concentration in liver and spleen. MT concentration in liver of birds fed ZnAA was higher than fed ZnSO4 (p < 0.05). The magnitude of incrementation of hepatic and splenic MT due to LPS challenge were higher by supplementation of ZnAA than ZnSO4. The results suggest that zinc amino acid complex enhances MT synthesis and zinc sequester in hepatic and splenic tissues, and increases the sensitivity of immune response due to LPS challenge.

Key Words: Laying Hens, Lipopolysaccharide, Zinc Metabolism

827 Effects of broiler strain on nonphytate phosphorus requirement. M. E. Persia* and W. W. Saylor, University of Delaware, Newark.

With yearly improvements in genetic stock and recent pressure to reduce safety margins of nonphytate phosphorus (nPP) in poultry feed, it is important to revisit strain differences in the nPP requirement of broiler chicks. Experiments were conducted to determine if broiler strain affects the nPP requirements of growing chicks. One-day-old Ross 308 and 708 chicks were obtained from a local commercial hatchery. Chicks utilized in both experiments were from breeder flocks of similar age that received the same level of dietary nPP. Chicks were maintained on a standard starter diet until 8 days of age, when chicks were sorted, wing-banded and randomly assigned to experimental treatments. Chick weight gain and feed intake were measured from 8 to 22 d of age. Chicks were then euthanized by cervical dislocation and the right tibia was harvested to determine fat-free tibia ash. Treatments were arranged utilizing a six by two factorial design. Experimental diets formulated to contain one
of six levels of nPp (0.13, 0.21, 0.29, 0.37, 0.45 or 0.53%) were fed to the six strains of broiler chicks. One hundred forty-four chicks of each strain were randomly assigned to six replicate groups of four chicks for each experimental treatment. Both dietary nPp level and broiler strain significantly affected weight gain and feed intake, but no interaction between the two factors was observed. Broken-line regression analysis resulted in requirement estimates of 0.33 and 0.30% for weight gain and 0.33 and 0.33% for feed intake for Ross 308 and TP7 chicks, respectively. There appears to be little difference in the NPP requirements of the two broiler strains utilized in this experiments.

Key Words: Nonphytate Phosphorus Requirement, Broiler, Strain

828 Plasma and tissue selenium and plasma glutathione peroxidase concentrations of broilers fed a selenium-deficient diet following a selenium-loading period. R. L. Payne* and L. L. Southern, Agricultural Center, Louisiana State University, Baton Rouge.

An experiment was conducted to compare plasma glutathione peroxidase (pGPX3) and plasma and tissue Se concentrations in broilers fed a Se-deficient diet after having been fed diets supplemented with either sodium selenite (SS) or Se-enriched yeast (SY). Female broilers were assigned to three treatments on d 0, and the trial lasted 22 d. The treatments were: 1) C-SBM (1994) containing 0.21 ppm Se supplementation (C-SBM), 2) C-SBM + 0.30 ppm Se from SS, and 3) C-SBM + 0.30 ppm Se from SY. Each treatment was replicated eight times with 15 broilers per replicate, and these treatments were fed from d 0 to 10 posthatching. On d 10, all broilers were fed a Se-deficient diet, which consisted of cornstarch (25%), dextrose (25%), SBM (31%), and torula (10%). Plasma and tissue Se concentrations of plasma and tissue Se and pGPX3 were established using 10 broilers on d 0. On d 10, 13, 16, 19, and 22, three broilers per replicate were randomly selected for plasma and tissue collection. Any significant effects listed are significant at P < 0.05. Diet did not affect growth performance during the Se-loading period (<d 10 or 10) or overall (d 0 to 22). Broilers fed either SS or SY had similar pGPX3 concentrations on d 10 and 13, but the broilers fed SY had higher pGPX3 activities than the broilers fed SS on d 16, 19, and 22. Both sources of Se resulted in higher pGPX3 and plasma Se concentrations than broilers fed the C-SBM without Se supplementation. Broilers fed SY had higher plasma Se than those fed SS except for d 10 and 22. Liver Se concentration was higher in broilers fed SY on d 10, 13, and 16 compared with those fed SS, but it was similar on d 19 and 22. Similarly, breast Se concentration was higher in broilers fed SY on d 10, 13, 16, and 19 compared with those fed SS, but it was similar on d 22. These results indicate that organic sources of Se are deposited at a greater rate in tissues, and then better utilized for maintaining pGPX3 concentrations over time than inorganic forms of Se.

