**734 Effect of Rumensin® and Tylan® in feedlot diets containing wet distillers grains plus solubles fed to beef steers.** N. F. Meyer*[1], G. E. Erickson[1], T. K. Klopfenstein[1], J. R. Benton[1], M. K. Luebbe[1], and S. B. Laudert[1], [1]*University of Nebraska*, *Lincoln*, [2]*Elanco Animal Health*, *Greenfield, IN*.

The objective of this study was to evaluate the effects of Rumensin and Tylan in feedlot diets containing wet distillers grains plus solubles. Eight hundred beef steers (329 ± 25 kg) were blocked by initial BW and randomly assigned to one of five treatments (20 steers per pen, 8 pens per treatment). Treatments consisted of a corn-based diet with Rumensin and Tylan (**CORN+RT**) and four treatments with 25% wet distillers grains plus solubles (**DG**) and either 36.7 mg/kg (**R**) or 49.0 mg/kg (**HIR**) of Rumensin and Tylan (**T**) at 90 mg•hd$^{-1}$•d$^{-1}$. Compared to CORN+RT, steers fed DG+RT gained more, were more efficient ($P<0.05$), and had similar DMI (10.7 vs. 10.6 kg). Feeding Rumensin increased G:F by 3.1% and Rumensin plus Tylan increased G:F by 4.9% when compared to DG alone ($P<0.05$). With the exception of dressing percentage, there were no differences in performance or carcass characteristics when Rumensin was fed at 36.7 compared to 49.0 mg/kg. Total liver abscesses were significantly greater for DG (42.4%) and DG+R (40.8%), compared to treatments containing Tylan, CORN+RT (17.0%), DG+RT (8.3%), and DG+HIRT (8.9%). Severe liver abscesses were also less for diets containing Tylan ($P<0.05$). This study indicates that steers fed Rumensin and Tylan in diets containing wet distillers grains plus solubles results in improved feed efficiency and decreased liver abscesses compared to similar diets without these feed additives.

**Table 1.**

| | CORN +RT | DG | DG +R | DG +RT | DG +HIRT | SEM | P-value |
|---|---|---|---|---|---|---|---|
| Final BW, kg[1] | 587[a] | 597[b] | 601[b] | 605[b] | 597[b] | 3 | <0.01 |
| DMI, kg | 10.7[abc] | 10.8[a] | 10.7[ac] | 10.6[bc] | 10.4[b] | 0.1 | 0.02 |
| ADG, kg[1] | 1.69[a] | 1.76[b] | 1.78[b] | 1.80[b] | 1.76[b] | 0.02 | <0.01 |
| G:F | 0.159[a] | 0.162[a] | 0.167[b] | 0.170[b] | 0.168[b] | 0.001 | <0.01 |
| Liver Abscesses | | | | | | | |
| Total, % | 17.0[a] | 42.4[b] | 40.8[b] | 8.3[a] | 8.9[a] | 3.0 | <0.01 |
| A+, % | 4.4[a] | 16.5[b] | 19.1[b] | 3.8[a] | 7.0[a] | 2.2 | <0.01 |

[abc]Within a row means without a common superscript letter differ ($P<0.05$). [1]Calculated from carcass weight, adjusted to a common 63% dress.

**Key Words:** Cattle, Feed Additives, Wet Distillers Grains Plus Solubles

**735 Effect of Rumensin® and Tylan® fed separately on in combination on feedlot performance and carcass characteristics of feedlot cattle.** G. J. Vogel*[1], S. B. Laudert[1], and R. S. Swingle[2], [1]*Elanco Animal Health*, *Greenfield, IN*, [2]*Cactus Feeders*, *Amarillo, TX*.

