

822 Effects of the forage source on feeding behavior and selectivity of dairy cows. G.M. Burato*¹, G. Cozzi¹, F. Gottardo¹, E. Ragno¹, and I. Andrighetto¹, ¹Dipartimento di Scienze Zootecniche, University of Padova, Italy.

The inclusion of a specific forage source in dairy cow TMR, depends upon its ability to stimulate chewing activity and to reduce feeding selectivity. The study compared 2 TMR differing only for sources of roughage: grass hay (H) vs corn silage (CS). The diets had similar chemical composition (DM basis: 16.0% CP; 33.6% NDF; 39.3% NFC) and particle size distribution measured by Penn State particle separator (6.2% top; 26.6% middle; 67.2% bottom as fed basis). Twelve Holstein cows (34.2 ± 4.5 kg/d milk yield; 139 ± 79 DIM) were divided in 2 groups according to a cross-over experimental design with 14 d periods. Each group of cows was housed in a separate pen and it had free access to 6 weighing manger stations. Individual cows feeding behavior was measured by an automatic system which recorded the duration of all visits at the manger and the intake per visit. Rumination activity was measured by direct observation for 24 h. Time spent eating was similar between diets but DMI was lower for H (18.6 vs 20.0 kg/d, P < 0.05) which instead increased rumination (499 vs 457 min/d, P < 0.05) and total chewing time (785 vs 737 min/d, P < 0.05). To evaluate feed selection activity, diets were sampled at each weighing station at the time of their administration and 4, 12 and 23h post-feeding (pf). Diets had similar chemical composition at the administration, however samples collected at 4h pf showed a higher NDF (35.7 vs 33.4%, P < 0.001) and a lower NFC content (36.8 vs 40.7, P < 0.001) for H. These differences remained still significant at 12h pf (NDF: 37.6 vs 34.3%, P < 0.01; NFC: 34.8 vs 40.1%, P < 0.001) and at 23h pf (NDF: 39.5 vs 35.3%, P < 0.05; NFC: 32.8 vs 39.8%, P < 0.001). These composition variations indicate a selection activity operated by the cows when fed H TMR. This feeding selectivity towards concentrates was confirmed by a progressive increase of the fraction retained by the top screen and by the reduction the fraction gathered on the bottom pan of the Penn State particle separator. The different chemical composition of the ingesta of the 2 diets had no effect on milk yield, and composition.

Key Words: dairy cow, forage source, feeding behavior

823 Methane emission from lactating Holstein Friesian cows from the northern Hemisphere and New Zealand grazing pasture or fed TMR over one lactation. G.C. Waghorn*¹, K.R. Lassey², E.S. Kolver³, G. Molano¹, and L. Robertson⁴, ¹AgResearch, ²NiWA, ³Dexel, ⁴Dairy Research Institute, New Zealand.

Enteric methane production was measured in 20 cows over three 5 day periods at 60, 150 and 240 days of lactation. Ten cows were of a New Zealand Holstein-Friesian (NZ HF) origin selected over 30+ generations from intensive (primarily ryegrass; *Lolium perenne*) grazing systems, and ten were from the Northern Hemisphere (United States/Netherlands) (NH HF) genotype selected from TMR feeding systems. Five cows from each genetic origin were fed *ad libitum* ryegrass pasture and the remainder a TMR. Principal measurements included methane production using the SF₆ tracer procedure, intakes using an alkane digesta marker, milk production and composition. Predicted annual methane production (kg/cow) were NZ HF, P 113.1; NZ HF, TMR 142.5; NH HF, P 112.1; NH HF, TMR 151.3. Cows fed TMR produced more (P<0.001) methane (438 g/day) than cows fed pasture (338 g/day) but had higher DM intakes (22.1 vs. 16.8 kg/day; P<0.001) and milk production (35.4 vs. 20.8 kg/day; P<0.001). Cows fed TMR increased (P=0.016) methane production from 18.2 to 21.9 g/kg DMI from day

60 to 240 of lactation (5.0 to 6.3% of gross energy (GE)). Corresponding values for pasture were an increase (P<0.001) from 16.6 to 23.6 g methane/kg DMI, representing 4.9 to 6.9% of GE. These changes were associated with an increase in fibre content of pasture (35.5 to 38.3% NDF) and increased forage content of the TMR (48 to 56%) over the lactation. When methane is expressed in terms of milk production there appears to be lower green house gas (GHG) emissions per unit product with TMR, but cultivation of annual crops used in TMR results in high GHG emissions relative to permanent pasture. Cow genotype had a significant effect upon methane production, with NH HF producing less methane (g/kg DMI) than NZ HF at day 60 of lactation (15.1 vs. 18.0, P=0.007) and at day 150 (16.0 vs. 20.3, P=0.067). These patterns disappeared by day 240. Genotypic origins of cows appear to influence rumen methanogenesis.

