

of carbon dioxide (33.8 vs 33.7 mmHg) while breathing room air. Inhalation of 100% O<sub>2</sub> for 30 min caused the arterial partial pressure of oxygen and HbO<sub>2</sub> to increase similarly (390 mmHg and >99%, respectively) in both groups, without reducing the pulmonary arterial pressure, the cardiac output, or the mean systemic arterial pressure in either group. None of the broilers in the WARM group and two in the COLD group developed PHS by Day 42. These observations demonstrate cardio-pulmonary characteristics in the COLD group typical of preascitic symptoms leading to PHS. Furthermore, it was an elevated cardiac output rather than hypoxic pulmonary vasoconstriction that made the major contribution to the existing increase in pulmonary arterial pressure in the COLD group.

**Key Words:** Ascites, Pulmonary hypertension

**137 A putative multi-drug resistance protein is present in the gastrointestinal tract of chickens.** T. Burke\* and D. Barnes, University of Arkansas, Fayetteville, AR.

Multidrug resistance (MDR) is a phenomenon in which acquired resistance to a single drug results in simultaneous resistance to a variety of drugs often structurally and functionally unrelated. MDR proteins act as selective ATP-dependent drug efflux transporters. Recent evidence suggests MDR to be a first line of defense against xenobiotics and environmental toxins. This experiment investigates the presence of MDR proteins in chickens. The proventriculus, liver, small intestine, cecum and large intestine were harvested from 6 week old broilers. Cellular and subcellular membrane vesicles (MV) were isolated from these organs using MgCl<sub>2</sub> precipitation and differential centrifugation. Prepared MV were then analyzed using protein electrophoresis, western blotting and immunodetection. Results indicate that a protein present in some organs of the chicken gastrointestinal (GI) tract hybridizes to an antibody directed against the mammalian MDR protein. This putative MDR protein shows differential expression along the GI tract and may be involved in regulating the uptake of some nutritional and growth promoting supplements commonly used in poultry feed. Liver had the highest expression followed by the duodenum, jejunum/ileum, ceca, proventriculus and large intestine.

**Key Words:** Multidrug resistance, P-glycoprotein, Transport proteins

**Relationship between Nonenzymatic Glycosylation and Mechanical Properties: Effect of Age, Diet Restriction and Aminoguanidine on Tendon of Broiler Breeder Hens.** M. Iqbal<sup>1</sup>, P. B. Kenney<sup>1</sup>, N. H. Al-Humadi<sup>2</sup>, and H. Klandorf, <sup>1</sup>West Virginia University, Morgantown, WV 26506, <sup>2</sup>NIOSH/HELD, Morgantown, WV 26505.

Nonenzymatic glycosylation contributes to the formation of crosslinks which leads to the structural and functional deterioration of tissue protein. The accumulation of these crosslinks in tissue proteins have been implicated in the alteration of biomechanical properties of connective tissues. The objective of this study was to compare tendon breaking time (TBT) and tendon breaking strength (TBS) of the *flezor perforans et perforatus digiti* tendon with concentrations of pentosidine in tendons (P<sub>t</sub>) of broiler breeder hens from 8 to 125 wk of age. In addition, effects of diet restriction (DR) and crosslinking inhibitor, aminoguanidine (AG) on plasma glucose P<sub>t</sub>, TBS and TBT were determined. Female chicks (n=450) were randomly assigned to four treatment groups immediately after hatch: ad libitum (AL); diet restricted (DR; 60% of AL); feed of AL and DR groups supplemented with 1.35 mg/kg BW/day AG each (AL+AG and DR+AG, respectively). No consistent effects of treatments were observed on plasma glucose concentrations. In AL-fed hens P<sub>t</sub> increased with increasing age (p<0.0001). Concurrently, there were an age-related parallel increases in TBS (p<0.0001), and TBT (p<0.0001). The rate of accumulation of P<sub>t</sub> by DR lowered (p<0.001), as were TBS (p<0.01) and TBT (p<0.02) compared to AL hens. Concentration of P<sub>t</sub> in AL+AG group was lower (p<0.0002) as were TBS and TBT (p<0.01). Supplementation of DR with AG did not affect P<sub>t</sub>, TBS and TBT. It is concluded that the glycosylation process may not be the primary cause of glucose-derived crosslinks and that an age-related increase in P<sub>t</sub> and loss of elasticity in the tendon was retarded by DR. AG was effective in AL-fed hens where P<sub>t</sub>, TBT and TBS declined compared to DR-fed hens.

**Key Words:** Pentosidine, Tendon, Mechanical properties, Diet restriction, Broiler breeder

**139 Influence of Genetic Selection for Breast Muscle Mass on Intramuscular pH and Metabolism of Supracoracoideus Muscle from Male and Female Turkeys.** J. Yost\*, P. B. Kenney, J. Kiffefer, and R. Russell, .

