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.

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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. Oetzel[1], D. Kohn[2], D. Kuhn[2], and D. Frost[2], [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

[1]Time 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. Stelletta[1], M. Gianesella[1], B. Paolo[2], M. Badan[1], A. Lotto[3], and I. Andrighetto[2], [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*.

Subacute rumen acidosis (SARA) represents a major metabolic disorder in intensive dairy farms. This condition affects rumen fermentations, animal welfare, and farm both productivity and profitability. The aim of the present study was to determine short chain fatty acids (SCFA) concentration and pH in ruminal fluid of lactating dairy cows. Ten commercial dairy herds suspected of SARA were investigated because of high incidence of laminitis, metritis and culling rate for various pathological conditions. Twelve cows in each herd were selected randomly among symptom free healthy animals between 5 to 60 DIM to perform rumenocentesis to obtain rumen fluid. The pH of the ruminal fluid was determined immediately after sampling. Concentrations of SCFA in ruminal fluid were determined on the stored samples (-80°C). Results were subject to ANOVA and correlation analysis using (software SIGMA STAT 2.02). The results indicated the presence of SARA in 3 herds (more than 33% of the cows with rumen pH < 5.5), a critical situation in 5 (less than 33% of the cows with rumen pH < 5.5 and more than 33% of the cows with rumen pH between 5.6 - 5.8) and a normal rumen pH condition in 2 herds. Table 1 shows the mean values found in three classes of herds. Linear regressions for pH and total SCVFA, acetate, propionate, acetate/propionate ratio n-butyrate and n-valerate resulted different for each class. Pearson correlation coefficients indicated a strong relationship between ruminal pH and total SCFA (r= -0.827, -0.711, -0.732) in the three classes respectively.

Table 1. Mean ruminal parameters in the three classes of herds.

	Acidosis	Critical	Normal
pH	5.68A	5.86B	6.16C
SCFA mMol/ml	150.68A	140.68A	123.03B
Acetate mMol/ml	91.33A	87.93A	76.02B
Propionate mMol/ml	38.94A	32.32B	28.67B
C2/C3 ratio	2.53	2.2	2.74
n-Butyrate mMol/ml	15.35	15.56	13.58
n-Valerate mMol/ml	2.27a	2.09ab	1.92b

a,b = P < 0.05; A, B, C = P < 0.01

Key Words: Dairy cows, Subacute rumen acidosis, Short chain fatty acids

T12 Acid-base status, and the pH of feces, urine, muzzle and uterus in dairy cows affected by Subacute Rumen Acidosis (SARA). C. Stelletta[1], M. Badan[1], M. Morgante*[1], M. Gianesella[1], P. Berzaghi[2], L. Ravarotto[3], A. Lotto[4], and I. Andrighetto[2], [1]*Dipartimento di Scienze Cliniche Veterinarie*, *Legnaro (PD), Italy*, [2]*Dipartimento di Scienze Zootecniche*, *Legnaro (PD), Italy*, [3]*Istituto Zooprofilattico Sperimentale delle Venezie*, *Legnaro (PD), Italy*, [4]*Cortal Extrasoy S.p.A.*, *Cittadella (PD), Italy*.

