

W166 Effect of estradiol cypionate® (ECP) on milk production in lactating dairy cows. A. Gümen*, J. P. Powell, A. H. Souza, A. P. Cunha, J. N. Gunther, P. M. Crump, and M. C. Wiltbank, *University of Wisconsin, Madison*.

Previous research indicated that early postpartum treatment with ECP increased milk production in multiparous cows and this was tested in 2 expts. There were an unexpectedly high number of cows with disease conditions (DA, 9.5%; mastitis, 42%; Johne's-positive, 16%) and the rate was unrelated to treatment. Each of these conditions was found to decrease milk production and subsequent analyses only included cows without these conditions. In expt 1, cows were randomly assigned to 1 of 3 treatments: 1) three injections of ECP (4 mg) weekly for 3 weeks (3X; n=13), 2) one injection of ECP (1X; n=19) and 3) control (untreated; n=18) beginning at days 1-4 post-calving. Ovulation was determined by weekly ultrasound. Time to first ovulation (average of 28 to 34 d) and milk production (43.4 to 44.5 kg average during first 20 wks) were similar among treatments. In expt 2, cows were randomly assigned to 1 of 3 treatments: 1) twice weekly treatments with 4 mg of ECP for 3 wks (4mg; n=21) 2) twice weekly (first injection with 4 mg following by 5 injections of 2 mg) treatments with ECP (2mg; n=18) and 3) control (untreated; n=25). Time to ovulation was delayed (P<0.05) with 4mg treatment (51.4±3.0 d) compared to 2mg (44.6±3.4 d) and control (43.4±3.0 d). Milk production began to be greater (P<0.05) at 5 wk after calving in cows treated with 2mg (40.3 kg) compared to controls (36.7 kg). From weeks 5 to 10, cows in 2mg (47.8 kg) tended to produce more (P<0.07) milk than control cows (42.9 kg) with 4mg also tending to be greater (46.4 kg; P=0.16) than controls. Milk production during the entire treatment period was numerically but not statistically higher in 2mg (44.4 kg) compared to controls (40.3 kg) with 4mg intermediate (42.5 kg). Analysis of treatment effects in cows with disease problems had similar trends but with lower milk production and more variability. Thus, multiple treatments with lower doses of ECP may increase milk production but further trials are needed to evaluate the repeatability of this response.

Key Words: ECP, Milk Production, Early Postpartum

W167 Effects of increasing energy density and cooling treatment on ovarian function in postpartum dairy cows under heat stress conditions. J. Y. Wang* and J. C. Kung, *Tunghai University, Taichung, Taiwan*.

The objective was to examine the effect of incrementing energy density and cooling treatment on ovarian function of postpartum dairy cows under heat stress conditions. Holstein cows (12 primiparous and 22 multiparous) were assigned randomly in a 2x2 factorial experiment consisting of a fat supplementation and water sprinkling treatment. The bypass fat was gradually increased from 100g to 400g/d at 4 weeks before calving, and increased at calving to 450g until 60 days after parturition. The automated cooling system which actuated sprinkling (30sec) was followed by forced ventilation (4.5min) and cows were cooled from 8:00 to 16:00. All cows were fed complete ration and residues were weighed back after each feeding. Ovaries were examined by transrectal ultrasonography from calving until ovulation. The data were analyzed following the GLM procedure of SAS. Results showed that the cooling system could effectively reduce rectal temperature (P<0.05) and achieve an earlier recovery of energy balance. The average energy balance from week 1 to week 8 postpartum was -18.3Mcal±0.6Mcal/d vs. -25.2± 0.6Mcal/d in the cooled group versus the control group (P<0.01). Cooled and fat treated cows had less first class (3-5mm) follicles than the controls (3.88± 1.34 vs. 8.13 ±1.13; P<0.05). However, fat supplemented cows developed more second (6-9mm) and third (>9mm) class follicles than the control cows. The interval from parturition to first ovulation was shorter (P<0.06) in the fat supplemented and cooled cows than the untreated cows. But there was no difference in the interval from parturition to the second ovulation and in the interval between the first and second ovulations. These results indicate that fat supplementation and evaporative cooling may have potential in improving postpartum ovarian function under heat stress conditions.

Key Words: Cooling, Fat, Ovarian Function

Production, Management and the Environment: Health and Reproduction

W168 Biosecurity practices related to cattle purchases. F. Hoe and P. Ruegg*, *University of Wisconsin, Madison*.