Key Words: cow, methane

824 Fractional synthesis rates in lambs infected with *Trichostrongylus colubriformis*. E.N. Bermingham*^{1,2}, N.C. Roy¹, G.W. Reynolds², G. C. Waghorn¹, I.A. Sutherland¹, D.K. Revell³, and W.C. McNabb¹, ¹AgResearch Limited, Palmerston North, New Zealand, ²Massey University, Palmerston North, New Zealand, ³University of Adelaide, Adelaide, Australia.

The aim of the experiment was to investigate the effects of *T. colubriformis* infection on the protein fractional synthesis rate (FSR) in the small intestine (SI), liver and muscle of 10 lambs (38 kg (SE 1.4) fed fresh lucerne (*Medicago sativa*). Five lambs were infected with *T. colubriformis* L3 larvae (P; 6000/d for 6 d; Day 0), whilst the remaining were kept as parasite-free controls (C). On day 48 of infection, [3,4-³H]-valine (10.2 MBq/h) was infused for 8 h into the jugular vein. The lambs were euthanased while the infusion was still running and tissue samples collected from the duodenum, ileum, liver and muscle (*biceps femoris*). The duodenum and ileum samples were stripped of their mucosa. All tissues were quickly rinsed in cold saline and frozen in liquid N. Tissue samples (2 g) were homogenised and processed in order to determine the specific radioactivity of the protein-bound and free-pool valine. Protein FSR (%/day) were calculated according to the equation described by Wykes *et al.* (1996; J. Nutr. 126: 1481). Total intestinal worm counts were 353 (SE 116.7) and 22050 (SE 991.1) in the C and P groups, respectively (P=0.001). The presence of parasites had no effect on feed intake (777 g DM/d (SE 7.69) but reduced liveweight gain (C: 168 vs. P: #108 g/d; P<0.10). The presence of parasites in the SI tended to reduce FSR in the ileum of the lambs (P<0.10) and tended to increase FSR in the liver (P<0.10). The increase in liver FSR is possibly related to more export protein being synthesised in the liver for meeting the demands of the immune response in lambs infected with *T. colubriformis*.

Tissue		FSR (%/d)				
		C		P		
		Mean	SE	Mean	SE	P=
Duodenum	Whole	43	9.8	32	8.5	0.45
	Stripped	11	1.9	12	1.1	0.59
	Mucosa	31	9.2	21	11.3	0.51
Ileum	Whole	25	4.1	19	3.7	0.36
	Stripped	11	1.8	5	1.6	0.06
	Mucosa	15	4.3	14	2.5	0.89
Liver		24	1.9	34	0.7	0.07
Muscle		1	0.6	2	0.8	0.64

Key Words: fractional synthesis rates, intestinal parasites, lambs

Extension Education

825 2001 results from Ohio's beef quality assurance program. S. Boyles*¹, W. Shulaw¹, D. Glauer², A. Henry³, H. Zerby¹, F. Fluharty¹, and G. Fike¹, ¹The Ohio State University, Columbus, OH, ²Ohio Department of Agriculture, Reynoldsburg, OH, ³Ohio Cattlemen's Association, Marysville, OH.

Beef Quality Assurance (BQA) is a program to ensure that beef and dairy cattle are maintained in a manner that will result in a safe and wholesome beef product for the consumer. The objectives of Ohio's BQA effort are to 1) set production standards in beef and dairy operations which meet or exceed the National Cattlemen's Beef Association guide-

lines and 2) provide technical assistance through Ohio State University, Ohio Department of Agriculture, Ohio Beef Council, and the Ohio Cattlemen's Association. The program is free to beef and dairy producers due to a grant from the U.S. Food Safety Inspection Service. Teachers for the BQA program are certified by attending a training workshop. Trainers receive an Ohio BQA manual and more are available upon request. They also receive a compact disc with presentations that follow the manual, a checklist for planning a BQA event, a training request form, a participant list form, and a list of other Ohio BQA certified trainers. Six hundred and thirty-seven people have gone through the program in 2001 with 329 filling out the post-program evaluation form.