One-thousand six hundred eleven crossbred steers (345 kg) were randomly allotted to 16 pens in a 2 × 2 factorial with 4 replications. Experimental treatments included a non-medicated control (C), Rumensin only (RO), Tylan only (TO) and Rumensin plus Tylan (R+T). Formulated Rumensin (R) and Tylan (T) levels were 36.5 and 10.0 mg/kg (DM basis), respectively. A two ration step-up program was used to adapt steers to final diets with cattle reaching the final diet by d 20. Steers were fed three times daily during the ration transition phase and twice daily once acclimated to the final diet. The study averaged 142 d (range 139 to 144 d). The final ration was formulated to contain 1.52 Mcal NEg/kg, 13.5% CP, 15.1% NDF, 7.0% EE, 0.56% Ca and 0.32% P. Performance parameters were analyzed using PROC MIXED with treatment as fixed effects and block as random effects. Orthogonal contrasts were used to evaluate main effects of R, T and R*T. Significant R*T interactions were observed for DM Intake and feed to gain. With both variables the magnitude of the effect was greater for steers fed R+T. R decreased (P<0.001) daily feed intake by 4.0% (9.98 vs. 9.55 kg) while feed to gain was improved (P<0.001) by 4.3% (5.52 vs. 5.30). Cattle fed T experienced a 72.4% decrease (P<0.0001) in liver abscess prevalence (26.8 vs. 7.4%) which resulted in a 2.3% increase (P=0.06) in daily gain (1.79 vs. 1.83 kg/d) and a 4.0 kg increase (P=0.03) in carcass gain. Compared to C, steers fed R+T consumed 4.4% less (P<0.05) feed and converted 6.4% more (P<0.05) efficiently. Quality and yield grade were not affected by treatment. These data indicate Rumensin and Tylan improved feed efficiency and decreased liver abscess incidence in steers fed to harvest on a conventional diet.

**Table 1.**

| | Treatment | | | | Main Effect | | P-Values |
|---|---|---|---|---|---|---|---|
| | C | RO | TO | R+T | R | T | R*T |
| DM intake, kg | 9.89[ab] | 9.66[bc] | 10.08[a] | 9.45[c] | <0.001 | NS[d] | 0.03 |
| Daily Gain, kg/d | 1.80 | 1.78 | 1.82 | 1.84 | NS | 0.06 | NS |
| Feed to Gain | 5.51[a] | 5.44[a] | 5.54[a] | 5.16[b] | <0.001 | 0.01 | <0.01 |
| Liver Abscess, % | 29.3[a] | 24.2[a] | 6.6[b] | 8.2[b] | NS | <0.0001 | NS |
| Carcass Gain, kg | 185.4[ab] | 182.2[a] | 189.3[b] | 186.2[ab] | 0.08 | 0.03 | NS |

[abc]Means with different superscripts differ (P<0.05), [d]NS=(P>0.10)

**Key Words:** Cattle, Feed Additives, Liver Abscess

**736 Interactions of monensin with dietary fat and carbohydrate components on ruminal fermentation and production responses by dairy cows.** B. Mathew*, E. R. Oelker, M. L. Eastridge, and J. L. Firkins, *The Ohio State University*, *Columbus*.

Variation in milk fat percentage due to monensin supplementation to lactating dairy cows could be due to altered ruminal fermentation with interactions of monensin with ruminal biohydrogenation of fat and ruminal carbohydrate availability. The objective of the study was to determine the effects of feeding monensin in diets differing in starch availability, effective fiber, and fat. Six ruminally cannulated lactating Holstein cows were used in a balanced 6 × 6 Latin square design with 21 day periods. The cows were fed six diets: 1) C = control diet with ground corn (GC) and long particle size for alfalfa hay (LAH), 2) CR = C plus 12 g/ton DM of monensin (R), 3) CRFL = CR plus 4% added fat (F), 4) CRFS = 4% F, R, GC, and short particle size of alfalfa hay (SAH), 5) SRFL = 4% F, R, steam-flaked corn (SFC), and LAH, and 6) SRFS = 4% F, R, SFC, and SAH. All diets were formulated to have 18% CP, 21% forage NDF, and 40% NFC. Monensin decreased DMI

($P < 0.10$). There was no effect of treatment ($P > 0.12$) on milk yield. Addition of monensin decreased ($P < 0.05$) milk fat yield and tended to decrease milk fat percentage (3.41 vs 2.98%; $P = 0.11$). Interactions between corn processing and hay particle size occurred for milk fat percentage ($P < 0.10$) and feed efficiency (FCM/DMI; $P < 0.05$). With feeding diets containing R: 1) SAH tended to increase milk fat percentage for the ground corn diet while it tended to decrease milk fat percentage with SFC (CRFL + SRFS vs. CRFS + SRFL), and 2) feed efficiency was not affected by particle size of hay with ground corn but was increased for SAH fed with SFC. The SFC increased ($P < 0.10$) NDF digestibility (CRFL + CRFS vs. SRFL + SRFS; 51.1 vs 56%). Addition of fat with monensin decreased ($P < 0.001$) total VFA but increased rumen pH ($P < 0.05$). Fat addition with monensin decreased rumen $NH_3$-N ($P < 0.05$) and MUN (12.8 vs 13.9 mg/dl; $P < 0.01$), and SFC decreased $NH_3$-N ($P < 0.10$). Fat, effective fiber, and ruminal starch availability may explain some responses of feeding monensin on ruminal fermentation and animal production.