Advances in genetic selection and nutrition have facilitated growth of the US turkey industry. The physiological state of these faster growing birds has not kept pace with the rapid increase in muscle mass, predisposing these animals to muscle disorders such as deep pectoral myopathies and pale, soft, and exudative muscle. The objective of this study was to determine if genetic selection for increased breast muscle mass has affected the supracoracoideus muscle's ability to regulate intramuscular pH during physical activity in male and female turkeys. Sixty-seven white turkeys, males and females of two meat lines and one female line, were obtained from British United Turkeys of America. At 18 weeks of age, birds were anesthetized and one supracoracoideus "deep pectoralis" muscle was electrically stimulated, via the pectoral nerve, by applying an intermittent 1-volt stimulus "10-msec pulse with 2-4 pulses per second". Measurements of pH were obtained with a 3.4mm stainless steel pH electrode placed in stimulated and nonstimulated muscles. Muscle pH was recorded every 30 seconds for 4 minutes of stimulation, and every minute for a ten-minute recovery period. Muscle samples were taken from stimulated and nonstimulated muscles to be assayed for lactate dehydrogenase "LDH" and glyceraldehyde phosphate dehydrogenase "GAPDH". Stimulated breast muscles showed a greater decline during the 4-minute stimulation period than the nonstimulated sides. Following stimulation, pH continued to decline but at a slower rate. There was no effect of line or gender on rate of pH decline during or after stimulation. The light weight meat line "LL" had the greatest decline in pH "6.90 Vs 6.68; P<.0001", followed by the female line "FL" at 6.71 and heavy weight meat line "HL" at 6.79. Females had a lower pH "P<.0001" immediately following stimulation than males. 6.62 Vs 6.72. LL had the greatest LDH "293 mmol/mg/min; P<0.0001". and GAPDH "0.4452 mmol/mg/min; P<0.05" activities. The decreased ability of hens to control pH following electrical stimulation agrees with findings that metabolic disorders of muscle are more common in females. To reduce incidence of muscle disorders related to handling stress, it is recommended that caution should be taken in handling market age hens during catch, transport and slaughter.

**Key Words:** Turkeys, Supracoracoideus, pH declines, Metabolism

**140 Biliary appearance and hepatic uptake of DL-2-hydroxy-4-(methyl-thio) butanoic acid (HMB) by SCWL liver in vivo.** Z. Song<sup>1</sup>, W. Bottje<sup>1</sup>, K. Beers<sup>1</sup>, M. Vasquez-Anon<sup>2</sup>, and J. Dibner<sup>2</sup>, <sup>1</sup>Dept. of Poultry Science, University of Arkansas, Fayetteville, AR 72701, <sup>2</sup>Novus International, Inc. St. Louis MO 63141.

The methionine source, HMB (Alimet, feed supplement), is widely used in the poultry industry. We observed a dramatic decrease in plasma HMB across the liver following infusion of high levels of HMB into the hepatic portal vein (Poultry Sci 77(1):31). As HMB is lipid soluble and can move through various cellular compartments, a major goal of the present study was to determine the amount of HMB that appeared in the bile following infusions of HMB into the hepatic portal vein. Cannulae were implanted in the carotid artery (CA), hepatic vein (HV), and hepatic portal vein (PV) in anesthetized SCWL males. The right bile duct (to the gall bladder) was clamped and the left bile duct was cannulated. Bile was collected directly into a microcentrifuge tube on ice and bile flow determined gravimetrically. Blood and bile samples were obtained at 30 min intervals during the study. After initial samples were obtained to establish baseline HMB levels, the birds were given 30 min infusions of HMB (diluted in saline, pH 7.41 ± 0.02) into the portal vein (0.1 mL/min/kg BW) calculated to deliver either 0.22 or 0.88 mg HMB/min/Kg BW. A 30 min recovery period was allowed between infusions. Both HMB infusions elevated HMB in bile and PV, but only the 0.88 HMB infusion raised HMB in the HV and CA. Using concentrations of HMB in plasma and assuming liver weight of 2.7% of BW and a liver blood flow rate of 2 mL/min/g liver, it was determined that less than 0.1% of HMB entering the liver appeared in the bile. The preliminary results of this study indicate that biliary HMB does not appear to be a major avenue for clearance by the avian liver. In addition, biliary HMB reuptake can occur along the lower gastrointestinal tract as previously described (Poultry Sci. 67:1314-1321).

**Key Words:** Alimet, HMB, SCWL Males, liver, Bile



# Poultry Science

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