

diets. Likewise, either SBM or urea can be fed to Mashona-sired steers after feeding low CP diets.

**Key Words:** Mashona, Performance, Carcass Characteristics

**967 Effect of two weaning systems on milk composition, storage, and ejection in dairy ewes.** B. C. McKusick\*<sup>1</sup>, Y. M. Berger<sup>1</sup>, P. G. Marnet<sup>2</sup>, and D. L. Thomas<sup>1</sup>, <sup>1</sup>*University of Wisconsin-Madison, Madison, WI*, <sup>2</sup>*Institut National de la Recherche Agronomique, Rennes, France*.

In small dairy ruminants, a mixed weaning system (MIX) of suckling and machine milking is commonly used during the first 30 d of lactation. The main disadvantage of the MIX system is the markedly low fat content in the machine milk. We hypothesize that the inhibition of milk ejection during machine milking along with alteration in storage of milk fat between milkings is responsible. Twenty-six East Friesian crossbred dairy ewes were used to study the effects of two weaning systems on milk composition, storage, and ejection during the first 4 wk of lactation. At parturition, ewes were randomly assigned to two weaning system groups: no suckling and exclusive twice daily machine milking (DY1, n = 10), or the MIX system of once daily machine milking in the morning and then suckling for 10 hr per day (n = 16). Ewes were injected with saline (control), oxytocin (OT), or an oxytocin-receptor blocking agent (AT) prior to a morning milking once weekly, and machine milk was sampled to evaluate milk storage within the udder. Milk and milk protein yields ( $1.15 \pm .10$  kg and  $58.4 \pm 4.7$  g, respectively) were similar for DY1/AT, MIX/control, and MIX/AT ewes, and less ( $P < .05$ ) than DY1/controls ( $1.49 \pm .10$  kg and  $77.4 \pm 5.1$  g, respectively). This observation confirms inhibition of the milk ejection reflex during machine milking of MIX/control ewes, as only 75% of total machine milk and milk protein is recuperated (cisternal milk). MIX/control and MIX/AT ewes yielded less ( $P < .001$ ) milk fat ( $28.8 \pm 4.3$  g) compared to DY1/AT ewes ( $57.2 \pm 6.1$  g). When OT was injected to remove all of the milk within the udder, MIX/OT ewes had similar milk and milk protein yield, but 34% less ( $P < .001$ ) milk fat yield than DY1/OT ewes. These results demonstrate that yield and storage of milk and milk protein within the udder is similar for MIX and DY1 ewes, however, there appears to be proportionally less cisternal storage of milk fat in MIX ewes. The present experiment raises further questions concerning the alveolar transfer, stasis and inhibition of milk fat synthesis in ewes managed within the MIX system.

**Key Words:** Dairy Ewe, Milk Fat, Milk Ejection

**968 Supplementing ewe diets with a microbial enzyme preparation (Fibrozyme). I. Effects on production characteristics during lactation.** D. K. Aaron\*<sup>1</sup>, D. G. Ely<sup>1</sup>, W. P. Deweese<sup>1</sup>, E. Fink<sup>1</sup>, B. T. Burden<sup>1</sup>, and K. A. Dawson<sup>2</sup>, <sup>1</sup>*University of Kentucky, Lexington, KY*, <sup>2</sup>*Alltech Biotechnology Center, Nicholasville, KY*.

Twenty-four Polypay ewes (70 kg), with twin lambs, were used to determine effects of dietary supplementation with a microbial enzyme preparation (Fibrozyme, Alltech Biotechnology Center, Nicholasville, KY) on production characteristics. Each ewe and her lambs were placed in individual pens, at 8 d postpartum, and randomly assigned to one of two treatments: F (2 g Fibrozyme, topdressed, 2x/d, n = 12) or C (no Fibrozyme, n = 12). The daily basal diet consisted of 1.0 kg grain,

