675 Toxicokinetic and carry-over of ochratoxin A in lactating goats. R. Blank*[1], M. Looff[2], M. Mobashar[2], A. Westphal[1], and K.-H. Südekum[2], *[1]University of Kiel, Germany, [2]University of Bonn, Germany.*

The aim of the present study was to investigate the effects of chronic feeding of 2 different doses of ochratoxin A (OTA) on feed intake, milk yield as well as systemic availability, urinary excretion and carry-over of OTA into milk in lactating goats fed high concentrate diets. Additionally, the effect of sodium bicarbonate (NaHCO3) supplementation was evaluated. For the experiment, 10 mid-lactating goats, divided into 2 groups of 5 animals each, received a diet consisting of 70% concentrate (1.5 kg/d) and 30% hay (0.65 kg/d). After feeding the OTA free diet for 2 weeks, the animals received a concentrate containing 1.5 or 2.8 mg/kg of OTA. After 3 weeks of feeding the OTA-concentrate, animals were switched for a period of 2 weeks to the same compound feed, except that it was supplemented with 15 g/kg NaHCO3. During the entire experiment, feed intake, milk yield, and urinary output was measured. Additionally blood samples from the jugular vein were drawn. Blood, urine, milk, and casein samples were analyzed for OTA and ochratoxin α (OTα). No toxic effects due to OTA could be detected. Feed intake of goats fed the high OTA concentrate was marginally lower ($P < 0.05$) compared with the low dosage group. Milk yield decreased slightly ($P < 0.05$) during the entire experiment but was unaffected by OTA feeding. Concentration of OTA in blood was lower ($P < 0.05$) in the low compared with the high dose group. Renal excretion of OTA (1.2–1.6% of OTA intake) was not affected by dose or NaHCO3 supplementation. Carry over of OTA into milk was unaffected by the dose (0.016 and 0.017% of intake) fed, while NaHCO3 supplementation reduced carry over of OTA (0.006 and 0.009% of intake). In the casein fraction, being the most relevant for cheese making, only OTα and no OTA could be detected. In conclusion, daily intake of 2–4 mg OTA in lactating goats fed high concentrate diets has no impact on milk performance, but may lead to marginally carry-over of OTA into milk. Supplementation of NaHCO3 has some potential to reduce carry-over of OTA in ruminants.

Key words: lactating goats, carry over, ochratoxin A

676 Effects of replacing rolled barley grain with wheat dried distillers' grains with solubles in Merino sheep rations. A. S. O'Hara*[1], A. V. Chaves[1], E. Jonas[1], A. Tanner[2], D. Palmer[1], and R. D. Bush[1], *[1]Faculty of Veterinary Science, The University of Sydney, Sydney, NSW, Australia, [2]Faculty of Agriculture, Food and Natural Resources, The University of Sydney, Sydney, NSW, Australia.*

Three experimental trials were conducted to determine the effects of replacing rolled barley grain with either 20% or 40% diet DM of wheat dried distillers' grains with solubles (DDGS) in Merino wether diets. Effect on ruminal fermentation from the experimental diets was measured using by a batch culture in vitro incubation trial. Nutrient degradability of dry matter (DM), neutral and acid detergent fiber (NDF and ADF) and crude protein (CP) in the diets was measured with an in situ study using 2 cannulated Holstein dairy cows. Finally, an in vivo experiment was conducted using 36 Merino wethers in a complete randomized design over a period of 50 d to determine the effect of feeding pelleted diets containing either 0%, 20% or 40% diet DM of wheat DDGS on wool production and growth performance. Diets were provided ab libitum to the Merino wethers by 9 automatic feeders. The data were analyzed using the mixed model procedure of SAS. In the in vitro study, gas and ammonia production were not affected by dietary treatment ($P = 0.34$). The addition of wheat DDGS in the diet increased total volatile fatty acids (VFA), in vitro dry matter digestibility, propionate production and slightly lowered culture pH ($P < 0.01$). In the in situ study, the wheat DDGS diets demonstrated faster ($P = 0.04$) rate of NDF degradation (k, h^{-1}) compared with control diet. All diets had high proportions of soluble CP (above 90% of total CP). In addition, replacing rolled barley grain with wheat DDGS increased ($P < 0.01$) the ruminal degradability of crude protein. The inclusion of wheat DDGS in the diets did not effect wool yield, fiber diameter or wool softness traits, however wool growth, staple length and the coefficient of variation were improved by feeding wheat DDGS to the Merino wethers ($P \leq 0.03$). This study showed up to 40% dietary DM of wheat DDGS can be used to replace rolled barley grain in Merino sheep rations to improve wool production, maintain growth performance and promote efficient rumen fermentation.

