T55 Effect of feeding a combination of galacto-oligosaccharides and a *Bifidobacterium* sp. strain on feline intestinal ecosystem. G. Biagi*[1], I. Cipollini[1], M. Grandi[1], C. Pinna[1], A. Pompei[2], M. Zini[3], and G. Zaghini[1], *[1]Department of Veterinary Medical Sciences, University of Bologna, Ozzano Emilia, Italy, [2]Department of Pharmaceutical Sciences, University of Bologna, Bologna, Italy, [3]Department of Biochemistry, University of Bologna, Bologna, Italy.*

Synbiotics (i.e., the combination of a prebiotic and a probiotic) are recognized means to modulate composition and activities of gut microbiota. The aim of the present study was to evalute the effects derived from the oral administration of a combination of galacto-oligosaccharides (GOS) and a *Bifidobacterium pseudocatenulatum* strain, previously isolated from the feces of a healthy adult cat, on composition and metabolism of feline intestinal microbiota. Growth kinetics of the *B. pseudocatenulatum* strain was determined on 4 different prebiotic substances (GOS, fructo-oligosaccharides, lactitol and pectin). Biomass yield was higher ($P < 0.01$) for GOS than for other treatments. Ten adult healthy cats received for 15 d a synbiotic consisting of the freeze-dried *B. pseudocatenulatum* strain (10^8 cfu/d) and GOS at 1% of the diet. Fecal samples were collected from each cat the day before synbiotic administration started (Day 0) and 1 and 10 d after synbiotic withdrawal (Day 16 and 25, respectively), for chemical and microbiological analysis. Results at Day 0, 16 and 25 were analyzed by one-way ANOVA with time as the main factor. While no difference on fecal moisture and pH was detected, ammonia concentrations were reduced on d 16 and 25 compared with trial start (288 and 281 vs. 353 mmol/g of fecal DM; $P < 0.05$). On Day 16, fecal concentration of acetic acid was increased compared with d 0 (17.1 vs. 13.2 mmol/g of fecal DM; $P < 0.05$). Furthermore, on Day 16, fecal concentrations of lactic, n-valeric and iso-valeric acids were lower than on Day 0 and 25 (0.18 vs. 0.30 and 0.30, 0.15 vs. 1.84 and 1.73, 0.35 vs. 0.65 and 0.62 mmol/g of fecal DM, respectively; $P < 0.05$). Fecal counts of *Cl. perfringens*, enterococci, *Bacteroides* spp., *E. coli* and lactobacilli were not influenced by treatment whereas an increase of bifidobacteria counts was observed on Day 16 and 25 compared with trial start (7.98 and 7.52 vs. 5.63 Log cfu/g of fecal DM; $P < 0.01$). Present results show an overall positive influence derived from the synbiotic administration on feline fecal microbiota.

Key words: bifidobacteria, feline intestinal microbiota, synbiotics

T56 Dietary fiber viscosity may affect insulin and GLP-1 secretion, but does not appear to contribute to the "second meal effect" in healthy adult dogs. P. Deng*[1], A. Wolff[1], A. N. Beloshapka[1], B. M. Vester Boler[1], and K. S. Swanson[1,2], *[1]Department of Animal Sciences, University of Illinois, Urbana, [2]Division of Nutritional Sciences, University of Illinois, Urbana.*