0.9 kg alfalfa cubes, and corn silage fed to appetite. Ewes, separated from lambs, had access to diets from 0800 to 0930 and 1600 to 1730 daily. Lambs had continual access to a creep diet beginning on d 26. Ewes and lambs were individually weighed and ewes body condition-scored and machine-milked every 7 d from d 15 through 64 of lactation. Weekly feed and creep intakes were recorded. By d 29, estimated 24-h milk production was higher for F than for C ewes ( $3.17$  vs  $2.80$  kg;  $P < .05$ ), and F ewes continued to produce more milk ( $P < 0.05$ ) on each of the remaining collection days (d 36:  $3.08$  vs  $2.66$ ; d 43:  $3.00$  vs  $2.58$ ; d 50:  $3.00$  vs  $2.48$ ; d 57:  $2.70$  vs  $2.23$ ; d 64:  $2.33$  vs  $1.70$  kg). Overall, F ewes produced 18 kg more milk ( $144$  vs  $126$ ;  $P < .01$ ), consumed slightly more feed ( $275$  vs  $269$  kg), and produced milk more efficiently ( $0.52$  vs  $0.47$ ;  $P < 0.10$ ). Ewes in both groups tended to gain weight and condition, but no significant differences were found between treatments. Lamb pairs nursing F ewes consumed less creep feed from d 26 through 64 than those nursing C ewes ( $37.6$  vs  $45.6$  kg;  $P < .05$ ), but twin lamb weaning weights were similar ( $52.8$  vs  $53.4$  kg) and lamb production efficiencies were equal ( $0.12$ ). These results indicate Fibrozyme can have a positive effect on milk production, but its effects on lamb growth may be offset by lower creep feed intake.

**Key Words:** Ewes, Lactation, Enzyme Supplement

**969 Supplementing ewe diets with a microbial enzyme preparation (Fibrozyme). II. Effects on nutrient utilization during lactation.** D. G. Ely\*<sup>1</sup>, D. K. Aaron<sup>1</sup>, W. P. Deweese<sup>1</sup>, E. Fink<sup>1</sup>, B. T. Burden<sup>1</sup>, and K. A. Dawson<sup>2</sup>, <sup>1</sup>*University of Kentucky, Lexington, KY*, <sup>2</sup>*Alltech Biotechnology Center, Nicholasville, KY*.

Twenty-four Polypay ewes (70 kg), with twin lambs, were used to determine effects of dietary supplementation with a microbial enzyme preparation (Fibrozyme, Alltech Biotechnology Center, Nicholasville, KY) on total GI tract nutrient digestibility and ruminal metabolism. Each ewe and her lambs were placed in individual pens, at 8 d postpartum, and randomly assigned to treatment: F (2 g Fibrozyme, topdressed, 2x/d, n = 12) or C (no Fibrozyme, n = 12). The daily basal diet contained 1.0 kg grain mix, 0.9 kg alfalfa cubes, and corn silage fed to appetite ( $3.9$  kg av.) from d 8 through 64 postpartum. Ewes, separated from lambs, had access to diets from 0800 to 0930 and 1600 to 1730 daily. Fecal grab samples were taken at 12-h intervals, advanced 2 h daily, from d 33 to 39. Samples were dried, composited by ewe, and analyzed for DM, N, ADF, and NDF. Acid-insoluble ash was used as an internal indicator. After the last fecal sampling at 0800 on d 39, ruminal fluid was obtained from each ewe with a stomach tube (0 h). Ewes were fed immediately after this sampling. Ruminal fluid was also collected 2, 4, 6, and 8 h post-feeding. The pH was determined as samples were collected. Samples were subsequently analyzed for VFA. Digestibilities (%) of DM, CP, ADF, and NDF were 62, 58 ( $P < 0.05$ ); 61, 59 ( $P < 0.05$ ); 32, 27 ( $P < 0.05$ ); and 30, 25 (ns) for F and C, respectively. Ruminal fluid pH was not affected by diet. Total VFA, acetate, butyrate, and valerate concentrations were greater ( $P < 0.05$ ) with F at 8 h post-feeding. Propionate, isobutyrate, and isovalerate were unaffected by diet. Acetate to propionate ratios were greater ( $P < 0.05$ ) for F at 6 and 8 h after feeding. These results indicate Fibrozyme can increase nutrient utilization, by altering ruminal metabolism, in ewes fed high roughage lactation diets.