Key words: by-products, ruminal fermentation, wool

677 Effects of dried distillers grains with solubles on feedlot lamb performance and carcass characteristics. T. L. Felix*, H. N. Zerby, S. J. Moeller, and S. C. Loerch, *The Ohio State University, Wooster.*

Dried distillers grains with solubles (DDGS) may be a cost effective source of energy and protein for feedlot lambs. However, the S content of DDGS may affect animal health, performance, and mineral metabolism. Information is lacking on the negative effects of elevated DDGS inclusion in lamb diets. The objectives of this study were to determine the effects 0, 20, 40 or 60% dietary DDGS on growing lamb performance, carcass characteristics, and tissue minerals. Ninety-six lambs were blocked by gender (ewes, n = 48; wethers, n = 48) and weight, housed in 24 pens (4 lambs per pen), and used in a 92 d feedlot trial (initial BW = 26.4 ± 16.7 kg). Lambs were fed 1 of 4 dietary treatments: 1) 0% DDGS, 2) 20% DDGS, 3) 40% DDGS, and 4) 60% DDGS. Dietary S was 0.12, 0.22, 0.36, and 0.47%, respectively. The DDGS replaced primarily corn and diets were fed as a complete pellet. There was a quadratic effect of DDGS inclusion on ADG; lambs fed the 20% DDGS diet had the greatest ($P = 0.04$) gains at 0.358 kg/d. This effect on ADG led to a quadratic ($P = 0.03$) effect of DDGS on final BW. There was no effect ($P > 0.05$) of treatment on DM intake. There was a linear ($P = 0.02$) effect of treatment on G:F (means: 0.216, 0.232, 0.206, and 0.209 for 0, 20, 40, and 60% DDGS, respectively). In the liver, S increased linearly ($P = 0.05$) while Cu decreased linearly ($P < 0.01$) with increasing dietary DDGS. No other liver minerals were affected ($P > 0.05$). In the kidney, increasing dietary DDGS increased ($P < 0.04$) P, Mg, and S concentrations linearly but did not affect ($P > 0.05$) other minerals. There was no effect ($P > 0.05$) of dietary DDGS on muscle mineral concentrations. Lamb HCW were 65.9, 71.6, 64.1 and 63.3 kg for 0, 20, 40, and 60% DDGS, respectively (quadratic; $P = 0.03$). Yield grade was not affected ($P > 0.05$) by dietary DDGS. Yield grade means were 3.10, 3.58, 2.97, and 2.86 for 0, 20, 40, and 60% DDGS, respectively. Lambs fed 20% DDGS had optimum performance in this study. Lambs fed 40 or 60% DDGS had similar performance as those fed 0% DDGS. Sulfur increased in the liver and kidneys of lambs fed DDGS reflecting the increase in S intake.

Key words: dried distillers grains, lambs, sulfur

678 Estimation of milk yield of West African Dwarf (WAD) ewe fed Mexican sunflower leaf meal (MSLM) based diets. A. H. Ekeocha*, K. D. Afolabi, and A. O. Akinsoyinu, *University of Ibadan.*

