TH186 Nursery performance in gilts farrowed by females housed in individual stalls and/or group pens during gestation. M. J. Estienne* and A. F. Harper, *Virginia Polytechnic Institute and State University*, *Blacksburg*.

Fetal programming is the process by which a stimulus in utero establishes a permanent response in the fetus impacting physiology later in life. O'Gorman et al. (2007; J. Anim. Sci. 85[Suppl. 2]:13) subjected sows to daily restraint for five min during wk 12 to 16 of gestation; Gilts farrowed by stressed sows exhibited puberty 14 d later than gilts farrowed by control females. The objective was to determine the effects of gestation housing on nursery performance in gilt offspring. Yorkshire × Landrace gilts were mated by AI and placed in individual stalls throughout gestation (n = 6); group pens throughout gestation (5 to 6 gilts/pen) (n = 6); or individual stalls for 30 d post-mating and then group pens for the remainder of gestation (n = 7). There were no effects of housing on litter size, although there was a trend (P = 0.11) for a greater number of pigs born alive for females kept in stalls throughout gestation (11.8) or in stalls for the first thirty days post-mating and group pens for the remainder of pregnancy (11.4), compared to gilts kept in group pens throughout gestation (9.2) (SE = 0.9). Barrows were cross-fostered among litters so that females were nursing a similar number of pigs (10.5 ± 0.3). Among treatments BW of gilt pigs were similar at birth (1.65 ± 0.05 kg; P = 0.46) and at weaning (24.6 ± 0.3 d of age; 8.67 ± 0.26 kg; P = 0.86). Gilts were placed in nursery pens each containing three pigs farrowed exclusively by females exposed to one of the three gestation housing systems (n = 9 pens/group). During the 5-week nursery study, ADG (0.53 ± 0.01; P = 0.93) and feed conversion efficiency (gain/feed; 0.57 ± 0.01; P = 0.93) were similar among groups. Gilt growth during the lactation and nursery phases of production was unaffected by the type of gestation housing to which dams were exposed. This suggests that if gestation housing does indeed affect gilt offspring performance via fetal programming, the effects are manifested later and not during early postnatal life. (Funded by the Virginia Pork Industry Board)

Key Words: Gestation Housing, Nursery Performance, Gilts

TH187 Group feeding dairy calves. D. G. Johnson*[1], C. Jergenson[1], and H. Chester-Jones[2], [1]*University of Minnesota*, *Morris*, [2]*University of Minnesota*, *Waseca*.

Heifer calves were used to evaluate the effect of early life nutritional level in a group management system on growth, feed costs and health. Calves (n=237) were assigned to groups (n=25) of 10 in super hutches by birth order. Calves were born in March - June and October-December calving seasons, with age within group ranging from 4 days to >2 weeks. Cows calved unattended on pasture or in an open shed during extreme weather. Accelerated (AG) groups were fed 2.2% of birth weight as milk replacer powder reconstituted over 2 equal feedings daily until the youngest calf in the group was 5 weeks old, reduced to once daily feeding for at least one week, then weaned when the group consumption averaged .91 kg starter/calf/day . Conventional (CG) groups were fed 1.1% of birth weight as milk replacer once daily, then weaned when the group consumed .91 kgof starter/head/day and the youngest calf in the group was >27 days old. Starter consumption (S) was restricted to 2.27 kg/day/calf, by group. Milk replacer (MR) was 22% protein, 20% fat. Calf starter was a premium 18% protein, highly palatable, low-molasses starter, but home ground 18% crude protein mix was utilized after per calf group consumption reached 2.2 kg. TMR was fed to groups that weighed >91kg. Feed cost to weaning per calf was AG, $116.19 vs CG, $54.52. Body weight and hip height, was recorded at birth weaning, 90 days, and 180 days. Statistical analysis was by Proc GLM /SAS with independent variables group and year, and birth weight as a covariate for individuals. Pen performance was weaning age (days), AG 55.1 vs CG 46.3 (P<.002); MR (kg), AG 37.2 vs CG 16.8 (P<.0001); S (kg), AG 14.2 vs CG 17.7 (P<.100); Gain at 35 days (kg), AG 10.9 vs CG 7.5 (P<.012); and Gain at 42 days (kg), AG 15.1 vs CG 10.9, (P<.027). Individual performance was weaning weight (kg), AG 67.4 vs CG 54.2 P<.0001); 90-day weight (kg), AG 97.1 vs CG 94.5 (P<.014); 180-day weight (kg), AG 168.6 vs CG 169.9 (NS); weaning hip height (cm), AG 87.6 vs CG 83.1 (P<.0001); 90-day hip height (cm), AG 92.8 vs CG 92.5 (NS); and 180-day hip height (cm) AG 106.4 vs CG 169.9 (NS). Weights and hip heights of AG were higher than CG at weaning but diminished by 180 days of age.

Key Words: Calves, Group Feeding, Replacement Growth

TH188 Impact of an acidifier in milk replacer or calf starter on Holstein heifer performance and health. M. Raeth-Knight*[1], B. Ziegler[2], R. Larson[2], S. Hayes[3], D. Ziegler[4], H. Chester-Jones[4], G. Golombeski[1], and J. Linn[1], [1]*University of Minnesota*, *St. Paul*, [2]*Hubbard Feeds*, *Mankato, MN*, [3]*Milk Products*, *Chilton, WI*, [4]*University of Minnesota, Southern Research and Outreach Center*, *Waseca*.

The objective of this study was to evaluate the impact of an acidifier (ERASE Micropearls®; 20% fumaric acid, 10% orthophosphoric acid, 10% citric acid, 10% malic acid) added to 20% protein:20% fat milk replacer (MR) or calf starter (CS) on performance and health of individually housed Holstein heifer calves from 2-4 d of age for 56 d. One-hundred-ten calves (40.46 ± 0.73 kg) were randomly assigned to 4 treatments:- 1) 0% acidifier (A) in MR and CS (CON); 2) MR with 0.75% A (MRA) and CS; 3) CS with 0.75% A (CSA) and MR; 4) MRA and CSA. All calves were offered MR at 0.284 kg (as-fed) in 1.99 L water 2X daily for the first 35 d, then 1X daily from d 36 to weaning at 42 d. Respective CS (21% CP, DM basis) and water were offered free choice. Feed intake, fecal scores and treatment costs were recorded daily. Body weight (BW) was measured d 1, 14, 28, 42 and 56 and hip heights d 1 and 56. Data was analyzed as repeated measures using the PROC Mixed procedures of SAS. The addition of acidifier in MR or CS was not effective in improving the performance or health of calves pre or post-weaning. Pre-weaning (d 1 to 42) calves on the CSA treatment consumed 3.5 kg less starter and gained 2.8 kg less BW than calves on the CON or MRA treatments (P =0.06). Treatment costs from d 1-56 were numerically lower for the acidified treatments ($1.72/calf) as compared to the control ($2.30/calf). Under the conditions of this study use of an acidifier in milk replacer or starter did not enhance calf performance.