**Key Words:** Enzyme, Digestibility, Ruminal VFA

## ASAS/ADSA Ruminant Nutrition: Growing Cattle

**970 Influence of mass of ruminal contents on voluntary intake of steers fed concentrate and forage diets.** Marcela A. Schettini\*, Edward C. Prigge, and Eric L. Nestor, *West Virginia University*.

Five ruminally cannulated steers (590 kg) were fed a high concentrate (C) or a hay (H) diet in a  $5 \times 5$  Latin square experiment to evaluate the influence of mass of rumen contents on voluntary intake and rumen function. Mass of ruminal contents was altered by adding varying weights of modified tennis balls (6.7-cm diameter) to the rumen before the initiation of each experimental period. Treatments consisted of 0 balls added to the rumen and fed 70 % C (control), 75 balls with a specific gravity (SG) of 1.1 fed C, 75 balls with SG 1.4 fed C, 75 balls with SG 1.1 fed H, and 75 balls with SG 1.4 fed H. Total weight of the balls

was 12.75 and 16.35 kg for 1.1 and 1.4 SG, respectively. Daily DMI was 15.11, 11.93, 10.65, 6.09, and 5.10 for control, 1.1 SG balls fed C diet, 1.4 SG balls fed C diet, 1.1 SG balls fed H diet, and 1.4 SG balls fed H diet, respectively. Addition of balls into the rumen of steers fed the C diet decreased DMI ( $P < 0.01$ ), and increasing SG of balls in the C and H diet decreased DMI ( $P < 0.05$ ) further. Digestibility of NDF, ADF, and CP, and DM were not influenced by the addition of balls nor by increasing SG of the balls for steers fed C and H diet. Adding balls to the rumen of steers fed the C diet decreased particle passage rate (PR) ( $P < .05$ ), while increasing SG of balls decreased particle PR for C and H diet. Liquid dilution rate (LDR) was decreased by the addition of balls in the rumen of the steers ( $P < 0.05$ ) fed the C diet and increasing SG of the balls decreased LDR ( $P < 0.01$ ) for both H and C diets.

Addition of balls in the rumen of steers fed the C diet decreased ( $P < 0.01$ ) the proportion of medium (1.1-1.4) and increased ( $P < 0.01$ ) the proportion of low (<1.1) functional SG digesta particles. Balls added to the rumen of steers fed C diet increased ( $P < 0.05$ ) digesta particle size. Ruminal  $\text{NH}_4$  levels of steers fed the C diet were decreased ( $P < .01$ ) with addition of balls. These results suggest that physical factors in the rumen have an influence on voluntary intake of both forage and concentrate diets.

**Key Words:** Beef Cattle, Voluntary Intake, Concentrate

**971 Intake characteristics of beef steers consuming hay ad libitum.** E.E.D. Felton\* and M.S. Kerley, *University of Missouri, Columbia Missouri.*