The effects of subacute rumen acidosis (SARA) on health status of dairy cows are not well known. SARA represents one of the most important disorder in intensive dairy farms, and affects animal welfare, productivity and farm profitability. The aim of present study is to evaluate acid-base status and the pH of feces, urine, muzzle and uterus, to verify the effects of SARA on heath and reproductive status of dairy cows. Ten commercial dairy herds suspected of SARA were investigated because of high incidence of laminitis, metritis and culling rate for various conditions. Twelve cows in each herd were selected randomly among no pregnant animals without clinical signs of disease, good body condition, and between 5 to 60 DIM to perform rumenocentesis, venous blood, urine and feces sampling. The pH of ruminal fluid, urine and feces was determined immediately after sampling. Muzzle and uterine pH were recorded using special pH probes. Blood was stored at +4°C before laboratory analysis. Results were subject to ANOVA and correlation analysis using software SIGMA STAT 2.03. The results indicated the presence of SARA in 3 herds (more than 33% of the cows with rumen pH < 5.5), a critical situation in 5 (less than 33% of the cows with rumen pH < 5.5 and more than 33% of the cows with rumen pH between 5.6 - 5.8) and a normal rumen pH condition in 2 herds. Table 1 shows the mean values of the principal parameters among the three classes of herds. These data suggest a possible role of SARA in the acid-base status of the affected vs normal cows, with significantly higher venous pH, PCO2, HCO3 and TCO2. The correlation between SARA and the pH of feces, urine and muzzle must be further investigated. The uterine pH seems to be lower in the cows of affected herds.

Table 1. Mean blood parameters and pH of feces, urine, muzzle and uterus in tne three classes of herds

	Acidosis	Critical	Normal
pCO2	50.12a	45.97a	43.08b
HCO3	31.63a	31.27a	28.65b
tCO2	33.17a	32.68a	30.45b
Beb	6.54ab	6.91a	5.22b
Blood pH	7.42a	7.43a	7.40b
Feces pH	6.44a	6.68b	6.61ab
Urine pH	8.23	8.36	8.30
Muzzle pH	6.73a	7.13b	6.81a
Uterine pH	7.04a	7.09ab	7.12b

a,b = P < 0.05

Key Words: Dairy cows, Subacute rumen acidosis, Acid-base status

T13 Effects of Johne's disease status on production, reproduction, and health traits in US Holsteins. M. Gonda*, Y. Chang, G. Shook, M. Collins, and B. Kirkpatrick, *University of Wisconsin*, *Madison*.

Blood and fecal samples were collected from 5611 cows primarily in second or third lactation in 300 herds throughout the U.S. An enzyme-linked immunosorbent assay (ELISA) for *M. a. paratuberculosis* antibodies was performed on the serum samples and *M. a. paratuberculosis* was cultured on fecal samples using the radiometric (BACTEC) method. Because of low false positive and high false negative error rates, cows positive for either antibody (S/P ≥ 0.10) or culture test were classified as disease positive. Overall disease prevalences were 0.248 with the antibody test, 0.0324 with the culture test, and 0.256 with the combined tests. Yield deviations for milk, fat, and protein, standardized daughter pregnancy rates, adjusted lactation average somatic cell scores, and projected total months in milk were obtained from the Animal Improvement Programs Laboratory, USDA, for the lactation concurrent with the sample collection date. Yield deviations were twice daily milking 305 day mature equivalent yields adjusted for management group, permanent environment, and herd-sire interaction effects. Except for yield deviations, each phenotype was regressed on Johne's disease status (combined tests), lactation number, herd, sire, and days in milk on sample date. For yield deviations, only Johne's disease status and sire effects were included in the model. The remaining effects were already accounted for in the yield deviations. Only herd and sire were significantly associated with somatic cell score, so lactation number and days in milk were removed from this model. Some animals were not included in each model due to missing data. Disease positive cows had 79.3 kg milk (P = 0.0054; N = 4230), 2.52 kg fat (P=0.0177; N = 4230), 2.64 kg protein (P = 0.0004; N = 4154), and 0.756 projected months in milk (P = 0.0432; N = 3009) less than negative herdmates. Johne's disease status did not significantly alter somatic cell score (P = 0.3458; N = 4076) or pregnancy rate (P = 0.2117; N = 2865). Disease progression should result in progressively greater effects on performance traits.

Key Words: Production, Paratuberculosis, Dairy

T14 Prevalence of foot lesions observed in dairy herds in Sicily and North Italy. J. D. Ferguson*[1], G. Azzaro[2], C. Scollo[2], R. Petriglieri[2], A. Cappa[4], and G. Licitra[2,3], [1]*University of Pennsylvania*, *Kennett Square, PA*, [2]*CoRFiLaC, Regione Siciliana*, *Ragusa, Italy*, [3]*D.A.C.P.A. University of Catania*, *Catania, Italy*, [4]*APA*, *Vicenza, Italy*.

