postweaning or over the entire experiment due to treatment. Calves fed flavoured starter were more efficient in converting diet DM to gain than calves fed unflavoured starter during the preweaning phase. These findings demonstrate that supplementing starter with vanilla as a flavour agent is advantageous to calf performance.

Table 1

	Diet [1]			
Item	UF starter	F starter	SEM [2]	P
Starter DMI (kg)				
Preweaning	0.40	0.44	0.010	0.03
Postweaning	2.12	2.25	0.121	NS[3]
Overall	1.05	1.25	0.082	0.02
ADG (kg)				
Preweaning	0.33	0.40	0.02	0.01
Postweaning	0.86	0.92	0.03	NS
Overall	0.44	0.47	0.02	NS
Feed efficiency [4]				
Preweaning	0.38	0.43	0.02	0.04
Postweaning	0.40	0.41	0.02	NS
Overall	0.34	0.31	0.02	NS

[1]UF, unflavoured and F, flavoured starter, [2]SEM – standard error of the means, [3]NS- non significant, [4]Ratio of ADG (kg) to DMI (starter and milk) (kg)

Key Words: calf, vanilla, weaning age

W232 Flavor effects on feed intake and performance of calves. C. Montoro*[1], I. Ipharraguerre[2], and A. Bach[1,3], [1]*IRTA-Ruminant Production, Caldes de Montbui, Spain*, [2]*LUCTA S.A., Barcelona, Spain*, [3]*ICREA, Barcelona, Spain*.

An experiment was conducted to determine whether calves can be encouraged to increase consumption of dry feed by association of oronasal cues (flavor) elicited by the milk replacer (MR) with those produced by the starter. Forty-three calves (initial BW=51.3±0.63 kg, age=23±1.2 d) participated in this study. All calves were weaned 6 wk after the beginning of the study, which was continued until 2 wk after weaning. Twenty-two calves received a MR treated with a novel flavor and the other 21 calves consumed the same MR but unflavored. Until the preweaning week (wk 4) all calves were fed the same unflavored starter. During the preweaning week (wk 5), within each MR group, half of the calves were fed a pelleted starter treated with the same flavor used in the MR, whereas the remaining calves were offered the same starter but unflavored following a 2x2 factorial design. Starter and MR consumption was registered daily, and BW was determined weekly. Overall, starter intake (as a percentage of BW) was not affected by flavor addition. However, the increase of starter consumption expressed as the percentage of starter intake with respect to average consumption the week before preweaning, was numerically greater when the flavored starter was offered (regardless of the MR treatment). Furthermore, when calves were classified in 4 groups according to the preweaning level of starter consumption, calves in the lowest consumption category consumed (as a % of BW) more ($P < 0.05$) dry feed when fed the flavored starter compared with the unflavored control. As a result, feeding the flavored starter numerically reduced the coefficient of variation of BW gain from 34.4 to 13.7% from preweaning to the end of the study. Results suggest that flavoring calf starters may improve feed intake of calves with a poor drive to consume dry feed, potentially reducing thereby variability in BW gain.

Key Words: aroma, palatability, choice

W233 Development of an animal model to evaluate oro-sensorial preferences in weaned calves. C. Montoro*[1], F. Boe[1], I. Ipharraguerre[2], and A. Bach[1,3], [1]*IRTA-Ruminant Production, Caldes de Montbui, Spain*, [2]*Lucta S.A., Barcelona, Spain*, [3]*ICREA, Barcelona, Spain*.