Wisconsin dairy producers (n = 1102) were surveyed in the fall of 2004 using a mailed questionnaire. A total of 583 farms responded for a response rate of 53%. Overall, herds contained 92 (169.4) lactating cows with a rolling herd average of 8,991 (1,748) kg and a bulk tank somatic cell count (BTSCC) of 245,963 (109,083) cells/ml. Responders were categorized based on the number of lactating cows: very small herds (< 50 cows; n = 279); small (51-100 cows; n = 199); medium (101-200 cows; n = 42); and large (> 200 cows; n = 36). The number of lactating cows was not reported for 27 herds. During the 3 years preceding the survey, 43.7% of the herds reported that they purchased cattle, with more medium (61.0%) and large (77.1%) herds reporting cattle purchases as compared to very small (40.4%) and small herds (39.1%). Overall, little was known about the source of purchased cattle. Only 38.9%, 50.8% and 13.2% of responding herds reported that they asked source herds for information about Johnes disease status, BTSCC or previous Mycoplasma infections, respectively. Medium and large herds were 6.6 times more likely to obtain information about Mycoplasma status as compared to smaller herds. Overall, 48.8% performed a reproductive exam before housing purchased cattle in existing cow groups. Medium and large herds were more likely to perform reproductive exams on purchased cattle (P = 0.04, OR = 1.9). Few herds performed diagnostic tests on purchased cattle. Only 18.3% of the responders tested for Johnes disease, 12.7% tested for BVD, 5.2% tested for bovine leukemia, 30.6% performed SCC or CMT, and < 10% tested milk for mastitis pathogens. As herd size increased, the frequency of diagnostic testing increased (P < 0.005). Only 44.0% and 18.5% of medium and large herds respectively reported that no diagnostic testing was performed for purchased cattle as compared to > 55% of the smaller herds. Many differences in biosecurity practices were identified based on herd size,

suggesting that producers from larger herds were more aware of and able to take preventive actions regarding biosecurity risks associated with purchased cattle.

Key Words: Biosecurity, Cattle, Purchase

W169 Biosecurity practices used during dairy herd expansion. J. Dalton*¹, R. Norell², and M. Chahine³, ¹University of Idaho, Caldwell, ²University of Idaho, Idaho Falls, ³Twin Falls Research and Extension Center, Twin Falls.

The Idaho dairy industry has undergone rapid growth recently. In December 2004, there were 435,000 lactating cows in Idaho, an increase of 163,000 cows in seven years. Consequently, the demand for dairy cattle has increased in order to fill new and remodeled facilities. A survey of Idaho dairy producers was performed to identify biosecurity practices used during herd expansion. Dairy producers, (n = 40; representing each geographical dairy region of the state), which had completed expansion within the last seven years, were selected as participants. Producers were asked questions regarding number and source of cattle purchased; pre-purchase health testing of cattle; use of quarantine for purchased cattle; and diseases contributing to treatments and (or) removal of cows following expansion. The range in herd size, after expansion, was 95 to 5,300 lactating cows. Twenty-three dairy producers (57.5%) reported purchasing greater than 101 animals, while seven dairy producers (17.5%) reported purchasing greater than 1001 animals. Twenty dairy producers (50%) purchased cattle from one source, while the remaining 50% of respondents reported up to four sources for purchased cattle. The majority of producers (80%) did not require health testing (non udder related) of new cattle prior to purchase. Of the

29 dairy producers who purchased lactating cattle, 89.7% tested animals for evidence of udder health. Only 20 dairy producers (50% of respondents) reported that new cattle were quarantined. The most significant producer-identified diseases contributing to treatments and (or) removal of cows following expansion were mastitis, hairy heel warts, Johne's disease, and bovine virus diarrhea. The results of this survey suggest: 1) many dairy producers have not identified the value in pre-purchase health testing (non-udder related) and quarantine prior to introduction into the existing herd, and 2) educational opportunities exist to ensure a safe and profitable milk supply.

Key Words: Biosecurity, Dairy, Expansion

W170 Do dairy producers manage dairy bulls to limit biosecurity and infertility risk? J. Dalton^{*1}, R. Norell², and M. Chahine³, ¹University of Idaho, Caldwell, ²Idaho Falls Research and Extension Center, Idaho Falls, ³Twin Falls Research and Extension Center, Twin Falls.

Despite the benefits of AI, such as reducing disease transmission, allowing for genetic selection, and increasing the milk yield of dairy cattle, many dairy producers use natural service bulls, either as the sire of choice, or as a clean-up bull after a few AI services. A survey of Idaho dairy producers was conducted to identify bull management practices aimed at limiting biosecurity and infertility risk. Dairy producers, (n = 40; representing each geographical dairy region of the state), which had completed expansion within the last seven years, were selected as participants. Producers were asked questions regarding whether bulls had been introduced into the herd; source of purchased bulls; vaccine administration prior to introduction into the herd; use of quarantine for purchased bulls; and whether a breeding soundness evaluation had been performed prior to purchase. Twenty-nine dairy producers (72.5%) reported purchasing bulls for natural service. The predominant source of bulls was a breeder of registered cattle. Although twenty-three dairy producers (79.3%) administered vaccines to incoming bulls prior to introduction to the herd, only 12 dairy producers (41.4%) reported that new bulls were quarantined. The majority of producers (72.4%) did not require a breeding soundness evaluation prior to purchase. The results of this survey suggest: 1) purchasing of bulls for natural service is common, 2) dairy producers have not identified the value of quarantine and breeding soundness evaluations prior to introduction into the herd, and 3) educational opportunities exist to enhance dairy producers understanding of the benefits of AI and management skills to limit biosecurity and infertility risk.