Table 1. Treatments

Item	CON	MRA	CSA	MRA + CSA	SE
Initial BW, kg	40.23	40.45	40.32	40.45	0.7
Final BW, kg	74.97	75.15	72.65	73.92	1.4
Day 1 to 56					
Total DMI, kg	61.97	63.49	58.41	60.95	2.0
Feed/gain, kg	1.83	1.84	1.81	1.83	0.03
Trt cost, $/calf	2.30	1.93	1.50	1.77	0.5

Key Words: Dairy Calves, Feed Acidifiers, Feed Additives

TH189 Pre- and post weaning performance and health of calves fed different mik replacer programs using non-medicated additives and different feeding rates. S. Hayes*[1], B. Ziegler[2], R. Larson[2], D. Ziegler[3], H. Chester-Jones[3], M. Raeth-Knight[4], J. Linn[4], and G. Golombeski[4], [1]*Milk Products*, *Chilton, WI*, [2]*Hubbard Feeds*, *Mankato, MN*, [3]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [4]*University of Minnesota*, *St. Paul*.

One hundred-twenty-five 2 to 4 d-old dairy heifer calves (42.7 ± 0.84 kg) were randomly assigned to one of 5 medicated (20% protein:20% fat) milk replacer (MR) programs to evaluate their effect on pre- (42 d) and post weaning (43-56 d) calf performance and health. Calves were housed in individual calf pens within a curtain side-wall, naturally ventilated barn. Treatments (Trt) were:- 1), All-milk protein MR (control) fed at 0.284 kg (as-fed) in 1.99 L water 2X daily for 35 d, and then 1X daily from 36 to 42 d (MRC); 2), MRC fed as in Trt 1 for 21 d then reduced at d 22 to 1X daily at 0.46 kg in 3.18 L water to d 35, then 0.23 kg in 1.59 L water from 36 to 42 d; 3), MR including 5% spray-dried animal plasma and nutritional additives (APL) fed as Trt 1 for 21 d, then switched to MRC from 22 to 42 d fed same as Trt 1; 4), APL MR fed for 21 d as in Trt 3, then MRC fed 1X daily from 22 to 42 d as in Trt 2 ; 5) APL MR fed for 21 d as in Trt 3, then MRC fed at 0.23 kg 2X daily in 1.82 L water from 22 to 35 d, and 1X daily from d 36 to 42 d. Calves were offered a 21.2% CP (DM basis) texturized calf starter (CS) free choice with access to fresh water at all times. Total DMI from MR for 42 d averaged 22.72 kg/calf for Trt 1 & 3 and 20.76 kg/calf for Trt 2, 4, & 5. Milk replacer programs did not affect CS DMI or calf performance ($P > 0.05$). Overall 56-d daily gain and feed/gain averaged 0.69 and 1.89 kg, respectively. Under the conditions of this study, strategies to reduce MR feeding rate and/or the number of MR feedings resulted in similar performance and health compared to the control calves. Calves fed MR supplemented with APL showed similar performance and health to calves fed all milk protein milk replacers.

Key Words: Dairy Calves, Feeding Strategies, Performance

TH190 Pre- and post weaning performance and health of calves fed texturized calf starters with different processed corn or on a different milk replacer feeding schedule. B. Ziegler*[1], R. Larson[1], D. Ziegler[2], H. Chester-Jones[2], M. Raeth-Knight[3], G. Golombeski[3], and J. Linn[3], [1]*Hubbard Feeds*, *Mankato, MN*, [2]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [3]*University of Minnesota*, *St. Paul*.

One hundred-eight 2 to 4 d-old dairy heifer calves (40.5 ± 0.81 kg) were randomly assigned to one of 4 treatments to evaluate their effect on pre- (42 d) and post weaning (d 43-56) calf performance and health. Calves were housed in 2.29 × 1.17 m individual calf pens, within a frame-steel curtain side-wall, naturally ventilated barn. All calves were fed a 20% fat, 20% protein all-milk protein medicated milk replacer (MR) with 19.7% CP (DM basis) calf starters (CS) fed free choice with access to fresh water. Treatments (Trt) were: 1), Texturized calf starter (CS) based on steam flaked corn, pellet and oats (SF); 2), CS based on whole corn and pellet (WC); 3), CS based on roasted corn, pellet and oats (RC); and 4) CS as in Trt 3 but fed a different MR feeding schedule (RC1X). Treatment 1, 2 and 3 calves were fed MR at 0.284 kg (as-fed) in 1.99 L water 2X daily for the first 35 d, then 1X daily from d 36 to 42 d. Treatment 4 calves were fed as the other calf groups for d 1-14 then offered 0.568 kg MR (as-fed) in 3.98 L water 1X daily from d 15-35 and 0.284 kg in 1.99 L water from 36 to 42 d. There was no effect on calf performance due to CS fed during the first 28 d ($P > 0.05$). During d 29-42, calves fed WC gained less ($P < 0.05$) than those fed RC. Calves fed WC had the lowest CS DMI ($P < 0.05$) during d 29-42. There were no Trt differences ($P > 0.05$) in overall pre-weaning calf performance. Overall 56 d calf performance was similar ($P > 0.05$). Daily gain and feed/gain averaged 0.66 and 1.98 kg, respectively. Under the conditions of this study, overall calf performance and health were not affected by corn form in the CS or milk feeding schedule. Once a-day milk feeding did not change CS intake as was anticipated.

Key Words: Dairy Calves, Calf Starters, Performance

TH191 Performance of post weaned Holstein heifer calves transitioned to group housing using different management strategies while fed a common diet. D. Ziegler*[1], B. Ziegler[2], M. Raeth-Knight[3], R. Larson[2], G. Golombeski[3], J. Linn[3], and H. Chester-Jones[1], [1]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [2]*Hubbard Feeds*, *Mankato, MN*, [3]*University of Minnesota*, *St. Paul*.

Our objective was to evaluate the impact of three 14-d post-weaning transition grouping strategies on heifer performance over a 112 d study from 2 to 6 months of age. One hundred-eight Holstein heifer calves (77.38 ± 2.28 kg; 60 ± 1.6 d of age) were randomly assigned to 1 of 3 treatments. Treatments d 1-14 were: 1), Calves moved immediately from the nursery barn to group housing in a grower barn in 6 replicated 9.14 × 4.57 m pens of 6 calves/pen (GM); 2), Calves not moved but changed to group pens in 6 replicated 7.02 × 2.29 m pens of 6 calves/pen within the same nursery barn (GN); or 3), Calves not moved and continued to be individually housed d 1-14 in 2.29 × 1.17 m pens within the same nursery barn (IN). On d 15, calves assigned to GN and IN were moved to the grower barn in 6 replicated pens of 6 calves/pen (GN calves remained in their respective groups). During d 1-7 of the study all calves were fed a complete texturized 20.1% CP (DM basis) calf starter and d 8-14 transitioned to whole corn and pellet 17% CP (DM basis) grain mix. After the feed transition, all group pens were fed 2.73 kg/d of the grain mix for d 1-28 and 2.27 kg/d from d 29 -112 with free choice hay. Transition strategy did not affect calf performance ($P > 0.05$) from d 1-14. Daily gain and feed/gain averaged 0.92 and 2.76 kg, respectively. The GM calves had higher ($P = 0.03$) daily gains (1.03 kg) from d 15-112 than GN (0.99 kg) calves with IN calves being similar (1.02 kg). Calves assigned to IN had lower feed/gain ($P = 0.05$) from d 15-112 (3.88 kg) compared to GN (3.99 kg) and GM (4.01 kg) calves.