Viscous dietary fibers have beneficial effects on postprandial glucose metabolism and insulin secretion. However, the effects of fiber viscosity on the "second meal effect" in dogs are unknown. Our objective was to evaluate the effects of dietary fiber type in a morning meal on glucose, insulin, and glucagon-like peptide 1 (GLP-1) responses to a glucose challenge later in the day. Six healthy adult intact female hounds (mean BW = 25 kg) were used in a replicated 3 × 3 Latin square design consisting of 21 d (3 7-d periods). Dogs were randomly assigned to one of 3 treatments containing equal amounts of fiber: a low-viscosity fiber (LVF) diet containing 8% cellulose; a moderate-viscosity fiber (MVF) diet containing 4% cellulose, 2% psyllium, and 2% pectin; or a high-viscosity fiber (HVF) diet containing 4% psyllium and 4% pectin. Dogs were fed 3 times daily (8 a.m.; 12 p.m.; 4 p.m.) to maintain BW. On the last day of each period, dogs were fed at 8 a.m. as usual, then dosed with 25 g of maltodextrin in 120 mL of water at 12 p.m. Blood samples were collected before (0 min) and 10, 20, 30, 45, 60, 90, 120, and 180 min after dosing, and analyzed for glucose, insulin, and GLP-1 concentrations. Baseline and postprandial incremental area under the curve (IAUC) data were analyzed statistically. Baseline GLP-1 concentrations were greater ($P < 0.005$) in dogs fed HVF, while baseline insulin concentrations in dogs fed HVF were lower ($P < 0.05$) than dogs fed MVF, but not different from dogs fed LVF. There were no differences in baseline GLP-1 and insulin concentrations between dogs fed MVF and LVF. No treatment effects were observed in glucose, insulin, and GLP-1 IAUC responses. This might be due to the timing of meals and baseline insulin and GLP-1 effects. In conclusion, while fiber viscosity did not appear to contribute to a second meal effect, dogs fed highly viscous fibers had altered GLP-1 and insulin concentrations 4 h after the morning meal. Further research to determine the effects of fiber viscosity on gut hormone response and mechanisms of action in dogs is needed.

Key words: viscous dietary fibers, second meal effect, dog

T57 Comparison of fecal microbial communities of healthy adult dogs fed raw meat-based or extruded diets using 454 pyrosequencing. A. N. Beloshapka*[1], S. E. Dowd[3], L. Duclos[4], and K. S. Swanson[1,2], *[1]Department of Animal Sciences, University of Illinois, Urbana, [2]Division of Nutritional Sciences, University of Illinois, Urbana, [3]Research and Testing Laboratory, Lubbock, TX, [4]Nature's Variety Inc., Lincoln, NE.*

It is often presumed that feeding a raw meat-based diet will negatively affect the fecal microbial populations of dogs. However, this question has not been well tested in healthy dogs. Thus, the objective of this experiment was to use 454 pyrosequencing to characterize microbial populations of healthy adult dogs fed raw meat-based or extruded diets. Six healthy adult beagles (5.5 ± 0.5 yr; 8.5 ± 0.5 kg) were first fed a commercially available extruded diet (control), then randomly allotted to 1 of 6 raw meat diets in a Latin square design. Diets had varying protein, fat and carbohydrate (including fiber) composition. Following a 14d adaptation phase, a fresh fecal sample was collected on d15 or d16 for each period. Dogs were fed to maintain BW throughout the study. Genomic DNA was extracted from fresh fecal samples and used to create 16S rDNA amplicons, which were then subjected to 454 pyrosequencing. Predominant bacterial phyla in all dogs included Firmicutes, Bacteroidetes, and Fusobacterium. However, dogs fed raw meat-based diets had lower ($P < 0.01$) Firmicutes and Bacteroidetes, but greater ($P < 0.01$) Fusobacteria and Proteobacteria populations. Actinobacteria were also present at low quantities (1.5%), but unchanged by diet. *Clostridium*, *Fusobacterium*, and *Bacteroides* were predominant bacterial genera in all dogs. Dogs fed raw meat-based diets had greater ($P \leq 0.05$) *Fusobacterium* (25.6 vs. 14.8%), but lower ($P \leq 0.05$) *Fecalibacterium* (0.3 vs. 9.7%), *Lactobacillus* (0.02 vs. 8.9%), *Prevotella* (0.2 vs. 8.8%), *Eubacterium* (1.4 vs. 2.8%), and *Enterococcus* (0.2 vs. 1.2%) populations as compared with dogs fed the extruded diet. Although gastrointestinal distress was not observed in dogs fed raw meat-based diets, the dietary changes resulted in great shifts in fecal microbiota. Future studies are required to determine

whether dietary macronutrient composition or form of diet resulted in such changes, and how they may affect long-term health.