Chopped alfalfa and big bluestem (early(EC) & late cut(LC)) hay were used in two 4X4 Latin square experiments (Exp.1 & Exp.2) to investigate the decrease in forage intake associated with decreasing forage quality. Treatments consisted of 100%EC or LC and 67%EC 33%LC or 33%EC 67%LC fed at 110% of ad-libitum intake. Dual-cannulated beef steers (Exp.1 & Exp.2 average BW = 298 & 321 kg, respectively) were used in both experiments. Diet and refusal samples were separated by particle size (fractions: (A) particles > 19mm, (B) between 19 and 8mm, & (C) < 8mm) using the Penn State particle separator and analyzed for fiber and CP. In both experiments, quality of the diets decreased (increased ADF & NDF, decreased CP) linearly ( $P < .01$ ) which resulted in a linear reduction in intake in Exp.1 ( $P = .08$ ) and in Exp.2 ( $P < .01$ ). In neither experiment were the proportions of particles within each diet or refusals affected by treatment (Diet-Exp.1 fraction A=8.24%, B=20.18%, C=71.58% & Exp.2 fraction A=21.56%, B=20.74%, C=57.70% and Refusal-Exp.1 fraction A=37.62%, B=33.64%, C=28.74% & Exp.2 fraction A=28.49%, B=24.89%, C=46.62%). From particle analysis of feed and refusals, animals in both experiments consumed a greater percentage of fraction C than of B or A. Fraction C of feed and refusals for both experiments had a higher ( $P < .05$ ) concentration of protein and less ( $P < .05$ ) fiber than fraction B or A. Correlation analysis of DMI to forage NDF, ADF and CP, were different between Exp.1 and Exp.2. Dry matter intake in Exp.1 appeared only marginally correlated with NDF (-.43,  $P = .09$ ) and CP (.41,  $P = .10$ ) and was not correlated with ADF. In Exp.2, DMI was highly correlated with ADF (-.90,  $P < .01$ ) and CP (.84,  $P < .01$ ) and had a moderate correlation with NDF (-.65,  $P < .01$ ). These results indicated that NDF from lower fiber forages does not have the same effect on DMI intake as does the NDF from higher fiber forages and may not be a good indicator of bulk fill.

**Key Words:** Intake, Forage, Steers

**972 Effect of rate of liveweight gain during winter grazing on blood constituents during adaptation of cattle in the feedlot.** M. J. Hersom, R. P. Wettemann, G. W. Horn, and C. R. Krehbiel, *Oklahoma Agricultural Experiment Station, Stillwater, OK.*

Forty-eight fall-weaned Angus x Hereford steer calves ( $244 \pm 23$  kg) were used in a completely random design to determine the effect of rate of liveweight gain during winter grazing and subsequent feedlot gain on serum and plasma hormones and metabolites. During the 120-d grazing period, the three treatments were: high (HGW, 1.28 kg/d) and low (LGW, 0.48 kg/d) gain on wheat pasture, and winter grazing of dormant tallgrass native range (NR, 0.21 kg/d). Prior to the feedlot phase (wk 0), jugular blood (venipuncture) was collected from all steers. Thirty-six steers were placed into three pens/treatment and fed a whole-shelled corn finishing diet. Blood was also collected weekly six times beginning 2 wk after arrival in the feedlot. Concentrations of insulin in serum on wk 0 were influenced by treatment ( $P < 0.05$ ;  $2.56 \pm 0.42$ ,  $1.18 \pm 0.40$ , and  $.92 \pm 0.44$  ng/mL for HGW, LGW, and NR respectively) and insulin was greater in HGW steers than LGW or NR steers during wk 4 through wk 7. Concentrations of glucose in plasma were not influenced by treatments after wk 0. Serum triiodothyronine ( $\text{T}_3$ ) concentrations were greater ( $P < 0.05$ ) in HGW than LGW and NR steers on wk 0 ( $1.6 \pm .1$ ,  $1.4 \pm .1$ , and  $1.2 \pm .1$  ng/mL) through wk 5. Similarly, thyroxine ( $\text{T}_4$ ) concentrations in HGW steers were greater ( $P < 0.05$ ), than in LGW or NR steers on wk 0 ( $71.7 \pm 3.9$ ,  $54.2 \pm 3.7$ , and  $49.5 \pm 4.0$  ng/mL) through wk 5. Concentrations of NEFA in serum were greater ( $P < 0.05$ ) in LGW ( $500 \pm 20$  ng/mL) and NR ( $530 \pm 22$  ng/mL) steers on wk 0 than HGW steers ( $286 \pm 21$  ng/mL). Thereafter, NEFA concentrations were greater ( $P < 0.05$ ) in HGW steers than LGW and NR steers until wk 5. Greater feed intake and/or daily gain before steers

were fed a high-energy diet increased serum concentrations of insulin and increased  $\text{T}_3$  and  $\text{T}_4$  during the first 5 to 7 wk of the feedlot phase.

