

## Metabolism and Nutrition: Minerals and Vitamins Posters

**595 Influence of soy oil source and supplementation of the diet with vitamin E and vitamin C on performance and egg quality of Single Comb White Leghorn laying hens from forty four to fifty six weeks of age.** H. Irandoust<sup>1</sup>, A. H. Samie<sup>1</sup>, H. R. Rahmani<sup>1</sup>, J. Pourreza<sup>1</sup>, M. Kadivar<sup>2</sup>, M. A. Edriss<sup>1</sup>, P. Garcia-Rebollar<sup>3</sup>, and G. G. Mateos<sup>3</sup>, <sup>1</sup>Department of Animal Sciences, Isfahan University of Technology, Isfahan, Iran, <sup>2</sup>Department of Food Science and Technology, Isfahan University of Technology, Isfahan, Iran, <sup>3</sup>Departamento de Producción Animal, Universidad Politécnica de Madrid, Spain.

Two experiments (Exp.) were conducted to determine the AME content of refined soybean oil (SO), recycled soybean oil (RSO), and acidulated soybean oil soapstocks (ASO) and the effects of inclusion of vitamin E and vitamin C in diets containing 3.5% of these soy oils on performance and egg quality of Hy-line hens from 44 to 56 wks of age. In Exp. 1 the AME of the 3 experimental oils were determined in adult cocks using 6 individual replicates per treatment. The apparent total tract digestibility (ATTD) of SO, RSO, and ASO were measured by 1) difference between AME values of the basal diet without any oil added and that of the diet based on 95% basal diet and 5% of the experimental oil, and 2) directly multiplying the ATTD of the ether extract fraction of the diet by the GE of the oil. The determined ATTD were 95.2, 94.5, and 85.9% for SO, RSO, and ASO, respectively. The AME of the oils were 9,138, 8,955, and 7,961 kcal/kg measured by the substitution method, and 8,916, 8,880, and 7,849 kcal/kg calculated directly from the ATTD coefficient of the ether extract, respectively. In Exp. 2 there were 12 treatments arranged factorially with 3 oil sources (SO, RSO, and ASO), 2 levels of vitamin E (0 vs. 250 mg/kg), and 2 levels of vitamin C (0 vs. 250 mg/kg). Each diet was replicated 5 times and the experimental unit was formed by 5 hens caged together. The trial was conducted under moderate temperature conditions (21 ± 3°C and 50% humidity) and lasted for 12 wks (44 to 56 wks of age). For the entire experimental period, diet did not affect laying hen performance or egg quality traits. It is concluded that recycled oil and acidulated soybean oil soapstocks are good alternatives to refined soybean oil in diets for laying hens. Under the conditions of this research, the supplementation of the diet with extra amounts of vitamin E and C to improve egg production or egg quality is not justified.

**Key Words:** apparent metabolizable energy, laying hen performance, soy oil sources, vitamin C, vitamin E

**596 Differential effects of sodium selenite and Sel-Plex selenium yeast on the hepatic gene expression profile of laying hens.** R. Xiao<sup>1,2</sup>, R. F. Power<sup>1,2</sup>, D. Mallonee<sup>1,2</sup>, K. Routt<sup>1</sup>, L. Spangler<sup>1</sup>, T. Ao<sup>1,2</sup>, J. L. Pierce<sup>1,2</sup>, and K. A. Dawson<sup>1,2</sup>, <sup>1</sup>Alltech, Nicholasville, KY, <sup>2</sup>Alltech-University of Kentucky Nutrition Research Alliance, Lexington.