Key words: gut microbiota, raw diets, pyrosequencing

T58 Processing techniques to maintain low glycemic index of peas. J. Fouhse*[1], J. Adolphe[2], L. Weber[2], and M. Drew[1], *[1]University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]Western College of Veterinary Medicine, Saskatoon, Saskatchewan, Canada.*

Peas have a low glycemic index (GI) due to their low content of rapidly digestible starch (RDS) and high content of slowly digestible (SDS) and resistant starch (RS) fractions. Low GI foods are thought to protect against cardiovascular disease, diabetes and obesity thus, the use of peas as a starch source in dog foods may improve the health of dogs. However, peas intended for canine diets require processing to increase palatability and digestibility, which may affect the GI of peas. An experiment was performed to determine the effect of extrusion processing on pea starch fractions RDS, SDS and RS. The trial used a completely randomized 2 × 2 × 2 × 2 factorial design with 2 levels of temperature (110 vs. 150°C), moisture (20 vs. 28%), particle size (288 vs. 407μm) and cooling method (freezing vs. drying). Extrudates were analyzed for their RDS, SDS and RS contents. Particle size significantly affected RS and RDS portions ($P < 0.05$). There was a significant negative correlation between particle size and RDS and SDS fractions ($P < 0.05$) and a trend toward particle size being positively correlated with RS content ($P = 0.059$). RDS was also positively correlated with temperature ($P < 0.05$). Subsequently, 4 of the 16 extruded pea treatments were selected for the measurement of GI in beagles (n = 6): 1) 150°C, 288 μm, 20% H_2O, dried; 2) 110°C, 288 μm 20% H_2O, dried; 3) 150°C, 407 μm 28% H_2O, frozen; 4) 110°C, 407 μm, 28% H_2O, frozen. All test diets were fed in amounts that provided 10g of available carbohydrate. A 20% glucose solution was used as a control. There was no relationship between GI and particle size, moisture content or cooling rate ($P < 0.05$). However, GI was negatively correlated with temperature ($P < 0.05$). These results suggest that in vitro starch fractions are not good predictors of GI in dogs. However, starch fractions and GI may be manipulated by controlling processing temperature. Further studies are needed to determine the effect of multiple temperatures on the GI of various starch fractions.

Key words: glycemic index, pea starch, extrusion

T59 Acute effects of carbohydrates in dogs. J. L. Adolphe*[1], J. M. Fouhse[2], M. D. Drew[2], and L. P. Weber[1], *[1]Department of Veterinary Biomedical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, [2]Department of Animal and Poultry Science, College of Agriculture and Bioresources, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.*

In humans, diets containing low glycemic index (GI) carbohydrate sources appear to be protective against cardiovascular disease, diabetes and obesity. However, the effect of carbohydrates on health in dogs is poorly characterized. The purpose of this research was to examine the acute effect that high and low glycemic ingredients and dog foods have on glycemic, insulinemic and cardiovascular responses in dogs. Laboratory beagles (n = 6–7) were used in 2 crossover experiments. First, the GI of 4 carbohydrate sources (corn, barley, rice and peas) was determined. Second, the GI was determined for 2 extruded dog diets containing either a high or low GI carbohydrate source. A glucose solution was used as the control food and foods were fed in amounts that provided 10 g available carbohydrate. Flow-mediated dilation (FMD), a measure of endothelial function and predictor of cardiovascular health, was performed before and 60 min after feeding. The mean GI (±SEM) of the carbohydrate sources were: peas 29 ± 5; corn 47 ± 10; barley 51 ± 7; and rice 55 ± 6. Thus, the peas (lowest GI) and rice (highest GI) were used as the carbohydrate source to formulate the extruded diets in experiment 2. The GI for the extruded pea and rice diets were 46 ± 7 and 63 ± 9, respectively. The area under the insulin response curve was significantly higher for the glucose compared with the carbohydrate sources or extruded diets, but no difference was observed between the carbohydrate sources or diets. FMD did not differ between the carbohydrate sources or diets, but was lowest 60 min after feeding glucose in both experiments. A negative correlation between FMD and serum glucose was found 60 min after feeding the carbohydrate sources ($r = -0.3$; $P = 0.02$), but not for extruded diets ($r = -0.08$; $P = 0.6$). In both studies, peas resulted in a decreased glycemic response. However, once formulated into an extruded dog food, the GI of the peas and rice increased suggesting that the properties of the carbohydrate source were altered due to the presence of other ingredients and/or extrusion. Future studies are needed to determine if the lower GI pea diet offers health benefits in the long-term.