A study was carried out to estimate the milk yield of West African Dwarf (WAD) ewe fed Mexican Sunflower Leaf Meal (MSLM) on a basal diet of Panicum maximum(Pm). Sixteen WAD ewe weighing 19.50 to 22.46kg on a basal diet of Pm were allotted into four treatment groups such that each treatment had four replicates of four ewes. The MSL replaced wheat bran (WB) gravimetrically at 0, 15, 30 and 45%. Diets were formulated on a DM basis. Animals on treatment A served as control while animals in treatments B, C and D received Mexican Sunflower Leaf Meal (MSLM) at 15, 30 and 45% respectively. The experiment lasted for thirteen weeks (91 days). Assessment of milk yield started in day 2 after lambing to enable lambs suckle colostrum. Lambs were kept separately from ewes and were only allowed together at periods of suckling. Milk production of the ewes were estimated by the indirect method of weighing lambs before and after suckling using a sensitive weighing balance thrice daily. Animals were weighed from day 2 to day 91 of lactation. Data were analyzed using descriptive statistics and ANOVA. From parturition there was an increase in milk production from 422.75g/day at first week to a peak of 570 g/day at third week and thereafter a gradual decline to 281.25 g/day at 13th week of lactation. Treatment effects on the variations in obtained yield (g/day) at week 2 and then from 6th week to 13th week of lactation were not significantly ($P > 0.05$) different. Overall total milk yield (kg) for the entire lactation period of 13 weeks were 36.7, 37.9, 37.3 and 35.6 kg for treatments A, B, C and D respectively. Variations observed were not significant ($P > 0.05$). Maximum daily milk production of 0.57 to 0.50 kg was obtained for WAD ewe. The total milk yield of 35.6 to 37.9 kg/ewe was obtained during the entire lactation period of 91 days. Feeding up to 30% Mexican sunflower leaf meal to West African dwarf ewe enhanced milk yield without deleterious effect.

Key words: milk yield, West African dwarf ewe, Mexican sunflower leaf meal

679 Iron carbonate supplementation of lambs administered high-sulfur water. A. M. Jons*[1], K. L. Kessler[1], K. J. Austin[1], C. Wright[2], and K. M. Cammack[1], *[1]University of Wyoming, Laramie, [2]South Dakota State University, Brookings.*

Drinking water with high sulfur (S) concentrations can reduce the performance and cause health problems such as polioencephalomalacia in livestock raised in the western US Monitoring and treating water for high levels of S are both expensive and often impractical; therefore, an alternative method of controlling this problem is needed. Our objective was to determine if supplemental Fe, commonly used in water treatment plants to bind S, prevents reduced performance and poor health caused by administration of high-S water. We hypothesized that dietary supplementation with an Fe compound would bind excess S in ruminant animals, preventing the negative effects associated with high-S drinking water. Wether lambs (n = 80) were assigned to one of 4 treatments in a randomized complete block design with 20 lambs per treatment replicated over 2 pens per treatment. Treatments included: 1) control feed and low-S well water; 2) control feed and high-S water (2,500 mg SO_4^{2-}/L); 3) low-Fe (250 ppm Fe as $FeCO_3$) feed and high-S water (2,500 mg SO_4^{2-}/L); and 4) high-Fe (500 ppm Fe as $FeCO_3$) feed and high-S water (2,500 mg SO_4^{2-}/L). All lambs received ad libitum access to feed and water. Body weights and blood samples were taken on d −1, 25, and 50, and H_2S gas in the rumen was measured on d −1 and 50. Effects of dietary treatment were estimated using the MIXED procedure of SAS. There were no differences in ADG ($P = 0.668$), daily water intake ($P = 0.795$), or daily feed intake ($P = 0.659$) between treatments. Trace mineral analysis showed no treatment differences in serum concentrations of Cu ($P = 0.199$), Fe ($P = 0.590$), Mo ($P = 0.119$), Mn ($P = 0.549$), or Zn ($P = 0.422$). Production of H_2S gas was less ($P \leq 0.001$) in low-S control lambs compared with lambs in the high-S treatment groups; no differences in H_2S gas production were detected between high-S treatment groups. These results indicate that supplementation of an Fe compound to lambs exposed to high-S water was not effective at preventing the reduced performance associated with elevated dietary S.

Key words: lambs, sulfur, water

680 Effect of supplementing ewes during late gestation with metabolizable protein on wether lamb feedlot performance, carcass characteristics, and nitrogen balance. M. L. Van Emon*[1,2], K. A. Vonnahme[1], S. E. Eckerman[1], L. A. Lekatz[1], K. R. Maddock Carlin[1], M. M. Thompson[2], and C. S. Schauer[2], *[1]Department of Animal Sciences, North Dakota State University, Fargo, [2]Hettinger Research Extension Center, North Dakota State University, Hettinger.*