A series of experiments were conducted to develop an animal model to evaluate oro-sensorial preferences in weaned calves. First, the feeding pattern of 35 calves (65±0.7 d of age) was monitored over 24 h every 60 min to define the optimum moment to conduct the assays. Results indicated that the best time to initiate a preference test would be around 0800. This is because at that time calves showed moderate hunger, allowing thereby detecting differences in oro-sensorial preferences that otherwise would be blunted by excessive or deficient feed consumption. Subsequently, a double-choice model involving 30 naive calves (65±0.7 d of age) was used to assess the capacity of animals to discern between a control diet and the same diet sweetened with 10% sucrose. Feed intake was monitored every 30 min during 6 h. The diet supplemented with 10% sugar was preferred when compared with the unsweetened control ($P<0.001$). The model was able to detect differences in oro-sensorial preferences when 10 calves were randomly removed from the dataset, and even when only the first 30 min of feed consumption were considered in the analysis. In a subsequent experiment, the model was evaluated using 30 calves (65±0.9 d of age) and novel feeds. All calves were simultaneously offered a choice of ground corn or barley, and feed consumption was registered over 6 h every 30 min. Using this model allowed to find significant differences when intake data from only the first 3 h were considered. Randomly removing 10 animals from the dataset did not change the statistical power of the model, but in this case using data from the first 5 h was required because of the low feed consumption during the initial hours of the study. It is concluded that a double-choice model consisting on offering 2 options of feed ad libitum to a minimum of 20 naive weaned calves while measuring feed consumption every 30 min for 6 h represents an effective approach to evaluate oro-sensorial preferences in calves.

Key Words: palatability, taste, model

Ruminant Nutrition: Dairy Heifers

W234 Pre- and post weaning performance and health of heifer calves fed different levels of bovine spray dried animal plasma in a traditional milk replacer program. S. Hayes*[1], D. Carlson[2], D. Ziegler[3], M. Raeth-Knight[4], G. Golombeski[4], B. Ziegler[5], R. Larson[5], J. Linn[4], and H. Chester-Jones[3], [1]*APC, Inc., Ankeny, IA*, [2]*Milk Products, Chilton, WI*, [3]*University of Minnesota Southern Research and Outreach Center, Waseca*, [4]*University of Minnesota, St. Paul*, [5]*Hubbard Feeds, Inc., Mankato, MN*.

Holstein heifer calves (n = 120; 2 to 4 d of age; 40.4 kg ± 0.68 kg) were randomly assigned to 1 of 4 different milk replacers (MR; 20% protein, 20% fat) in November 2007 to develop feeding programs that targeted the use of spray-dried animal plasma (SDP) in MR. Calves were

housed in 2.29 x 1.17 m individual calf pens within a frame-steel curtain side-wall naturally ventilated barn. Treatments (Trt) were:- 1) All-milk (AM) protein medicated MR fed at 0.284 kg in 1.99 L water (12.5% solids) 2X daily for the first 35 d and 1X daily from d 36 to weaning at 42 d (CON); 2) Medicated MR with 4% inclusion of SDP fed as in Trt 1 (SDP4); 3) Medicated MR with 8% inclusion of SDP fed as in Trt 1 (SDP8); 4) Same as Trt 3 with additional amino acids (SDP8AA). Calves were fed an 18% CP (as-fed) texturized calf starter and had access to fresh water. Total DMI from MR averaged 22.9 kg. Average daily gain (ADG) pre-weaning (0.56 kg/d), ADG post weaning (0.99 kg), total d 1 to 56 (0.67 kg/d) and hip height gain (9.9 cm) were not affected ($P > 0.05$) by MR program. Pre-weaning and total calf starter dry matter intake were 21 and 12.2% greater ($P < 0.05$), respectively, for SDP8AA calves vs. those fed the other MR programs. Calves fed SDP8 had 4.2% greater feed efficiency ($P < 0.04$) than those fed SDP8AA but similar to calves on other MR programs. There were no Trt differences in health parameters. Under the conditions of this study, inclusion of 4 or 8% SDP in a 20:20 milk replacer resulted in similar calf performance and health to those fed an all-milk protein milk replacer. The addition of amino acids to milk replacer formulated with 8% SDP increased starter intake but not calf growth.

Key Words: dairy calves, milk replacer, animal plasma level

W235 Performance and health of post weaned Holstein heifer calves from 9 to 25 weeks of age fed grain mixes containing varying levels of bovine spray dried plasma protein during the initial transition to group pens. H. Chester-Jones*[1], S. Hayes[2], R. Larson[3], B. Ziegler[3], D. Ziegler[1], M. Raeth-Knight[4], G. Golombeski[4], and J. Linn[4], [1]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [2]*APC, Inc.*, *Ankeny, IA*, [3]*Hubbard Feeds, Inc.*, *Mankato, MN*, [4]*University of Minnesota*, *St. Paul*.

