335 *Campylobacter* contamination of broilers fed cottonseed or cottonseed products. J. A. Byrd*[1], R. D. Stipanovic[2], J. L. McReynolds[1], L. F. Kubena[1], and D. J. Nisbet[1], [1]*USDA/ARS/SPARC, Food and Feed Safety Research Unit*, *College Station, TX*, [2]*USDA/ARS/SPARC, Cotton Pathology Research Unit*, *College Station, TX*.

Previous research has demonstrated that broiler breeders fed cottonseed meal had significant reductions in *Campylobacter* when compared to soybean controls. In the present experiment, three studies were conducted to evaluate the effect of dietary cottonseed meal or gossypol on the incidence of *Campylobacter* and *Salmonella* colonization in broilers. In the first study, an *in vitro* fermentation using cecal contents from six-week-old broilers were combined with gossypol (4 µg/mL) and challenged with either *Campylobacter jejuni* (10^4 cfu/mL) or *Salmonella* Typhimurium (ST; 10^4 cfu/mL) and evaluated for the presence of these bacteria at 1, 3, 5, or 18 hours after challenge. *Campylobacter* was significantly reduced from the gossypol treated contents one h after exposure as compared to the controls. *Salmonella* was not significantly reduced compared to the control. In the second study, day-of-hatch broiler chicks were fed a diet containing 0, 300, or 600 mg/kg of gossypol for 10 days and challenged with ST at d 3. The incidences in cecal *Salmonella* concentrations were not significantly different in broilers fed gossypol when compared to the controls. In a third study, market-age-broilers were fed a diet containing either a corn-soybean control, 20% cottonseed meal, 5% cottonseed hulls, or 5% whole cottonseeds for 12 weeks to evaluate the effects on *Campylobacter* cecal colonization. Broilers fed each diet became *Campylobacter* positive after one week and remained positive until termination of the experiment. The results of the present study suggest that broilers fed cottonseed or cottonseed products were not protected from *Campylobacter* or *Salmonella* colonization.

Key Words: Broiler, *Campylobacter*, Cottonseed

Production, Management & the Environment - Livestock and Poultry: Dairy Production and Management II

336 Reasons for culling in Iranian Holstein cows. A. A. Naserian[1], M. Sargolzaee[1], M. Sekhavati[1], and B. Saremi*[2], [1]*Ferdowsi University Of Mashad, Agric college, Animal Science Department*, *Mashhad, Khorasan Razavi, Iran*, [2]*Education Center of Jihad-e Agriculture, Animal Science Departemnt*, *Mashhad, Khorasan Razavi, Iran*.

Culling of dairy cows is probably one of the most complex decisions in dairy operations. It involves several factors and farmers consider e.g. stage of lactation, age, health status, level of milk production and current reproductive status of cows while making decisions about which cows to keep and which ones to call. The aim of this study was to determine the profiles of culled cows in order to access the possible contribution to economic losses due to health disorders in the dairy herds of Khorasan province (Northeast of Iran). Data regarding all exits of cows from the herd were collected during a 5-year prospective survey in 15 large dairy commercial Holstein herds with over 4000 milking cows totally (From March 1999 to March 2004). All herds were recorded by an official milk-recording scheme. The management and feeding systems were almost similar in all herds. Rolling herdâ€™s averages were also similar in all herds; over 24000 lb. A polytomous stepwise logistic regression method was used because it allows the use of a non-ordinal categorical variable. The model was run (Procedure PR of BMDP). Table 1 shows the results of this study. The most frequent primary culling reasons were infertility and health disorders, 25.13, 28.57 of total cull respectively. Percentages of six groups of culling reasons for level of parity showed that the first parity level had more frequent reproductive problems and health problems too. Therefore, in this study, more than one half of the cows were declared culled for health or reproductive related problems.

Table 1. Primary culling reasons across parities (Iranian Holstein cows 1999-2004)

	Parity						Total
Problem	1	2	3	4	5	>5	%
Reproductive	6.02	4.62	3.54	3.76	3.97	3.22	25.13
Mastitis	4.08	1.84	0.97	1.18	1.50	1.50	11.06
Lameness	2.15	1.50	2.47	2.50	1.18	2.26	11.07
Milk fever	0.54	0.75	1.18	0.86	1.07	1.61	6.02
Low Milk yield	2.26	2.79	3.44	1.61	2.15	5.91	18.15
Health disorders	5.70	3.22	4.83	5.59	4.19	5.05	28.57

Key Words: Culling, Parity, Health and Production

337 Commercial application of sex-sorted semen in Holstein heifers. J. M. DeJarnette*[1], R. L. Nebel[1], B. Meek[2], J. Wells[3], and C. E. Marshall[1], [1]*Select Sires, Inc.*, *Plain City, OH*, [2]*Cache Valley Select Sires*, *Logan, UT*, [3]*All West Select Sires*, *Turlock, CA*.

