

Tuesday, July 26, 2005

POSTER PRESENTATIONS

Animal Behavior and Well-being: Behavior, Health and Nutrition

T1 Ingestive behavior of Holstein steers fed with different particle sizes of Tifton 85 hay. E. S. Pereira^{*1}, A. M. V. Arruda¹, and I. Y. Mizubuti², ¹Universidade Estadual do Oeste do Parana, Marechal Candido Rondon, Parana, Brasil, ²Universidade Estadual de Londrina, Universidade Estadual de Londrina, Parana, Brasil.

The objective of this work was evaluate the ingestive behavior of Holstein steers feeding with different particles sizes of Tifton 85 hay (5, 7, 10 millimeters and whole). Four steers with the average weight of 300 kilograms and 20 months of age, maintained in individual stalls and ad libitum feeding during the experimental period of 64 days. The animals were allotted in 4 by 4 latin square experimental design, with four steers and four experimental periods. The ingestive behavior of each steer was visually determined at 16 days, in intervals of 10 minutes, during 24 hours. The statistical analyses performed including general variation analyses and comparative means by tukey test in five percent probability. The feeding time (hour or minutes for day) of the animals was significant ($P < 0.05$) for Tifton 85 whole hay and with particle size of 5 millimeters. The longer feeding time was observed with the Tifton 85 whole hay (6.85 hours for day) and shorter feeding time was observed with particle size of 5 millimeters (5.42 hours for day). No differences ($P > 0.05$) were observed for feeding time when steers received Tifton 85 hay with particles sizes of 7 and 10 millimeters (5.81 and 6.29 hours for day, respectively). Average rumination time in minute for kilogram of dry matter and neutral detergent fiber were higher for the animals fed with Tifton 85 whole hay (50.97 and 86.11 minute for day, respectively). Ingestive behavior of steers was influenced by different dietetic particle sizes.

Key Words: Ingestive Behavior, Nutrition, Particle sizes

T2 Relationship between feeding behavior, morbidity and vaccination in feedlot cattle. K. S. Schwartzkopf-Genswein^{*1}, M. A. Shah¹, T. A. McAllister¹, B. M. A. Genswein¹, M. Streeter², M. Branine³, and S. Swingle³, ¹Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, ²Alpharma Inc., Delaware, ³Cactus Research Ltd., Amarillo, TX.

Three-hundred and eighty, non-preconditioned, multi-sourced, heifers (503±49 kg) were used to access the relationship between feeding behavior, morbidity and vaccination over 227 d. On entry to the feedlot calves were administered tilmicosin and vaccinated against IBR and BVD. Half of the calves were also vaccinated (V) against BRD while the other half were not (C). Calves were blocked by source and randomly allotted to V or C treatments within one of 4 pens. Calves were fed receiving and finishing rations containing (DM basis) steam-flaked corn (53 and 57 %), high-moisture corn (0 and 20 %), alfalfa hay (35 and 7 %), corn silage (5 and 5%), fat (0 and 3 %) and supplement (7 and 8 %), twice daily. Animals were weighed on entry to the feedlot, mid-way through, and at trial completion. Variables measured included number of medical treatments, incidence of lung lesions (LL), feeding behavior and ADG. Feeding behavior was collected using the GrowSafe System[®] to quantify daily bunk attendance duration, inter-meal interval and attendance frequency. Heifers were defined as sick (S) based on drug treatment and hospital diagnosis; healthy (H) cattle were never treated. Health status was compared by matching individuals by day of pull and pen. Overall and 4 d period prior to being pulled, S heifers spent less time at the bunk (81 vs 104 and 94 vs 141 min/d), made fewer daily

visits (5 vs 7 and 7 vs 9) and had longer mean inter-meal intervals (513 vs 273 and 317 vs 204 min/d) respectively, then H heifers ($P < 0.001$). S heifers treated 3 times or more also spent less time at the bunk (97 vs 67 and min/d) and made fewer daily visits than those treated once (5 vs 4) ($P < 0.0001$). Cattle with LL spent less time (99 vs 102 min/d), made fewer visits (6 vs 7) and had longer mean inter-meal intervals (302 vs 291 min/d) than heifers without LL ($P < 0.0001$). V heifers required fewer medical treatments (2.2 vs 2.9), had higher ADG (2.6 vs 2.5 kg/d) and fewer LL (0.08 vs 0.18) than C ($P < 0.0001$). Use of feeding behavior as an early predictor of illness and indicator of vaccine efficacy could offer considerable benefit to the fed cattle industry.