BQA was considered by participants to be an important consideration for the future (Mean = 1.4, SD = .81). Participants felt that the program helped them increase their understanding of BQA (Mean = 1.6, SD = .78), and provided relevant information to their work (Mean 1.6, SD = .84). A major emphasis of the program was to encourage producers to place all injections in the neck region. When given the choice of indicating where injections should be placed, all respondents indicated the neck, versus the rump or round. Eighty-five percent of respondents correctly indicated that "Extra-label" drug use could only be done with a valid veterinarian-client-patient relationship. However, 33% incorrectly indicated that "Extra-label" drug use in the mixing of drugs in animal feeds is permitted while there is a valid veterinarian-client-patient relationship.

Key Words: Beef, Quality, Assurance

826 Uniformity of mixing and delivery of total mixed rations. A. Predgen* and L. E. Chase, *Cornell University, Ithaca, NY.*

Total mixed rations (TMR's) are being increasingly implemented on dairy farms. One concern is the uniformity of mixing of the TMR on both a within and between day basis. This trial was conducted to evaluate the uniformity of the feed mixing and delivery process on 5 New York dairy herds. Observations were obtained on 3 different days for each farm. Samples were obtained from 5 locations in the feedbunk immediately after the TMR was delivered by the mixer wagon. Samples were analyzed for dry matter, particle size, density, pH, chloride, crude protein (CP) and acid detergent fiber (ADF). The coefficient of variation (CV) was calculated as an index of uniformity. A CV >10% was observed in 14 out of 15 observations for coarse particle distribution. This result indicates the difficulty of incorporating coarse particles uniformly into TMR's. The percent of coarse particles in samples 1 through 5 for 1 day on 1 farm was 24.0, 26.4, 26.5, 21.6 and 28.5%. Analysis of variance was used to examine differences between days or sample location within day. Significant differences (P<.05) were found for sample location within day in only 3 comparisons out of the 45 conducted. There were 14 significant differences (P<.05) detected for between day observations. These included 4 for particle size, 3 for dry matter, 1 for density, 1 for chloride, 3 for pH and 2 for CP. No significant differences were found for ADF for either within or between day determinations. The results of this study indicate that greater differences in TMR uniformity existed between days than within days on these farms. This variation between days could be related to factors including variations in feeds, operator differences, loading procedure, mixing time or scale errors. The technique of analyzing samples from a number of locations in the feedbunk provides a method to assess the uniformity of TMR mixing and delivery on dairy farms.

Key Words: Total mixed rations, Feedbunk management

827 A heifer development system emphasizing genetics - The Virginia Premium Assured Heifer Program: program development and requirements. J. B. Hall, S. P. Greiner*, B. R. McKinnon, and W. D. Whittier, *Virginia Tech, Blacksburg, VA.*

Several extension sponsored beef heifer development and marketing programs exist in the US, but they give minimum consideration to genetic merit of the heifers. In 1999, the Virginia Premium Assured Heifer (VAPAH) Program was designed as an elite beef replacement heifer program which would emphasize genetic merit of service sires and heifers. The VAPAH Program was designed to produce, for home use or sale, replacement heifers that are healthy, reproductively sound and of known