Flow cytometric procedures were used to produce sex-sorted (SS; ~90% X-bearing), cryopreserved Holstein semen for commercial use at 2.1 x 10^6 sperm/dose. Data were obtained from 108 herds of Holstein heifers via electronic back-up of herd records and personal communications. Conception rates (CR) achieved at first services with conventional semen (CS) were used to assess relative field performance and were assumed to be 60% when CS data were not available. The unadjusted CR to SS across 121 herds was 44% (n=16,587). The CR achieved by SS averaged 85±2.9% of that achieved with CS at first service and 74% of herds achieved CR ≥70% of that obtained with CS at first service. Among 25 herds that used ≥100 doses of SS (n=608±122 per herd), CR to SS averaged 48±1.9% (range 33 to 72%) compared to a CS first service CR of 54±1.8% (range 38 to 70%; n=525±109 per herd). Among heifers bred to SS, the average age at AI (425±0.81 d, n=3969) and at calving (708±1.31 d, n=2280) was shorter ($P<0.01$) than for heifers bred to CS (461±1.05 d, n=2367; 745±1.19 d, n=4028, respectively) reflecting recommendations for preferential use of SS at first service. Among heifers that failed to conceive at AI, the percentage re-bred in a normal 18 to 24 d interval was greater ($P<0.05$) for SS (70%, n=5,495) than CS (64%, n=3,712), which may be a function of more accurate estrus detection among SS bred heifers or a result of increase rates of fertilization failure to SS. The percentage of abortions did not differ ($P>0.05$) among heifers that conceived to SS or CS (1.4%, n=1810 vs. 1.9%, n=4902, respectively). Among single births, the percentage of female calves was greater ($P<0.001$) for SS (90%, n=3,361) than CS (48%, n=10,999). Among twin births, a greater percentage ($P<0.01$) of female-female pairs were observed for SS (75%, n=20) than CS (22%, n=121). Legitimate comparisons of CR for SS and CS in the commercial setting are difficult due to bias in semen use, however these data imply >70% of herds achieved CR with SS that were ≥70% of first service CR obtained using CS with a resulting female gender bias of ~90%.

Key Words: Sexed Semen, Flow Cytometry, Heifer AI

338 Effect of out-wintering pad design on cow hoof health. K. O'Driscoll*[1,2], L. Boyle[1], P. French[1], and A. Hanlon[2], [1]*Moorepark Dairy Production Research Centre*, *Fermoy, Co. Cork, Ireland*, [2]*University College Dublin*, *Dublin, Ireland*.

This study aimed to evaluate four over-wintering options for spring calving dairy cows; uncovered [UP] and sheltered [SP] woodchip pads, both with a concrete feed face, a woodchip pad with a self-feed silage pit on top [SF] and indoor cubicles [IC], with regard to hoof health. Cows (n=96) were assigned to treatment using a randomized complete block design from 17 Nov (pluriparous) or 5 Dec (primiparous) until calving (mean=21 Feb 06) then turned out to pasture. Sole lesions (SL) heel erosion (HE) and dermatitis (D) on hind feet were scored according to severity at housing, calving, 8 & 14 weeks post partum (pp). Hardness (Shore D scale) of all claws was recorded at each inspection using an analogue duromoter. Data was analyzed using SAS. A mixed model was used to analyze SL and HE. Kruskall-Wallis and Wilcoxon tests were used to analyze D. Correlations between hardness and pathologies were investigated. Treatment had no effect on SL score, but scores increased over time ($P<0.001$), with an interaction between treatment and time ($P=0.1$). There were higher HE scores on SF than IC and SP ($P<0.01$). Cows on SF had highest D scores and IC lowest ($P<0.05$). Higher D scores occurred in SF than IC ($P<0.01$) and SP ($P<0.05$) at calving, and SF tended to have higher scores than IC 8 weeks post calving ($P=0.06$). Lateral claws were harder than medial claws ($P<0.001$). Hardness was highest at housing, lower at calving and 8 weeks pp ($P<0.05$), but no different 14 weeks pp. The hooves of IC and SP cows were harder than those of SF and UP cows ($P<0.05$). There was no correlation between hardness and D, and only weak correlations with SL ($P<0.001$; $r=-22.602$) and HE ($P<0.05$; $r=-0.061$). Exposure to excreta and moist conditions are risk factors for D and HE, explaining higher levels of these pathologies in SF than the other treatments as the feedface had no manure removal system. In IC the passageways as well as feedface were cleaned of manure explaining lower D scores. Provision of shelter on SP reduced exposure to environmental moisture which ensured hooves remained as hard as those in IC. However, low correlations between hardness and pathologies indicate that other factors are involved in pathology development.