Key words: glycemic index, cardiovascular, flow-mediated dilation

T60 Effects of protease enzyme on diets for growing mink (*Mustela vison*). E. S. Dierenfeld*[1], E. Keith[1], R. Johnson[2], C. Falco[2], B. Roeder[3], and N. Odetallah[1], *[1]Novus International, Inc., St. Charles, MO, [2]FBAC, Sandy, UT, [3]Brigham Young University, Provo, UT.*

Enhanced protein digestion/diet utilization through the use of exogenous enzymes was investigated for application to commercial mink production. A preliminary in vitro study was conducted to determine effects of time (0, 2, 3 or 4 h), temperature (23°, 30°, 35° or 40°C), and enzyme inclusion (0, 0.05% or 0.1%) upon diet matrix viscosity to mimic practical handling/storage/ranch conditions associated with bulk diet preparation, transport to feeding sites, and environmental temperatures of feed on cages. Healthy growing mink kits (n = 24) were assigned randomly to one of 4 diet treatments with 6 replicates. Animals were housed individually in metabolism cages, acclimated for 2 wk and fed a blended diet (150 −230 g) twice daily, with water available ad libitum. Diets were identical with the exception of protease enzyme (CIBENZA DP100) added at 0 (Control), 0.05, 0.1 or 0.2% (wt/wt). Apparent digestibility (D_a) was measured over a 5-da trial using Cr_2O_3 (0.1%) as a marker; daily feed intake and weekly BW were recorded. Kits fed diets containing 0.1% enzyme gained more weight (76 g; $P = 0.11$), demonstrated higher ADG (41 vs. 30 g/d), and consumed less food (20 g/d) than controls, resulting in improved F:G ratios (9 vs. 13; $P = 0.05$). Additionally, they tended toward higher DM digestibility (85.5 vs. 83%; $P = 0.11$) and improved crude protein D_a. Inclusion of 0.1% protease thus resulted in improved utilization of practical diets for growing mink. In the laboratory studies, time ($P < 0.001$) and enzyme concentration ($P < 0.05$, for all temperatures except 35°C) had significant impacts on diet matrix consistency. Direction of change was temperature dependent, suggesting varying protein fractions may have been affected at different temperatures. For minimal effects upon physical characteristics of mink diet containing exogenous CIBENZA DP100, maintain long-term storage at ≤ 4°C, and when feeding, ensure diet is kept at ≤ 30°C for no longer than 2–3 h before consumption.

Key words: mink, protease enzyme

T61 Influence of feeding a fish oil containing diet to mature overweight dogs: Effects on lipid and protein metabolism, postprandial glycemia, and body weight. M. R. C. de Godoy*, K. R. McLeod, and D. L. Harmon, *University of Kentucky, Lexington.*