Key Words: Beef Cattle Feeding Behavior, Health, Disease Detection

T3 Do changes in conductivity measures reflect variation in somatic cell count in bovine milk? A. M. Hurt^{*}, F. C. Gwazdauskas, R. E. Pearson, A. Becvar, C. O. Wilkes, K. J. Pence, S. C. Wilson, and L. Harris, Virginia Polytechnic Institute and State University, Blacksburg.

The objective of this study was to determine if milk conductivity measures can indicate changes in somatic cell counts (SCC), percent fat (PF) and percent protein (PP). Milk samples were obtained weekly from mid-July, 2004 for 12 wk on 95 cows (71 Holstein, 22 Jersey) in various stages of lactation; SCC, PF and PP were determined by DHI. Conductivity and milk yield (MY) were obtained twice daily using the Afimeteric[®] system. Conductivity measures were converted to integers (8 to 16 mS/cm) for categorization. Conductivity significantly affected SCC. Least squares means for SCC increased from $76.5 \pm 253.8 \times 10^3$ cells/mL at 8 mS/cm to $1125.1 \pm 277.9 \times 10^3$ cells/mL at 14mS/cm and then declined. Conductivity and MY significantly affected SCC in Holsteins. SCC increased from $183.6 \pm 299.0 \times 10^3$ to a peak at $1367.5 \pm 335.5 \times 10^3$ cells/mL at conductivity measures of 8 to 14 mS/cm. As MY increased, SCC declined significantly. Conductivity and days in milk (DIM) significantly affected the SCC in Jerseys. SCC increased from $3.5 \pm 445.9 \times 10^3$ to $1465.57 \pm 463.9 \times 10^3$ cells/mL from 8 to 14 mS/cm, respectively. As DIM increased, SCC increased ($p < 0.01$). PP was significantly affected by breed, conductivity, DIM and MY. Conductivity had a negative affect on PP. PP increased throughout lactation, but decreased with increases in MY. PF was significantly affected by breed, conductivity, DIM and MY. PF for Holsteins was 3.6 ± 0.1 vs. $4.31 \pm 0.15\%$ for Jerseys. As conductivity measures increased from 8 to 15 mS/cm, PF decreased from 5.0 ± 0.2 to $3.6 \pm 0.5\%$, respectively. PF increased as lactation advanced. Overall our results indicated that breed, conductivity and MY significantly affected SCC, PP and PF. Our results show that milk conductivity can be an indication of changes in SCC, PF and PP in both Holsteins and Jerseys.

Key Words: SCC, Milk Conductivity, Percent Protein

T4 Stimulation of consumption in lambs trough variations in food flavor. J. Merino¹, R. Distel^{*1,2}, R. Rodriguez-Iglesias^{1,2}, and J. Arroquy^{2,3}, ¹Universidad Nacional del Sur, Bahia Blanca, Buenos Aires, Argentina, ²CONICET, Bahia Blanca, Buenos Aires, Argentina, ³INTA, Santiago del Estero, Argentina.