Under the conditions of this study delaying socialization for 14 d resulted in similar growth as compared to calves grouped housed for 112 d.

Key Words: Dairy Calves, Transition Management, Performance

TH192 Performance and growth of Holstein dairy heifers fed grain mixes supplemented with differing protein and non-protein nitrogen sources. R. Larson*[1], B. Ziegler[1], M. Raeth-Knight[2], G. Golombeski[2], J. Linn[2], H. Chester-Jones[3], and D. Ziegler[3], [1]*Hubbard Feeds*, *Mankato, MN*, [2]*University of Minnesota*, *St. Paul*, [3]*University of Minnesota Southern Research and Outreach Center*, *Waseca*.

Ninety dairy heifers (88.3 ± 1.73 kg BW) were used in a 112-d study to evaluate feed intake and performance from 9 to 25 weeks of-age. Heifers were housed in 9.14 × 4.57 m pens (6 heifers/pen) within a naturally ventilated bedded-pack pole barn and randomly assigned to 1 of 3 grower diets among 5 replicated pens/treatment. Treatments (Trt) were:-1), 16% CP 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 (CON); 2), Same as CON Trt with 1.01% urea in the grain mix (UREA); 3) Same as CON Trt with 6.01% rumen fermentation enhancer (FERMENTEN®; 43% CP, as-fed; FERM). Each treatment group was offered a 16.6% CP (as-fed) hay free choice (FC) for the duration of the trial. During the first 28 d, heifers fed UREA had lower ($P< 0.05$) daily gains than those fed CON, with FERM heifers being similar to the other groups. Heifer performance was similar across all groups from d 29 to 112 ($P > 0.05$). Overall 112 d gain was higher ($P < 0.05$) for CON heifers (1.08 kg/d) compared to those fed UREA (1.02 kg/d), with FERM heifers being intermediate (1.04 kg/d). There were no overall differences in total DMI, DMI as a percentage of BW, feed/gain or body condition score change ($P > 0.05$) which averaged 4.24 kg/d, 3.26%, 4.02 kg/kg gain and +0.80, respectively. Under the conditions of this study, heifers limit-fed a 16% CP grain mix containing urea (average 0.024 kg/heifer daily) with FC hay had lower overall gains from 9 to 25 weeks of-age than those fed a grain mix without urea mainly due to the first 28 d of the study. Including a rumen fermentation enhancer in the grain mix (FERMENTEN®; average 0.14 kg/heifer daily) did not improve heifer performance.

Key Words: Dairy Heifers, Grain Mixes and Protein Sources, Performance

TH193 Performance and growth of young Holstein dairy heifers limit-fed diets based on body weight. H. Chester-Jones*[1], D. Ziegler[1], R. Larson[2], B. Ziegler[2], M. Raeth-Knight[3], and G. Golombeski[3], [1]*University of Minnesota Southern Research and Outreach Center*, *Waseca*, [2]*Hubbard Feeds*, *Mankato, MN*, [3]*University of Minnesota*, *St. Paul*.

Ninety dairy heifers (91.68 ± 0.72 kg BW) were used in a 112-d study to evaluate feed efficiency and performance from 9 to 25 weeks of-age when reducing total DMI as a % of BW below an expected 3% or greater shown from previous studies. Heifers were housed in 9.14 x 4.57 m pens (6 heifers/pen) within a naturally ventilated bedded-pack pole barn and randomly assigned to 1 of 3 grower diets among 5 replicated pens/treatment. Treatments (Trt) were: 1), 18% CP grain mix control (58.75% cracked corn, 40% pellet, 1.25% tallow) fed at 2.72 kg/d for 28 d and 2.27 kg/d from d 29 to 112 with access to free choice (FC) 15.24% CP (DM basis) hay (CON); 2), 18% CP grain mix fed as for CON with limit hay feeding based on cumulative DMI of grain and hay to equal 3% of projected BW by 14-d periods (3DMI); 3), 18% CP grain mix fed at 2.72 kg/d for 14 d, 2.39 kg/d from d 15-28 and 2.05 kg/d d 29-112 with limit hay feeding based on cumulative DMI of grain and hay to equal 2.7% of projected BW by 14-d periods (2.7DMI). Initial BW and estimated daily gains were based on previous studies of 0.98, 1.07, 1.09, 1.0, 1.0, 0.98 and 0.93 kg by 14-d periods and were used to project period BW. Total DMI and DMI as a % of BW were lowest ($P < .05$) for heifers fed 2.7DMI for each 14-d period from d 15 to 112 except d 29-42 when CON had similar DMI to 2.7DMI ($P > 0.05$). Total DMI d 1-112 were 8.5 and 8.9% less for 2.7DMI than heifers fed 3DMI and CON, respectively. Overall 112 d daily gain was lowest (0.99 kg; $P < 0.05$) for 2.7DMI heifers being 5.7 (1.05 kg) and 9.2% (1.09 kg) less than those fed 3DMI and CON, respectively. There were no Trt differences ($P > 0.05$) in feed/gain. Although limit feeding young heifers under the conditions of this study did not improve feed efficiency, it did offer acceptable growth and body weight gain. Further research on optimum hay quality when limit feeding is needed.

Key Words: Dairy Heifers, Limit-Feeding Diets, Performance

TH194 Pre- and post weaning performance and health of calves fed milk replacers supplemented with trace minerals from differing sources. G. Golombeski*[1], S. Hayes[2], M. Raeth-Knight[1], B. Ziegler[3], R. Larson[3], D. Ziegler[4], H. Chester-Jones[4], and J. Linn[1], [1]*University of Minnesota*, *St. Paul*, [2]*Milk Products*, *Chilton, WI*, [3]*Hubbard Feeds*, *Mankato, MN*, [4]*University of Minnesota Southern Research and Outreach Center*, *Waseca*.