Key Words: Dairy, Housing, Hoof Health

339 Correlation between tarsal lesions on dairy cows housed in free-stalls and culling rate, somatic cell count, percent mature cows, and milk production by stall base. W. K. Fulwider*, T. Grandin, D. J. Garrick, T. E. Engle, W. D. Lamm, N. L. Dalsted, and B. E. Rollin, *Colorado State University*, *Fort Collins*.

The objective of this study was to determine relationships between tarsal lesions, management, and outcomes by base: rubber-filled mattress (RFM), sand, and waterbeds (WB) from data collected on 85 dairies. Somatic cell count (SCC) was correlated with stall width (-0.26, $P = 0.02$). Percent of cows with tarsal swelling was correlated with stall length (-0.23, $P = 0.05$). Somatic cell count was correlated with stall width (-0.50, $P = 0.01$) and length (-0.46, $P = 0.01$) on RFM. Severe swellings were correlated with stall width (-0.52, $P = 0.01$) and SCC (0.60, $P = 0.001$) on RFM. Inadequate stall dimensions may increase lesions and SCC. Percent mature cows (fourth lactation or greater) was 13% (RFM), 14% (sand), and 20% (WB). Percent mature cows on sand was related to stall length (0.56, $P = 0.01$). Base types may require different stall dimensions to maximize cow well-being and productivity. Cull rates were 29% (RFM), 26% (sand), and 23% (WB). Within base type dairies were split into thirds according to the percentage of cows with tarsal swellings. Percent of cows with swellings differed for RFM ($P < 0.0001$): 4% in the best herds and 27% in the worst; corresponding best and worst for sand were 0% and 5% ($P < 0.01$); while (WB) were 1% and 9% ($P < 0.0001$). Sand and waterbeds may require less management than RFM. Rolling herd average (RHA) by bases were 8,399 L (RFM), 8,626 L (sand), and 8,172 L (WB). When base type dairies were split into thirds according to tarsal swelling, only RFM was different for RHA ($P = 0.01$). The worst dairies produced 1,816 L additional milk, with the highest culling rate (31%). Sand dairies differed in production by 227 L, the high third for lesions had the high RHA. There was no difference in RHA for (WB). Annual death rate (0.34, $P < 0.002$) and percent lame on visit day (0.45, $P < 0.0001$) were correlated with SCC; these rates were highest on RFM dairies (0.52, $P = 0.004$) and (0.52, $P = 0.003$). Inadequate stall dimensions may contribute to lameness, lesions, premature culling and increased death rate. Lameness and lesions may increase SCC.

Key Words: Somatic Cell, Lesion, Cull

340 Effect of body condition score at calving on production and reproduction performance in dairy herds of Argentina. J. Grigera*[1], F. Busso[2], F. Bargo[1], and C. Corbellini[2], [1]*Elanco Animal Health, ACBSCR*, [2]*INTA Pergamino*.