**Key Words:** Growing Cattle, Winter Weight Gains, Hormones

**973 Coastal and Tifton 85 hay digestion by steers: I. Cultivar and maturity effects.** G. M. Hill\*<sup>1</sup>, R. N. Gates<sup>2</sup>, J. W. West<sup>1</sup>, R. S. Watson<sup>1</sup>, and B. G. Mullinix<sup>1</sup>, <sup>1</sup>University of Georgia, Tifton, GA/USA, <sup>2</sup>USDA-ARS, Tifton, GA/USA.

Bermudagrass hay cultivar [Coastal (C) or Tifton 85 (T85)] and hay maturity (5-wk or 7-wk (7-wk)), effects on growing beef steer intake and digestion were determined. Steers ( $n=24$ ;  $255.2 \pm 10.7$  kg BW) were ranked by BW and randomly assigned to four hay treatments (TRT) in a 2 X 2 factorial with six steers per TRT. Steers were individually-fed T85 hay from a different source for 10 d, followed by free-choice feeding of TRT hays for 21 d. Fresh water and a free-choice mineral supplement (12.5% Ca, 4% P, 19% NaCl, with trace minerals) were available at all times. Steers received  $\text{Cr}_2\text{O}_3$  (10 g/steer daily) in gelatin capsules from d 10 to d 20, and 12 fecal samples/steer were collected (d 17 to d 21), dried, composited, and analyzed for Cr, and nutrients. In hay analyses (4 samples/hay) the DM, ash, CP, ADF, and NDF (% DM basis), respectively, were: C-5-wk= 92.0, 7.1, 14.4, 36.8, 75.3; C-7-wk=93.2, 6.7, 10.2, 38.9, 70.3; T85-5-wk=94.2, 6.9, 13.6, 39.0, 78.4; T85-7-wk=94.4, 6.3, 9.9, 40.6, 79.0. Hay cultivar and maturity main effects for DMI (kg/d) and digestibility (%) of OM, CP, ADF, and NDF, respectively, were: Cultivar, C=4.19, 61.6b, 67.1, 59.3b, 61.8b; T85=4.25, 67.7a, 66.0, 69.2a, 71.9a; Maturity, 5-wk=4.25, 65.8, 70.6a, 66.3c, 69.5a; 7-wk=4.18, 63.6, 62.5b, 62.2d, 64.2b; within main effect, for each component (a,b  $P < 0.01$ ; c,d  $P < 0.05$ ). There were no cultivar X maturity interactions ( $P > 0.10$ ) for these variables. Although T85 hays had comparatively high concentrations of ADF and NDF, DMI was not affected ( $P > 0.10$ ), and digestion of OM, ADF and NDF were higher for T85 than C. Maturity of the forage when harvested for hay did not affect DMI, but it decreased CP content and digestion of CP, ADF and NDF.

**Key Words:** Hay, Steer, Digestion

**974 Coastal and Tifton 85 hay digestion by steers: II. Cultivar, maturity and energy effects.** G. M. Hill\*<sup>1</sup>, R. N. Gates<sup>2</sup>, J. W. West<sup>1</sup>, R. S. Watson<sup>1</sup>, and B. G. Mullinix<sup>1</sup>, <sup>1</sup>University of Georgia, Tifton, GA/USA, <sup>2</sup>USDA-ARS, Tifton, GA/USA.