Personnel from CoRFiLaC and Vicenza, Italy provide an extension program to dairy farms in foot trimming and hoof care. Description of foot lesions in Ragusa

and Vicenza are similar due to collaboration between the services. Records were compiled for cows examined from 1998 through 2004 and coded for date of examination, herd, cow, date of calving, lactation number, foot lesion(s), and/or hoof trimming. Data from 2317 cows from 54 herds comprised the data base of 3531 records in Ragusa whereas data from 4184 cows from 129 herds comprised the data base of 5798 records from Vicenza. The crude prevalence of foot lesions for all foot interventions in Ragusa and Vicenza, respectively, was as follows: abscess, 12.8%, 11.0%; deformity of claw, 23.2%, 13.9%; digital dermatitis, 28.6%, 22.5%; interdigital fibroma, 2.0%, .1%; infectious pododermatitis, 3.5%, 2.2%; laminitis lesions, 12.6%, 8.9%; sole ulceration, 21.0%, 8.8%; and tendon injury, .8%, 0%, trimming 35.3%, 32.5%. Mean days in lactation at time of foot intervention were 218.8 days (sd = 139.7) in Ragusa and 168.8 days (sd 143.4) in Vicenza. Age, season, and other foot lesions were examined as factors associated with the prevalence of a foot lesion. Data for reproduction and production from herd improvement association records were merged by herd, cow, and date of calving. Cows were coded as not seen for foot pathology, foot pathology more than 30 days prior to first insemination, foot pathology +/- 30 of first insemination, and foot pathology more than 30 days after first insemination. Reproduction was poorer in cows with foot pathology, but most foot pathology occurred well after first insemination suggesting other factors contributed to reduced reproductive performance in these cows. Production was higher in cows with foot pathology compared with herd mates, possibly reflecting a bias in producer selection of cows for intervention by off farm service providers.

Key Words: Foot lesions, Dairy cows

T15 The use of infrared and exercise to non-invasively determine lameness in dairy cattle. D. B. Haley*[1], C. J. Bench[2], A. M. de Passille[3,4], J. Rushen[3,4], P. Lepage[5], J. Coplyn[5], and A. L. Schaefer[5], [1]*Alberta Agriculture, Food & Rural Development*, *Red Deer, AB, Canada*, [2]*University of Sasakatchewan*, *Saskatoon, SK, Canada*, [3]*Agriculture & Agri-Food Canada*, *Lennoxville, QC, Canada*, [4]*Agriculture & Agri-Food Canada*, *Agassiz, BC, Canada*, [5]*Agriculture & Agri-Food Canada*, *Lacombe, AB, Canada*.

An induction model was used to test whether infrared thermographic images of the feet and legs could be used as a non-invasive means of differentiating lameness in dairy cows. Eight Holstein cows were chosen for this preliminary study based on detectable signs of lameness in their gait (eg. uneven stride length and reluctance to bear weight; n=4) or otherwise walking normally (n=4). All cows were exercised by allowing them to move at their own pace a distance of 466.2m. Infrared images were recorded immediately before and after exercise as well as 20 min after exercise. Four limb regions were imaged for analysis: (1) anterior aspect of the carpus on both front limbs, (2) lateral aspect of the tarsus (hock) of both hind limbs, (3) anterior aspect of the inter-digital cleft of both front and (4) hind feet. Data were analyzed as a GLM ANOVA for repeated measures. Thermographic images were not available for all cows in all regions. Significant interactions between lameness and time were found for regions 2 (n=6; $P \leq 0.05$) and 3 (n=8; $P \leq 0.05$). Limb temperature tended to increase between pre- and post-exercise time periods (P=0.11), however these effects were not consistent for all the limb regions measured. There was no significant difference between the temperature measurements for lame and non-lame cows (P=0.14). However, given the very low number of animals used here, the results suggest infrared thermography may be deserving of more attention as a potentially useful tool in the early, non-invasive detection of lameness in dairy cows.