Claves is a program conducted by INTA and Elanco to monitor body condition score (BCS) and metabolic diseases of transition dairy cows in Argentina. A 4000-cows data set from 15 dairies was used to determine the relationship between BCS at calving and production and reproduction performance. Body condition score (1 to 5 scale) was measured at calving, milk production at 15, 45, and 75 DIM, and subclinical ketosis (milk BHBA concentration, Ketotest) at 30 DIM. A complete randomized blocked design was used to analyze the data using the SAS PROC MIXED model with dairy as random variable and parity and calving season as fixed variables. A significant ($P <0.05$) interaction between BCS at calving and parity was found for milk production. Primiparous cows produced more ($P < 0.05$) milk when calving at 3.75. Milk production of primiparous cows decreased ($P < 0.05$) linearly as cows calved with BCS lower than 3.75. Multiparous cows produced more ($P < 0.05$) milk when calving at 3.25. Milk production of multiparous cows was lower ($P < 0.05$) when calved with BCS lower or higher than 3.25. Cows losing 0.75 of BCS during the first 30 DIM produced more ($P < 0.05$) milk than cows losing 0.25 (28.4 vs. 27.6 kg/d). Losing more than 0.75 points of BCS did not increase ($P > 0.05$) milk production. Days to first service and days to conception were lowest ($P < 0.05$) for cows calving at 3.25 or 3.75. Subclinical ketosis positive cows (≥ 100 µm/L milk BHBA) had higher ($P < 0.05$) BCS at calving (3.52 vs. 3.40) and lower ($P < 0.10$) milk production at 15 DIM (25.5 vs. 26.7 kg/d) than negative cows. Positive cows were 0, 1.9, 1.5, 3.3, and 3.5% for cows calving at 2, 2.25, 2.75, 3.25, and 3.75, respectively. The low incidence of ketosis is probably associated to the use of monensin in the transition diets. Body condition score at calving affected production and reproductive performance of dairy herds in Argentina. Optimum BCS at calving for production and reproduction performance were 3.75 and 3.25 for primiparous and multiparous cows, respectively.

Key Words: BCS, Performance, Ketosis

341 Ration sorting in freestall dairy herds. M. I. Endres* and L. A. Espejo, *University of Minnesota*, *St. Paul*.

The objectives of this study were to evaluate ration sorting and investigate herd-level risk factors for sorting by high producing dairy cows housed in freestall barns. Fifty randomly selected dairy herds participated in the study which was conducted during the summer. Five representative samples of TMR were collected from the high group feed bunk during the one time visit to represent the initial ration as delivered to the cows, three other samples collected every 2-3 hours, and the accumulated orts cleaned out of the bunk by the feed manager. At every sampling time, measurement of the particle size of the TMR was performed in triplicate by the same person using the 3-screen and bottom pan The Pennsylvania State University Particle Separator, and a sample was taken for DM, NDF, and CP analysis. The average of mass retained at each sampling time was used to calculate the geometric mean of particle length. No herds were below the minimum recommendation of 2% particles retained on the upper screen; however, 52% of them were above the maximum recommended limit of 8%. The geometric mean particle length of the TMR delivered to the 50 high production groups was 6.4 mm ± 1.4 mm. The TMR had physical and chemical changes across the samples. After feed delivery cows sorted the TMR against long particles favoring the consumption of shorter particles. The overall geometric mean of particle size increased from 6.4 mm in the initial ration to 9.2 mm in the orts. The NDF content increased 6.75 percentage units whereas the CP content decreased 1.52 percentage units in the orts compared to the initial sample. The multivariate regression model used for the analysis of factors associated to changes in the geometric mean of the particle size of the ration indicated that frequency of feed delivery, initial geometric mean of the particle size of the ration, hay content of the ration, and time after feed delivery were associated with ration sorting. Additionally, linear feed bunk space per cow tended to be associated with ration sorting. In contrast, type of feed bunk barrier, frequency of feed push-up, percent of forage in the ration, and DM content of the initial ration were not associated with ration sorting.

Key Words: Ration Sorting, Rsk Factors

342 The effect of breed and feeding a split ration to lactating hair sheep on ewe body temperature in the tropics. R. W. Godfrey*, M. C. Vinson, and R. C. Ketring, *University of the Virgin Islands, Agricultural Experiment Station*, *St. Croix, US Virgin Islands*.