Bermudagrass hay cultivar [Coastal (C) or Tifton 85 (T85)], hay maturity [5-wk (5wk) or 7-wk (7wk)], and energy supplementation [None (NE) or added corn (E)] effects on beef steer intake and apparent digestion were determined. Steers ( $n=36$ ;  $261.8 \pm 12.9$  kg BW) were randomly assigned to treatments (TRT) in a 2 X 2 X 2 factorial arrangement (4 steers/ TRT for hay; 5 steers/TRT for hay and energy). After feeding T85 hay from another source for 10 d, steers were individually-fed TRT diets for 21 d. Gelatin capsules with  $\text{Cr}_2\text{O}_3$  (10 g/steer daily) were given from d 10 to d 20. Fecal samples (12/steer; d 17 to d 21) were dried, composited, and analyzed for Cr, and nutrients. The DM, ash, CP, ADF, and NDF (% DM basis), respectively, in four samples/hay were: C-5wk= 93.4, 7.7, 14.1, 36.2, 73.0; C-7wk=94.1, 6.4, 9.8, 36.8, 71.4; T85-5wk=94.6, 6.9, 13.3, 38.0, 77.3; T85-7wk=94.6, 6.7, 9.9, 40.0, 78.5. Total DMI was restricted to 90% of hay DMI by similar steers in a companion study. Four TRT were fed hay only, and four TRT were fed rolled corn (89.7% DM, 10.2% CP) at 33% of total DMI. Hay DMI, corn DMI, and total DMI (kg), respectively, were: C-5wk-NE=3.76, 0, 3.76; C-5wk-E=2.51, 1.30, 3.81; C-7wk-NE=3.76, 0, 3.76; C-7wk-E=2.51, 1.29, 3.80; T85-5wk-NE=3.9, 0, 3.90; T85-5wk-E=2.61, 1.33, 3.94; T85-7wk-NE=3.70, 0, 3.70; T-85-7wk-E=2.46, 1.29, 3.76. Cultivar X energy interactions for digestibility (%) of OM and ADF were: OM= C-NE, 46.5, C-E, 56.9, T85-NE, 58.4, T85-E, 59.8 [SE=1.63, F=7.7 ( $P < 0.01$ )]; ADF= C-NE, 40.9, C-E, 43.7, T85-NE, 60.9, T85-E, 57.0 [SE=1.75, F=3.6 ( $P < 0.07$ )]. Cultivar, maturity and added energy digestibility (%) for CP and NDF, respectively, were: CP=C, 50.3a, T85, 50.5a; NDF=C 46.4b, T85, 61.1a; CP=5wk, 54.1a, 7wk, 46.7b; NDF=5wk, 57.2a, 7wk, 50.2b; CP=NE, 55.9a, E, 44.9b; NDF=NE, 55.5a, E, 52.0b; within nutrient (a,b,  $P < 0.05$ ). Hay digestibility was greater for T85 than C, and increased hay maturity decreased nutrient digestion. Added energy increased OM digestibility of C hay diets to the level of T85 hay without added energy, but added energy did not increase OM digestion of T85 hays.

**Key Words:** hay, steer, *Cynodon dactylon*

**975 Effect of intake level on the body composition and net energy requirement of Nellore steers and bulls for maintenance and growth.** L.O. Tedeschi<sup>\*1</sup>, D.G. Fox<sup>1</sup>, C. Boin<sup>2</sup>, P.R. Leme<sup>3</sup>, and G.F. Alleoni<sup>4</sup>, <sup>1</sup>Cornell University, Ithaca, NY, USA, <sup>2</sup>ESALQ-USP, Piracicaba, SP, Brazil, <sup>3</sup>FZEA-USP, Pirassununga, SP, Brazil, <sup>4</sup>Instituto de Zootecnia, Nova Odessa, SP, Brazil.