The aim of this study was to assess the mechanism by which fish oil may alter lipid and protein metabolism, postprandial glycemia, and body weight in mature overweight dogs. Seven female dogs were randomly assigned to 1 of 2 isonitrogenous and isocaloric diets, control (CO) or 2% fish oil (FO), in a crossover design. Experimental periods were 69 d, separated by a wash out period of 30 d. At the beginning of the experiment, and at 30 and at 60 d of feeding the experimental diets, the dogs were infused with D-glucose (2 g/kg body weight) through the intravenous catheter. Blood samples were collected for 3h to perform a glucose tolerance test. Nitrogen balance began at 0700 on d 63 of each experimental period, and ended at 0700 on d 69. On d 66 of each period a single dose (7.5 mg/kg) of ^{15}N-glycine was administered orally to each dog via a gelatin capsule. From d 66 at 0700 through d 69 at 0700 an additional 25% of acidified urine from each dog was separated, composited and frozen for later analysis for ^{15}N enrichment and determination of protein turnover. Incremental area under the curve and glucose concentration at peak did not differ between treatments or overtime within treatment. Glucose clearance from plasma was increased ($P < 0.05$) in the FO treatment on d 30 when compared with baseline (d 0). β-Hydroxybutyrate, NEFA and triglycerides did not differ within or between treatments. Cholesterol decreased ($P < 0.05$) on the FO treatment on d 30, d 60 and d 69 when compared with d 0, as well as on d 60 when compared with d 30 of the same dietary treatment. High density lipoprotein (HDL) decreased in the FO treatment on d 69 when compared with d0. Body weight, food intake, fecal excretion, dry matter and nitrogen digestibilities, nitrogen balance, as well as protein turnover were not different between diets. Overall, the FO diet improved the rate glucose tissue uptake and decreased cholesterol and HDL concentrations in mature overweight dogs.

Key words: dog, fish oil, postprandial glycemia

T62 Influence of feeding a fish oil containing diet to adult lean dogs: Effects on lipid and protein metabolism, postprandial glycemia, and body weight. M. R. C. de Godoy*, C. E. Conway, K. R. McLeod, and D. L. Harmon, *University of Kentucky, Lexington.*

The aim of this study was to assess the mechanism by which fish oil may alter lipid and protein metabolism, postprandial glycemia, and body weight in lean adult dogs. Eight female Beagles were randomly assigned to 1 of 2 isonitrogenous and isocaloric diets, control (CO) or 2% fish oil (FO), in a crossover design. Experimental periods were 69 d in length, separated by a wash out period of 30 d. At the beginning of the experiment, and at 30 and at 60 d of feeding the experimental diets, a baseline blood sample was collected and the dogs were, subsequently, fed their daily ration. Postprandial blood samples were collected for 3h to perform a glycemic response. Nitrogen balance began at 0700 on d 63 of each experimental period, and ended at 0700 on d 69. On d 66 of each period a single dose (7.5 mg/kg) of ^{15}N-glycine was administered orally to each dog via a gelatin capsule. From d 66 at 0700 through d 69 at 0700 an additional 25% of acidified urine from each dog was separated, composited and frozen for later analysis for ^{15}N enrichment and determination of protein turnover. Incremental area under the curve and glucose concentration at peak did not differ between treatments or overtime within treatment. Triglycerides were increased ($P < 0.05$) in both dietary treatments on d 69 when compared with baseline (d 0). Cholesterol was increased ($P < 0.05$) on the CO treatment on d 69 when compared with d 0. Body weight and food intake did not differ between dietary treatments. Dry matter digestibility was decreased ($P < 0.05$) and fat digestibility tended ($P < 0.10$) to decrease in the FO treatment. Nitrogen digestibility and balance, as well as protein turnover were not different between dietary treatments. Overall, feeding a FO containing diet did not appear to improve protein and lipid metabolism, and postprandial glycemia in adult lean dogs.

Key words: dog, fish oil, postprandial glycemia

T63 In vivo and in vitro procedures for measuring coat quality after dietary manipulation in dogs. G. González-Ortiz[1], L. Castillejos*[1], R. Franco-Rosselló[1], J. J. Mallo[3], J. Alcañiz[3], M. A. Calvo[2], and M. D. Baucells[1], *[1]Nutrition and Welfare Service, Department of Animal and Food Science (UAB), Bellaterra, Spain, [2]Departament de Sanitat i d'Anatomia Animals (UAB), Bellaterra, Spain, [3]Norel, S.A., Spain.*