Lactating St. Croix White and Dorper × St. Croix White ewes grazing guinea grass pastures were used to evaluate the effect of breed and feeding a split ration on body temperature during the cool (March through April) and warm (July through August) seasons. In each season ewes were assigned to treatments (n = 8/treatment) based on breed, age and number of lambs. Treatments consisted of individually feeding 0.9 kg concentrate (16.4% CP, 68% TDN) in the morning (AM) or afternoon (PM), 0.45 kg in the morning and afternoon (AM-PM) or no feed (Control) for 46 d beginning on d 6 (lambing = d 0). Ewes were fitted with intravaginal temperature data loggers, set to record vaginal temperature (VT) at 5-min intervals, for 48 h in wk 2, 5 and 8 postpartum. The mean temperature, relative humidity and and temperature humidity index during the cool and warm seasons were 25.8 °C, 85.9% and 76.1 and 28.3 °C, 86.7% and 80.6, respectively. There was no effect of season ($P > 0.10$) so all data were pooled across season. During wk 2 there was no difference ($P > 0.10$) in VT around the AM or PM feeding times among treatment groups. During week 5 the AM-PM fed ewes had higher ($P < 0.01$) VT than ewes in other groups around the times of feeding. During wk 8 the AM-PM and the PM fed ewes had higher VT ($P < 0.01$) than either the AM fed or Control ewes. Data from all ewes fed in the PM (PM and AM-PM; PMALL) was pooled and compared to the Control and AM ewes. During wk 2 there was no difference ($P > 0.10$) in VT around the AM or PM feeding times among the groups. During wk 5 and 8 the PMALL ewes had higher ($P < 0.01$) VT than Control or AM ewes around the times of feeding. To determine breed differences, data were pooled across treatments and compared between breeds. Dorper × St. Croix White ewes had higher ($P < 0.05$) VT than St. Croix White ewes during wk 5 and 8 but not during wk 2 ($P > 0.10$). The results show that body temperature of ewes can be influenced by time of feeding and breed. Ewes fed in the afternoon had elevated body temperatures which could make them more susceptible to heat stress.

Key Words: Sheep, Feeding, Body Temperature

343 Effects of heat stress on production, lipid metabolism and somatotropin variables in lactating cows. M. L. Rhoads*[1], R. P. Rhoads[1], S. R. Sanders[1], S. H. Carroll[1], W. J. Weber[2], B. A. Crooker[2], R. J. Collier[1], M. J. VanBaale[1], and L. H. Baumgard[1], [1]*University of Arizona*, [2]*University of Minnesota*, *St. Paul*.

To delineate differences between heat stress and decreased feed intake on physiological and metabolic indices, we conducted a heat stress experiment where a thermal-neutral control group (n=6) was pair-fed/underfed (UF) to match nutrient intake with heat-stressed (HS) Holstein cows (n=6). Multiparous cows (140 DIM, 663 kg BW) were subjected to two experimental periods: 1) thermal neutral (TN) and ad libitum intake for 9 d and 2) HS or UF for 9 d. HS conditions were cyclic with temperatures ranging from 29.7 to 39.2°C. During each period all cows received an I.V. challenge of epinephrine (EPI, 1.4 µg/kg BW, d 6), growth hormone releasing factor (GRF 4 µg/100 kg BW, d 7), and a somatotropin (ST, 15 µg/kg BW, d 9) and had ST profile characteristics assessed (sampled every 15 min for 6 hr, d 8). Results were analyzed as repeated measures using PROC MIXED of SAS. Rectal temperatures and respiration rates increased during HS (38.7 to 40.2°C and 46 to 82 breaths/min). HS reduced DMI by 32% and by design, UF cows had similar intake reductions (34%). Milk yield was decreased by HS (45%, 14.5 kg/d) and UF (19%, 6.7 kg/d), but there were little effects on milk composition. Reduced DMI only accounted for 46% of the decreased milk production by HS. Both HS and UF markedly reduced EBAL, but only UF increased basal NEFA levels (136 vs. 298 µEq/l). Neither NEFA response to EPI nor ST response to GRF differed between treatments. Area under the curve and rate of ST disappearance in response to the ST challenge did not differ between treatments. During the 6 h bleed, there were little or no treatment differences on ST pulsatility and mean ST (4.25 ng/ml). Reduced nutrient intake accounted for about 50% of the HS-induced decrease in milk yield and this appears to have occurred independent of changes in the ST system. Differences in basal NEFA between UF and HS suggest a shift in metabolism and nutrient partitioning which may help explain reduced milk yield during heat stress.

Key Words: Heat Stress, Somatotropin, Lipid Metabolism

344 Effect of encapsulated niacin on resistance to acute thermal stress in lactating Holstein cows. R. B. Zimbelman*, J Muumba, L. H. Hernandez, J. B. Wheelock, G. Shwartz, M. D. O'Brien, L. H. Baumgard, and R. J. Collier, *University of Arizona*.