The advantage of organic selenium over inorganic selenium in animal diets has been well documented. To gain further insights into biological functions at the molecular level, this study investigated the effects of dietary sodium selenite (SS) or organic yeast selenium Sel-Plex (SP, Alltech Inc.) on the hepatic gene expression profiles of laying hens. Hens were assigned at age of 6 wks to one of 3 treatments: basal semi-purified diet (control), basal diet + 0.3 ppm SP or basal diet + 0.3 ppm SS. At 49 wks, liver samples were collected and used for gene expression analysis. Results indicated that 1039 transcripts were differentially regulated by SP (508 down, 531 up,  $P < 0.01$ , FC > 1.2), while 514 transcripts were altered by SS (207 down, 307 up, respectively). There

were 135 transcripts commonly changed by SP and SS. Further pathway analysis revealed the significant upregulation of genes involved in energy metabolism and other mitochondrial functions including oxidative phosphorylation and ubiquinone biosynthesis pathways by SP, while similar effects were not observed in SS-fed chickens. Genes involved in signaling pathways that are important in response to cellular stress and injury such as P53 signaling (e.g., CCNK, GADD45B) and production of nitric oxide and reactive oxygen species were also suppressed by SP. On the other hand, increased expression of multiple genes that have been linked with development of certain liver diseases, such as aryl hydrocarbon receptor (AHR), nuclear factor kappa (NFkB1) and microsomal glutathione S-transferase 2 (MGST2) by SS may suggest an increased risk of hepatic system diseases when high levels of inorganic selenium are added to the diets of hens. This study indicates that differences in liver gene expression profiles, especially on genes involved in energy production and cellular stress, may partially explain the reported biological differences related to SP and SS.

**Key Words:** selenium, gene expression, liver, hen, microarray

**597 Effect of chelated trace minerals, zinc, manganese, copper and iron on layer performance and egg shell quality.** S. S. Padhye<sup>1</sup>, A. S. Ranade<sup>1</sup>, D. N. Desai<sup>1</sup>, P. E. Avari<sup>1</sup>, M. Manangi<sup>2</sup>, M. Vazquez-Anon<sup>2</sup>, and D. Joardar<sup>2</sup>, <sup>1</sup>Bombay Veterinary College, Mumbai, Maharashtra, India, <sup>2</sup>Novus International Inc., St. Charles, MO.

Two trials were conducted to study the effect of chelated organic trace minerals such as Mintrex Zn [Zn(HMTBa)<sub>2</sub>], Mintrex Mn [Mn(HMTBa)<sub>2</sub>] and Mintrex Cu [Cu(HMTBa)<sub>2</sub>] and Glytrex Fe on layer performance and egg shell quality for 16 weeks. The first trial was conducted on 360 layers of BV 300 strain of 23 weeks of age. The birds were randomly divided into 3 equal groups, A, B and C of 120 birds, having 24 replicates, each. The second trial was conducted on 9886 layers of BV-300 strain of 24 weeks of age under field conditions. The birds were randomly divided into 3 groups having 4 replicates of about 825 birds. In both the trials, group A received control diet containing Zn, Mn, Cu and Fe in inorganic form at the levels of 60, 60, 9 and 60 ppm, respectively, as per Indian standards. Groups B and C received treatment diets containing Zn, Mn, Cu and Fe in chelated form at 50% and 25% of the levels used in control group, respectively. The levels of Se and I were kept same in all the groups. For both the trials, production performance, egg quality, economics, ND titers and tissue mineral levels were studied. Results from both the trials showed no differences ( $P \geq 0.05$ ) among treatments for the measured variables such as egg production, feed consumption, FCR, mortality, egg quality, tissue mineral levels and NCD titers. However, % broken eggs was significantly ( $P \leq 0.05$ ) reduced for groups B and C compared with control. The % broken eggs for groups A, B and C were 0.150, 0.039, 0.062 for Trial-1 and 0.113, 0.069 and 0.076 for Trial-2, respectively. In summary, results from the current trials indicate a significant reduction in % broken eggs with no change in production performance and egg shell quality when chelated trace minerals were used in layers at significantly reduced levels compared with higher levels of inorganic trace minerals that are currently being used in Indian poultry industry.

**Key Words:** layer nutrition, chelated trace minerals

**598 Influence of graded levels dietary sodium on the development of foot pad dermatitis in broiler chickens.** ö Cengiz<sup>1</sup>, J.