**Key Words:** Monensin, Forage Particle Size, Starch Availability

**737 Effects of Optaflexx ™ on ruminal ammonia and amino acid concentrations in cattle fed dry-rolled or steam-flaked corn finishing diets with or without dried distiller's grains.** C. E. Walker* and J. S. Drouillard, *Kansas State University*, *Manhattan*.

The effects of ractopamine (Optaflexx™, Elanco Animal Health) supplementation on ruminal concentrations of ammonia and free amino acids were evaluated in a randomized complete block experiment utilizing a 2 × 2 × 2 factorial arrangement of treatments. Factors consisted of grain processing method (steam-flaked or dry-rolled corn; SFC or DRC); level of dried distiller's grain with solubles (0% DG or 25% DG, dry basis); and level of Optaflexx (0 or 200 mg/d). Sixteen ruminally fistulated Holstein steers were randomly assigned to the 8 treatment combinations and adapted to their respective diets for 21 d prior to sampling ruminal fluid. Ruminal fluid was collected during a 3-d sampling period; d 1 at 0, 6, 12, 18 h; d 2 at 2, 8, 14, 20 h; d 3 at 4, 10, 16, 22 h. Ruminal fluid was strained through 4 layers of cheesecloth, mixed in a 4:1 ratio with 25% metaphosphoric acid solution, and frozen. Prior to analysis, samples were thawed, thoroughly homogenized, and then centrifuged at 21,000 x g to remove particulate matter. Concentrations of ammonia and amino acids in the supernatant were measured colorimetrically using an autoanalyzer (Technicon III Auto Analyzer). Ruminal $NH_3$ concentrations were lower when Optaflexx was fed in combination with DRC, but not when fed in conjunction with SFC (grain processing x Optaflexx, $P < 0.01$). Addition of Optaflexx, SFC, and DG all resulted in lower ruminal ammonia concentrations (main effects, $P < 0.01$). Amino acid concentrations were decreased when Optaflexx was added to diets without DG, but were unchanged in diets with DG added (interaction, $P < 0.05$). Changes in ruminal $NH_3$ and amino acid concentration with Optaflexx supplementation are dependent on processing method of the grain and the addition of distiller's grains to finishing diets. The results of this experiment suggest that Optaflexx may influence ruminal degradation of dietary protein, which could have important implications for diet formulation.

**Key Words:** Cattle, Optaflexx, Rumen Fermentation

**738 Effects of cinnamaldehyde-eugenol and capsicum on rumen fermentation and feeding behavior in beef heifers fed a high-concentrate diet.** M. Rodriguez-Prado[1], S. Calsamiglia[1], A. Ferret[1], J. Zwieten[1], L. Gonzalez[1], and D. Bravo*[2], [1]*Universitat Autonoma de Barcelona*, *Spain*, [2]*Pancosma*, *Switzerland*.