Key Words: Broiler, Glutathione Peroxidase, Selenium

829 Validation of a selenium-deficient diet for broilers. R. L. Payne* and L. L. Southern, Agricultural Center, Louisiana State University, Baton Rouge.

Two experiments (EXP) were conducted to develop a Se-deficient diet that could be used for selenium-dependent plasma glutathione peroxidase (pGPX3) assays in broilers. For each EXP, 288 female broilers were weighed, wingbanded, and allotted to dietary treatment on d 0, and the EXP lasted 21 or 20 d, respectively. All diets were formulated to provide 1.26% total Lys, 1.0% Ca, 0.45% available P, and 3,200 kcal/kg that could be used for selenium-dependent plasma glutathione peroxidase (pGPX3) and plasma Se concentrations in broilers fed a selenium-deficient diet following a selenium-loading period. This trial evaluated various dietary calcium and non-phytate phosphorus (nPp) levels fed to Nicholas 700 toms from 2 to 19 wk of age. After a two-wk brooding period, 24-25 pouls/pen were allocated to 8 pens/treatment. Crumbs were fed from 2 to 5 wk of age and pellets were then fed to 19 wk of age. Treatment diets were fed in three-wk phases except for the finisher II diet which was fed for 2 wk. Diet 1 (LOW) was formulated to provide 0.50% nPp from 2-5 wk of age and maintenance rations for each phase without Se supplementation with 0.25% nPp from 17-19 wk of age. Dietary calcium was kept at a 2:1 ratio with nPp. For all diets, 2 (MED) and formulated nPp levels that averaged 0.06 percentage units higher than the LOW diet. Diet 3 (HIGH) averaged 0.10 percentage units higher nPp than the MED diet. Diet 4 (VHIGH) was formulated according to breeder recommendations and was about 0.10 percentage units higher than the MED diet for dietary nPp. Body weight was reduced by the LOW diet at 5 wk of age (P = 0.009). At 8 wk of age, BW was lower when the MED diet was fed compared to the HIGH and VHIGH diets (P < 0.001). The LOW diet resulted in lower BW compared to the MED diet at 8 wk. Similar responses were observed the rest of the trial. Cumulative feed intake was reduced by the LOW diet at 14 wk (P = 0.001) compared to the other diets and was lower than the MED diet on d 17 and 19 of wk. Both sources of Se resulted in higher pGPX3 and plasma Se concentrations than broilers fed the C-SBM without Se supplementation. Broilers fed SY had higher plasma Se than those fed SS except for d 10 and 22. Liver Se concentration was higher in broilers fed SY on d 10, 13, and 16 compared with those fed SS, but it was similar on d 19 and 22. Similarly, breast Se concentration was higher in broilers fed SY on d 10, 13, 16, and 19 compared with those fed SS, but it was similar on d 22. These results indicate that organic sources of Se are deposited at a greater rate in tissues, and then better utilized for maintaining pGPX3 concentrations over time than inorganic forms of Se.

Key Words: Broiler, Glutathione Peroxidase, Selenium

830 Growth performance and spontaneous bone fracture incidence of toms fed various levels of calcium and non-phytate phosphorus to heavy market weight. K. D. Roberson*, J. L. Kalbfleisch, R. A. Charboneau, and W. Pan, Michigan State University, East Lansing.

This trial evaluated various dietary calcium and non-phytate phosphorus (nPp) levels fed to Nicholas 700 toms from 2 to 19 wk of age. After a two-wk brooding period, 24-25 pouls/pen were allocated to 8 pens/treatment. Crumbs were fed from 2 to 5 wk of age and pellets were then fed to 19 wk of age. Treatment diets were fed in three-wk phases except for the finisher II diet which was fed for 2 wk. Diet 1 (LOW) was formulated to provide 0.50% nPp from 2-5 wk of age and maintenance rations for each phase without Se supplementation with 0.25% nPp from 17-19 wk of age. Dietary calcium was kept at a 2:1 ratio with nPp. For all diets, 2 (MED) and formulated nPp levels that averaged 0.06 percentage units higher than the LOW diet. Diet 3 (HIGH) averaged 0.10 percentage units higher nPp than the MED diet. Diet 4 (VHIGH) was formulated according to breeder recommendations and was about 0.10 percentage units higher than the MED diet for dietary nPp. Body weight was reduced by the LOW diet at 5 wk of age (P = 0.009). At 8 wk of age, BW was lower when the MED diet was fed compared to the HIGH and VHIGH diets (P < 0.001). The LOW diet resulted in lower BW compared to the MED diet at 8 wk. Similar responses were observed the rest of the trial. Cumulative feed intake was reduced by the LOW diet at 14 wk (P = 0.001) compared to the other diets and was lower than the MED diet on d 17 and 19 of wk. Both sources of Se resulted in higher pGPX3 and plasma Se concentrations than broilers fed the C-SBM without Se supplementation. Broilers fed SY had higher plasma Se than those fed SS except for d 10 and 22. Liver Se concentration was higher in broilers fed SY on d 10, 13, and 16 compared with those fed SS, but it was similar on d 19 and 22. Similarly, breast Se concentration was higher in broilers fed SY on d 10, 13, 16, and 19 compared with those fed SS, but it was similar on d 22. These results indicate that organic sources of Se are deposited at a greater rate in tissues, and then better utilized for maintaining pGPX3 concentrations over time than inorganic forms of Se.