Because preferences for food flavors decline during and after a meal, consumption could be stimulated by offering a specific food in different flavors simultaneously. The objective of this study was to determine the effects of offering the same hay with different flavors on voluntary intake by lambs. Sixteen Corriedale female lambs 6-mo-old were randomly assigned to either a treatment (multiple flavors, MF) or a control (natural flavor, NF) group. For 15 d, individually penned lambs were given ad libitum access to either alfalfa hay (Trial 1) or alfalfa-grass hay (Trial 2). The alfalfa hay was lower in neutral detergent fiber (NDF) and acid detergent fiber (ADF) and higher in crude protein (CP) than the alfalfa-grass hay (49% vs. 57%, 34% vs. 39%, and 21% vs. 19%, respectively). In both trials, lambs in the MF treatment were fed natural, garlic, oregano, and basil flavored hay, whereas lambs in the NF treatment were fed natural hay. The hay was artificially flavored by mixing 20 g of either garlic, oregano or basil per kg of hay. Animals were switched in between treatments from Trial 1 to Trial 2. There was no difference ($P > 0.05$) between treatments in daily intake of alfalfa hay in Trial 1 (average daily intake was 1,620 g for MF and 1,583 g for NF), but in Trial 2 lambs in the MF treatment ingested 10% more ($P < 0.07$) alfalfa-hay grass than lambs in the NF treatment (average daily intake was 1,443 g for MF and 1,320 g for NF). In both trials, the average consumption of hay in the different flavors varied widely at the beginning of the trial, but it was much similar toward the end of the trial. Variety in flavor tended to stimulate consumption of alfalfa-grass hay (middle quality hay), but did not stimulate consumption of alfalfa hay (high quality hay).

Key Words: Flavor, Voluntary Intake, Ruminant

T5 Comparison of ethograms between penned and ranged young beef cattle. K. Uetake^{*1}, T. Ishiwata¹, R. J. Kilgour², Y. Eguchi¹, and T. Tanaka¹, ¹Azabu University, Sagami-hara, Kanagawa, Japan, ²Agricultural Research Centre, NSW Agriculture, Trangie, NSW, Australia.

To get some basic data to assess cattle welfare, ethograms of young cattle in pen and range conditions were compared. Behavioral observations of 122 steers in eight pens and 1136 steers in six ranges were performed using instantaneous recording during daylight over 3 days in each farm. The pens had Wagyu (W) and Wagyu × Holstein (WH) separately, and the ranges had assorted breeds of Angus, Murray Grey, Shorthorn, Santa Gertrudis and their crosses aged 5-15 months. The ranges varied in vegetation from native pasture to improved pasture. The proportion of behavioral repertoire was compared between rearing conditions by MANOVA, one-way ANOVA and the Tukey's post-hoc test in that order. Difference in daytime activities pattern (the interaction between rearing condition and time) was tested by repeated measures ANOVA. The proportion of walking was much lower in both pens (pen W: $1.4 \pm 0.2\%$; pen WH: $1.0 \pm 0.2\%$) compared to all ranges (at least $9.4 \pm 4.0\%$; all $P < 0.05$), but grooming (pen W: $3.1 \pm 0.8\%$; pen WH: $5.9 \pm 1.2\%$), investigating (pen W: $1.1 \pm 0.3\%$; pen WH: $2.5 \pm 0.2\%$) and tongue playing (pen W: $0.1 \pm 0.1\%$; pen WH: $1.1 \pm 0.3\%$) made up the loss. However, the proportion of feeding in the pens (pen W: $21.3 \pm 6.5\%$; pen WH: $32.4 \pm 0.3\%$) was not different to that in one range ($42.2 \pm 12.6\%$), which had an improved pasture. The proportion of resting in this range ($41.3 \pm 9.1\%$) was also not different to that in pen WH ($53.2 \pm 1.7\%$). Especially the proportion of lying in this range ($24.2 \pm 2.3\%$) ranked between those in pen W ($22.9 \pm 8.5\%$) and pen WH ($32.2 \pm 1.1\%$). Fluctuation patterns of the proportions of feeding ($P < 0.001$) and resting ($P < 0.001$) were different between pen and range conditions, whereas the pattern of the proportion of walking was not different. These results suggest that we can learn a well-balanced ethogram for beef cattle by making comparisons of the proportion of behavioral repertoire and activities pattern between pen and various range conditions.

Key Words: Beef Cattle, Animal Welfare, Behavior

T6 Choice of attractive conditions by beef cattle in a Y-maze following release from restraint: effects of sheep. T. Ishiwata^{*1}, R. J. Kilgour², K. Uetake¹, Y. Eguchi¹, and T. Tanaka¹, ¹Azabu University, Sagami-hara, Kanagawa, Japan, ²Agricultural Research Centre, NSW Agriculture, Trangie, NSW, Australia.