Four beef Holstein heifers (BW = 436 ± 17 kg) fitted with a 1-cm i.d. plastic ruminal trocars were used in a 4 × 4 Latin square design to evaluate the effect of feeding combinations of essential oils on feeding behavior and ruminal fermentation in heifers fed a high-concentrate diet. Animals were fed (DM basis) 10% barley straw and 90% concentrate (32.2% barley grain, 27.9% ground corn, 7.5% wheat bran, 10.7% soybean meal, 10.7% soybean hulls, 7.2% corn gluten feed, 3.1% mineal-vitamin mix; 16,6% CP, 18,3% NDF). Treatments were arranged in a factorial design with cinnamaldehyde and eugenol (CINE, 167 and 334 mg /animal/d, respectively) with or without capsicum (CAP, 500 mg/animal/d). Each experimental period consisted of 25 d (15 d for adaptation, 5 d DM intake continuous measurements and 3 for rumen sample collection. Animals had ad libitum access to water and feed offered once daily at 0800. Data was analysed using using PROC MIXED for repeated measures (SAS), and differences were declared at $P < 0.05$. Consumption of water was higher in CAP compared with CTR (33.7 vs. 37.8 L/d). Although there were no differences in total (9.3 kg/d) and concentrate DM (8.6 kg/d) intake, animals fed CAP spent more time eating (11.3 vs 8.0% of the time of the day) and the pattern of intake was more stable during the day compared with CTR. As a result, the pH fell to its lowest level 6 h after feeding but was lower in CTR compared with CAP, suggesting that the modification of the pattern of intake induced by CAP was responsible for controlling the sharp drop of pH after feeding. Total volatile fatty acids tended ($P < 0.07$) to be higher in CAP compared with CTR (162.4 vs. 133.6 mM), but the proportion (mol/100mol) of acetate (59.2), propionate (25.2), butyrate (13.4) and lactate (0.31) was not affected by treatments. Feeding CAP may modify the pattern of intake and help to control the drop of pH after feeding high concentrate diets.

**Key Words:** Intake Pattern, Essential Oils, Fermentation

**739 Meta-analysis on the effect of a cinnamaldehyde and eugenol mixture on the performance of lactating dairy cows.** D. Bravo*[1] and P. Doane[2], [1]*Pancosma Research*, *Geneva, Switzerland*, [2]*ADM Research*, *Decatur, IL*.

This abstract presents a meta-analysis of lactating dairy cow studies involving a botanical composition comprised of eugenol and cinnamaldehyde (XT). Data from 16 studies with side by side comparisons of XT to a control diet provided 33 treatment groups which were pooled for evaluation. The model used was a mixed model with a fixed effect (effect of XT: present vs. absent) and a random effect (ie. the trial effect). For each measure of performance, mean value of XT or control, the number of groups involved, partial $R^2$, and P value were determined.
Addition of XT increased dry matter intake (22.1 vs. 20.6 kg/d; N=16, $P<0.001$, $R^2=0.96$), and milk yield (34.2 vs. 33.1 kg/d; N=36, $P<0.001$, $R^2=0.45$). Feed efficiency (kg of milk/kg of DMI) was equivalent for XT and control, (1.44 vs. 1.46; N=16, $P=0.441$, $R^2=0.10$). When XT was present, milk protein content decreased, and milk fat content was

unchanged. However, protein and fat yields were increased because of improved milk yield.
Between trials, correlation between diet composition and XT response were explored to determine the interaction of XT and dietary nutrient profile. For each trial, the efficacy of XT was represented as the ratio of the mean for XT to the mean of the control and assessed with linear correlation and regression procedures. Results suggest an interaction of diet nutrient composition and product efficacy. For example, XT was more efficacious for improving milk yield when diets contained greater amounts of NEL, NFC or digestible fiber.
Meta analysis using a data set consisting of a diverse population of trials avoided emphasis of a particular trial while illustrating the robust nature of XT. Meta analysis is useful for developing a statistically valid framework for additive use in diets of varying composition. The results of meta-analysis demonstrate benefits for using XT to increase DMI and milk yield by lactating dairy cows.

**Key Words:** Meta Analysis, Plant Extracts, Dairy Cows

**740 Effects of yeast culture on rumen microbial fermentation of heifers challenged with high-concentrate feeding.** D. Moya*[1], S. Calsamiglia[1], A. Ferret[1], J. I. Fandiño[1], and L. Castillejos[2], [1]*Universitat Autònoma de Barcelona*, *Bellaterra, Spain*, [2]*Diamond V Europe*, *Marum, the Netherlands*.