Key Words: Broiler, Glutathione Peroxidase, Selenium

831 The impact of dietary copper source and level on hen performance, egg quality and egg yolk cholesterol. P. H. Patterson1, T. L. Cravener1, and D. M. Hooge2, 1The Pennsylvania State University, University Park, 2Hooge Consulting Service, Inc., Eagle Mountain, UT.

A first-cycle layer feeding trial was conducted for twelve 28d periods (October 2001 to October 2002; 18 to 66wk) using 504 Hy-Line W-36 hens in cages at 387cm2/bd initially. Three dietary treatments were: control (CON), 18.4ppm Cu; copper sulfate (CuSO4), +125ppm Cu; tribasic copper chloride (TBCC), +125ppm Cu. There were 18 replicates of CON, 12 of each CuSO4, and TBCC treatments all with 12 hens/replicate. Pullets were grown on corn-soy based CON, CuSO4, and TBCC diets to 18wk, and as layers fed every pullet/hen diet combination e.g. CON/CON, CON/ CuSO4, CON/TBCC etc. Laying hen results are reported as main effects. Egg quality measurements were taken in Periods 5, 6, 7, 9, and 12, and eggs were sampled for egg yolk cholesterol. Results for egg yolk cholesterol were observed with the TBCC, which was non-hygroscopic, with small uniform particle size compared to CuSO4, which had to be ground with mortar and pestle to break up large particles. For CON, CuSO4, and TBCC fed hens, respectively, results were: final BW 1.692, 1.672, and 1.672 kg (P = 0.34); 12-period average hen-day egg production 74.9, 77.5, and 76.0% (P = 0.19); feed intake 95.6, 95.1, and 95.6 g/hen/d (P = 0.88); kg feed/dozen eggs 1.927, 1.555, and 1.590 (P = 0.14); kg feed/kg eggs 2.066, 2.049, and 2.088 (P = 0.84); egg weight 58.5, 58.2, and 57.9 g (P = 0.47); Haugh units 71.7.

Organic trace minerals (OTM) are used in animal feed to provide enhanced mineral availability compared to inorganic salts. Mineral absorption from inorganic salts is limited by their tendency to form complexes with dietary constituents like phytic acid, and by their tendency to interfere with each other when multiple salts are included in the diet. The most common OTM forms are mineral amino acid complexes (such as zinc methionine) or mineral proteinates. The latter consist of hydrolyzed protein; thus, the ligand consists of multiple amino acids, each with its own binding characteristics. HMTBA is an organic acid with a structure identical to methionine except that it bears a hydroxyl group on the alpha carbon instead of an amino group. Its mineral binding is also similar to that of methionine except that the hydroxyl group replaces the amino group in formation of the complex. Mintrex™ Zn mineral supplement is the name of the zinc complex using HMTBA as ligand. It is a 2:1 ligand to mineral complex. In the study reported here, birds were vaccinated with ADVENT® Coccidiosis Control on day of hatch and fed a zinc deficient diet (Zn < 30 ppm) for days followed by application of treatment diets consisting of the basal and four supplemented diets: zinc sulfate, Zinpro 100 and Mintrex Zn, all at a final concentration of 70 ppm supplemental zinc. Pre-challenge performance and gut morphometry were affected by vaccination (P < 0.01) and zinc source (P < 0.05). Birds were given a coccidiosis challenge by oral gavage on day 23. Performance and lesion scores following challenge were improved by zinc supplementation (P < 0.05). Post-challenge tibia zinc was affected by vaccination and zinc source with the highest tibia zinc observed in the birds that were fed Mintrex. All zinc supplemented birds had greater tibia zinc than the unsupplemented basal (P < 0.01). ADVENT is a trademark of Novus International, Inc., and is registered in the United States and other countries.