Key Words: Biosecurity, Dairy, Bulls

W171 Optimum month of pregnancy to maximize average daily milk production in Holstein cows. M. Terre^{*1} and A. Bach^{2,1}, ¹Unitat de Remugants-IRTA (Institut de Recerca i Tecnologia Agroalimentàries), Barcelona, Spain, ²ICREA (Institució Catalana de Recerca i Estudis Avançats), Barcelona, Spain.

In many species, the onset of pregnancy has a negative impact on lactation. Because most dairy systems have the objective of an annual calving, artificial insemination is initiated around 80 d after calving. A database with 15,022 complete lactations of Spanish Holstein cows was used to assess the optimum stage of lactation in which pregnancy should take place to maximize average daily milk yield (ADY). Monthly milk production records from 60 DIM and above were used to perform a linear mixed-effects model with month of lactation where pregnancy occurred (DIMP = 2, 3, 4, 5, 6 and over 7 mo), DIM, and the interaction of DIMP and DIM as fixed effects, and cow as random effect. This model was used to analyze separately data from primiparous (PM) and multiparous (MP) cows, according to their milk yield level: high (H), moderate (M), and low (L), resulting in 6 different data sets. Also, ADY of 36 virtual pens (6 DIMP levels for each of the 6 data sets) were modeled for a period of 5 years using the predicting equations obtained. The slope of the fitted line describing milk production decay with DIM decreased ($P < 0.001$) as DIMP increased, indicating that pregnancy in early lactation had a more negative impact on milk persistency than pregnancy in later lactation. Predicted ADY for modeled pens of cows with 2 and 3 DIMP were greater than that of cows with 4, 5, 6 and over

7 DIMP for all 6 groups. However, ADY of simulated pens of MPH cows with 2 DIMP was 3, 6, 8, and 12% greater than that of pens of MPH cows with 4, 5, 6, and over 7 DIMP, respectively. But ADY of simulated pens with PMH cows becoming pregnant on the 2nd mo of lactation was only 1, 2, 3 and 5% greater than that of pens with PMH cows with 4, 5, 6 and over 7 DIMP, respectively. These results confirm that to ensure pregnancy of MP cows between 2 and 3 months after calving is optimum, but in PM cows, pregnancy could be delayed without resulting in an important decrease in milk yield.

Key Words: Yield, Pregnancy, Model

W172 Assessment of voluntary waiting period and frequency of estrus synchronization among herds. R. H. Miller^{*1}, H. D. Norman¹, M. T. Kuhn¹, and J. S. Clay², ¹Animal Improvement Programs Laboratory, Agricultural Research Service, USDA, Beltsville, MD, ²Dairy Records Management Systems, Raleigh, NC.

Lactation stage when cows are first inseminated (voluntary waiting period, **VWP**) and extent of estrus synchronization (**ES**) were examined. Data were 5,551,562 lactations with first inseminations from 1995 to 2002. Annual herd means were computed for days in milk until first service (**D1**). For each herd-year, cumulative distribution of D1 was grouped as ≤ 30 , ≤ 40 , ≤ 50 , ≤ 60 , ≤ 75 , ≤ 90 , ≤ 120 , ≤ 150 , and ≤ 200 d. For 3377 herds on DHI test, mean D1 were 89, 91, 92, and 95 d for 1995 through 1998, respectively. For 1995, cumulative frequencies were 1, 3, 9, 22, 45, 64, 84, 93, and 98% for the 9 lactation stages; corresponding frequencies for 1998 were 1, 3, 8, 19, 40, 58, 80, 90, and 97%. First insemination was later in lactation in 1998 than in 1995. Herd VWP was defined as days in milk when 10% of cows had been inseminated for the first time. For 1995, cumulative frequencies of herds with VWP of ≤ 30 , ≤ 40 , ≤ 50 , ≤ 60 , ≤ 75 , and ≤ 90 d were 1, 7, 33, 78, 98, and 100%; corresponding frequencies for 1998 were 1, 5, 28, 72, 96, and 99%. Thus, >50% of herds had VWP of <60 d. Intraclass correlation of D1 was 0.70, which suggested consistency in lactation stage at first insemination across years within herds. To identify ES herds, a χ^2 was calculated for each herd-year to detect differences in frequencies of first inseminations by weekday. Herd-years were classified into 4 groups: 1) $\chi^2 < 22.46$, 2) $22.46 \leq \chi^2 < 100$, 3) $100 \leq \chi^2 < 250$, and 4) $\chi^2 \geq 250$. In 1995, 91.2, 8.0, 0.8, and 0.1% of herds were in those groups, respectively; corresponding percentages for 2001 were 77.2, 15.7, 4.4 and 2.7. If groups 3 and 4 contained ES herds, then ES frequency steadily increased from 0.9% in 1995 to 7.1% in 2001. Mean herd D1 and services per cow were 95.4 and 2.1 for group 1 versus 74.0 and 2.5 for groups 3 and 4. Fertility data from ES herds may require different treatment than those from herds using traditional estrus detection.