Twelve multiparous Holstein cows producing an average of 31.7 kg/d and balanced for parity and stage of lactation were randomly assigned to either 0 g encapsulated niacin/d (C) or 12 g niacin/d (NIASHURETM®) (Trt) and were exposed to two environmental temperature patterns, thermoneutral (TN) and heat stress (HS). The temperature humidity index (THI) range of TN pattern never exceeded 72 while HS consisted of circadian THI temperature range exceeding 72 for 12 hours per day. Milk yields were recorded twice a day and milk sampled once a day for composition. Cows were fed twice a day and refusal and water intake was measured once a day. Respiration rates, surface temperatures of both shaved (S) and unshaved (U) areas were taken at the rump, (ST-R-S, ST-R-U) shoulder, (ST-S-S, ST-S-U), and tailhead (ST-T-S, ST-T-U), and sweating rates (SR) of the shoulder shaved (SR-S) and unshaved (SR-U) areas 4× daily. Rectal temperatures (RT) were measured four times a day. Cows in Trt had increased DMI (40.7 vs 37.7,g/d) compared to cows in C. Surface temperatures were unaffected by Trt but were affected by shaving (32.5 shaved vs. 31.4°C unshaved). Cows given Trt had a tendency for higher average sweating rates when shaved (66.3 vs 57.8 g/M2/hr, P=0.11) and numerically for unshaved (57.4 vs 52.7 g/M2/hr) over the entire 24 hour period and these differences grew larger during periods of peak thermal stress along with the entire study (62.0° shaved vs. 55.0° unshaved). Between 11:00AM and 4:00 PM average sweating rate for Trt group was higher than C (81.1 vs. 68.2 g/M2/hr shaved; P<0.0001 and 70.6 vs. 62.3 unshaved; P<0.0001). Vaginal temperatures recorded at 15 min intervals and averaged over last 72 hours of period 2 (HS) were lower (38.4 vs. 38.0°C; P <.0001) for cows given Trt compared to cows in C. We conclude that cows given encapsulated Niacin had higher sweating rates and lower core temperatures during acute thermal stress.

Key Words: Niacin, Heat Stress, Sweating Rate

345 Effect of level of production and intensive cooling in summer on productive and reproductive performance of high yielding dairy cows. I. Flamenbaum*[1] and E. Ezra[2], [1]*Ministry of Agriculture, Extension Service*, *Beit-Dagan, Israel*, [2]*Israel Cattle Breeders Association*, *Caesarea, Israel*.

The effects of production level and heat stress relief were studied during 2005 in a large scale survey including 22 dairy herds, averaging 300 cows each and a total of 6600 cows. All the dairy herds were located in the coastal part of Israel. Cows in all the herds were held under similar housing system, milked 3 times per day and fed for ad libitum intake a TMR, distributed twice daily. Twelve of the herds were of high and 10 of low production level (previous year winter Economical Corrected Milk - ECM yields averaged 41 and 35 kg/d, respectively). Cows in half of the herds in each production level were intensively cooled (IC) during summer, using a combination of wetting and forced ventilation for 10 cooling periods and a total of 7 cumulative hours/d. Cows in the second half of the herds in each production level were moderately cooled (MC) by a combination of wetting and forced ventilation in the holding pen, only before milking. Winter (Jan-Mar), spring (Apr-Jun), summer (Jul-Sep) and autumn (Oct-Dec) ECM production averaged 41.5, 41.0, 40.7, 41.7 kg/d, respectively, for the IC herds, and 38.5, 37.7, 33.8, 35.7 kg/d, respectively, for the MC herds of the high production level. During the same seasons, in the low producing herds, ECM production averaged 36,5, 38.0, 36.8, 37.8 kg/d, respectively, for the IC herds, and 34.4, 34.6, 30.2, 33.5 kg/d, respectively for MC herds. Intensive cooling, significantly reduced summer decline in ECM production and conception rate for herds of both production levels (P<0.01). Conception rate of first and second insemination, performed in winter, spring, summer and autumn averaged 39, 31, 19, 29%, respectively, for the IC, and 39, 30, 12, 29%, respectively, for the MC high producing herds. For the same seasons, in the low producing herds, conception rates averaged 40, 38, 25, 40%, respectively in the IC and 39, 25, 3, 29%, respectively, in the MC herds. Intensive cooling almost eliminated summer decline in milk production, regardless of the level of production and reduced about half of the summer decline in conception rate. Intensive cooling had greater impact on improving conception rate in low, than in high producing herds.