The objective was to determine the effect of metabolizable protein (MP) supplementation to ewes during the last 50 d of gestation on wether offspring nitrogen (N) balance, feedlot performance, and carcass characteristics. Maternal dietary treatments were isocaloric and contained 100% (CON), 80% (MED), and 60% (LOW) of MP requirements for ewes bearing twins during the last 50 d of gestation. Feedlot (29 ± 2 kg) and N balance wethers (32 ± 0.4 kg) were fed a common feedlot ration (84.4% whole corn, 15.6% commercial market lamb pellet). Initial and final feedlot BW, ADG, and G:F were not affected ($P \geq 0.17$) by maternal dietary treatment. Wethers born to ewes fed the LOW diet had increased ($P = 0.01$) DMI compared with the wethers born to ewes fed the MED diet during the feedlot phase. Wethers born to CON had reduced ($P = 0.10$) days on feed compared with wethers born to MED ewes. Wethers born to CON ewes had increased ($P = 0.04$) percent boneless, closely trimmed, retail cuts compared with wethers born to the LOW and MED ewes, with all other carcass characteristics not affected ($P \geq 0.13$). Nitrogen balance trial DMI, NDF intake, total tract digestibility of DM, NDF, and N, fecal N excretion, and N balance were not affected ($P \geq 0.12$) by maternal dietary treatment. Wethers born to LOW ewes had increased ($P = 0.08$) daily N intake and reduced ($P = 0.08$) daily digested N retained compared with wethers born to CON and MED ewes. Wethers born to LOW ewes had increased ($P = 0.03$) daily urinary N excretion compared with wethers born to the MED and CON ewes. A treatment × day interaction was observed ($P = 0.004$) for serum urea N concentrations. On collection d 2, 4, 5, and 6 of a 7 d collection period, the wethers born to LOW ewes had increased ($P \leq 0.001$) serum urea N concentrations compared with the wethers born to MED and CON ewes. These results suggest that wethers born to ewes fed below MP requirements are less efficient in N retention, require more feed to finish in the feedlot, and have decreased retail product.

Key words: feedlot, metabolizable protein, nitrogen balance

681 Effect of increasing dietary inclusion of dried distillers grains with solubles on nutrient digestion and retention in growing lambs. T. L. Felix* and S. C. Loerch, *The Ohio State University, Wooster.*

Dietary inclusions of dried distillers grains with solubles (DDGS) greater than 40% have been shown to decrease lamb performance. This may be due in part to dietary S in excess of the maximum tolerable limit. Recent data suggest that feeding 60% DDGS to growing cattle decreases digestibility of DM, NDF, and fat. The effects of DDGS on nutrient digestibility and retention in lambs are not known. Therefore, the objectives of this study were to determine the effects of increasing dietary inclusion of DDGS on nutrient and mineral digestibility and retention in growing lambs. Twenty-four Dorset × Suffolk lambs (initial BW = 43.0 ± 4.4 kg) were used in a metabolism study. Lambs were adapted to experimental diets for 17 d before a 5 d sampling period during which total feces and urine were collected. The treatment diets were fed for ad libitum intake and were: 1) 0% DDGS, 2) 20% DDGS, 3) 40% DDGS, and 4) 60% DDGS. The DDGS replaced primarily corn and diets were fed as a complete pellet. Dietary S concentrations were 0.12, 0.21, 0.35, and 0.45%, respectively. The apparent digestibility of dietary DM decreased linearly ($P < 0.01$) with increasing dietary inclusion of DDGS (79.6, 78.4, 75.2, and 72.7% for treatments 1 through 4, respectively). Digestibility of fat, followed a similar pattern, whereas, N, S, and P digestibility increased linearly ($P < 0.03$) with increasing dietary DDGS. The digestibility of NDF was not affected ($P > 0.05$) by dietary treatment. Apparent retentions (as a percentage of intake) of N, K, Mg, Cu, Fe, and Zn, were not affected ($P > 0.05$) by dietary DDGS inclusion. The retention of S and P was decreased ($P < 0.04$) with increasing dietary DDGS. Daily urine output increased linearly ($P < 0.01$) with increasing dietary inclusion of DDGS. Urine pH decreased linearly ($P < 0.01$) with increasing DDGS (7.46, 5.86, 5.52 and 5.32 for treatments 1 to 4, respectively). These data suggest urine is a major route for excretion of acid when high S diets containing DDGS are fed. Increases in dietary DDGS resulted in decreased digestion of DM and fat which may affect lamb feedlot performance.