Key Words: Estrus Synchronization, Voluntary Waiting Period

W173 Viability of *Salmonella enterica* Typhimurium and *Escherichia coli* O157:H7 in finishing swine manure slurries with and without a urease inhibitor and a plant essential oil. J. E. Wells^{**} and V. H. Varel, USDA-ARS, U.S. Meat Animal Research Center, Clay Center.

Pathogens are commonly found in animal waste and their viabilities in manures are a concern for the environment and food safety. To determine the effects of urine and feces content, and treatments with a urease inhibitor and/or an odor-reducing compound, selected strains of *Salmonella enterica* Typhimurium and *Escherichia coli* O157:H7 were inoculated into swine manure slurries. Fresh (overnight) feces were collected from pens of swine fed a finishing ration, blended with urine and additives (n = 3 reps/trt), and inoculated with *S. enterica* Typhimurium strain 14028 (nalidixic acid-resistant) and *E. coli* O157:H7 strain 43895 (streptomycin-resistant). On d 0, a 1 g sample of the inoculated slurry was diluted and viable counts were determined by plating onto agar with either nalidixic acid or streptomycin. Viable counts were determined daily until no longer detectable. In slurries containing approximately 1:1 or 2:1 of urine and feces, the decrease in viability of *Salmonella* and *E. coli* were similar and few viable cells were found after 14 d. When the urine content of the slurry was increased to 5:1, both *Salmonella* and *E. coli* died off faster (5.7- to 6.0-fold, P

< 0.01) than the 1:1 slurries and few viable cells were detectable after 2 d. When the urease inhibitor, N-(n-butyl) thiophosphoric triamide (NBPT), was added to the slurries, pathogen viability was not affected in the 1:1 manure slurry where urea content was low. However, in the 2:1 and 5:1 slurries where urea was higher, NBPT addition prolonged the viability of *Salmonella* and *E. coli* up to 10 d ($P < 0.05$). Thymol addition, regardless of NBPT treatment or the urine to feces ratio, dramatically decreased ($P < 0.01$) pathogens and few viable counts of *Salmonella* or *E. coli* O157:H7 were observed after d 1. These experiments suggest that urea hydrolysis in swine waste may control pathogen levels and the inhibition of this biological process may promote pathogen viability unless antimicrobial compounds are also utilized.

Key Words: Swine, Manure, Pathogens

W174 Pregnancy rates and progesterone concentrations following ovsynch and cidr ovulation synchronization and timed artificial insemination protocols in postpartum cows. M. Aali*¹, K. Cheng¹, G. Giritharan¹, N. Dinn¹, and R. Rajamahendran¹, ¹Kuwait Institute for Scientific Research, Safat, Kuwait, Kuwait, ²University of British Columbia, Vancouver, British Columbia, Canada, ³University of British Columbia, Vancouver, British Columbia, Canada, ⁴University of British Columbia, Vancouver, British Columbia, Canada, ⁵University of British Columbia, Vancouver, British Columbia, Canada.

The objective of this study was to compare pregnancy rates (PR) and progesterone (P_4) concentrations following Ovsynch and CIDR ovulation synchronization and timed artificial insemination (AI) protocols in postpartum dairy cows. Two hundred and twenty seven postpartum Holstein cows were randomly divided into Ovsynch (n=111) and the CIDR (n=116) treatment groups. The Ovsynch protocol consisted of an initial injection of Gonadotropin Releasing Hormone (GnRH, 100 μ g) followed by an injection of Prostaglandin $F_{2\alpha}$ (PGF_{2 α} , 25mg) 7 d later and a second injection of GnRH (100 μ g) 48 h after PGF_{2 α} . The CIDR protocol consisted of insertion of a CIDR vaginal device and an injection of P_4 (100mg) and estradiol-17 β (E_2 , 5mg) on the first day of treatment, a PGF_{2 α} injection (25mg) 7 d later, removal of CIDR 24 h after PGF_{2 α} , and a second E_2 injection (5mg) 48 h after PGF_{2 α} . Artificial insemination for Ovsynch and CIDR groups of cows was performed at 64 and 76 h after PGF_{2 α} , respectively. Pregnancy was diagnosed by ultrasonography at d 35 after AI. Milk samples were taken from the beginning of treatment until d 35 after AI for P_4 determination. Pregnancy rates (based on ultrasound at d 35) for Ovsynch and CIDR groups of cows were 32 \pm 14.9% and 42 \pm 14.25, respectively ($P > 0.05$). Ovulation synchronization rates (based on milk P_4 level < 1ng/ml on the day of AI and > 1ng/ml on day 7 post AI) for Ovsynch and CIDR groups of cows were 61.3 \pm 13.1% and 74.8 \pm 8.66%, respectively ($P > 0.05$). Progesterone profiles from the time of AI until d 35 after AI were similar ($P > 0.05$) between Ovsynch and CIDR group cows. Ovsynch and CIDR protocols are very promising methods to eliminate estrus detection and carry out fixed-time AI in cycling heifers and postpartum cows and have the potential to enhance PR and the success of AI programs.