Three comparative slaughter experiments with individually fed Nellore bulls (31 animals) and steers (66 animals) were used to determine their NEm and NEg and the effect of level of intake on their composition of gain. Bulls (experiment 1) were divided into two intake levels (60 g DM/kg<sup>0.75</sup> of shrunk body weight (SBW) and ad libitum of a diet containing 2.3 Mcal ME/kg) and three slaughter groups, which were based on days on treatment (100, 150, and 190 days, and 130, 180, and 200 days, respectively for older and younger animal subgroups). For experiments 2 and 3, steers were allocated to three intake levels (55 and 70 g DM/kg<sup>0.75</sup> SBW, and ad libitum of a diet containing 2.2 Mcal ME/kg). In both trials, three slaughter groups within each intake level were set as when animals of the ad libitum treatment reached 400, 440, and 480 kg SBW on average for the first, second, and third group, respectively. For all experiments, initial body composition was determined with equations developed from a base line slaughter group, using SBW, empty body weight (EBW), fat (EBF), and protein (EBP) as variables. For bulls, there were no differences ( $P > 0.05$ ) between treatments in EBW percentage of protein and water, and fat and protein in the gain (FIG and PIG, respectively). In contrast, in steers level of intake affected EBW percentage of protein and fat ( $P < 0.05$ ), but FIG and PIG were not different ( $P > 0.05$ ). A nonlinear equation with the pooled data was developed to predict retained energy (RE) using maturity degree ( $u$  = actual/mature weight, which was estimated to be 350 and 550 kg of SBW at 25% EBF for steers and bulls, respectively);  $RE = 0.00949 \cdot EWG^{0.9425} \cdot EBW^{exp(0.0924 \cdot u)}$ . The NEm was similar for bulls and steers, and averaged 76 kcal/kg<sup>0.75</sup> EBW. However, the efficiency of conversion of metabolizable to NEm was greater for steers than bulls (70.6 and 65.2%, respectively), indicating that bulls had an 8.6% greater ME requirement for maintenance than steers ( $P < 0.05$ ). Our analyses do not support the hypothesis that Nellore, a *Bos indicus* species, has a lower net energy requirement for maintenance than *Bos taurus* breeds.

**Key Words:** body composition, net energy requirement, Nellore

## PSA Pathology: Session II

**977 Pathogenesis of ascites syndrome in broiler chicken in relation to combined E. coli and infectious bronchitis virus (IBV) infection.** M.S. Youssef<sup>\*</sup>, A.H. Bayoumi, A.Z. Mahmoud, S. Mousa, and M. Mubarak, *Veterinary Medicine, Assiut University, Assiut, Egypt.*

Forty white leghorn chicks (one day old and specific pathogen free) were used in this study. Chicks were inoculated via nares with 0.1 ml E. coli (O : 115 serotype O) at the titre of 106.7 colony forming units/ml, and 0.1 ml IBV (Massachusetts serotype M41) at the titre of 105.5 ciliostatic dose 50 (CD 50). The experimental period was 7 weeks. The incidence of ascites was 20%. Tissues from inoculated birds were examined using light and electron microscopes. Immunohistochemistry was also conducted to detect IBV antigen in pulmonary tissue of inoculated birds. Pulmonary lesions were fibrinopurulent pneumonia at early stage followed by late granulomatous reaction. It was concluded that the development of ascites in IBV-E. coli infected birds is attributed to the induced pulmonary lesions which led to a state of pulmonary hypertension.

**Key Words:** Ascites, broiler chickens, E. coli, IBV

**978 Clinicopathological studies on ascites syndrome in broiler chickens with special reference to the role of hypoxia.** A.Z. Mahmoud<sup>\*</sup>, A.H. Bayoumi, S. Mousa, M.S. Youssef, and M. Mubarak, *Veterinary Medicine, Assiut Univ., Assiut, Egypt.*

Forty-nine ascitic broiler chickens from 7 different flocks were used in this study. An experimental investigation was also conducted to induce ascites in broiler chickens by creating a hypoxic condition. In the first trial 32 birds were exposed to periodic hypoxia (6 and 12 hrs/day) and in the second trial 24 birds were exposed to periodic hypoxia (6 hrs/day) and fed on pelleted feed. The experimental period was 4 weeks. All

**976 Monitoring energy expenditure in sheep from daily heart rate measurement.** A Arieli<sup>\*1</sup>, A Kalouti<sup>2</sup>, Y Aharoni<sup>3</sup>, and A Brosh<sup>3</sup>, <sup>1</sup>Hebrew University of Jerusalem, Israel, <sup>2</sup>Wageningen Agricultural University, Netherlands, <sup>3</sup>Agricultural Research Organization, Ramat Yishay, Israel.