We have previously reported that peers are attractive and a human is aversive to cattle by using choice test (J. Anim. Sci. 82 (Suppl. 1), 2004). In this study, we tested whether sheep grazing in the next pasture were as attractive as conspecific peers kept in the same group. Angus heifers ($n=157$) were individually allowed to enter a choice area after 2 min of restraint in a crush and to choose between 2 pens. After the animal had chosen a pen, she could freely access both test pens and the choice area for a further 5 min. The latency to choose, the pen first chosen, the time spent in each choice pen and choice area, and the number of times each pen entered were recorded. The behaviors during choice and after the first choice were recorded. In experiment 1, each heifer was given one of the following choices: pen with 3 familiar heifers (Peers) vs. pen with 6 sheep (Sheep) ($n=30$); Peers vs. the bare pen (Bare) ($n=30$); Sheep vs. Bare ($n=30$). More heifers chose Peers over Bare ($\chi^2 = 4.80$; $P < 0.05$), whereas Peers and Sheep, and Sheep and Bare did not differ. The heifers given the choice of Sheep vs. Bare spent more time standing than the heifers given the choice of Peers vs. Bare ($P < 0.05$). After the first choice, more heifers entered the Peers pen than the Bare pen ($P < 0.05$) or the Sheep pen ($P < 0.10$). When the choice was Peers vs. Sheep, heifers spent longer in the Peers pen than in the Sheep pen ($P < 0.01$). In experiment 2, another 67 heifers were given one of the following choice: Peers vs. pen with a novel object (NO) ($n=19$); Sheep vs. NO ($n=22$); Bare vs. NO ($n=26$). The proportion of heifers choosing either pen was not different in any choice combination. However, after choosing, more heifers entered the Peers pen than the NO pen ($P < 0.01$). When the choice was Sheep vs. NO, heifers spent more time in the choice area ($P < 0.01$). We conclude that sheep were not as attractive as peers, but sheep were not fearful animals for cattle.

Key Words: Beef Cattle, Behavior, Preference Test

T7 Effect of tagging site in chicks on broiler performance, pecking behavior, and tag retention. J. E. Wohlt^{*1}, D. B. Imwalle¹, L. S. Katz¹, and E. W. Zirkle², ¹Rutgers University, New Brunswick, NJ, ²Zirkle Animal Health LLC, Fairton, NJ.

Tagging as a means of identifying chicks was tested in a 6-wk study. Day-old male broiler chicks (Ross x Arbor) were received and maintained as a group for 24 h and introduced to feed and water. Chicks were weighed and assigned to serve as controls ($n=36$) or administered tags in the wing ($n=36$) or neck ($n=36$). Yellow-colored tags (1.9 cm x 4.9 cm) having a plastic T-bar fastener (2 cm) were administered using an Avery Dennison System 1000 II Swiftach[®] through the wing web or neck skin. Six chicks were assigned to individual pens (6 pens/treatment). All pens were equipped with an electric brooder, hanging feeder, and gravity-fed waterer and bedded with wood shavings. A commercial broiler grower (wk 1-4) and finisher (wk 5-6) were fed. Feed offered and refused was recorded and birds weighed weekly. Pens were randomly observed daily for 5 min, and pecks that any bird directed toward another bird recorded. Pecks were differentiated as to whether the peck was directed at the tag (or tag site) or anywhere else on the body. Data were analyzed using repeated measures with NCSS[®] software. During wk 1-6, feed intake was 102.9, 112.6, 108.9 g/d for control, wing-, and neck-tagged birds, respectively. During wk 1-6 ADG was 59.8 (control), 63.0 (wing tag), 59.1 (neck tag) g/d. For wk 1-6 efficiency (feed/gain) was 1.64 (control), 1.67 (wing tag), 1.79 (neck tag). Tagged birds ate more feed wk 4-6 compared to controls ($P < 0.05$), but only neck-tagged birds were less efficient during wk 4-6 ($P < 0.05$). Performance may be related to pecking behavior. Pecks to other parts of the body did not vary among treatments, but pecks to tag sites averaged 2, 9, and 10 per 5 min for control, wing-, and neck-tagged birds. Pecking at tags of tagged birds was greater wk 1-3 than in controls ($P < 0.05$) but still elevated wk 4-6. Birds tagged in the neck retained 100% of their tags, with tags easily visible at 6 wk. By 6 wk only 37% of wing tags were retained and visibility was impossible due to wing feathers. Tagging site was an important factor influencing tag retention, pecking behavior, and performance.