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Key Words: Ovsynch, CIDR, Synchronization

W175 Effect of hCG on the pregnancy rate of beef cows synchronized with GnRH, progesterone, and prostaglandin $F_{2\alpha}$. M. L. Borger and W. A. Greene*, *The Ohio State University, Wooster.*

The main objective of this study was to investigate the effect of the addition of hCG to a common synchronization program on pregnancy rates (PR). Eighty-four beef cows were allotted to two similar groups (hCG and Saline) based upon breed, age, postpartum interval, and postpartum cyclicality (as determined by ultrasonography). All cows received an intravaginal releasing device (CIDR), containing 1.38 g progesterone, and 100 μ g GnRH i.m. on d 0. On d 7, CIDRs were removed and all cows received 25 mg PGF_{2 α} i.m. Cows were observed for estrus 0730 and 1930 and were artificially inseminated (AI) 10-14 h after estrus was observed. If estrus was not observed, cows were timed AI (TAI) and re-

ceived 100 μ g GnRH i.m. 70-72 h after PGF_{2 α} . Seven days post-AI, the hCG cows received 3 ml (3000 IU) human chorionic gonadotropin i.m. and the Saline cows received 3 ml saline i.m. Following the synchronization period, repeat breedings were done until d 52. Cows were pregnancy diagnosed by ultrasonography on d 106. hCG and Saline groups had similar ($P > .05$) PR to synchronization (50.0 and 64.3%) and overall PR (78.6 and 90.5). Anestrous (n=34) and cycling cows had similar ($P > .05$) estrus detection rates following synchronization (50.0 and 52.0%), PR to synchronization (55.9 and 58.0%), and overall PR (85.3 and 84.0%). PR to synchronization were similar ($P > .05$) for cows AI after estrus observation (58.1%, n=43) and cows TAI (56.1%). There was no benefit to the addition of hCG to a beef synchronization program.

Key Words: Synchronization, Beef

W176 Relationship of calf respiratory and digestive disease and age at first calving in a large commercial Holstein herd. K. Rossini*¹, M. McGilliard¹, R. Pearson¹, R. James¹, W. Swecker¹, and G. Bethard², ¹Virginia Polytechnic Institute and State University, Blacksburg, ²G&R Dairy Consulting, Inc., Wytheville, VA.

Calf health data and first lactation records for 2556 cows born in a commercial Holstein dairy herd between June 1998 and June 2001 were studied to determine the effects of calthood disease on survival and performance. Data were not available for calves that left the herd before calving. A total of 2083 calves contracted respiratory disease within 1 yr of age or digestive disease within 45 d of age at least once, 865 calves had digestive disease only, 292 had respiratory disease only, and 191 calves had both diseases. Occurrence of calthood digestive disease doubled the chance of calthood respiratory disease. Single incidences of disease occurred in 56% of calves (digestive), and 30% of calves (respiratory), whereas multiple incidences occurred at rates of 21% (digestive) and 17% (respiratory). Age at first calving increased 0.53 mo with multiple occurrences of respiratory disease versus none. In the absence of respiratory disease, there was a 0.28 mo increase in age at first calving as digestive disease increased from none to multiple occurrences. Similarly, with one occurrence of respiratory disease, an increase in digestive disease from none to multiple occurrences resulted in 0.32 mo increase in age at first calving. The pattern did not hold for multiple occurrences of digestive disease, as calving age was oldest for one occurrence of respiratory disease, rather than multiple occurrences. Overall, heifers were oldest at first calving, at or above 25 mo, when they had a history of multiple cases of respiratory disease. Calves born in the winter calved at 25.4 mo, whereas calves born in spring calved at 24.5 mo. Relative to no disease, respiratory disease delayed calving the most for calves born in the spring, from 23.9 mo of age for no occurrence to 25.4 mo for multiple occurrences. No significant effect of disease was detected for 305-d milk yield, fat yield, or SCC, but protein yield decreased by 0.05 kg/d with increased calf respiratory disease. Calthood disease had no influence on subsequent illness as a cow in first lactation.

Key Words: Calf Disease, Age at Calving, Morbidity

W177 Environment effects on immunoglobulins (IgG, IgM) in dairy cattle and subsequent calf development in the sub-tropics. C. N. Lee* and M. Watson, *University of Hawaii-Manoa, Honolulu.*

Previous studies in temperate regions had shown that heat stress results in the decrease of IgG in serum and colostrum. The objectives of this study were: a) to evaluate the concentrations of dam's serum and colostrum IgG and IgM in primiparous and multiparous Holstein cows calving in the cool months and hot-humid months for vaccinated and non-vaccinated herds and b) the subsequent growth rates of calves. Forty-one dam-calf pairs from a commercial herd that practiced routine vaccination and eleven primiparous dam-calf pairs from non-vaccinated herd were used in the study. Serum samples from dam and calves were harvested at calving, 24h and 7d postpartum. Colostrum samples were daily for 5 consecutive days following parturition. Calf growth rate was monitored weekly for 6 weeks after birth. IgG and IgM concentrations were quanti-