Key Words: Lameness, Thermography, Dairy

T16 Highly sensitive and specific PCR assay for routine mastitis diagnostics: a comparative study of DNA and bacterial culture based methods. L. Salmikivi, P. Bredbacka, and M. Koskinen*, *Finnzymes Diagnostics*, *Espoo, Finland*.

Due to their high level of sensitivity and specificity, PCR based methods have become widely used in the field of pathogen diagnostics. However, difficulties relating to isolation of high quality bacterial DNA from raw milk and the need to identify a large number of causal pathogens have hindered the development of PCR assays for routine testing of bovine mastitis. Here, we outline a high throughput method for identification of the most relevant bacteria causing mastitis. The assay takes approximately five hours to perform and employs: i) a three-step DNA extraction from raw milk; ii) PCR amplification of bacterial and positive control DNA; iii) amplicon cleavage with restriction endonucleases; and iv) electrophoresis in precast agarose gels. Sensitivity and specificity of the PCR test was compared against bacterial culture methods. Quarter milk samples were collected from 338 dairy cows and tested for mastitis pathogens using both methods and a double-blinded experimental design. Bacterial culture and PCR revealed 239 and 293 positive results, respectively, suggesting markedly higher sensitivity of the PCR assay. A total of 221 samples were positive with both methods. Strikingly, in 39 cases the culture and PCR tests revealed discordant positive results. Sequencing of bacterial DNA from the discordant positive samples, and sequence alignment against known species sequences demonstrated full concordance, suggesting that the PCR method provided higher specificity than bacterial culture. Finally, performance of the PCR assay across potentially genetically differentiated bacterial strains was confirmed by analysing monocultures originating from geographically distant locations. Sequence mutations altering the PCR primer or restriction endonuclease recognition sites were not found.

Key Words: Mastitis testing, DNA diagnostics, PCR assay

T17 Modified Mannitol Salt Agar for Isolation and Enumeration of *Staphylococcus aureus* and Coagulase Negative Staphylococci from raw milk. A. Gurjar*, S. Larson, A. Sawant, B. Straley, N. Hegde, and B. Jayarao, *Pennsylvania State University*, *University Park*.

Two selective media including Baird Parker and modified Mannitol Salt Agar (mMSA) supplemented with egg yolk (50ml/L), esculin monohydrate (1gm/L) and ferric citrate (0.5gm/L) were evaluated for isolation and enumeration of staphylococcifrom raw milk. Five percent sheep blood agar was served as a positive control medium. Thirty two American Type Culture Collection reference strains (gram positive cocci and gram negative bacteria) were cultured on Blood Agar, Baird Parker Agar, and mMSA. Under experimental conditions mMSA showed significantly higher sensitivity and specificity as compared to Baird Parker Agar. mMSA allowed the growth of all Staphylococcal ATCC reference strains and two enterococcal species, while inhibited growth of all streptococci and gram negative reference strains. Baird Parker Agar allowed growth of some Staphylococcal ATCC reference strains (7 of 8 strains), enterococci (2 of 2 strains), Streptococci (1 of 8 strains) and gram negative bacteria (1 of 12 strains). mMSA allowed presumptive identification of *Staphylococcus aureus* at end of 24 h or incubation as compared as Baird Parker Agar which required at least 48 h of incubation before presumptive identification of *S. aureus* could be made. These results of the study indicate that mMSA can be used for isolation, and enumeration of Staphylococcal organism from raw milk.

Key Words: Bulk tank milk, Mastitis, Media

T18 Use of in-line milk sampling for monitoring milk quality and udder health on herds of large dairy operations. B. Straley*, A. Sawant, A. Gurjar, N. Hegde, D. Wolfgang, and B. Jayarao, *Pennsylvania State University*, *University Park*.