Key Words: Broiler, Tag Identification, Pecking Behavior

T8 Determination of piglets' preferences for drinker types at two weaning ages. S. Torrey* and T. Widowski, *University of Guelph, Guelph, ON, Canada.*

Piglets often experience a lag in growth at weaning during the transition from suckling to independent feeding and drinking. In a previous experiment, we found that through 48 h post-weaning, piglets weaned at 15 d of age given access to a push-lever bowl drinker consumed more feed while spending half as much time at the drinker and using a third of the water as piglets given access to a nipple drinker. Therefore, it appears that drinker style affects pigs initiation of feeding. In this experiment, we examined piglets' preferences for a drinker style. 32 Yorkshire pigs were used in two experiments to determine piglets' preferences for drinker types at two weaning ages. In experiment 1, 16 piglets were weaned at either 19 or 26 d of age and housed individually with two drinkers: a stainless steel push-lever bowl (P) and a stainless steel nipple drinker (N). Experiment 2 was identical to experiment 1 but pigs had access to a float bowl (F) instead of N. Growth, feed intake, water intake and wastage and ingestive behavior were examined through 10 d post-weaning. Preferences were analysed using T-tests and effects of age on preference and preference on other variables were tested with ANOVA. When pigs weaned at either 19 or 26 d were housed with P and N, they exhibited no preference for drinker type, as determined by their time spent at the drinkers (P=0.26 and P=0.39, respectively) and their total water intake (P=0.88 and P=0.83, respectively). Pigs weaned at 26 d also showed no preference between F and P, as determined by their time spent at the drinker (P=0.81), but had a tendency to consume more water from P (P=0.06). Pigs weaned at 19 d showed a significant preference for F. They consumed more water from F (P=0.03) and spent more time drinking from the F (P<0.001). However, this preference did not influence initial or overall feed intake (P=0.72 and P=0.37, respectively). More studies with larger numbers of pigs are necessary to determine why pigs weaned at different ages prefer one drinker style rather than another and whether these preferences reflect differences in the development of ingestive behavior systems.

Key Words: Behavior, Drinking, Weaning

T9 Effects of intermittent lighting on resting behavior by newly weaned piglets. S. T. Millman*, K. C. Sheppard, M. Madden, and A. E. Valliant, *University of Guelph, Guelph, ON, Canada.*

By initiating hourly nursing bouts, sow cue rest and activity of their piglets. The importance of rest by piglets is unknown, but has been shown to be an important prognosis of recovery from infections in other species. The objectives of this study were to determine if an intermittent lighting regimen facilitates rest by piglets post-weaning, and examined if high and low weaning weight piglets would be affected differently. Yorkshire piglets were weaned at 21 days of age and 16 pens of four piglets were formed so that each pen contained two high (H) and two low (L) weight pigs. Half of the pens received a standard (8L:16D) lighting regimen (S), and half received an intermittent lighting regimen (I) consisting of four periods of 2L:4D. Timelapse video recorded behavior over 24-hours, and piglets were individually marked for identification. Resting and activity data was recorded using 5-min scan sampling on post-natal days (PND) 22, 23, and 25. Data was analysed using an ANOVA and the Mixed Model or General Linear Model procedures as appropriate. Overall, resting was not affected by light treatment (P = 0.76), or piglet type (P = 0.41). However, time spent resting was significant affected by PND (P < 0.0001), with resting increasing from 0.80 on PND 22 to 0.87 on PND 25. There was also a light treatment by PND interaction (P = 0.0043). Neither lighting treatment (P = 0.69) nor piglet type (P = 0.44) had an effect on piglet weight gain, and there were no interactions (P = 0.97). Total time spent resting was not significantly correlated with weight gain for H piglets (P = 0.54), however there was a trend toward a negative correlation between resting and weight gain for L piglets (P = 0.0591). Transitions in light did not appear to cue resting or activity since behavior did not significantly change during 5, 10 or 20 minute time periods after lights switched on (P = 0.77, 0.63, and 0.51 respectively). In conclusion, lighting regimen has limited impact on resting behavior and weight gain of newly weaned piglets.