Key Words: Mintrex, Zinc, Hydroxy-4-(methylthio)butanoic Acid

833 Reduction of ascites mortality in broilers by dietary coenzyme Q10 supplementation. A. Geng1, Y. Guo, and Y. Yang, College of Animal Science and Technology, China Agricultural University, Beijing, P.R. China.

One experiment was conducted to study the effects of dietary coenzyme Q10 (CoQ10) supplementation on growth performance and ascites in broilers. One hundred and eighty one-day-old Arbor Acre male broiler chicks were randomly allocated into 3 groups with 6 replicates each. From day 8, the diets were supplemented with CoQ10 at levels of 0, 20, and 40 mg/kg, respectively. During day 15 to day 21, all the chicks were exposed to low ambient temperature (15-18°C) to induce ascites. Feed intake, weight gain, and feed conversion ratio of the broilers during 0-6 wk were measured, mortality was recorded, and ascites was diagnosed. On day 15, 22, 29, 36, and 47, blood was sampled to measure blood packed cell volume (PCV) and erythrocyte osmotic fragility (EOF) immediately. On day 22, 36, and 43, a method of right cardiac catheter was adopted to determine right ventricular pressure (RVP), pulmonary arterial pressure (PAP) and the maximum change ratio of right intraventricular pressure. The results showed that there were no significant influences observed on broilers growth performance, but the mortality due to ascites was significantly reduced by CoQ10 supplementation (P < 0.01). 40 mg/kg CoQ10 decreased EOF significantly compared with the control, but no significant changes were observed in PCV between the CoQ10 supplemented and control. Pulmonary arterial diastolic pressure was significantly lowered at age of 36 days, but no significant changes were observed in RVP, pulmonary arterial systolic pressure, and the maximum change ratio of right intraventricular pressure. AHI was significantly decreased by dietary 40 mg/kg CoQ10 supplementation (P < 0.05). The results of this study suggest that dietary supplementation of CoQ10 has beneficial effect on reducing ascites mortality in broilers.

Key Words: Broilers, Ascites, Coenzyme Q10

834 Comparison of growth potential and carcass components of a new strain of tom turkeys with other commercial strains. K. D. Roberson1*, J. L. Kalbfleisch1, and D. Dransfield2, 1Michigan State University, East Lansing, 2British United Turkeys of America.

A 19-wk trial was conducted to evaluate the growth potential and carcass component yield of a newly developed tom strain with two other major strains of commercial toms grown in the U.S. turkey industry. Hybrid Converter (HYB) pouls were smaller (p = 0.005) at hatch than Nicholas 700 (NIC) or B.U.T.A. T2 (T2) pouls (56.7 vs. 59.8 or 59.0 g). Breeder hen wk of lay was 21 wk (HYB), 19 wk (NIC) or 6 wk (T2). Pouls were brooded at 50 toms/pen for two wk with 4 pens of HYB and NIC toms and 8 pens of T2 toms. After two wk, each pen of pouls was split to provide 32 total pens of 25 toms each. Body weight was measured at 2, 5, 11, 17 and 19 wk of age. T2 toms weighed less than other strains at 2 and 5 wk (p < 0.001), but were heavier at 17 and 19 wk (p < 0.001). T2 toms were lighter than NIC toms at 11 wk, but heavier than HYB toms (p < 0.001). Net cumulative feed conversion was higher for T2 toms than HYB toms at 2 wk (p < 0.001) and both HYB and NIC toms at 5 wk of age (p < 0.001). There were no significant cumulative feed conversion effects in the remainder of the trial. Livability was higher (p = 0.002) for HYB toms compared to the other strains. Mortality due to cardiovascular problems was higher (p = 0.007) for NIC toms than the other strains. Three toms per pen were selected based upon similar BW (17.8 kg) at 17 wk and average BW in the pen at 19 wk. There was a significant (p < 0.001) difference in BW of toms slaughtered at 19 wk (19.3, 20.5 or 21.2 kg for HYB, NIC, or T2, respectively). Breast yield was higher (p < 0.001) for T2 toms than other strains at both market ages. Thigh and drumstick yield were consistently lower (p < 0.019) for T2 toms compared to HYB and NIC. HYB toms had lower wing yield (p < 0.001) and higher percent breast skin (p < 0.001) than other strains. There was no significant effect on lightness of breast meat. The results show that T2 toms will reach heavy (18 kg) market weight sooner with a higher proportion of meat produced as breast tissue than common commercial toms strains from other breeder companies.