A standardized methodology, noninvasive and practical procedure to asses coat quality in companion animals has not been described in the literature. Beneficial effects of probiotic supplementation on animal and human health have been reported. The objective was to determine whether probiotic supplementation could improve coat quality in healthy dogs using noninvasive procedures. Sixteen beagles were divided in 2 groups of 8 dogs: control (T1) and treatment (T2) supplied with 1 g/kg of ingested food of a mixture of *Bacillus amyloliquefaciens* CECT 5940 and *Enterococcus faecium* CECT4515 (5×10^8 cfu/g each strarin) from Norel S.A. Procedures were carried out after the supplementation period (D1) of 39 d and after 56 d of non probiotic supplementation (D2). Each animal was evaluated by 4 trained observers who recorded different scored parameters (visual brightness, softness and optimum coat feel). These scores resulted in a final hair condition score (HCS) between 3 (less valued) and 7 (more valued). Colorimetry was used for measuring light intensity (L*) in the parietal area by MiniScan 45/0 Lav of HunterLab. Hair samples were taken to perform an in vitro challenge. The ability of Microsporum canis to degrade hair's structure and develop drilling organs was used as resistance or susceptibility indicator. Data was analyzed using the MIXED procedure of SAS. On D1, T1 and T2 had similar HCS (5.34 vs. 5.36). T2 showed lower HCS in D2 than D1 ($P = 0.02$) whereas no differences were found in T1. Concerning L*, the interaction of the main factors was statistically significant ($P = 0.047$). T2 showed greater L* in D1 than D2 (39.19 vs. 36.83 ± 1.873; $P = 0.054$). However, L* values in T1 were not different between days. No drilling organs were observed in T2 on D1, but on D2 they were detected in half of T2 samples. However, T1 showed drilling organs in both sampling periods. Data suggest differences in the coat quality after the nonprobiotic supplementation period. The combination of hair condition score, colorimetry and in vitro hair culture could be used to evaluate changes on hair quality in dogs related to dietary manipulation.

Key words: dogs, hair quality, probiotic

T64 Evaluation of a mixture of *Bacillus amyloliquefaciens* CECT 5940 and *Enterococcus faecium* CECT4515 in adult healthy dogs. G. González-Ortiz[1], L. Castillejos*[1], J. J. Mallo[3], J. Alcañiz[3], M. A. Calvo[2], and M. D. Baucells[1], *[1]Nutrition and Welfare Service, Department of Animal and Food Science (UAB), Bellaterra, Spain, [2]Departament de Sanitat i d'Anatomia Animals (UAB), Bellaterra, Spain, [3]Norel, S.A., Spain.*

Probiotic supplementation has demonstrated beneficial effects such as reestablishment of unbalanced intestinal microbiota, enhanced resistance to colonization by enteropathogens and improving intestinal barrier, among others. The objective of this study was to evaluate the potential effect of a mixture of 2 probiotic strains (*Bacillus amyloliquefaciens* CECT 5940 and *Enterococcus faecium* CECT 4515 at 5×10^8 cfu/g each strain) in adult healthy dogs. Sixteen beagles (8 males and 8 females; between 1 and 7 years of age) housed at the UAB facilities were used. Animals were divided into 2 groups of 8 dogs: control (T1) and treatment (T2) group received daily 1 g of probiotic mixture per kg of the same dry diet for 39 consecutive days. Daily food consumption, weekly body weight and body condition score and fecal score (3 times a week) were assessed as health indicators. Fresh fecal samples were collected on d 1, last day of supplementation period (d 39) and after a withdrawal period of 6 d (d 45). By means of conventional plating methods, total aerobic mesophilic bacteria, *Enterobacteriaceae* spp., *Escherichia coli*, *Clostridium perfringens*, lactic acid bacteria and the 2 probiotic strains were analyzed. Fecal pH was determined. Total fecal samples were collected during 6 d to perform a digestibility trial during the supplementation period according to FEDIAF (2008). Differences were tested by PROC MIXED (SAS, 2002). The 2 probiotic strains were recovered after the supplementation period from fresh fecal samples, but not after the withdrawal period. No statistical differences were detected in any health indicators measured or in digestibility coefficients. No statistical differences were found in microbiota analyzed. However, C. perfringens counts were significantly reduced in T2 after the supplementation period (5.64 vs. 2.94 ± 0.53 log cfu/g feces; $P < 0.0001$). Bacterial counts were in the same range as baseline after the withdrawal period and no differences were detected in fecal pH. The use of probiotics could stabilize dog fecal microbiota, by decreasing pathogenic populations.