One hundred-seven 2 to 4 day-old dairy heifer calves (40.1 ± 0.61 kg) were randomly assigned to one of 3 medicated, all-milk protein (20% protein:20% fat) milk replacers (MR) with supplemental trace mineral treatments to evaluate their effect on pre- and post weaning calf performance and health. Calves were housed in 2.29 × 1.17 m individual calf pens, within a curtain side-wall, naturally ventilated barn. Treatments were: 1), MR control containing inorganic trace minerals (INORGMR); 2), MR containing organic trace minerals (ORGMR); 3), ORGMR with organic selenium (Se; ORGSEMR). Milk replacers were fed at 0.284 kg (as-fed) in 1.99 L water 2X daily for the first 35 d, then 1X daily from d 36 to weaning at 42 d. Calves were offered a 21.4% CP (DM basis) texturized calf starter (CS) free choice and had access to fresh water at all times. Total DMI from MR for 42 d averaged 20.56 kg/calf. There were no pre- and post weaning performance differences by treatments ($P > 0.05$). Pre-weaning total DMI, gain and feed/gain averaged 37.23, 21.33, and 1.83 kg, respectively. Post weaning CS DMI, gain, and feed/gain averaged 25.60, 12.70 and 2.02 kg, respectively. Overall 56-d daily gain and feed/gain averaged 0.61 and 1.91 kg, respectively. Hip height gain was greater ($P < 0.02$) for calves fed ORGMR vs. those fed INORGMR. Calves fed ORGSEMR had higher ($P <0.03$) serum Se on d 14 compared to those fed ORGMR with INORGMR being intermediate. Health treatment costs/calf were similar across treatments. Under the conditions of this study, feeding a MR containing organic trace minerals with or without organic Se did not affect pre- and immediate post weaning calf performance and health compared to calves fed MR with inorganic trace minerals.

Key Words: Dairy Calves, Milk Replacer Trace Minerals, Performance

TH195 Effect of the origin, month born, and shipment group on growth of Holstein heifers at a raising facility. J. Wohlt*[1], C. Jin[1], and J. Ferguson[2], [1]*Rutgers University*, *New Brunswick, NJ*, [2]*University of Pennsylvania*, *Kennett Square*.

Twelve groups (9 to 23 head/shipment group) of Holstein heifers (total n = 179, 60 and 40% from PA and DE, respectively) were received at Rutgers University (New Brunswick) from either the University of Pennsylvania (Kennett Square) and/or the University of Delaware (Newark). Some shipments contained heifers from each origin as the same transportation route (161 km) was used. Heifers were approximately 3 months of age at receipt with the 12 shipments occurring between April 2004 and October 2005. Heifers were grouped in pens (5 to 7 head/pen) in a loose housing system and fed (NRC, 2001) diets for an 0.82 kg ADG. Once monthly each heifer between the ages of 3 to 18 months was weighed (Weight-By-Breed Management Tape), height at the withers measured, and body condition (1=thin, 5=fat) scored. Data were analyzed by ANOVA using GLM procedures with shipment groups, origin, and month born being main effects. Body weight increased ($P < 0.01$) linearly with heifer age, but height and body condition score increases were curvilinear. Growth rate, determined by linear regression analysis, did not differ with heifer origin: DE 0.84 kg/d, PA 0.83 kg/d. Heifer growth did differ ($P < 0.01$) among groups ranging from 0.73 to 0.97 kg/d. Heifers born between January and June compared to those born between July to December grew at a slower ($P < 0.01$) rate; 0.74 vs. 0.80 kg/d. The data suggest that early life events (nutrition, illness, etc.) may have long-term carry over effects on heifer growth at a raising facility.

Key Words: Dairy Heifer, Growth, Origin of Heifer

TH196 The association of mortality and 60 day culling rates with housing, feeding and pasture systems. C. D. Dechow*[1] and R. C. Goodling[2], [1]*Penn State University*, *University Park*, [2]*Pennsylvania State Cooperative Extension*, *University Park*.

The objective of this study was to determine the association of various housing and management systems with measures of cow welfare, including mortality rates and culling by 60 days in milk (CR60). Herd surveys were received from 316 Pennsylvania dairy herds that participate in DHI herd testing and that had data available in 2005. The herd surveys identified feeding system (TMR = total mixed ration, CF = component feeding), housing system (FS=free stall, TS = tie stall, other), and pasture access (regular pasture, occasional pasture, exercise lot, no outdoor access). There was significant confounding of feeding, housing and pasture systems with herd size. Of herds with 100 cows or more (60 herds), 7% were TS, 22% had pasture access, and 97% fed TMR. Herds with fewer than 100 cows were more likely to have pasture access (62%), house cows in a TS (73%), or use CF (37%). Feeding, housing, and pasture system were analyzed with the GLM procedure of SAS. Least-squares-means (LSM) for mortality and CR60 were significantly higher in TMR fed herds (5.0% and 8.2%, respectively) than in CF herds (3.2% and 6.7%, respectively). Mortality rate was significantly lower in TS herds (3.3%) than in FS herds (4.9%), as was CR60 (6.3% versus 8.8%). Feeding, housing and pasture system were also combined into five total herd management systems. The most optimal herd environment (TS, CF, with pasture access) had LSM for mortality rate of 2.1% and CR60 of 5.3%, whereas the corresponding LSM for the least optimal environment (FS or other, TMR, no outdoor access) were 6.3% and 9.1%, respectively. While management system effects were highly significant, they explained less than 10% of herd variation in mortality and CR60, which highlights challenges of associating cow welfare with herd type. In particular, the results indicate that legislative efforts to eliminate TS because of concern over limited cow movement may actually compromise cow welfare and reduce pasture access.

Key Words: Mortality, Housing, Pasture

TH197 How winter conditions affect feed intake of steers in different housing systems. H. Koknaroglu[1], Z. Otles[2], T. Mader[3], T. Purevjav*[4], and P. Hoffman[4], [1]*Suleyman Demirel University, Department of Animal Science*, *Isparta, Turkey*, [2]*Frontier Science and Technology Research Foundation*, *Madison, WI*, [3]*University of Nebraska*, *Lincoln*, [4]*Iowa State University*, *Ames*.

A total of 182 yearling steers of predominantly Angus and Hereford breeds, with mean body weight of 327 kg, were used in this study, which started on 8 November and finished on 12 April, to assess the effects of environmental factors on feed intake of steers in various housing systems. Housing consisted of outside lots with access to overhead shelter, outside lots with no overhead shelter and a cold confinement building. Ad libitum corn, 2.27 kg of 35% dry matter whole plant sorghum silage and 0.68 kg of a 61% protein-vitamin-mineral supplement was offered. Feed that was not consumed was measured to determine feed intake. The temperature data were recorded by hygro-thermographs. Hourly temperatures and wind speed were used to develop weather variables. Regression analysis was used and weather variables were regressed on dry matter intake (DMI). When addition of a new variable did not improve R2 more than one unit, then the number of variables in the model was truncated. Cattle in confinement tended to have lower DMI than those in open lots and those in open lots with access to an overhead shelter ($P > 0.05$). Effect of cold was predominantly displayed in January in the three housing systems. In terms of explaining variation in DMI, in outside lots with access to overhead shelter, afternoon and peak temperatures were important factors, whereas in open lots, evening, nocturnal temperatures and windchill index were important factors ($P<0.05$). In confinement buildings, daytime, nocturnal temperatures and windchill index were the most important factors explaining variation in DMI. Results show that winter conditions have detrimental effect on performance of cattle and when considering these results, cattle producers wishing to improve cattle feedlot performance should provide overhead shelter which provides more favorable conditions.