Key words: dried distillers grains, lambs, metabolism

682 Performance of growing West African Dwarf ewe fed Mexican sunflower leaf meal based diets. A. H. Ekeocha*, *University of Ibadan, Ibadan, Oyo, Nigeria.*

Studies were conducted using 16 lambs weighing 13–15kg on based diet of *Panicum maximum* were allotted into 4 treatments. The experiment was conducted using completely randomized design with 4 replicates. The Mexican sunflower leaf meal (MSLM) replaced wheat Bran (WB) gravimetrically at 0, 15, 30, 45%. Animals on diet A served as control while animals in diets B, C and D received Mexican sunflower leaf meal (MSLM) at 15, 30 and 45% respectively. The experiment lasted 84 d. Parameters measured included voluntary dry matter intake (VDMI) which comprised concentrate DMI (CDMI) and grass DMI (CDMI), changes in body weight (BW) and feed conversion ratio (FCR). Data were analyzed using descriptive statistics and ANOVA. The VDMI (g/d) varied from 351.0 to 621.9 for ewe-lambs. CDMI (g/d) varied from 162.70 to 480.30 and GDMI (g/d) varied from 116.90 to 193.22 for ewe-lambs. Approximately 75.5 ± 1.1 of the VDMI came from the supplement. Diets containing 30% MSLM was superior to others for GDMI (116.9–193.2 g/day) and CDMI (162.7- 480.3g/day) during the growth phase ($P < 0.05$). BW gain (Kg) varied from 3.50 to 3.58 and FCR varied from 8.42 to 14.92 and these were similar. Inclusion of up to 45% MSLM based-diets enhanced the performance of ewe-lambs in terms of BW gain, growth and feed conversion ratio.

Key words: Mexican sunflower leaf, West African Dwarf ewe

683 Use of *Megasphaera elsdenii* NCIMB 41125 during introduction of sheep on corn crop residues and un-harvested corn lands. P. H. Henning* and F. M. Hagg, *MS Biotech, Centurion, South Africa.*

Ruminants are often grazed on corn crop residues to utilize grain wasted during harvesting. They may also be grazed on un-harvested corn lands. In both cases rumen acidosis is a problem due to the sudden high intake of starch-rich grain. *Megasphaera elsdenii* is a rumen bacteria which utilizes lactic acid, thus preventing rumen acidosis. Its numbers are low on grass diets and only increase slowly when animals change to high starch diets. It is hypothesized that supplying *Megasphaera elsdenii* as a DFM when placing animals thus may benefit adaptation and production. The objective of this study was to determine the benefit of drenching sheep with *Megasphaera elsdenii* NCIMB 41125 (Me) just before introduction onto intact or harvested corn lands. In Trial 1 300 recently weaned male and female lambs (average live-weight 25 kg), on grass pasture, were randomly divided into 2 equal groups. Both groups were subsequently placed on the same newly harvested corn land for 50 d. One group (Me-treated) received a single 70 mL oral dose of Me (10^8 cfu ml^{-1}) 60 min before this placing, while the other group (control) received none. In Trial 2 184 castrated male lambs (average live-weight 47 kg), on grass pasture, were randomly divided into 2 equal groups. Both groups were subsequently placed on the same un-harvested corn land for 50 d. One group (Me-treated) received a single 70 mL oral dose of Me (10^8 cfu ml^{-1}) 60 min before this placing, while the other group (control) received none. In Trial 1 Me-treated male and female sheep gained 16.2 and 9.3 kg live-weight, respectively, which was significantly ($P < 0.01$) more than the corresponding 15.9 and 8.3 kg for the control group. In Trial 2 Me-treated lambs gained 6.64 kg, which was significantly ($P < 0.05$) greater than the 5.92 kg gain for the control group. It is concluded that a single oral dose of *Megasphaera elsdenii* NCIMB 41125 given to sheep just before placing them on harvested or un-harvested corn land can benefit production, probably by controlling rumen acidosis.

Key words: corn crop residues, *Megasphaera elsdenii*, rumen acidosis