Ninety-six heifer calves (85.1 ± 1.56 kg BW) were used in a 112-d study to evaluate feed intake and performance from 9 to 25 wk of age. Heifers were randomly assigned to 1 of 4 diets among 4 replicated pens/treatment (6 heifers/pen). Treatments were:-1) 16% CP pelleted grain mix fed free-choice (FC) d 1 to 7 and limit-fed (LF) 2.72 kg/d d 8 to 28 with FC hay (CON); 2) 16% CP pelleted grain mix containing 5.5 g/kg spray-dried plasma protein fed as described for CON (SDP2); 3) 16% CP pelleted grain mix containing 11 g/kg spray-dried plasma protein fed as described for CON (SDP3); 4) 16% CP pelleted grain mix containing 16.5 g/kg spray-dried plasma protein fed as described for CON (SDP4). From d 29 to 112 heifers were fed a common diet of 16% CP whole corn and pellet mix at 2.72 kg/d d 29 to 56 and 2.27 kg/d d 57 to 112 with FC hay. Daily gain d 1 to 28 was higher ($P < 0.05$) for heifers fed CON and SDP2 vs. those fed SDP4 with SDP3 heifers being intermediate. Total DMI d 1 to 28 was higher ($P = 0.04$) for CON heifers than the other heifer groups due to higher ($P = 0.03$) hay intake but this was not reflected in feed/gain differences. There were no heifer performance differences d 29 to 112 and overall d 1 to 112. Overall daily gain, DMI and feed/gain averaged 1.08, 4.29 and 4.07 kg, respectively. Under the conditions of this study, offering a complete pellet grain mix that contained spray-dried plasma protein (5.5, 11, or 16.5 g/kg) did not enhance heifer performance during the initial 28 d transition period to group pens when compared to a grain mix without supplemental plasma protein. There were no overall effects on heifer performance and health from the diets fed.

Key Words: dairy heifers, grain mixes, performance

W236 Performance of post weaned Holstein heifer calves fed limit or free-choice pelleted grain mixes with two differing fiber levels along with free-choice hay. D. Ziegler*[1], R. Larson[2], B. Ziegler[2], M. Raeth-Knight[3], G. Golombeski[3], H. Chester-Jones[1], and J. Linn[3], [1]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [2]*Hubbard Feeds, Inc.*, *Mankato, MN*, [3]*University of Minnesota*, *St. Paul*.

Ninety-six heifer calves (85.5 ± 1.73 kg BW) were used in a 112-d study to evaluate feed intake and performance from 9 to 25 wk of-age. Heifers were randomly assigned to 1 of 4 diets among 4 replicated pens/treatment (6 heifers/pen). Treatments (Trt) were:- 1) 16% CP (as-fed) grain mix (66.25% cracked corn, 32.5% pellet, 1.25% tallow) fed at 2.72 kg/d for 28 d and 2.27 kg/d from d 29 to 112 with free-choice (FC) hay (CON); 2) 16% CP high fiber (19.9% ADF; 37.8% NDF, DM basis) pelleted grain mix limit-fed as CON with FC hay (LFHF); 3) High fiber pelleted grain mix as in Trt 2 fed FC with FC hay for 84 d and then switched to CON with FC hay from d 85 to 112 (FCHF); 4) Medium fiber (11.1% ADF; 32.5% NDF, DM basis) pelleted grain mix fed for 84 d as Trt 3 and switched to CON d 85 to 112 (FCMF). Daily gain d 1 to 84 was the highest ($P < 0.05$) for heifers fed FCHF (1.16 kg/d) vs. other heifers groups (0.95 kg/d), which were similar. Grain and hay intake d 1 to 84 averaged 2.18, 1.73; 2.18, 1.64; 3.96, 0.64; 3.64 and 0.59 kg for heifers fed CON, LFHF, FCHF and FCMF diets, respectively. Overall 112 d average daily gain (1.10 kg) and hip height gain (22.1 cm) were the highest ($P < 0.05$) for FCHF heifers with the other heifer groups being similar (av. 0.93 kg and 18.9 cm). Total DMI expressed as a percentage of body weight was the lowest ($P < 0.05$) for CON and LFHF heifers d 1 to 84 and FCHF heifers d 85 to 112. There were no overall differences in feed/gain. Under the conditions of this study, feeding FC hay with FCHF pellet mix resulted in gain and growth advantages when compared to heifers fed FCMF, LFHF or CON for 84 days without excessive body condition. This advantage was maintained from d 85 to 112 when heifers were on a common diet.