Key Words: Cold Stress, Dry Matter, Steers

TH198 Effect of age and breed on reproductive performance in the tropics. II. Beef heifers bred at 11 to 16 months of age. Year 2004. A. C. Pereira*[1], R. L. Remonatto[2], G. R. Pacheco[2], E. J. Bungenstab[1], and S. P. Schmidt[1], [1]*Auburn University*, *Auburn, AL*, [2]*IACO Agrícola S.A.*, *Chapadão do Sul, Mato Grosso do Sul, Brazil*.

The objective was to determine the influence of breed and age of eight breeds of beef heifers 11 to 16 mo old when exposed to bulls in a tropical environment. Breeds used were Bonsmara (BN), Boran (BO), Brahman (BR), Composite (CO), ½ Nellore x ½ Angus (F1), Nellore (NE), Senepol (SE), and Tuli (TU). Heifers born from July to December, 2002, (n = 9,235) were allocated by age and exposed to bulls Nov 1 to Dec

31, 2003, at 11, 12, 13, 14, 15, and 16 mo of age. Pregnancy status was determined by trans-rectal palpation. All ages had an effect on pregnancy rate ($P < 0.001$). Heifers at 16 month had a higher ($P < 0.01$) pregnancy rate (32% ± 3.5) compared with all other ages with exception of 15 month (21% ± 3.4). There also was a breed effect ($P<0.01$). More F1 heifers were pregnant (32% ± 1.1; ($P<0.01$) than all other breeds; next were TU heifers (18% ± 1.1) which were higher ($P<0.01$) than all other breeds with the exception of BN (5.9% ± 6.3) and BO (9.5 ± 6.3). There was a age x breed interaction on pregnancy rate ($P<0.01$). F1 Heifers at 16 month (65 ± 2.9%) did not differ from SE breeding at 16 month (60 ± 15.8%) but had a higher pregnancy rate than all others. The heifer F1 breeding at 15 months (49 ± 2.1) did not differ from SE breeding at 16 months (60% ± 15.8) but had a higher pregnancy rate than all others. These data indicate that under the condition of this study in a tropical area, F1 and SE heifers were superior in pregnancy rate at 16 month, but F1 heifers may reach maturity as early as 15 mo of age.

Key Words: Beef Heifers, Reproduction, Breeding Season

TH199 Effect of age and breed on reproductive performance in the tropics. I. Beef heifers bred at 11 to 15 months of age. Year 2002. E. J. Bungenstab*[1], R. Remonatto[2], G. R. Pacheco[2], A. C. Pereira[1], and S. P. Schmidt[1], [1]*Auburn University*, *Auburn, AL*, [2]*IACO Agrícola SA*, *Chapadão do Sul, MS, Brazil*.

The objective was to determine the influence of breed and age of four breeds of beef heifers 11 to 15 mo of age when exposed to bulls in a tropical environment. Breeds used were Tuli (TU), Brahman (BR), Composite (CO), and ½ Nellore × ½ Angus (F1). Heifers born from July to December, 2000, (n = 6,687) were allocated by age and exposed to bulls from November, 2002 through January, 2003, at 11, 12, 13, 14, and 15 mo of age. Pregnancy status was determined by trans-rectal palpation. Age had an effect on pregnancy rate ($P < 0.01$). Heifers breeding at 15 mo had the highest ($P < 0.01$) pregnancy rate (46 ± 1.7%) followed by 14 mo (37 ± 1.1%), 13 mo (26 ± 1.0%), 12 mo (14 ± 0.9%) and 11 mo (9 ± 1.9%) which was not different from 12 mo. There also was a breed effect ($P < 0.01$). The F1 heifers had a higher ($P < 0.01$) pregnancy rate (42 ± 1.3%) than all other breads. The TU heifers (27 ± 1.4%) were next and were higher ($P < 0.01$) than BR (12 ± 1.1%) but did not differ from CO (23 ± 1.1%). BR heifers (12 ± 1.1%) had the lowest ($P < 0.01$) pregnancy rate. There was an age x breed interaction on pregnancy rate ($P < 0.01$). F1 Heifers breeding at 15 mo (67 ± 5.1%) did not differ from F1 at 14 mo (62 ± 2.4%) and TU at 15 mo (56 ± 2.2%); however, those three had higher ($P < 0.01$) pregnancy rates than all others. These data indicate that in tropical areas, F1 heifers matured earlier and could be bred at 14 months of age.

Key Words: Beef Heifers, Reproduction, Breeding Season

TH200 Effect of early weaning of first-calf beef heifers. II. On calf and subsequent open heifer performance in the tropics. E. J. Bungenstab*[1], R. Remonatto[2], G. R. Pacheco[2], A. C. Pereira[1], and S. P. Schmidt[1], [1]*Auburn University*, *Auburn, AL*, [2]*IACO Agrícola SA*, *Chapadão do Sul, MS, Brazil*.

The objective was to investigate the effect of three calf weaning ages from first-calf heifers on subsequent dam and calf performance. From a herd of 650 ½ Angus × ½ Nellore primiparous heifers, 123 that had male calves born between October 1 and 15 were selected and bred to composite bulls (¼ Tuli, ¼ Angus, ½ Brahman) during November and December. In March, following trans-rectal palpation, heifers were stratified by pregnancy status (63 pregnant or 60 open) and assigned randomly to three groups: normal weaning age at 7 mo ± 7 d (7M), early weaned at 6 mo ± 7 d (6M), or at 5 mo ± 7 d (5M). No groups received supplementation. For all observations, d 0 = day 5M calves were weaned. Heifer body weights were taken on d 0, 30, 60, 90 and 315; body condition scores (BCS) were determined on d 0, 60 and 90; calf weights were taken on d 0, 30, 60, 90, 120, 150 and 315. Data reported here are for the 60 first-calf heifers that were not pregnant but were nursing their first calves. Heifer weights (410 ± 41 kg) and BCS (4.30 ± 0.5) were not different ($P > 0.05$) at d 0 when the 5M calves were weaned. By d 30 (420 vs. 395 kg) and continuing to d 90 (444 vs. 399 kg), 5M heifers weighed more ($P < 0.05$) than 7M heifers; 6M heifers were intermediate (426 kg) and not different from either 5M or 7M ($P > 0.05$). Similarly, BCS was greater for 5M than 7M at d 90 (5.4 vs. 4.9; $P < 0.05$), and 6M was intermediate (5.1; $P > 0.05$). Because these first-calf heifers were open, they were sold after calves were weaned. At d 0, there were no differences in calf weights (154 ± 16 kg). By d 30, 5M calves weighed less ($P < 0.05$) than 6M or 7M calves (170, 187, 185 kg, respectively). 5M calves continued to weigh less than 6M or 7M calves through d 150. By d 315, calf sale weights among weaning treatments were similar (290 ± 26 kg; $P > 0.05$). These data imply that early weaning (5M) will not affect calf sale weight, while significantly increasing cow weight, resulting on a heavier sale weight at 90 days after early weaning.