Key Words: Intensive Cooling, Milk Production, Conception Rate

346 Reducing freestall availability without limiting feed access during dry period does not affect subsequent milk yield. J. M. Velasco*, K. K. Fried, T. F. Gressley, E. D. Reid, T. C. Hausman, and G. E. Dahl, *University of Illinois*, *Urbana*.

Comfortable housing during the dry period may impact the dairy cow as reflected in her health, reproductive and productive performance during lactation. Stocking density is a critical component of overall cow comfort, yet the impact of stocking density during the dry period is unknown. Further, the relative contribution of limiting feed access versus stall access to stocking density effects is unknown. To determine if reduced freestall availability during the dry period had an impact on subsequent milk yield and performance, we used 40 Holstein cows dried off approximately 58 ± 12 d before calving and assigned to 70% stall availability (70SA; n=20) or 100% stall availability (100SA; n=20) for the entire dry period. All cows were fed individually using a Calan gate system and dry matter intake (DMI) was recorded during the dry period. Prolactin (PRL) concentration was measured in samples collected every other week from dry off until calving as an indicator of relative stress. Body condition score (BCS) was measured every other week. Treatments ended at calving when all cows were managed in a commercial facility throughout lactation. Cows were milked 3 times per day; milk production was recorded until 150 d in milk. Days dry averaged 57.3 for 70SA and 59 for 100SA (P>0.4). There was no difference between treatments in DMI, PRL, BCS and milk production (P>0.5). When dry, cows on 70SA consumed 15.3kg/d DM compared with 14.9 kg/d for cows on 100SA. BCS was not different between treatments, and scores averaged 3.2 for 70SA versus 3.1 for 100SA cows. One day after treatment began and at calving, PRL concentrations averaged 14.8 and 25.8 ng/mL for 100SA and 16 and 24.4 ng/mL for 70SA, respectively. Milk production was 43.9 kg/d for 100SA and 43.5kg/d for 70SA. These results suggest that dry cows can adapt to substantial reductions in stall availability during the dry period if adequate access to feed is maintained, and not experience a reduction in subsequent milk yield.

Key Words: Freestall Availability, Dry Period, Milk Yield

347 Using ear canal temperature to predict vaginal temperature. B. H. Carter*, T. H. Friend, M. A. Tomaszewski, J. R. Fisher, and G. M. Bingham, *Texas A&M University*, *College Station*.

The objective of this study was to evaluate the efficacy of using ear canal placement of a temperature data logger as a predictor of vaginal temperature. Temperature data loggers are commonly used to sample body temperature in unrestrained animals. Temperature loggers have previously been placed in the vagina and(or) ear canal of cattle, horses and sheep. Two trials were conducted in Texas during summer (n = 7) and winter (n = 9) conditions when ambient temperature ranged from -2.0 to 9.5°C and 18.3 to 36.56°C respectively. Holstein-friesian cows were fitted with two iButton® temperature loggers programmed to sample every five min. The data loggers were placed vaginally using progesterone free CIDRs®. Data loggers were placed in the ear canal by first inserting the logger into the tip of a cotton infant sized sock which was then filled with polyester fiber batting. The data logger portion was placed in the ear canal and the batting packed firmly against the canal opening to insulate it from external thermal influence. Finally, the pinna of the ear was wrapped around the sock and taped closed using 3 inch wide Elastikon™ tape to hold the sock and batting in place. The resulting data was analyzed using the GLM procedure of the SAS® system. Ear canal temperature predicted vaginal temperature for the summer ($r^2 = 0.58$) and for the winter ($r^2 = 0.70$) trial. To adjust for variation due to moisture cooling the data loggers during udder washes or overhead sprinkling, the data were edited to drop outlying data points. Adjusting the data yielded a correlative value of $r^2 = 0.75$ for the summer trial and $r^2 = 0.73$ for the winter trial. Measuring ear canal temperature as described can be used for predicting vaginal temperature, although ear canal temperature may be susceptible to external influences, especially water.

Key Words: Cattle, Temperature, Data Logger

Ruminant Nutrition: Nitrogen Metabolism/Immunology

348 Effects of N solubility on metabolisable protein value of grass silage. P. Huhtanen*[1], M. Rinne[2], and J. Nousiainen[3], [1]*Cornell University*, *Ithaca, NY*, [2]*MTT-Agrifood Research*, *Finland*, [3]*Valio Ltd.*, *Finland*.