Key Words: dairy heifers, grain mixes, fiber levels

W237 Correlation between future production performance and hepatic gene expression in postpubertal Holstein dairy heifers. J. Doelman*, N. G. Purdie, H. Cao, N. A. Karrow, and J. P. Cant, *University of Guelph*, *Guelph, ON, Canada*.

As the metabolic hub in the ruminant animal, the liver is essential in the assimilation and distribution of nutrients. The objective of this study was to assess the correlation between liver gene expression and both milk yield and milk component production in yearling heifers. One-hundred postpubertal Holstein heifers between 9 and 13 months of age were randomly assigned to a fed or a 24-hour feed withdrawal treatment under a randomized block design. Liver biopsies were taken to obtain RNA for microarray analysis and quantitative RT-PCR analysis. A cDNA microarray consisting of 8800 oligonucleotide inserts was used to identify hepatic transcript profiles. Array elements were selected from a database of bovine ESTs. A reference design was employed to compare Cy-5 labelled RNA from liver to Cy-3 labelled RNA from reference standard (derived from bovine liver, spleen and placenta). Gene Spring analysis software was used for LOWESS normalization procedures and statistical analysis (ANOVA, $P = 0.05$). Sixty-two differentially expressed genes were found using Benjamini and Hochberg's False Discovery Rate ($P = 0.05$). Validation of microarray results was performed on 24 genes using qRT-PCR. Correlation analysis was conducted using those genes identified as differentially expressed by microarray. This analysis revealed moderate positive correlations between 305 DIM milk yield and Apolipoprotein A-IV, Cadherin 2 and Retinoid X Receptor

γ (correlation value 0.27- 0.36) for both the fed and fasted treatments. Similar correlations between 305 DIM milk yield and Fructose 1,6 Bisphosphate, Fatty Acid Binding Protein, Glutathione S-transferase A1, and Aldehyde Dehydrogenase 1 Family (0.22- 0.43) were found in the fasted condition alone; comparable correlations in the fed state include Apolipoprotein A1, Homer 3 Homolog, and Centrosomal Protein 250kDa (0.24- 0.38). Moderate positive correlations were also noted between 305DIM protein yield and Apolipoprotein A1, Cadherin 2 and Retinoid X Receptor γ (0.24- 0.34) for both treatments.

Key Words: heifer, gene expression, correlation

W238 High protein level in the diet to dairy heifers from 10 to 22 months of age reduced milk yield in first lactation. M. Vestergaard*, M. B. Petersen, and K. Sejrsen, *Faculty of Agricultural Sciences, Aarhus University, Tjele, Denmark*.

Many Danish dairy farmers use one total mixed ration (TMR) based on a mixture of grass- and corn silage to all heifers. Thus, the heifers above one year of age receive a surplus of protein compared to the Danish recommendations. Our hypothesis was that high (H, +15% of N) compared to the recommended (N) protein level would not affect growth rate (ADG), reproduction and energy-corrected milk yield (ECM). A total of 145 heifers; 51 Red Danish (RD), 57 Holstein (HF) and 37 Jersey (DJ) loose-housed in pens of 6 or 8 started the experiment at 10.5 mo of age. Heifers were double-weighed at birth, and at 10.5, 15 and 22 mo. ADG from birth to 10.5 mo was 810 (RD and HF) and 580 g/d (DJ). TMR was based on whole-crop maize or -barley silage, barley straw and soybean meal. Within a pen, N-and H-heifers had free access to N-TMR and H-TMR, respectively, via transponder-controlled access to the feeding troughs. Crude protein (CP) content was 101-105 and 116-120 g/kg DM for N- and H-TMR, respectively. The fill value of TMRs allowed for an ADG of 750 g/d from 10 to 15 mo and 900 g/d from 15 to 22 mo (e.g., RD and HF). Data was analyzed with a mixed model including treatment, breed, their interaction, and blocks as fixed and animal as random factors and with days or weeks as repeated measures. There was no difference in ADG from 10 to 22 mo (RD and HF: 840±16; DJ: 630±18 g/d), percent pregnant at first service (55%), age (26.4±0.5 mo) and BW at calving (HF: 630, RD: 610, and DJ: 440 kg), and calving ease between N- and H-heifers. The cow-dataset included 105 animals. Days to first service, inseminations per pregnancy (2.5±0.2) and days open (96±6 d) were not different, but a chi-square test revealed lower pregnancy percentage at first service ($P \leq 0.05$) in N- compared to H-heifers. Milk yield was recorded at each milking and milk composition was analyzed twice weekly. ECM to 120 d of lactation was lower in H- compared to N-heifers (25.1 vs. 26.5 kg/d, $P \leq 0.05$), the difference being highest in DJ (2.2 kg) and lowest in HF (0.7 kg). The milk yield effect is surprising and warrants further investigation.