Key Words: Early Weaning Tropics, First-Calf Heifers, Performance

TH201 Effect of early weaning of first-calf beef heifers. I. On calf and subsequent heifer weights and pregnancy for third-parity in the tropics. A. C. Pereira*[1], R. Remonatto[2], G. R. Pacheco[2], E. J. Bungenstab[1], and S. P. Schmidt[1], [1]*Auburn University*, *Auburn, AL*, [2]*IACO Agrícola SA*, *Chapadão do Sul, MS, Brazil*.

The objective was to investigate the effect of three calf weaning ages from first-calf heifers on subsequent dam and calf performance. From a herd of 650 ½ Angus x ½ Nelore primiparous heifers, 123 that had male calves born between October 1 and 15 were selected and bred to composite bulls (¼ Tuli, ¼ Angus, ½ Brahman) during November and December. In March, following trans-rectal palpation, heifers were stratified by pregnancy status (63 pregnant or 60 open) and assigned randomly to three groups: normal weaning age at 7 mo ± 7 d (7M), early weaned at 6 mo ± 7 d (6M), or at 5 mo ± 7 d (5M). No groups received supplementation. For all observations, d 0 = day 5M calves were weaned. Heifer body weights were taken on d 0, 30, 60, 90 and 315; body condition scores (BCS) were determined on d 0, 60 and 90; calf weights were taken on d 0, 30, 60, 90, 120, 150 and 315. Data reported here are for the 63 first-calf heifers that were pregnant. Heifer weights (422 ± 47 kg) and BCS (4.61 ± 0.49) were not different ($P > 0.05$) at d 0 when the 5M calves were weaned. By d 30 (436 vs. 402 kg) and continuing to d 90 (467 vs. 406 kg), 5M heifers weighed more ($P < 0.05$) than 7M heifers; 6M heifers were intermediate and not different from 5M (462 kg; $P > 0.05$). Similarly, BCS were similar for 5M and 6M at d 90 (5.7 vs. 5.6; $P > 0.05$) and greater than 7M (5.1; $P < 0.05$). There was a weaning treatment response for overall pregnancy rate. More ($P < 0.05$) 5M heifers were pregnant (87.5%) compared to 7M (50.0%); 6M heifers were intermediate and not different from 5M or 7M (66.7%; $P > 0.05$). At d 0, there were no differences in calf weights (150 ± 19 kg).

By d 60, 5M calves weighed less ($P < 0.05$) than 6M or 7M calves (168, 187, 188 kg, respectively). The 5M calves continued to weigh less than 6M or 7M calves through d 150. By d 315, calf weights among weaning treatments were similar (285 ± 28 kg; $P > 0.05$). These data imply that early weaning (5M) will increase pregnancy rate at re-breeding without affecting calf weight when sold.

Key Words: Early Weaning Tropics, First-Calf Heifers, Performance

TH202 Effect of calving scheme, seasonal vs. year-round, on production, reproductive performance, and culling by organically-managed dairy herds in Southeastern Pennsylvania. K. Griswold*[1], H. Karreman[2], and J. High[3], [1]*Penn State Cooperative Extension*, *University Park*, [2]*Penn Dutch Cow Care*, *Gap, PA*, [3]*Lancaster DHIA*, *Manheim, PA*.

The effects of seasonal calving (SC) vs. year-round calving (YRC) on production, reproductive performance and culling were examined using a combination of survey and DHIA data. Initially, 38 organically-managed (OM) herds using Lancaster DHIA services were recruited for the study, but only 29 herds returned completed surveys. The survey consisted of 308 questions concerning herd demographics, milk quality, health, reproduction, nutrition, and young stock. Monthly DHIA 202 report data from 2006 for each herd were used for the study. Data were analyzed using PROC MIXED within SAS. The model included the fixed effect of calving scheme and the random effect of farm. Significant differences were determined at $P < 0.05$, and trends were determined at $0.05 < P < 0.15$. LS means with standard errors are presented in the table below. The results indicate that SC herds produced significantly less total milk and total components per cow per year compared to YRC herds. Milk fat % was not affected ($P > 0.15$), but there was a trend for milk protein % to be greater for SC herds compared to YRC herds. For reproductive performance, SC herds had significantly fewer days to 1st service, greater pregnancy rates, and fewer days open compared to CM herds. The overall cull rate was not affected ($P > 0.15$) by calving scheme, but there was a trend for YRC herds to cull more cows for reproductive reasons whereas SC herds tended to cull more cows for mastitis. These results suggest that among organic dairies, seasonal calving herds have greater challenges with milk production and mastitis while year-round calving herds have greater challenges with reproductive performance.

Table 1. Effect of calving scheme on production, reproduction, and culling by organic dairy herds

Item	Seasonal	SE	Year-round	SE	*P*
Milk yield, kg/cow/yr	6,247	511	7,698	209	0.015*
Fat, kg/cow/yr	243	18	289	7	0.03*
Protein, kg/cow/yr	196	15	231	6	0.04*
Milk protein, %	3.20	0.07	3.08	0.03	0.12**
Days to 1st Service	79	6.6	96	2.7	0.02*
Pregnancy rate, %	25.3	2.2	16.1	0.9	0.0007*
Days Open	118	9.8	152	4.0	0.004*
Cows left herd for reproduction, %	1.3	2.2	5.2	0.9	0.11**
Cows left herd for mastitis, %	6.3	1.9	3.0	0.8	0.13**

*Difference $P < 0.05$, **Trend $0.05 < P < 0.15$

Key Words: Organic, Calving Scheme, Milk Yield

TH203 Influence of horn flies on the behavior of beef cattle. H. T. Boland*[1] and G. Scaglia[2], [1]*Virginia Tech*, *Blacksburg*, [2]*Iberia Research Station, LSU Agricultural Center*, *Jeanerette, LA*.