Key Words: Carcass Components, Growth Potential, Tom Strain


A battery trial was conducted to study the influence of type of cereal (60% corn or 60% rice), heat processing of the cereal (HP) (raw or cooked at 90°C for 50 min and then rolled), and sources of fiber (none, 3% oat hulls, and 3% soybean hulls) on productivity and digestive traits of broilers from 1 to 21 d of age. Each of the twelve treatments were replicated 6 times (a cage with 14 birds). The two control diets were based on soybean protein concentrate and fish meal, and had either 2.45% (corn diets) or 1.54% (rice diets) crude fiber. In the high fiber diets, the hull source was included at expenses of an inert material. Birds and feed intake were weighed at 0, 4, 8, 13, and 21 d. Heac viscosity and digestive organ size were measured at 21 d. From 0 to 21 d broilers fed rice had better feed conversion (FC) (1.34 vs 1.38, P < 0.001) than broiler fed corn. Heat processing of the cereal did not affect broiler performance at 21 d of age, but a cereal x HP interaction was detected; HP improved FC in broilers fed rice but not in broilers fed corn. Broilers fed the hull-containing diets had better FC (1.34 vs 1.39, P < 0.01), higher ADG (32.5 vs 30.7 g/d, P < 0.05), larger gizzards (P < 0.001), and both HYB and NIC toms were heavier at 17 and 19 wk (p < 0.001). T2 toms were lighter than NIC toms at 11 wk, but heavier than HYB toms (p < 0.001). Net cumulative feed conversion was higher for T2 toms than HYB toms at 2 wk (p < 0.001) and both HYB and NIC toms at 5 wk of age (p < 0.001). There were no significant cumulative feed conversion effects in the remainder of the trial. Livability was higher (p = 0.002) for HYB toms compared to the other strains. Mortality due to cardiovascular problems was higher (p = 0.007) for NIC toms than the other strains. Three toms per pen were selected based upon similar BW (17.8 kg) at 17 wk and average BW in the pen at 19 wk. There was a significant (p < 0.001) difference in BW of toms slaughtered at 19 wk (19.3, 20.5 or 21.2 kg for HYB, NIC, or T2, respectively). Breast yield was higher (p < 0.001) for T2 toms than other strains at both market ages. Thigh and drumstick yield were consistently lower (p < 0.019) for T2 toms compared to HYB and NIC. HYB toms had lower wing yield (p < 0.001) and higher percent breast skin (p < 0.001) than other strains. There was no significant effect on lightness of breast meat. The results show that T2 toms will reach heavy (18 kg) market weight sooner with a higher proportion of meat produced as breast tissue than common commercial toms strains from other breeder companies.

Key Words: Carcass Components, Growth Potential, Tom Strain
Ruminant Nutrition: Beef - Digestibility & Production


Twelve Angus-cross cattle (avg. initial BW = 594 kg ± 44.4 kg) fitted with ruminal and duodenal cannulae were used in a 4 × 4 Latin square double cross-over designed experiment to determine site and extent of digestion in beef cattle consuming restricted amounts of forage plus a ruminally undegradable protein (RUP) supplement. Heifers were fed chopped (2.54 cm) bromegrass hay (11.4% CP, 57% NDF) at 30, 55, 80, or 105% of maintenance. Cattle fed below maintenance were given increasing amounts of RUP supplement (6.8% blood meal, 24.5% feather meal, and 68.7% menhadon fish meal; DM basis) in an effort to equalize duodenal essential AA flow to that of the 105% of maintenance diet. Experimental periods were 21 d in length with 17 d of adaptation followed by 4 d of intensive sample collection. Total OM intake and duodenal OM flow decreased (P < 0.001) proportionally in cattle consuming 105 to 30% of the forage intake required for maintenance. Therefore, OM truly fermented (% of intake) did not differ (P = 0.43) as intake declined. True ruminal N digestibility (% of intake) tended to decrease linearly (P = 0.07); however true ruminal N digested (g/d) increased as intake decreased from 105 to 30%. Duodenal N flow was equal (P = 0.33) across intake level, even though microbial N flow declined (P < 0.001) as forage OM intake decreased. Due to the low ruminal degradability of the RUP supplement, non-ammonia non-microbial N flow increased (P < 0.001) with RUP supplementation. Postruminal N digested tended to increase (P = 0.06) with increasing levels of RUP in the diet. The increased ruminal N digested associated with supplemental RUP and restricted forage intake increased ruminal molar proportions of branched chain VFA (P ≠ 8804 0.02) and millimolar concentrations of ruminal d NH₃ (P < 0.001). Therefore, when beef cattle consume restricted amounts of bromegrass hay, supplemental RUP can boost the supply of highly digestible N presented to the small intestine for absorption.