Key Words: replacement heifers, protein, performance

W239 Effects of limit feeding and ionophore supplementation on replacement heifer growth, rumen function and manure excretion. K. A. Kruse*, N. M. Esser, P. C. Hoffman, and D. K. Combs, *University of Wisconsin, Madison*.

Ninety-six Holstein heifers (400 ± 6 kg, 15.2 ± .1 mo) including 9 heifers fit with ruminal cannulae were assigned one of three dietary treatments for 180 ± 8 days in a pen replicated randomized complete block design. Treatment diets included: control (C100) fed ad libitum, (L85) fed at 85% of C100 intake, and (L80+I) fed at 80% of C100 intake containing 325 mg/hd/d of Lasalocid. Diets were formulated to provide isonitrogenous and isocaloric intakes and balanced according to NRC requirements. Treatment diets were fed as a TMR (1x/d) and heifers were evaluated for growth, rumen function, and manure excretion parameters. Heifers fed L85 and L80+I consumed less DM, CP, and NDF when compared to heifers fed C100. Heifers fed C100 had lower ADG and higher feed to gain ratios, and tended to excrete more DM. Heifers fed L80+I retained more N compared to heifers fed L85. No differences were found in pH and NH_3-N between limit and control fed heifers. Lower rumen fill was observed 7-14d post trial in heifers fed L85 and L80+I. Limit feeding increased growth, feed efficiency, tended to decrease DM excretion and reduced rumen fill potential 7-14d post trial. Ionophore supplementation appeared effective in replacing dietary DM and CP in limit feeding programs.

Table 1.

Item	C100	L85	L80+I	SEM	Treatment	C vs L	L80+I vs L85
DMI, kg/d	10.3	8.5	8.1	0.2	0.0001	0.0001	0.18
CP intake, kg/d	1.4	1.3	1.2	0.03	0.02	0.03	0.05
NDF intake, kg/d	5.1	3.1	2.9	0.1	0.0001	0.0001	0.25
ADG, kg/d	0.81	0.96	0.89	0.03	0.03	0.01	0.2
Feed:gain, kg/kg	5.9	4.1	4.2	0.2	0.0001	0.0001	0.74
DM excretion, kg/d	4.3	3.9	3.2	0.4	0.19	0.15	0.24
Apparent N retention[1], g/d	77.1	84.1	96.8	8.7	0.04	0.3	0.04

[1] Does not account for potential N volatilization.

Key Words: limit feeding, growth, heifers

W240 Effect of feeding method on the behavior and growth of dairy heifers. A. M. Greter*[1], K. E. Leslie[2], G. J. Mason[3], B. W. McBride[3], and T. J. DeVries[1], [1]*Department of Animal and Poultry Science, University of Guelph, Kemptville Campus, Kemptville, ON, Canada*, [2]*Department of Population Medicine, Ontario Veterinary College, Guelph, ON, Canada*, [3]*Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada*.