The horn fly (*Haematobia irritans*) is a common pest of cattle. When fly populations are high they can reduce animal performance leading to economic losses for producers. A study was conducted to evaluate the effects of a heavy burden of horn flies on the behavior of beef cattle. Angus-cross steers (n=4) that were being grass-finished on endophyte-free tall fescue (*Festuca arundinacea* Shreb.) were evaluated prior to and after application of 40% organophosphate ear tags. Fly-avoidance activities (head throw, tail or ear flick, front and rear leg kick, and skin twitch) and grazing behavior parameters (bite rate and number of feeding stations) were recorded over two-1 minute periods during morning and afternoon grazing bouts. High resolution digital photographs were taken of each steer from a lateral view at each sampling time. Images were analyzed with computer software to determine the number of flies present. Behavior and fly counts were monitored from 2 d prior until 3 d after fly tag application. Data were analyzed using the SAS procedures CORR and MIXED with Tukey's adjustment for means separation. There were more (P=0.003) flies present per animal before tagging (831) than after (203). Prior to tagging steers exhibited a greater number of tail flicks (P=0.01) and leg kicks (P=0.002). There was a linear effect of day (P=0.06) on bite rate (bites/min), with rate increasing after fly tags were applied. Bite rate was negatively correlated to the number of flies on the steers (r=-0.31, P=0.006) while the number of feeding stations was positively correlated (r=0.43, P<0.0001). Head throws (r=0.27), tail flicks (r=0.50), leg kicks (r=0.47), and skin twitches (r=0.45) were all positively correlated ($P \leq 0.02$) to the number of flies on the steers. High fly populations had a negative impact on the behavior of grazing cattle. Decreasing fly burdens can promote animal well-being by decreasing the display of fly-avoidance activities and increasing bite rate.

Key Words: Grazing Behavior, Bite Rate, Insecticide

TH204 Description of factors influencing reticular temperatures in lactating dairy cows. J. M. Bewley*, M. E. Einstein, M. W. Grott, and M. M. Schutz, *Purdue University*, *West Lafayette, IN*.

The Phase IV Cattle Temperature Monitoring System (CTMS, Phase IV Engineering Inc., Boulder, CO) utilizes a passive bolus equipped with a temperature sensor, a stationary panel reader to query the bolus, and software to collect data. The biologically inert bolus resides in the cow's reticulum and is queried each time the cow passes the reader. Cow temperatures were collected immediately after each milking from 298 Holstein cows at the Purdue Dairy Research and Education Center (DREC) from June 1, 2006 to August 31, 2007. Cows were managed in 3 housing systems: a freestall barn (FS) with 128 stalls in 4 quadrants, a bedded-pack barn with an open grass lot (BP), and a geothermally-modified barn with tiestalls for overflow and sick cows and box stalls for recently fresh cows (GM). Ambient weather conditions were recorded at 0.5 h intervals at the Purdue Agronomy Research Farm, which is adjacent to the DREC. Raw cow reticular temperatures were edited to remove erroneous reads and temperatures potentially influenced by water intake. Unadjusted mean reticular temperature for the remaining 131,181 temperatures was 38.77 (± 0.44). The PROC MIXED procedure of SAS was used to assess the impact of milking time, parity, temperature humidity index (THI), housing system, days in milk, and milk production, on reticular temperatures. All main effects were significant ($P < 0.01$) except for THI which was, however, significant in 2-way interac-

tions (with barn, milk weight, or date). Temperatures decreased as cows progressed through lactation. Temperatures were higher for the PM milking than the AM milking ($P < 0.0001$). Variation in temperatures increased with increasing THI. After accounting for other effects in the model, the impact of increasing THI on reticular temperatures was higher for BP cows than FS or GM cows. An automated temperature monitoring system could be useful for herd management, however, variation caused by several factors must be considered for correct interpretation of temperatures provided by such a system.

Key Words: Temperature Monitoring, Reticular Temperature

TH205 Relationship of temperament and growth in the suckling beef calf. K. J. Matheney*[1], J. P. Banta[1], D. A. Neuendorff[1], T. H. Welsh, Jr.[2], R. C. Vann[3], and R. D. Randel[1], [1]*Texas AgriLife Research and Extension*, *Overton*, [2]*Texas AgriLife Research*, *College Station*, [3]*Mississippi State University*, *Raymond*.

Exit velocity (EV) has been reported as an effective measure of temperament in Brahman calves after weaning (Curley et al., 2006; JAS 84:3100-3103.). This experiment was conducted to evaluate the relationship of EV on weaning weight of suckling Brahman calves (n = 109). Additionally, evaluation of EV during the suckling period was examined from d 21-24 through weaning. Cows were assigned a temperament score from 1 to 3 (1 = calm, n = 35; 2 = intermediate, n = 47; 3 = temperamental n = 27). Exit velocity and BW were collected on d 21-24 and every 28 d through weaning; weaning BW was adjusted to 173 d according to BIF guidelines. Calves were classified at weaning based on EV, with calves 1 SD slower than the mean classified as calm (C; n = 16; 0.72 ± 0.18 m/s), calves 1 SD faster than the mean classified as excitable (E; n = 23; 3.61 ± 0.47 m/s), and all others classified as intermediate (I; n = 70; 1.77 ± 0.53 m/s). This was repeated with EV measurement taken 28 d prior to weaning, C (n = 21; 0.85 ± 0.23 m/s), I (n = 71; 2.11 ± 0.52 m/s), E (n = 17; 3.83 ± 0.55 m/s), and on d 21-24, C (n = 13; 0.24 ± 0.09 m/s), I (n = 1.01 ± 0.45 m/s), and E (n = 13; 2.86 ± 0.50 m/s). The statistical model used for analysis included EV classification being tested, calf sex, and cow temperament as fixed effects; calf sire was included as a random effect. Classification by EV at weaning, 28 d prior to weaning, and d 21-24 were not significantly related to calf BW at weaning ($P > 0.10$; Table 1). Correlations were determined between EV on d 21-24 and at weaning ($r = 0.41$; $P < 0.001$), and 28 d prior to weaning with EV at weaning ($r = 0.69$; $P < 0.001$). The results from this experiment suggest that temperament does not affect growth of the suckling calf. These data suggest that calves can be evaluated for temperament using EV as early as 21-24 d of age.

Table 1. Effect of EV classification on adjusted weaning BW, kg

	Calm	Intermediate	Excitable	P =
Day 21-24	195.7 ± 6.4	204.3 ± 4.2	202.7 ± 5.6	0.32
28 days prior to weaning	201.9 ± 6.0	204.2 ± 4.3	199.1 ± 5.8	0.57
Weaning	204.1 ± 6.1	203.9 ± 4.3	199.2 ± 5.4	0.58

Key Words: Temperament, Calves, Growth

TH206 Effect of supplemental saturated fatty acids on production and body temperature in heat-stressed mid-lactation dairy cows. J. P. Wang[1,2], D. P. Bu[1], J. Q. Wang*[1], X. K. Huo[1], T. J. Guo[1], H. Y. Wei[1], L. Y. Zhou[1], R. R. Rastani[3], L. H. Baumgard[4], and F. D. Li[2], [1]*Chinese Academy of Agricultural Sciences*, *Beijing, China*, [2]*Gansu Agricultural University*, *Gansu, China*, [3]*MSC Specialty Nutrition*, *Dundee, IL*, [4]*University of Arizona*, *Tucson*.