Key Words: Nutrient digestion, Restricted intake, ruminal undegradable protein


Fifteen Holstein steers (398.2 ± 7.3 kg initial BW) were allotted by weight to one of four dietary treatments in a completely randomized design. Objectives of this trial were to determine effects of rumen degradable (RDP) and undegradable protein (RUP) on site and extent of digestion, microbial efficiency, and ruminal fermentation. Dietary treatments were arranged in a 2 × 2 factorial. Factors were RDP (+/-) and RUP (+/-). RDP source was urea and RUP was a combination of hydrolyzed feather meal and blood meal (80:20 on N basis). The basal diet was formulated to contain (DM basis) 85% barley, 5% alfalfa hay, 5% corn silage, 5% de-sugared molasses, 27.5 mg/kg monensin, and 11.0 mg/kg tylosin. The control diet (without added RDP and RUP) was formulated to contain a minimum of 12.5% CP, 0.7% calcium, and 0.3% phosphorus. Diets were formulated such that +RDP added 1% CP from urea and +RUP added 1% CP from the feather meal/blood meal combination. Steers were adapted to the experimental diets for 29 d before collection. Average DMI during trial period was 11.5 kg/d. Apparent ruminal OM digestibility decreased (P = 0.05) with RUP (41.4 vs. 35.1 ± 2.2%). Digestibility of OM in the small intestine tended (P = 0.09) to increase with the inclusion of RUP (2.8 vs. 9.8 ± 2.5%). Intake and ruminal digestibility coefficients of NDF decreased (P = 0.01) with the dietary addition of RUP (2.98 vs. 2.64 ± 1.20 kg/d; 17.1 vs. 0.2 ± 5.8%, respectively). The inclusion of RUP increased duodenal NDF flow (P = 0.08; 2.45 vs. 2.87 ± 2.06 kg/d) and decreased NDF ruminal digestion (P = 0.06; 17.1 vs. 4.5 ± 5.8%). The addition of RUP alone in the diet increased CP intake over control and RDP diets (P = 0.02; 1.62 ± 1.79 ± 0.07 kg/d). Total tract OM, CP, ADF, and NDF digestibilities were unaffected by RDP and RUP supplementation. These results suggest that protein supplementation decreased ruminal fiber digestion and did not improve digestion of other feed fractions.

Key Words: Barley, Digestion, Rumen Fermentation

838 Effect of choice-select spread on carcass value and profitability in early-weaned Simmental steers. N. A. Pyatt1,*, L. L. Berger1, D. B. Faulkner1, and P. M. Walker2,1, University of Illinois at Urbana-Champaign, Urbana, 2Illinois State University, Normal.

Early-weaned steers (n = 192, 1/4 Simmental or greater) of known genetic and body weight characteristics were fed three basal diets formulated to contain a minimum of 12.5% CP, 0.7% calcium, and 0.3% phosphorus. The control diet (without added RDP and RUP) was formulated to contain a minimum of 12.5% CP, 0.7% calcium, and 0.3% phosphorus. The inclusion of RUP increased duodenal NDF flow (P = 0.08; 2.45 vs. 2.87 ± 2.06 kg/d) and decreased NDF ruminal digestion (P = 0.06; 17.1 vs. 4.5 ± 5.8%). The addition of RUP alone in the diet increased CP intake over control and RDP diets (P = 0.02; 1.62 ± 1.79 ± 0.07 kg/d). Total tract OM, CP, ADF, and NDF digestibilities were unaffected by RDP and RUP supplementation. These results suggest that protein supplementation decreased ruminal fiber digestion and did not improve digestion of other feed fractions.

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839 Effect of dressed price on carcass value and profitability in early-weaned Simmental steers. N. A. Pyatt1,*, L. L. Berger1, D. B. Faulkner1, and P. M. Walker2,1, University of Illinois at Urbana-Champaign, Urbana, 2Illinois State University, Normal.

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