Provision of a TMR to growing heifers promotes a balanced nutrient intake across the day. Alternatively, top-dressed (TD) feeding results in the rapid consumption of concentrate after feeding and increased feed sorting across the day. The objective of this study was to determine the long-term effects of feeding method on the growth, feeding, and sorting behavior of dairy heifers. Thirty-two Holstein heifers (146.2 ± 21.9 d of age; mean ± SD) were divided into 8 groups of 4 and exposed to 1 of 2 dietary treatments for 13 weeks using a completely randomized design. The treatment rations contained 65% grass/alfalfa haylage and 35% textured concentrate (on a DM basis) fed either as a: 1) TMR or 2) TD ration. Group DMI were recorded daily. Feeding behavior was recorded using time-lapse video for 7 d during weeks 1, 5, 9, and 13. Fresh feed and orts were sampled each day of the recording weeks and were subjected to particle size analysis. The particle size separator contained 3 screens (19, 8, and 1.18 mm) and a bottom pan, resulting in 4 fractions (long, medium, short, and fine). Sorting activity for each fraction was calculated as the actual intake expressed as a percentage of the predicted intake. To determine if sorting occurred, each fraction was tested for a difference from 100%. Animals were fecal scored for consistency of stool twice weekly using a scale from 1 (liquid) to 4 (normal). Neither DMI (7.5 kg/d) nor ADG (1.3 kg/d) differed between treatments. Sorting against long particles was greater for the TD ration compared to the TMR (96.0 vs. 98.9%; SE=0.4; *P*=0.002). Daily feeding

time did not differ between treatments (201.0 min/d), but heifers did spend more time at the bunk in the 2 h following feed delivery on the TD ration (50.1 vs. 32.0 min/d; SE=1.3, *P*<0.001). Fecal scores were lower for heifers on the TD ration (2.7 vs. 3.4; SE=0.1; *P*=0.003). Lower fecal scores may reflect altered rumen fermentation on the TD ration from lower effective fiber intake, as result of greater sorting against long particles, and consumption of a large portion of concentrate following feed delivery.

Key Words: heifers, sorting, feeding behavior

W241 Wheat grain eases metabolic transitions in periparturient heifers. F. Ehsanbakhsh, H. Amanlou, D. Zahmatkesh, and A. Nikkhah*, *Zanjan University*, *Zanjan, Iran*.

Wheat grain possesses reasonably synchronous starch and protein fermentation rates, low cation-anion difference, and high palatability. Such prepartal diet properties can reduce the risk of postpartum hepatic lipidosis, hypocalcemia, and subacute rumen acidosis. We determined the effects of feeding WG to prepartum heifers on periparturient metabolic, health, and productive criteria. Fifteen Holstein heifers at 31 ± 6 days prepartum were blocked based on expected calving date and assigned to three treatments. The treatments were totally mixed rations containing either 1) a conventional blend of barley grain and wheat bran (BGW), 2) 10% wheat grain (WG10), or 3) 18% WG (WG18) (DM basis). Prepartum diets contained no anionic salts. Cows were monitored until 21-day postpartum and fed a same early lactation diet. The prepartal WG tended to linearly increase DMI (10.1, 10.6, 10.7 kg/d, P=0.09), reduced urine pH at 7-day prepartum (7.0, 6.7, 6.6; P<0.001), and elevated (P<0.05) blood calcium and glucose at 7-day prepartum (40 vs. 52, 53 mg/dl; 7.5 vs. 8.6 and 9.1 mg/dl) and at 3-day postpartum (30 vs. 39 and 40 mg/dl; 7.5 vs. 8.0 and 8.8 mg/dl). Milk fat (0.98 vs. 1.03 and 1.14 kg/d, P<0.01) and protein (0.89 vs. 1.02 and 1.02, P<0.05) yields increased during 21-day postpartum in heifers receiving prepartal WG10 and WG18 instead of BGW. The prepartal apparent dry matter (59.9 vs. 54.3%, P=0.09) and crude protein (67.7 vs. 60.3%, P=0.05) total tract digestibilities were greater for WG10 than for BGW. Blood albumin, globulins, total proteins and urea were similar among groups. Feeding WG did not affect body condition score, calving difficulty, calf weight and health, placenta weight, and the time interval between calving and placenta expulsion. In conclusion, prepartal WG provision concurrently improved energy and calcium states in transition heifers without compromising parturition status and calf health. These data support our previous findings in mature cows and suggest that novel feeding strategies using most suitable ingredients ease the periparturient metabolic transition even without anionic salts in the diet.