Twelve Holstein heifers (277 ± 28 kg BW) fitted with ruminal trocars were used in a crossover design study to determine the effects of yeast culture on ruminal microbial fermentation during a feed challenge. The challenge consisted of a 3-week adaptation period (100% forage diet) followed by a 2-week transition period when heifers were gradually switched to a 10:90 forage to concentrate diet to cause digestive upset (visual observation of bloat or reduction in feed intake by 50% from the previous day). Treatments consisted of a control diet without (**CT**) or with yeast culture supplementation at 14 g/hd/d (**YC**, Diamond V $XPC_{LS}^{TM}$ Yeast Culture, Diamond V Mills, Cedar Rapids, IA, USA). Ruminal fluid samples were collected at 0 and 6 h post-feeding on the first and last day of the adaptation period and daily during the transition into the high concentrate diet. Foam height and strength were determined on the day when a digestive upset was detected as a measure of potential foam production and bloat appearance. The addition of YC had no effect on ruminal fermentation during the 100% forage diet period except for an increase ($P < 0.01$) in ammonia N concentration. Yeast culture did not affect the incidence (83.3%) or the time (7.00 ± 0.62 d) to cause digestive upset. However, YC increased ($P < 0.05$) ruminal pH and branched chain VFA, and decreased ($P < 0.05$) lactate concentration on the day after digestive upset. Yeast culture reduced ($P < 0.05$) ruminal fluid viscosity 3 days prior and 2 days after digestive upset, and foam strength on the day digestive upset occurred. Ruminal population of *S. bovis* or *M. elsdenii* was not affected by treatment. Results indicated that YC had no effect on development of digestive upset during the feed challenge, but contributed to a faster recovery by increasing ruminal pH and reducing lactate production. In addition, YC reduced foam strength which could reduce the risk of developing bloat.

**Key Words:** Yeast Culture, Microbial Fermentation, Fed Challenge

**741 Influence of body condition at calving and feed supplementation with yeast culture on feed intake, peripheral blood metabolites and blood mineral concentrations in early lactating dairy cows.** R. AlIbrahim*, M. Doherty, L. O'Grady, V. Gath, P. Duffy, and F. Mulligan, *University College*, *Dublin, Ireland*.

The influence of body condition score (BCS) at calving and feed supplementation with Saccharomyces Cerevisiae live yeast culture (Yea-Sacc1026) on feed intake, blood metabolites and major blood minerals, were determined by randomly allocating thin (mean BCS= 3.25 ± 0.5) or moderate condition (mean BCS=4.00 ± 0.25) forty Holstein/Friesian cows of mixed parity to receive one of two nutritional treatments (yeast supplemented and control diets) from day 14 pre-calving till day 70 post-calving. Daily feed intake was monitored individually. Blood samples were taken via jugular venipuncture on the day of calving and on days 5, 25 and 35 post-calving and analysed for glucose (GLS) non-esterified fatty acids (NEFA), beta-hydroxybutyrate (BHB), calcium (Ca), magnesium (Mg) and phosphorus (P). In weeks 1 and 2 of lactation, cows in moderate condition had a lower ($P<0.06$) feed intake than thin cows. Moderate condition cows tended to have higher NEFA ($P=0.08$) on the day of calving, and higher BHB concentrations ($P=0.09$) on day 5 post-calving, when compared with thin cows. Moderate condition cows also had higher BHB concentrations at days 25 ($P=0.07$) and 35 ($P<0.01$) and had higher NEFA concentrations at day 25 ($P<0.01$) post-calving when compared with thin cows. Thin cows had higher GLS concentrations at days 25 ($P<0.01$) and 35($P=0.06$) post-calving when compared with the moderate condition group. Cows supplemented with yeast tended to have lower NEFA concentrations at day 25 post-calving ($P<0.10$) than control cows. On the day of calving, moderate condition cows had a higher ($P<0.05$) Mg, lower ($P=0.06$) Ca and tended to have a lower($P<0.10$) P than thin cows. Yeast supplementation had no effect ($P>0.05$) on Ca, Mg or P status on the day of calving. These data clearly indicate that appropriate body condition score at calving and offering yeast supplements, significantly altered feed intake, indices of energy balance and major mineral concentrations in the peripheral blood of early lactating dairy cows.

**Key Words:** Body Condition Score, Blood Metabolites, Yeast Culture

**742 Effect of feeding Diamond V Yeast Culture™ on milk production and dry matter intake in lactating dairy cows: A meta-analysis.** A. R. Rabiee[1], I. J. Lean*[1], K. L. Dorton[2], M. E. Engstrom[2], and W. K. Sanchez[2], [1]*Bovine Research Australasia*, *Camden, NSW, Australia*, [2]*Diamond V Mills*, *Cedar Rapids, IA*.