Key words: dogs, microbiota, probiotic

T65 Effect of increasing levels of mannoprotein in humoral immunity in dogs. A. F. Chizzotti*, F. M. O. B. Saad, F. S. Ebina, R. C. Silva, J. S. R. Reis, and M. C. Kadri, *Universidade Federal de Lavras, Lavras, MG, Brazil.*

The advances of health sciences have provided a deeper understanding of cellular and molecular mechanisms for normal and abnormal physiological states. At the same time, the relationship between nutrition and health has been studied through the discovery of nutrients and non-nutrients capable of interfering in the pathological process. Nutraceuticals can improve organism functions and some are used as immunomodulators. Nutrients denominated immunonutrients or immunomodulators, such as mannoprotein, obtained from external cell wall of *Saccharomyces cerevisiae*, have shown the ability to preserve the intestinal mucus integrity, improving the immunological response. The aim of this study was to evaluate the effect of increasing levels of fractions of mannoprotein in dog's immune system. This study was conducted at the Department of Animal Science of Federal University of Lavras, Brazil. Twenty-four adult Beagle dogs were randomly assigned to 4 treatments: commercial diet (control) and control plus 300, 600, 900 ppm of fractions of mannoprotein, on dry matter basis. Diets were formulated according to NCR (2006) recommendations, and mannoprotein were added to the diets in capsules. Diets were fed for 37 d. Blood samples were collected from jugular vein on d 0, 10, 23 and 35 in a syringe and were centrifuged to obtain serum which was kept refrigerated until clinical analysis. The blood assessments included complete blood count, quantification of antibodies against leishmaniasis, immunoglobulin IgA, IgG and IgM concentrations, platelets, fibrinogen and C-reactive protein. The animals were exposed to antigen challenge by vaccination against leishmaniasis on d 7. Data were analyzed as repeated measurements in time using PROC MIXED of SAS 9.1. No treatment differences were detected over all variables measured ($P > 0.05$). The use of mannoprotein fractions up to 900 ppm in the diet did not influence humoral immunity of dogs.

Key words: immunonutrients, nutraceuticals, canines

T66 Effect of dietary starch level on protein metabolism in domestic cats. T. J. Wester*[1], K. Weidgraaf[1], M. Hekman[1], N. J. Cave[2], and M. H. Tavendale[3], *[1]Institute of Food, Nutrition and Human Health, Massey University, Palmerston North, New Zealand, [2]Institute of Veterinary, Animal and Biomedical Sciences, Palmerston North, New Zealand, [3]AgResearch Ltd., Palmerston North, New Zealand.*

Cats evolved eating meat-based diets high in protein and very low in carbohydrates and consequently have high AA requirements and high obligate AA catabolism. Cats must also use AA to produce glucose when dietary carbohydrate is limited. Metabolism may be affected at low protein intake when there is a conflict between AA use for protein synthesis and gluconeogenesis. This study was undertaken to test whether protein utilization in cats would be enhanced if glucose, from dietary starch, is used to replace gluconeogenesis from protein. Adult cats (n = 12) were allocated to either low or high starch diets (0 or 25% starch as-fed) with 15% ME as CP. Diets were fed at maintenance for 3 wk, and then cats were fitted with saphenous and cephalic vein catheters. On the following day, they received primed continuous infusions of [^{13}C]bicarbonate, [1-^{13}C]Leu, and [$^{15}N_2$]urea and [6,6-d_2]glucose from 0 to 120, 120 to 480, and 0 to 480 min, respectively. Cats were fed hourly during infusion and Leu entry rate from diet was calculated. Breath was sampled at 0, 100, 110, 120, 440, 460, and 480 min to measure $^{13}CO2$, with blood sampled at 0, 440, 460, and 480 min to measure ^{13}C enrichments in Leu and ketoisocaproate, and urea and glucose fluxes. There were no differences between treatments for non-oxidative Leu disposal (NOLD, an indicator of protein synthesis), Leu rate of appearance in plasma (Ra, an indicator of protein degradation), and Leu oxidation (Table 1). However, Leu flux and urea production rate (an indicator of net protein catabolism) tended to be lower ($P < 0.1$) in cats fed 25% starch diets indicating that protein utilization for anabolism may be more efficient in cats fed starch.