Key Words: wheat, preparturient, heifer

Ruminant Nutrition: Fat Supplementation

W242 Effect of dietary lipids on selected strains of ruminal bacteria. R. B. Potu*[1], A. A. AbuGhazaleh[1], K. L. Jones[1], R. L. Atkinson[1], D. Hastings[1], J. D. Haddock[1], and S. Ibrahim[2], [1]*Southern Illinois University*, *Carbondale*, [2]*North Carolina A&T University*, *Greensboro*.

Previous studies have shown that fish oil (FO) promotes vaccenic acid (VA) accumulation in the rumen by inhibiting the last step of biohydrogenation. The objective of this study was to compare the effects of different lipid sources on DNA concentration of bacteria involved in biohydrogenation. Four continuous culture fermenters were used in a 4 x 4 Latin square design with four periods of 10 d each. Treatment diets (50% alfalfa pellets, 50% concentrate) were fed (45 g/d DM basis) in three equal portions during the day. The diets were 1) control (CON), 2) control + saturated fat (rumofat; SAT), 3) control + soybean oil (SBO), and 4) control + fish oil (FO). Lipid supplements were added at 3% of diet DM. Samples collected at 3 h post feeding on d 10 were used for fatty acids and quantitative PCR analysis. The concentrations (g/100g fatty acids) of VA were similar between the SBO (10.50) and FO (12.72); both were higher (P < 0.10) than the levels for CON (6.71) and SAT (3.64). Concentrations of C18:0 were lowest (P < 0.10) for FO (4.82) compared with the other treatment diets (SAT- 45.46, SBO- 21.14, and CON- 14.61). The concentration of conjugated linoleic acid (cis-9, trans-11 CLA) was highest (P < 0.10) with SBO (0.41) in comparison with the other treatment diets (SAT- 0.04, FO- 0.10, and CON- 0.11). DNA concentrations for total bacteria, *Anaerovibrio lipolytica*, and *Succinivibrio dextrinosolven*s were similar (P > 0.10) for all diets. The concentrations of *Butyrivibrio fibrisolvens* (0.06196 ng/45ng total DNA) and *Ruminococcus albus* (0.00196 ng/45ng total DNA) were lowest (P < 0.10) with FO but were similar among the other treatment diets (SAT- 0.1042; 0.005416, SBO- 0.1212; 0.00571, and CON- 0.1263; 0.00517). In conclusion, SBO and rumofat had no effects on bacterial DNA concentrations tested in this study and FO effects on biohydrogenation may be due in part to its effect on *Butyrivibrio fibrisolvens* and *Ruminococcus albus*.

Key Words: fish oil, trans FA, bacteria

W243 Effects of docosahexaenoic acid and linoleic acid on rumen trans-vacceinc acid and microbe populations. D. Li, J. Q. Wang*, D. P. Bu, K. L. Liu, and P. Yu, *State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences*, *Beijing, China*.

The objective of this study was to determine the influence of dietary refined docosahexaenoic acid and free linoleic acid supplementation on the population of *Anaerovibrio lipolytica, Fibrobacter succinogenes, Ruminococcus flavefaciens, Megasphaera elsdenii* strain YJ-4, *Butyrivibrio fibrisolvens* A38, *Butyrivibrio hungatei* JK684, and *Butyrivibrio hungatei* Su6 in ruminal fluid and the concentration of trans vaccenic acid (TVA) in rumen from lactating cows fed high forage diets (forage to concentrate ratio 60:40). Four lactating cows with ruminal, duodenal and ileal cannulas were randomly assigned into a 4 × 4 Latin square with 21-d periods. These diets included basal diet (control), basal diet with 2.73% refined free linoleic acid (RFLA), 2.73% refined free linoleic acid plus 0.50% refined docosahexaenoic acid (RFLDA), or 0.50% refined docosahexaenoic acid (RFDA) on a DM basis. Rumen samples were obtained via the fistula at 0, 4, 6, 8, 10 and 12 h after morning feeding on the 15th d of each period, respectively. TVA was measured with gas chromatography. DNA was extracted and shift in the microbial populations were monitored by real-time PCR using specific primers. The data were statistically analyzed using the PROC MIXED models of SAS (SAS Institute, 2002). The TVA contents in RFLA, RFLDA and RFDA treatments increased by 3.5-, 5.4- and 1.0-fold compared