A meta-analytic approach was used to evaluate the effectiveness of supplementation with Diamond V YC™, XP™, and XPC™ Yeast Culture (fermented *Saccharomyces cerevisiae*) on milk production and dry matter intake (DMI) in lactating dairy cows. The presence and sources of heterogeneity in responses were also investigated. Published research papers and other reports (n = 60) were considered for meta-analysis. Trials were included if these provided: information on the form and dose of Diamond V Yeast Culture, adequate description of randomization, data on milk production or DMI, a measure of variance (SE or SD), and/or P-value. Switch back trials were not included. A total of 32 studies (milk production trials = 49; DMI trials = 28) met the selection

criteria. Treatment significantly increased milk production by 0.93 kg/day/cow (weighted mean difference = 95% confidence interval (CI) = 0.70 to 1.15, P < 0.0001). There was no evidence of heterogeneity in milk production responses (P = 0.347). Meta-regression showed that the effect of treatment was not influenced by stage of lactation, type and dose of yeast culture, duration of supplementation before and after calving, type of diet and parity. However, meta-analysis on subgroups (early-mid vs. late lactation trials) showed that the response to Diamond V Yeast Culture was slightly greater in late lactation. The effect of Diamond V Yeast Culture on DMI was not significant (effect size (ES) = 0.084; 95% CI= -0.025 to 0.19), and there was no evidence of heterogeneity (P = 0.628). Meta-regression analysis showed that this response was influenced by the delivery method (mixed vs. topdressed) as DMI was significantly greater when the treatment was top dressed (ES = 0.44; 95% CI = 0.18 to 0.70; P = 0.001). Dry matter intake was significantly greater during the early stage of lactation (ES = 0.31; 95% CI = 0.084 to 0.53; P = 0.049) studies compared to later studies.

**Key Words:** Diamond V Yeast Culture, Meta-Analysis, Dairy Cows

**743 Dose-response effects of Rumensin® supplementation on kinetics of biohydrogenation of fatty acids in the rumen.** M. S. Allen* and Y. Ying, *Michigan State University*, *East Lansing*.

Eight ruminally and duodenally cannulated multiparous Holstein cows were assigned randomly to replicated 4 × 4 Latin squares in a dose-response arrangement of treatments. Treatments were Rumensin® supplementation at 0, 8, 16, and 24 ppm DM. Diets consisted of corn silage and alfalfa silage (2:1 ratio, DM basis), high moisture corn, distiller's grains (6.9% of diet DM), protein supplement, minerals and vitamins. Diets were intended to promote milk fat depression and contained 25% NDF, 18.5% forage NDF, 28.6 % starch, and 3.5% total fatty acids (FA). Treatment periods were 28 d with the final 11 d used for sample and data collection. Treatment did not affect concentration or molar percentage of acetate or propionate in ruminal fluid, or ratio of acetate to propionate. Rumensin® tended to decrease rate of biohydrogenation of 18:1 trans FA linearly from 38.9 to 32.6 %/h (P=0.09). This resulted in a quadratic increase in the ruminal pool of 18:1 trans FA (P=0.04) and numerically greater flow of 18:1 trans FA at the duodenum from 61.0 to 80.6 g/d (P=0.13). Linear increases in concentrations of 18:1 t10 and t10, c12 CLA were detected in the milk (> 2.2X, P< 0.05). Mean daily ruminal pH tended (P=0.09) to decrease from 6.26 to 6.14 with increasing Rumensin® concentration. Rumensin® decreased milk fat concentration from 3.23% for 0 ppm to 2.85% for 24 ppm (P=0.03) but did not affect yield of milk fat (P=0.28). Lack of effect of treatment on milk fat yield is consistent with effects on de novo FA synthesis; total FA < C16 as a % of total FA in the milk was not affected by treatment (P=0.75). Although milk fat yield was not affected by treatment in this experiment, a reduction in rate of biohydrogenation resulting in increased flow of trans 18:1 FA from the rumen may contribute to the development of milk fat depression when supplementing Rumensin® in highly fermentable diets.

**Key Words:** Milk Fat Depression, Kinetics, CLA

**744 Exogenous glucosamine administration alters glucose and insulin homeostasis in sheep.** M. W. Robertson*, F. R. Dunshea, and B. J. Leury, *The University of Melbourne*, *Parkville, Victoria, Australia*.