Acknowledgements: The authors thank Ms. Erin Reid and OMAF Swine and Isolation Units for technical assistance, as well as Ontario Pork, OMAF and NSERC for financial support.

Key Words: Swine, Rest, Behaviour

Animal Health II

T10 Continuous measurement of reticular and ruminal pH in dairy cows using a wireless pH system. K. M. Krause*¹, G. R. Oetzel¹, D. Kohn², D. Kuhn², and D. Frost², ¹*University of Wisconsin, Madison*, ²*DK2Solutions, LLC, Cave Creek, AZ.*

The objectives of this study were to 1) compare ruminal pH measured using a wireless radio telemetry system with a hard-wired system and 2) to investigate the relationship between reticular and ruminal pH. Eight lactating, ruminally cannulated cows in tie stalls were equipped with hard-wired (hw) pH electrodes placed in the rumen and with wireless capsules (wc) anchored adjacent to the hard-wired electrode. Each cow also had a capsule placed in the reticulum. Cows were fed TMR once daily. Ruminal and reticular pH values were recorded every 10 sec for a 5 day period and were then collapsed by 1-min, 15-min and hourly intervals. Mean pH was evaluated using hours post feeding as repeated measurements in a mixed model. Hours after feeding significantly affected both reticular and ruminal pH (P<0.001), but post feeding drop in pH appeared less pronounced for reticular pH (P=0.11). Ruminal pH measured using hw and wc did not differ, whereas reticular pH was higher than ruminal pH regardless of method (hw or wc). Nadir pH (based on ±15 min rolling averages) was higher for reticular pH than for hw ruminal pH and wc ruminal pH. Nadirs occurred approximately 10.5 h post feeding. Hours spent below pH 6 was lower for reticular pH than for ruminal pH. Area below pH 6 was highest for hw ruminal pH and lowest for reticular wc pH. The wireless radio telemetry system reliably transmitted reticular and ruminal pH data. Ruminal pH from the capsules was very similar to hw ruminal pH. Reticular pH was consistently higher than ruminal pH.

Item	Hard-wired Ruminal	Wireless Ruminal	Wireless Reticular	SED
Number of daily readings (1-min) ¹	982	845	764	146
Mean pH (hourly) ¹	6.22 ^b	6.29 ^b	6.51 ^a	0.06
Nadir pH (15-min) ¹	5.56 ^b	5.76 ^b	6.21 ^a	0.09
Time of nadir post feeding, hh:mm (15-min) ¹	10:34	10:16	10:26	0.9 h
Hours<6.0, h/d (1-min) ¹	7.6 ^a	5.3 ^a	1.1 ^b	1.4
Area<6.0, minxpH/d (1-min) ¹	128.5 ^a	91.7 ^b	3.0 ^c	9.2

¹Time interval into which readings were collapsed, ^{abc}Means within row with different superscripts differ, P < 0.05.

Key Words: Wireless pH system, Ruminal vs. reticular pH, Dairy cows

T11 Correlation among ruminal pH and short chain fatty acids in dairy cows affected by Subacute Ruminal Acidosis (SARA). M. Morgante*¹, C. Stelletta¹, M. Giancesella¹, B. Paolo², M. Badan¹, A. Lotto³, and I. Andrighetto², ¹*Dipartimento di Scienze Cliniche Veterinarie, Legnaro (PD), Italy*, ²*Dipartimento di Scienze Zootecniche, Legnaro (PD), Italy*, ³*Cortal Extrasoy S.p.A., Cittadella (PD), Italy.*