Milk samples were sequentially collected using in-line milk sampling device from a large dairy operation comprised of 12 different herds totaling about 2000 lactating cows. The dairy operation was visited six times, during each visit 12 bulk tank and12 in-line samples were collected over one milking session. Milk samples were analyzed for somatic cells, mastitis pathogens and bacterial counts for milk quality determination.

Bacterial and somatic cell counts for samples taken from the milk line system were averaged over time with respect to the volume of milk produced by each herd. Herd milk counts were compared to bulk tank counts as a function of milk

volume over time. A high correlation was observed between bulk tank and in-line counts for somatic cell counts (0.86), coliform counts (0.95), non-coliform counts (0.90), and lipolytic counts (0.81). Moderate to poor correlations were observed for standard plate count, laboratory pasteurization count, preliminary incubation counts, coagulase negative Staphylococcal counts, and Streptococci and Streptococci-like counts. The findings of the study revealed that in-line milk sampling permitted better interpretation of results not only in context to the whole operation but individual herds of lactating cows that contributed milk to the bulk tank. It can be concluded that in-line sampling is a valuable tool in monitoring somatic cells counts and number and type of mastitis pathogens and bacteria that influence milk quality in large dairy operations.

Key Words: Bulk tank milk, Udder health, Milk quality

T19 An approach to evaluate effects of gene expression of *Escherichia coli* associated with bovine mastitis. J. Bowman, M. Worku*, and P. L. Matterson, *North Carolina A&T State University*, *Greensboro*.

Infection with *Escherichia coli* and the resulting inflammation, in particular mastitis, is associated with changes in milk composition, loss of production and has consequences for animal health. The objective of this study was to evaluate the effect of host immune factors in whey on gene expression in *E. coli*. A mid-log culture of *E. coli* isolated from an acute case of clinical mastitis was grown . Whey samples were prepared from clinically healthy cows. The samples were heat inactivated (56°C, 30 min.). Six samples of *E. coli* (1 x10^9 cells) were incubated in RNase free Phosphate Buffered Saline (PBS) as negative controls. Six samples were incubated with a 1:1 dilution of the inactivated whey (10 min., 37°C). RNA from control and treated samples was isolated using Tri-Reagent® (Sigma) or RNeasy kits (Qiagen). The integrity and size distribution of total RNA purified with the RNeasy Kit was checked by 1 % denaturing agarose gel electrophoresis and ethidium bromide staining. RNA isolation using Tri-Reagent® was unsuccessful with all samples. However, the RNeasy method yielded sharp bands of the negative control on stained gels. The negative control gels revealed a smear of fluorescent material centered in the 1.3-2.6 kb range. For total RNA from *E. coli*, the major bands observed were 16S rRNA or 23S rRNA. In samples exposed to whey, ribosomal bands appeared as a smear of smaller sized RNA. These studies indicate that exposure to whey samples may have adversely affected the quality and integrity of RNA isolated from *E. coli* and may indicate a possible mode of action for immune components in bovine whey in combating *E. coli* infection that needs to be further investigated. Such studies are important for the understanding of mechanisms of host resistance against *E. coli* at the transcription level.

Key Words: Whey, Mastitis, E.coli

T20 Effects of acute experimental mastitis on clinical and productive variables in early-lactation dairy cows. M. R. Waldron*, A. E. Kulick, and T. R. Overton, *Cornell University*, *Ithaca, NY*.