Table 1.

	Diet (% starch as fed)			
	0	25	SEM	P <
Leu flux, μmol/(kg•h)	243.8	207.6	12.85	0.07
Leu NOLD, μmol/(kg•h)	150.4	129.7	12.67	0.28
Leu Ra, μmol/(kg•h)	157.1	126.1	13.19	0.13
Leu oxidation, μmol/(kg•h)	93.5	77.9	11.82	0.37
Urea production, μmol/(kg•h)	519.0	396.8	46.56	0.09
Glucose flux, μmol/(kg•h)	1,065.3	1920.7	103.74	0.001

Key words: feline nutrition, protein metabolism, urea flux

T67 Effect of glucose infusion and dietary protein level on urea production in the domestic cat. T. J. Wester*[1], K. Weidgraaf[1], M. Hekman[1], N. J. Cave[2], and M. H. Tavendale[3], *[1]Institute of Food, Nutrition and Human Health, Massey University, Palmerston North, New Zealand, [2]Institute of Veterinary, Animal and Biomedical Sci-*

ences, Palmerston North, New Zealand, [3]AgResearch Ltd., Palmerston North, New Zealand.

Cats are unique among domestic animals as they are obligate carnivores that have evolved eating diets high in protein and very low in carbohydrate. As a carnivore eating a meat-based diet, cats are reliant on gluconeogenesis from protein to meet their glucose requirement even when protein intake is low or at the requirement (15% ME as CP). This study was undertaken to examine the effect of glucose infusion on AA catabolism in cats fed at and above their protein requirement. Our hypothesis was that once the glucose requirement was met by endogenous administration, urea production would reach a minimum. Adult cats (n = 18) were allocated to one of 3 very low carbohydrate diets with 15, 45 or 65% ME intake as CP and fed at maintenance for 3 wk. Cats were then fitted with saphanous and cephalic vein catheters and fasted overnight. The following day they received a primed continuous infusion of [$^{15}N_2$]urea from 0 to 720 min. Starting at 120 min, glucose was continuously infused into the cephalic vein at 0, 0.75, 1.5, 4.0, and 8.0 mg/kg•min for 2 h at each level. Blood was sampled in the last 30 min of each level of glucose infusion. Urea production rate increased with increasing dietary protein ($P < 0.001$), but decreased as glucose level increased only at 45 and 65% ME as CP ($P < 0.001$; Table 1). This drop in urea production as rate of glucose infusion increased was greater at 65 vs. 45% CP as ME ($P < 0.001$). When dietary protein was supplied at its requirement, AA catabolism was low and not affected by glucose infusion. The minimum level of urea produced when glucose was supplied in cats fed 15% ME as CP may represent obligate AA catabolism.

Table 1. Urea production (μmol/kg•h) in cats fed diets containing varying levels of ME intake as CP

Glucose infusion, mg/kg•min	Diet (% ME as CP)		
	15	45	65
0	32.60	466.2	598.8
0.75	325.74	439.8	556.2
1.5	315.56	418.2	510.6
4.0	302.90	401.4	473.4
8.0	307.74	394.2	447.0

Fixed effects of protein level, glucose infusion, and protein×glucose were significant ($P < 0.001$; SEM = 25.08).

Key words: feline nutrition, protein metabolism, urea flux