genetic value. Extension professionals and veterinarians provide nutritional, genetic, phenotypic, and health guidelines and recommendations. Physical requirements include maximum age at calving, frame score 4.5 to 6.5, body condition score 5 to 7, proper weight for age and frame and muscling scores of 1 to 2.5 (USDA feeder calf grades). A committee evaluates heifers for structural soundness and freedom from defects (e.g. horns, bad eyes, frozen ears). Health program includes vaccination against bovine respiratory complex, clostridial diseases and leptospirosis as well as calthood vaccination for brucellosis. Heifers must be treated with an endectocide and certified free of anaplasmosis before sale as VAPAH. Reproductive requirements for open heifers are reproductive tract score of 3 and yearling pelvic area ≥ 150 cm², whereas bred heifers must conceive within 50 d of the beginning of the breeding season and have a pelvic area ≥ 180 cm² at 18 m of age. Maximum birth weight EPD for service sire (SS) must not exceed the equivalent of the top 40% of Angus breed birth weight EPD. In addition, SS must be breed average for YW EPD. Heifers sired by bulls that meet minimum YW and milk EPD standards are designated as VAPAH Plus. Requirements are updated annually. Approximately, 1700 heifers from 45 farms have been enrolled in the VAPAH program. One thousand eighty-eight heifers have been sold since the start of the program with 57.0 % of the heifers qualifying as VAPAH Plus.

Key Words: Beef, Extension, Replacement heifer

828 A heifer development system emphasizing genetics - The Virginia Premium Assured Heifer Program: marketing. J. B. Hall*, B. R. McKinnon, S. P. Greiner, and W. D. Whittier, *Virginia Tech, Blacksburg, VA.*

The Virginia Premium Assured Heifer (VAPAH) Program is a novel replacement beef heifer development program emphasizing genetics of the heifer and service sire. Heifers meeting VAPAH requirements are identified with a VAPAH eartag to facilitate trace-back, if necessary. Heifers sired by bulls that meet additional genetic standards for growth and milk based on EPDs are designated as VAPAH Plus. Marketing of heifers is facilitated by extension agents and specialists with livestock markets and the Virginia Cattlemen's Association serving as marketing agents. Additionally, VAPAH can be marketed by private treaty. Since 2000, 1088 VAPAH have been marketed. To make comparisons among VAPAH and non-VAPAH, data on 686 heifers marketed from January 2000 to August 2001 were examined. Average price received per heifer was \$980.14, \$947.66 and \$880.93 for bred VAPAH Plus, VAPAH and non-VAPAH, respectively, and \$745.11, \$729.57 and \$665.37 for open VAPAH Plus, VAPAH and non-VAPAH, respectively. These sale results indicate that buyers are willing to pay over \$60/hd more for VAPAH compared to non-VAPAH and an additional \$15 to \$30/hd for VAPAH Plus compared to VAPAH. Thirty-nine farms that purchased a total of 371 heifers responded to a buyer's survey. Satisfaction ratings (1 = very satisfied to 5 = very unsatisfied) were 2.3 and 1.5 for bred and open VAPAH, respectively. Likelihood of buyers purchasing VAPAH again (1 = definitely to 5 = never) was 2.15 (bred) and 2.00 (open). However, when VAPAH and non-VAPAH were offered in the same sale, some buyers indicated considerable confusion in understanding the difference between the designations. To increase marketability of VAPAH outside the region, a web site has been developed that features heifer requirements, upcoming sales, sale summaries and digital images of VAPAH sold or for sale. Based on sale results and buyer surveys, VAPAH and non-VAPAH will not be offered in the same sale. Buyer and producer surveys as well as sale results will be used to refine marketing methods for VAPAH.

Key Words: Beef, Extension, Marketing

Growth and Development

829 Porcine leptin alters fatty acid metabolism by swine adipocytes. T.G. Ramsay*¹, ¹USDA-ARS.

The present study examined whether or not recombinant porcine leptin can alter lipid synthesis in porcine adipocytes. The stromal vascular (SV) cell fraction of neonatal subcutaneous adipose tissue was isolated by collagenase digestion, filtration, and subsequent centrifugation. These SV cells were seeded on 25-cm² tissue culture flasks and proliferated to confluency in 10% fetal bovine serum in DMEM/F12 (50:50).

Cultures were differentiated using 2.5% pig serum + 10 nM insulin + 100 nM hydrocortisone. After 7 d of lipid filling, cultures were washed free of this medium, incubated overnight in DMEM/F12 containing 2% pig serum and then used for experiments. Acute experiments assessed 1-¹⁴C-palmitate metabolism in cultures exposed to porcine leptin (0 to 1000 ng/mL medium) for 4 h. Chronic experiments used cultures incubated with 0 to 1000 ng porcine leptin/mL medium for 44 h prior to measurements of 1-¹⁴C-palmitate oxidation and incorporation into