A trial was conducted in sheep to validate the usage of continuous heart rate (HR) monitoring for the prediction of energy expenditure (EE) in free-living animals. Sixteen Assaff lambs (BW 50 kg) were used. Four lambs were slaughtered at the beginning of the experiment, and the others at the end of the experiment. Carcass body composition was analysed and energy retention was calculated. The 12 lambs were kept on metabolic crates for 84 d. Lambs were blocked into 3 dietary treatments: Group HH was fed a 75:25 concentrates: alfalfa hay (C:A) diet during the entire experiment. Group LH were fed 25C:75A diet during the first 42 d, and then switched into a 75C:25A diet. Group LL received 25C:75A diet during the entire experimental period. Feed was given ad libitum. The experimental period was divided into 4 sub-periods of 21 d. During each sub-period, body weight change, daily intake and feces output was measured. Intake of ME was calculated from NRC (1989). HR was recorded by data loggers during 15 to 17 d. On 18 d oxygen consumption (VO<sub>2</sub>), using an open circuit mask system, and HR were measured for a period of 15 min, from which oxygen pulse (OP = VO<sub>2</sub>:HR ratio) was determined. For each sub-period EE was estimated from daily HR measurements and oxygen consumption, calibrated against OP. Direct measurement of EE could thus be compared with the prediction obtained from the difference between ME intake (MEI) and measured energy retention. Average (and SE) intakes of ME were 857 (33), 854 (39), and 805 (42) kJ/metabolic body weight (MBW)-d in HH, LH, and LL, respectively. The respective energy retentions were 194 (23), 233 (27) and 141 (22) kJ/MBW-d ( $P = 0.06$ ). Overall energy predictability (MEI/(energy retention + EE estimated by the HR method) was 0.957 ( $n = 12$ ; SE 0.024), and was not affected by dietary energy concentration. It is concluded that the HR technique can be used for the estimation of long-term energy expenditure in growing animals.

**Key Words:** Energy expenditure, Heart rate, Oxygen pulse

exposed birds were investigated for haematological, histopathological, immunohistochemical, and ultrastructural studies. Pathomorphological examination revealed degenerative myocarditis, granulomatous and fibrinopurulent pneumonia, 25% of experimental birds developed ascites, and haematological and pulmonary changes were prominent in them. It was concluded that ascites syndrome in broiler chickens is multifactorial in origin, and heart and lungs are central organs in the pathogenesis of ascites. The development of ascites in hypoxic birds is mediated through haematological and pulmonary changes.

**Key Words:** Ascites, broiler chicken, Hypoxia

**979 Experimental study on sodium intoxication in relation to ascites syndrome in broiler chickens.** M. Mubarak<sup>\*</sup>, A.H. Bayoumi, A.Z. Mahmoud, M.S. Youssef, and S. Mousa, *Vet. Med., Assiut Univ., Assiut, Egypt.*

This work was designed to induce ascites in broiler chickens by sodium chloride intoxication. Three experiments were conducted using 40, 40, and 50 chickens, respectively, which received high doses (1.5%) and low doses (0.75%) of sodium chloride (SC), sodium bicarbonate (SB), and sodium phosphate (SP) in their drinking water for 4 weeks. Haematologic parameters, serum level of sodium, creatine kinase and lactate dehydrogenase were estimated. Histopathological and ultrastructural studies were also performed. Ascites was not recorded in high dosed birds. Low dosed birds manifested ascites at the incidence of 40% (SB), 35% (SC), and 10% (SP). Cardiac and pulmonary lesions were observed in ascitic birds. It was concluded that pathogenesis of ascites in sodium intoxicated birds is mediated through pulmonary hypertension induced right sided heart failure.

**Key Words:** Ascites, broiler chicken, sodium chloride toxicity