fied using immunodiffusion (RID) kits. The THI for summer or cool months were similar in both locations although temperatures and humidity differences were observed. Vaccinated animals had higher IgG and IgM in serum (2778mg/dl, 405mg/dl) and colostrum (1416mg/dl, 135mg/dl) vs. serum of controls (1636mg/dl, 160mg/dl) or colostrum of controls (705mg/dl, 69mg/dl) ($p < 0.01$). Similar trends for IgG and IgM were reflected in the calves of the respective groups. No seasonal variations of IgG and IgM were observed in the vaccinated herd. For the vaccinated animals, the level of serum IgG increased from the first to the third lactation and tapered off by the 4th -6th lactation while the serum IgM for the 3rd or more lactations were higher than the first two locations. No differences in IgG and IgM were found colostrum with respect to lactations. Calves in the none vaccinated herd gained 34kg in 42 days while the vaccinated calves gained only 11kg. ($p < 0.01$). Calf performance within a herd was not affected by season. No calves were lost in the study. The findings suggested that beside immunoglobulins, other factors pertaining to good calf management are important for healthy growth rates.

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Key Words: IgG, IgM, Dairy Calves

W178 Vaginal and rumen temperature during the estrous cycle. A. Kennedy* and S. Mathew, *University of Manitoba, Winnipeg, MB, Canada.*

A pilot study was conducted to determine if rumen temperature can be used to predict estrus in dairy cows. Four rumen fistulated first-calf heifers that were 71 to 161 d post-partum were fitted with one temperature radiotransmitter in the vagina and one in the rumen. Temperatures were recorded at 4 min intervals for 72 days during which time the heifers were either synchronized using the Ovsynch method (cycles 1 and 3) or not synchronized (cycle 2). All heifers were bred by AI after the second synchronized cycle. Milk samples were collected 4 times weekly to track the CL regression which precedes estrus. In total, 13 periods of CL regression were observed. Due to equipment failure, vaginal and rumen temperature values were available only for 8 and 7 periods of CL regression, respectively. Various prediction equations were tested to maximize efficiency and accuracy of estrus prediction using vaginal and rumen temperatures. A rise in vaginal temperature of at least 0.3C (true positive) was found during all 8 periods of CL regression studied and 5 of 7 periods of CL regression were associate with a rise in rumen temperature. Mean rise in rumen temperature was 0.51C at estrus. A very high number of false positives were found for both vaginal (20) and rumen (26) temperatures. The results suggest that high variability in vaginal and rumen temperatures when heifers are not in heat may limit usefulness in estrous prediction.

Key Words: Estrus, Rumen, Temperature

W179 Variability of double ovulation during estrous cycles in lactating Holstein cows. R. Silcox*, J. Brinkerhoff, J. Milner, J. de Almeida, and K. Genho, *Brigham Young University, Provo, UT.*

We have previously characterized the incidence of double ovulation in lactating Holstein cows (22%) by making a single observation in a large number of animals within two herds. This study was designed to characterize the variability in the incidence of double ovulation within and between individual lactating cows within one high producing herd (>13,000 kg rolling herd average). The ovaries of 133 lactating cows calving between May-August were ultrasonically scanned weekly beginning 28 days postpartum and continuing until the cows became pregnant or left the herd. Number, size, and location of CL and of follicles greater than 10 mm in diameter or of the two largest follicles were recorded. Date of AI and pregnancy status were updated weekly. Body condition score and milk production were recorded monthly. Cow pregnancy status and number of fetuses present were determined 28-35 days after breeding. The ovaries of 117 cows were observed through 3 or more estrous cycles (mean number of cycles/cow=7.1; range 3-14 cycles). Two hundred-ninety of the 830 cycles observed were accompanied by double ovulation (35%) and 97/117 cows (83%)

had at least one cycle with double ovulation. Four cows had double ovulation during every cycle observed. Lactation number affected the overall frequency of double ovulation ($P < .05$) with 1st lactation cows having fewer cycles with double ovulation than did 2nd or 3rd and greater lactation cows (24% versus 40% and 43%, respectively). There were 102 cows that became pregnant, of which 38 (37%) established pregnancy during cycles with double ovulation, 18 (18%) of which became pregnant with twins or triplets. Thus, establishment of pregnancy during cycles with double ovulation results in twins <50% of the time. We conclude that the incidence of double ovulation in lactating Holstein cows is variable within individual cows, some experiencing double ovulation frequently while others do so rarely, despite being exposed to similar environmental conditions.

Key Words: Double Ovulation, Lactation, Cattle

W180 Prevalence of mastitis pathogens in milk samples in Ragusa, Sicily from 2000 through 2004. J. D. Ferguson*¹, M. Gambina², G. Azzaro², and G. Licitra^{2,3}, ¹University of Pennsylvania, Kennett Square, ²CoRFiLaC, Regione Siciliana, Ragusa, Italy, ³D.A.C.P.A. University of Catania, Catania, Italy.