The objective of this study was to determine whether exogenous glucosamine alters glucose, insulin and NEFA metabolism in sheep by increasing flux through the hexosamine biosynthetic pathway, a purported nutrient sensing pathway. Six cross bred ewes (34.9 kg ± 3.8) were used. Each ewe underwent a saline (C), and a 2.5 (LG) and 5 (HG) mg/kg/min glucosamine infusion for 6h. Blood samples were taken during a 1.5 h baseline period, at 1h intervals throughout the infusion and during a 6h recovery period. There was a significant time × treatment interaction ($P$<0.001) throughout the sampling period for glucose, insulin and NEFA plasma concentrations. Mean baseline concentrations were not significantly different for glucose (C, 2.61; LG, 2.90; HG, 2.99 mmol/L), insulin (C, 5.66; LG, 6.39; HG, 4.88 mU/ml) or NEFA (C, 724; LG, 576; HG, 589 μmol/ml). Significant differences in plasma concentration of glucose were first observed at 2h (C, 2.34; LG, 3.54; HG, 3.88 mmol/L; $P$<0.002) and for insulin at 4h (C, 5.66; LG, 6.39; HG, 4.88 mU/ml; $P$<0.003) from start of infusion. Glucose and insulin concentrations continued to increase in both LG and HG treatments throughout the remaining infusion period. At the end of the 6h infusion there were significant differences ($P$<0.001) between all 3 treatments (glucose: C, 2.40; LG, 4.28; HG, 5.44 mmol/L and insulin: C, 1.67; LG, 5.98; HG, 17.37 mU/ml). Post infusion, concentrations of glucose and insulin remained higher than C treatment and did not approach C values until around 4h and 6h, respectively. Changes in NEFA concentration were variable throughout the infusion period. At 2h post infusion NEFA concentration in LG and HG treatments fell significantly ($P$<0.003) below the C treatment (C, 831, LG, 481; HG, 415 μmol/ml), but there were no significant differences in plasma NEFA concentration at 6h post infusion (C, 922, LG, 914; HG, 670 μmol/ml). These data indicate that glucosamine affects glucose and insulin homeostasis in a manner that is indicative of an insulin resistant state and this effect is dose dependant.

**Key Words:** Glucosamine, Insulin, Sheep

**745 Effect of ZADO®, as enzymes from anaerobic bacterium, on extent of ruminal fermentation kinetics, microbial protein synthesis and milk production in dairy cows.** H. M.Gado*[1], M. Hassan[2], and A.-F. Z. M. Salem[3], [1]*Ain Shams University*, *Cairo, Egypt*, [2]*Cairo University*, *Cairo, Egypt*, [3]*Alexandria University*, *Alexandria, Egypt*.

A 2 × 2 factorial experiment was conducted to evaluate the effect of ZADO®, as enzymes preparation containing cellulases, xylanases, α-amylase and proteases from an anaerobic bacterium, on milk production and composition, ruimianl fermentation activities and nutrients digestibility in dairy cows. Twenty multiparous lactating Brown Swiss cows (550 kg BW) were randomly assigned in two groups of 10 animals fed a mixed ration (CP 15%, TDN 74%) with or without addition of 40 g/head/d ZADO®. Milk production was recorded daily during 12 weeks of the experiment. Total and individual VFA (acetate, propionate, and butyrate), NH3-N concentrations, and microbial protein synthesis were significantly (P<0.05) increased for cows fed ZADO® diet. Digestibility coefficients of DM, OM, NDF and ADF were significantly (P<0.05)

improved by addition ZADO® in cow diet. Consequently, total milk yield, 3.5 and 4% fat corrected milk and energy corrected milk improved (P<0.05) by 12, 21, 14, and 20% respectively, and there was no affect on milk composition. In conclusion, supplementing dairy cow diets with ZADO® has the potential to enhance milk yield as consequence for improving the nutrients digestibility, ruminal fermentation activities and microbial protein synthesis. ZADO® confirm its roles in improving the fiber digestibility and suggested positive effects on ruminal fibrolytic microorganisms and increased milk production in dairy cows

**Key Words:** ZADO®, Microbial Protein Synthesis, Milk Yield