Proportion of soluble N in grass silage total N (SOLN) is related to protein degradability, especially determined in situ. Hence the concentration of metabolisable protein (MP) should decrease with higher SOLN. To test this hypothesis a meta-analysis based on 253 treatment means from 79 dairy cow production studies was conducted. In each study forage treatments (e.g. date of cut, fermentation quality and wilting) were investigated. Both the level and composition of concentrates were fixed within a study. Silage SOLN was divided into ammonia N and soluble non-ammonia N (SNAN). Silage MP was calculated as amino acids absorbed from the small intestine using constant values for ruminal protein degradability and intestinal digestibility of RUP. Mixed model regression analysis (SAS) with a random study effect (intercept random) was used to model milk protein yield (MPY), efficiency of N utilisation (NU) and milk urea N (MUN) concentration using estimated MP supply alone or together with SOLN fractions as independent variables. MPY was closely related to MP supply (residual mean squared error (RSME) of MPY adjusted for random study effect 15.7 g/d) suggesting that the simple MP model estimated the variation in silage MP precisely. MPY decreased with increasing soluble N concentration in silage, but the effect was almost completely related to ammonia N, and the effects of SNAN were non-significant and small. The effects of soluble N fractions on MUN and NU were consistent with milk production responses. The lack of MPY responses to silage SNAN concentration suggested that the division of silage N between soluble and insoluble N (excluding ammonia N) does not markedly influence silage MP concentration. In is concluded that analysis of silage SOLN has a limited value in practical feed evaluation and silage MP concentration can be estimated accurately using constant values for ruminal protein degradability and intestinal digestibility of RUP.

Key Words: Dairy Cow, Protein Utilization, Degradability

349 Ruminal metabolism of ^{15}N labelled ammonium-N and grass silage soluble non-ammonia-N. S. Ahvenjarvi*[1], A. Vanhatalo[1], P. Huhtanen[1], and A. N. Hristov[2], [1]*MTT Agrifood Research Finland*, *Jokioinen, Finland*, [2]*University of Idaho*, *Moscow*.

Ruminal metabolism of ^{15}N labelled ammonium-N and grass silage soluble N fractions was investigated in a change-over study using four dairy cows. Timothy grass (Phleum pratense) grown on a field plot was fertilized with ^{15}N enriched ammonium-N. Grass was preserved as silage, and then fractionated into soluble and insoluble fractions. Labelled ammonium-N (821 mg of ^{15}N in excess of background enrichment) and grass silage soluble N (840 mg ^{15}N) was administered into the rumen as a single dose. Grass silage soluble N fractions comprised 59 mg of ammonia-^{15}N and 781 mg of soluble non ammonia-^{15}N (SNAN). To follow the ruminal metabolism of ^{15}N-labelled N-fractions grab samples of ruminal digesta were collected at 0.5, 1.0, 1.5, 2, 3, 4, 6, 8, 11, 14, 17, 22, 27, 33, 39, 47, 55, 63 and 72 h after the dose. Digesta samples were treated with mercuric chloride, then fractionated into ammonia-N, SNAN, insoluble-N, and bacteria-N. Rumen liquid passage rate was determined using LiCoEDTA and particle passage rate was determined based on ADIN-^{15}N excretion in feces. A dynamic mechanistic model was developed to describe the ruminal N metabolism. The model comprised five ruminal compartments: grass silage SNAN, ammonia-N, bacteria-N associated with non-escapable particles, bacteria-N associated with escapable particles, and liquid associated bacteria-N. The model indicated that of ammonia-N administered into the rumen 32% disappeared by absorption, 19% escaped in the liquid phase, 14% in liquid associated bacteria-N, and 36% in particle associated bacteria-N. Of grass silage soluble N 17% was absorbed as ammonia-N, 11% escaped the rumen in liquid phase as ammonia-N, 19% escaped the rumen in liquid associated bacteria, 33% in solids associated bacteria, and 19% of grass silage SNAN escaped the rumen as undegradable feed N. In conclusion, a greater proportion of silage soluble N compared with ammonia-N is incorporated into microbial N, and a considerable proportion of silage SNAN escapes rumen degradation.

Key Words: Grass Silage, Rumen N Metabolism, Modelling