Between Oct., 2000 and Nov., 2004 12814 milk samples (quarter or composite) from 2431 cows from 80 herds in Ragusa Province, Sicily were cultured by the milk microbiology laboratory at CoRFiLaC, Ragusa, Sicily. Milk sample collection and organism isolation followed procedures outlined by the Federation Internationale De Laiterie International Dairy Federation (FIL-IDF). Laboratory Methods for Use in Mastitis Work, Document 132. Major pathogens were classified as follows: *Streptococcus agalactiae*, environmental streptococci, *Staphylococcus aureus*, staphylococcal species, coliforms, and other organisms. Samples were considered contaminated if bacteria isolated were not a major mastitis pathogen or multiple organisms were cultured from one milk sample. Herds that submitted less than 10 milk samples (five herds) were deleted from the analysis of herd factors associated with prevalence of organism isolates. Herds were classified based on bedding type (none, straw, sawdust, sand) and housing type (bedded pack or free stalls) for lactating dairy cows. Production records from the Ragusa milk recording center were used to calculate mean somatic cell count and production for each herd on test. Herds were classed into five categories based on mean linear score (mls), (number of herds): Group 1 (6), mls <3.0; Group 2 (21), mls 3.0, 3.9; Group 3 (19), mls 4.0, 4.57; Group 4 (12), mls >4.58; Group 5 (18) mls not available as herds not on official test.

Prevalence of isolation for all samples was as follows: percent of herds with positive sample, percent of samples: no growth, 1.25%, 63.06%; *Streptococcus agalactiae*, 37.5%, 1.37%; environmental streptococci, 86.3%, 6.79%; *Staphylococcus aureus*, 87.5%, 15.33%; staphylococcal species, 82.5%, 14.02%; coliforms, 51.3%, 1.56%; and other organisms, 63.8%, 3.54%. The influences of season and herd factors such as housing and bedding, and mean somatic cell count were examined on prevalence of isolation of mastitis organisms.

Key Words: Mastitis, Microbiology, Dairy Cows

W181 The relevance of cows leaking milk in German dairy farms. M. Kollmann*, M. Rovai, and R. M. Bruckmaier, *Physiology Weihenstephan, Techn. Univ. Munich, Freising, Germany.*

The importance of milk leakage in dairy cows was studied in a survey in Bavaria, the south-eastern state in Germany. A questionnaire was sent to 56717 farms which was returned by 1116 farms representing approx. 35850 cows. The breeds are Simmental, Brown Swiss and Holstein-Friesian (73%, 7% and 3% of the farms, resp.). 26% of the farms kept < 20 cows, 60% 20-50 cows, 13% 50-100 cows and only 0.3% of farms had more than 100 cows. Milk yield in these groups had an average of 5750, 6600, 7150, and 7350 kg/y, resp., i.e. increased with herd size. Milk leakage occurred on 83% of all farms. The proportion of leaking cows varied from 1 - 50%. Leaking occurred in most farms shortly before milking (39%). However, 22% of farmers observed leaking already more than one h before milking. An influence of lactation number on milk leakage was denied by 47% of the farmers. Most other farmers (41%)

stated that leaking occurs mainly in older cows. An effect of lactation stage was obvious for most farmers. Most milk leakage was observed in the postpartum period by 66% of farmers, whereas in later stages leaking was observed in < 10% of farms. Milk leakage occurring mainly in cows with high milkability was stated by 76% of the farmers. Only some answered that leaking occurs in cows with average (19%) and low (3%) milkability. 49% of farmers stated that milk leakage is a problem of high yielding cows mainly. A significant correlation ($p < 0.01$) between herd milk yield the frequency of milk leakage could be calculated. The handling of leaking cows was different from not-leaking in 9% of the farms, mostly reflected in a shortening or omission of udder preparation before milking. The theory that milk leakage was a risk factor for mastitis was abandoned by 70% of the farmers. 87% of farmers did not acknowledge leaking as a risk factor for the health of the herd. In conclusion, milk leakage occurs frequently in dairy farms of all herd sizes. In most cases and in contrast with some scientific results, farmers do not consider milk leakage as an animal health problem.

Key Words: Milk Leakage, Survey, Dairy Cows

W182 Relationship of cow cleanliness during the close-up period and milk quality following calving. M. Chahine^{*1}, J. K. Reneau², R. J. Norell³, J. C. Dalton⁴, and J. M. Lukas², ¹University of Idaho, Twin Falls, ²University of Minnesota, St. Paul, ³University of Idaho, Idaho Falls, ⁴University of Idaho, Caldwell.

Ruminant Nutrition: Feed Additives and Feedstuffs

W183 Tea saponins affect in vitro fermentation and methanogenesis in faunated and defaunated rumen fluid. W.-L. Hu^{*}, Y.-M. Wu, J.-X. Liu, and Y.-Q. Guo, Zhejiang University, Hangzhou, P. R. China.