Study objectives were to investigate the effect of supplemental saturated fatty acids (Energy Booster 100®) on body temperature, production and body condition of mid-lactation Holstein dairy cows (n=48; 184 ± 17 DIM; 30.8 ± 3.3 kg of milk/d and parity=2.2) experiencing heat stress. Cows were allocated into three treatments (n=16) according to a completely random block design and were fed individually in a tie-stall facility. Three treatment diets consisted of supplemental saturated fatty acids at 0, 1.5 or 3.0% of dry matter (C, LF and HF). The basal diet contained 44% forage and 56% concentrate. The supplemental fat replaced corn and soybean meal in the diet. Diets were isonitrogenous (CP=16.8%) and contained 1.54, 1.60 and 1.67 Mcal NE_L/kg DM in C, LF and HF, respectively. Cows were already heat-stressed at the beginning of the trial, and experimental diets were fed ad libitum as a TMR for 9 additional wk during heat stress conditions. Cows were milked 3 x/d and milk yields were recorded. Milk samples were collected weekly from 3 consecutive milkings and analyzed for composition. Ambient temperature and humidity were recorded 3 x/d, and rectal temperatures were monitored 3 x/d every other day. BCS and BW were measured weekly. During the experiment, the minimum, maximum and average THI were 64.2, 97.3 and 76.6, respectively. Overall rectal temperatures at 1400 h were 39.98^a, 38.98^b, and 39.25^b°C for C, LF and HF, respectively ($P < 0.05$). There was no treatment effect on DMI (20.1 kg/d), BCS (2.72) or BW (616.8 kg). Fat supplementation increased ($P < 0.05$) milk yield (26.4^a, 28.6^b, 28.5^b kg/d for C, LF, and HF, respectively). Milk fat content and total solids increased linearly ($P < 0.02$) with increasing fat supplementation. Supplemental saturated fatty acids reduced rectal temperatures and improved milk yield in mid-lactation heat-stressed dairy cows.

Key Words: Supplemental Saturated Fatty Acids, Heat Stress, Milk Yield

TH207 Ocular thermography as a measure of body temperature in beef cattle: Influences of environmental factors. S. M. Dray*[1], R. C. Vann[2], A. B. Chromiak[1], J. K. Lyons[3], T. H. Welsh, Jr.[3], R. D. Randel[4], and S. T. Willard[1], [1]*MAFES, Mississippi State University*, *Mississippi State*, [2]*MAFES, Mississippi State University*, *Raymond*, [3]*Texas A&M System*, *College Station*, [4]*Texas AgriLife Research and Extension Center, Texas A&M System*, *Overton*.

Our laboratory has shown that digital infrared thermal imaging (DITI) of the eye may be used as a measure of body temperature (BT) in livestock, with correlations to rectal temperature (RT; J. Anim. Sci. 84 (Suppl.1):354). However as environmental factors may have a negative influence on DITI, the objective of this study was to evaluate the impact of these factors on ocular DITI in beef cattle. Ocular temperature (TEMP) was measured with an infrared camera (FLIR, Wilsonville, OR). A total of 1027 observations were made using heifers (HF; n=515) and

steers (ST; n=453) among two breeds, Angus (A; n=658) and Brahman (B; n=368). Data were acquired over 3-months on numerous days at the same or multiple locations (MS, TX). Measures included: ambient TEMP (AMBT; °C), relative humidity (RH; %), TEMP-humidity index (THI), RT (°C) and maximum ocular TEMP (MAX EYE, °C). Analysis among these parameters used the Pearson Correlation Coefficient (r). Environmental measures ranged as follows: AMBT: 6.4°C to 36.2°C; RH: 28.4 to 91.0%; THI: 45.9 to 84.9. MAX EYE was highly correlated ($P<0.01$) with AMBT (r=0.82) and THI (r=0.81), whereas there was a low correlation between RH and MAX EYE (r=0.14). Overall, AMBT and MAX EYE were moderately correlated ($P<0.05$) to RT (r=0.65 and 0.74, respectively). MAX EYE and RT relationships exhibited a similar trend when separated by gender (HF: r=0.71; ST: r=0.75; $P<0.05$) and breed (A: r=0.74; B: r=0.67; $P<0.05$). To assess variability of ocular DITI measures, standard deviation (EYE STD) within and among ocular images was examined in relation to environmental parameters. We noted that AMBT and THI were negatively correlated ($P<0.01$) with EYE STD (r=-0.87 and -0.88, respectively); as AMBT and THI decreased, EYE STD within ocular images increased. RH alone had no influence on EYE STD (r=0.02; $P>0.05$). In summary, ocular DITI was moderately correlated to RT (as was AMBT) among gender and breed. Changes in environmental TEMP influenced ocular DITI (MAX EYE and EYE STD), which needs to be considered when using ocular DITI as a measure of BT. [USDA-NRI: 2005-35204-15737; Biophotonics: #58-6402-3-0120]

Key Words: Thermography, Cattle, Body Temperature

TH208 Forced-traffic in automatic milking systems effectively reduces the need to fetch cows but alters eating behavior of dairy cattle. A. Bach*[1,2], M. Devant[2], and A. Ferrer[2], [1]*ICREA*, *Barcelona, Spain*, [2]*IRTA-Unitat de Remugants*, *Barcelona, Spain*.

Eighty five lactating Holstein dairy cows in loose housing conditions evenly distributed in 2 symmetrical pens, each containing 28 feeding places, 2 waterers, and 1 automatic milking system (AMS) were used evaluate the effects of the traffic type imposed to lactating cows through an AMS on milking frequency, feeding behavior, and milk production. The study followed a cross-over design with 2 periods and 2 treatments. Each period lasted 3 mo, with 1 mo of adaptation between periods. All cows were fed a partially mixed ration twice daily and up to 3 kg/d of a concentrate during the visits to the AMS. Treatments consisted on allowing free-traffic of cows throughout the pen or forcing cows to pass through the AMS before access to the feed bunk could be attained (forced traffic). Individual eating behavior and feed consumption were continuously monitored throughout the study using a computerized system. Individual milk production was recorded at each milking, and milk composition monthly. In addition, the number of cows fetched to the AMS was recorded. The number of voluntary and total milkings was greater with forced traffic (2.4±0.04 and 2.5±0.06 milkings/d, respectively) than with free traffic (1.7±0.06 and 2.2±0.04 milkings/d, respectively). Total DMI was numerically lower and milk production numerically greater with forced (20.4±0.61 and 30.9±0.79 kg/d, respectively) than with free traffic (21.2±0.61 and 29.8±0.79 kg/d, respectively). Milk fat content tended ($P = 0.06$) to be lower and milk protein was lower with forced traffic (3.44±0.08 and 3.31±0.02 %, respectively) than with free traffic (3.65±0.08 and 3.38±0.02%, respectively). The number of meals was lower whereas meal duration and meal size was greater with forced traffic (6.6±0.3 meals/d, 20.4±0.65 min/meal, and 2.7±0.09 kg/meal, respectively) than with free traffic (10.1±0.3 meals/d, 15.7±0.65 min/meal, and 1.8±0.09 kg/meal, respectively). Forced traffic improved the number of voluntary milkings but altered milk quality and eating behavior of dairy cattle.

Key Words: Robotic Milking, Behavior, Feeding