Twenty Holstein cows in early lactation (7 days in milk) were administered 100 μg of *Escherichia coli* lipopolysaccharide (LPS) dissolved in 10 ml sterile 0.9% NaCl saline (TRT, n = 10) or 10 ml sterile saline absent LPS (CTL, n = 10) into both right mammary quarters. The hypothesis that acute experimental mastitis would result in altered measurements of clinical and productive variables similar to that seen during cases of natural periparturient bovine mastitis was tested. The CTL cows were pair-fed with the TRT cows for the 8 h after intramammary infusion, thus there were no treatment differences for dry matter intake (DMI) during this period. However, all animals were allowed ad libitum access to feed after the 8-h period and daily DMI for the TRT cows was decreased by 49% and 19% for the day of infusion and one d post-infusion, respectively (treatment by time effect, $P < 0.01$). Heart rate was increased by as much as 30 ± 3 beats/min (treatment by time effect, $P < 0.01$) and rectal temperature was increased by as much as and 2.9 ± 0.2 °C (treatment by time effect, $P < 0.01$) in TRT cows. Plasma cortisol concentration was increased by greater than ten-fold and remained elevated throughout the 480 min following TRT (treatment by time effect, $P < 0.01$). Milk somatic cell counts increased dramatically in LPS-infused quarters only (treatment by time effect, $P < 0.01$), and milk yield at each of four milkings after TRT was decreased by as much as 72% (treatment by time effect, $P < 0.01$). All milk components were significantly affected by TRT for at least 4 milkings (treatment by time effect, $P < 0.01$) and are reported according to maximal percent change relative to CTL in the table below. The TRT cows displayed clinical, physiological, and productive signs of moderate to severe inflammation, whereas CTL cows displayed no signs of immune activation. The data from this study will be useful for the future study of the metabolic responses to immune activation in periparturient dairy cows.

Maximal percent change of milk components during the four milkings following intramammary lipopolysaccharide infusion

Milk Variable	Percent Change
Fat %	+69%
Fat yield	-56%
Protein %	+27%
Protein yield	-62%
Lactose %	-21%
Lactose yield	-76%

Key Words: Mastitis, Clinical, Production

T21 Appearance of insulin resistance in dairy cows following a four-day fast to induce hepatic lipidosis. S. Oikawa*[1,2] and G. R. Oetzel[2], [1]*Rakuno Gakuen University*, *Ebetsu, Japan*, [2]*University of Wisconsin*, *Madison*.

Negative energy balance (NEB) around parturition has been implicated in the development of fatty liver, insulin resistance, and impaired health in early lactation dairy cows. A 4-day fasting model has been previously reported to increase liver triglyceride (TG) more than 2.5-fold and reduce hepatic extraction of bile acids. The purpose of the present study was to evaluate insulin resistance in this fasting model. Ten non-lactating, non-pregnant Holstein cows were fasted for 4 days (n=6) or fed continuously as controls (n=4). Samples were collected from 3 days before until 17 days after the 4-day fast. Fasted cows had higher ($P < 0.05$) liver TG content (49.4 vs. 16.2 mg/g, wet weight basis) at the end of the fasting period compared to controls. Fasted cows also had higher ($P < 0.01$) plasma nonesterified fatty acid (NEFA) concentrations (1.24 vs. 0.21 meq/l) and higher ($P < 0.01$) plasma beta-hydroxybutyrate (BHB) concentrations (439 vs. 220 μM) at the end of the fasting period. Liver TG, plasma NEFA, and plasma BHB in fasted cows returned to pre-fasting levels by the end of the experiment. Plasma glucose concentrations in fasted cows were not different than control cows throughout the study. Plasma insulin concentrations in fasted cows were lower ($P < 0.01$) than for control cows at the end of the fast (6.3 vs. 14.1 μU/ml). Insulin-stimulated glucose reduction (ISGR) was determined by calculating the percentage reduction in plasma glucose concentration 30 minutes after intravenous insulin administration. ISGR was lower ($P < 0.01$) in fasted cows at the end of the fast compared to controls (24.9 vs. 48.6%), suggesting that the fasting model induced insulin resistance. ISGR was negatively correlated with plasma NEFA and liver TG. Insulin resistance apparently increases in severity with increasing plasma NEFA and hepatic TG content, and may be an important complication of NEB and hepatic lipidosis in dairy cattle.

Key Words: Dairy cows, Fasting model, Insulin resistance