The effect of tea saponins (TS) on rumen fermentation and methane emission was examined using an in vitro gas production technique named Reading Pressure Technique. Three levels of TS addition (0, 0.2, 0.4mg/ml) were evaluated in the faunated and defaunated rumen fluid. Compared to the control, TS addition decreased the 24h gas production in the faunated rumen fluid, but had a minor effect on gas yield in the defaunated rumen fluid. The TS significantly reduced methane production in vitro. In the faunated rumen fluid, 0.2 or 0.4mg/ml TS decreased the 24h methane emission by 12.7% or 14.0%, respectively. Rumen fluid pH value was affected neither by TS addition nor by defaunation. The TS addition had only minor effects on volatile fatty acids, but the yield and pattern of volatile fatty acids were greatly affected by defaunation. While the molar proportion of acetate was not affected by defaunation, the propionate was significantly increased and the butyrate significantly decreased. Ammonia-N concentration and microbial protein yield were influenced by TS inclusion and defaunation. Inclusion of 0.4mg/ml TS increased the microbial protein mass by 18.4% and 13.8% and decreased the ammonia-N concentration by 8.3% and 19.6% in the faunated and defaunated rumen fluid, respectively. Protozoa counts were significantly reduced by TS inclusion. The current study demonstrated the beneficial effect of TS on methane production and rumen fermentation, and indicated that this may be due to the effect of the associated depression on protozoa counts.

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Key Words: Tea Saponin, Ruminal Fermentation, Methane

The objective of the study was to determine the effect of cow cleanliness during the close-up period on milk quality following calving during the summer season. Seven open-lot commercial herds located in Southern Idaho were used in the study. A scoring system from 1 to 5 was selected. Score 1 indicates a cow that is absolutely clean while a score 5 indicates a very dirty cow. A total of 681 close-up cows were hygiene scored at least twice during the close-up period. Each cow was scored for cleanliness of udder (HU) and lower rear legs (HL). Udder and lower rear legs scores were averaged and a composite score was created (HUL). SCC data were obtained from DHI and converted to a linear score (LS). HU, HL, and HUL were correlated to SCC and LS using PROC CORR and regression analyses were conducted using PROC REG of SAS. SCC for the 681 cows on their first DHI test date following calving averaged 251×10^3 cells/ml. HU, HL, and HUL averaged 2.3 ± 0.02 , 3.1 ± 0.01 , and 2.7 ± 0.01 , respectively. HU were significantly correlated to HL ($P < 0.001$, $R^2 = 0.57$). There were no significant correlations between SCC and the hygiene scores ($P > 0.05$). LS was significantly correlated to HU and HUL ($P < 0.03$) but not correlated with HL ($P > 0.05$). However, using a linear regression model in which HU and HUL were the explanatory variables and LS was the dependent variable resulted in a very low R^2 ($R^2 < 0.10$). Thus, the dependence of first SCC and LS following calving on hygiene scores during the close-up period in the high desert area of Southern Idaho is either absent or relatively small in cattle housed in open-lot facilities during the dry summer season.

Key Words: Milk Quality, Hygiene Scores, Cleanliness

W184 Feed intake, nutrient digestibility, milk production, and milk composition in cows fed cinnamaldehyde, yucca saponins extract, and condensed tannins. C. Benchaar^{*1}, T. A. McAllister², and P. Y. Chouinard³, ¹Agriculture and Agri-Food Canada, Dairy and Swine R&D Centre, Lennoxville, QC, Canada, ²Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, ³Laval University, Quebec, QC, Canada.

Four lactating cows (BW=730 kg; DIM=87 d) were used in a 4x4 Latin square design (3 wk/period) to study the effects of no additive (CO), or cinnamaldehyde (CIN, 1g/d), yucca saponins extract (YUC, 60 g/d), and condensed tannins (CT, 150 g/d) addition on feed intake, nutrient digestibility, milk production, and milk composition. Cows were fed for *ad libitum* intake a TMR consisting of 40% of grass silage and 60% of concentrate (DM basis). Effects of treatments were determined (PROC MIXED, SAS) by orthogonal contrasts: CO vs. all additives, CIN vs. (CT+YUC) and CT vs. YUC. Significance was declared at $P \leq 0.05$, and tendencies at $0.05 < P \leq 0.10$. DMI was similar between CO and supplemented diets (22.9 kg/d), but was lower (-1.7 kg/d) with YUC than with CT. Apparent DM (63.7%), OM (65.9%) and NDF (54.8%) digestibilities were similar between CO and supplemented diets. Digestibility of CP tended to be lower (58.2 vs. 61.2%) and that of ADF was reduced (45.3 vs. 49.9%) with CT than with YUC. Milk production (33.1 kg/d), 4%FCM (34.5 kg/d), BW change (0.73 kg/d), milk fat content (4.31%), and milk protein content (3.52%) remained unchanged between treatments. Lactose content tended to decrease with supplemented diets as compared with CO (4.44 vs. 4.52%), and tended to be lower for CT+YUC compared to CIN (4.42 vs. 4.45%). Milk urea nitrogen was similar between CO and supplemented diets (17.8 mg/dl) and tended to decrease with YUC compared to CT (16.3 vs. 18.3 mg/dl). Except for milk protein yield which tended to increase with CIN compared to CT+YUC (1.17 vs. 1.10 kg/d), yields of other milk components did not differ among treatments. This study suggests that the addition of CIN, CT and YUC has small effects on nutrient digestibility, milk production and milk composition in dairy cows. More investigation is needed to evaluate the potential of adding plant extracts compounds in dairy cow diets to improve feed efficiency.

Key Words: Plant Extracts, Digestion, Milk