ABSTRACTS
ADSA Student Affiliate Division

*** Author Presenting Paper**

Original Research/Independent Study Undergraduate Paper Presentations

957 The luteolytic potential of reduced doses of prostaglandin. J. Brinkerhoff*, R. Silcox, J. Donley, and C. Kubo, *Brigham Young University, Provo, UT*.

Prostaglandin (PGF) and its analogs have greatly contributed to managing the reproductive performance of dairy herds. The most effective route of administration as well as the minimal dose requirement for induction of luteolysis has been investigated previously. This study was designed to compare the luteolytic response of lactating cows treated with a reduced dose of Prostamate administered in the ischiorectal fossa versus the recommended dose given intramuscularly. Non-pregnant lactating Holstein cows with a functional corpus luteum (CL> 20 mm as determined by transrectal ultrasonography) were sorted by lactation into three groups; 1st (n=40), 2nd (n=40), 3rd and greater (3+) lactation (n=40). Cows within lactation group were paired. One cow of each pair was randomly assigned to be treated with 25 mg Prostamate intramuscularly (IM group) or with 15 mg Prostamate given in the ischiorectal fossa (IRF group). Ovaries of cows were examined by ultrasound 72 hours post-injection to determine luteal regression. The functionality and regression of the CL were confirmed through analysis of serum progesterone concentrations in blood samples collected by tail venipuncture at the time of PGF administration, then 24 and 72 hr later. Tail heads of all cows were chalked at the time of PGF treatment. Estrus was detected daily for seven days post-PGF by assessing chalk removal. Luteal regression was induced in 103/120 cows. Luteolytic response was not affected by lactation number (P>.05). Route of administration and dose of prostaglandin did not affect response rate (P>.05; IRF:50/60, 83%; IM:53/60, 86%). Overall estrus detection rate for all cows given PGF was 43% (IM:29/60, 48%; IRF:23/60, 38%; P>.05). Estrus detection rate among cows that responded to PGF did not differ due to treatment (IM:29/53, 55%; IRF:23/50, 46%; P>.05). The IRF is a viable alternate route of administering a reduced (60% of normal) dose of PGF to lactating dairy cows since both luteolysis and estrus are induced at rates comparable to that attained with a normal dose administered IM.

Key Words: Cattle, Luteolysis, Prostaglandin

958 Evidence for differential degradation of α_s- and β-casein in milk from mastitic quarters. K. M. Matson*, A. C. W. Kauf, A. L. Magliaro, and R. S. Kensinger, *The Pennsylvania State University, University Park*.

Mastitis decreases the yield of cheese from milk through the proteolytic degradation of milk casein. Our objective was to compare the changes in the pattern of proteins seen in mastitic milk samples caused by different pathogens. Milk samples were aseptically collected from inflamed and control quarters of seven mid-lactation Holstein cows upon diagnosis of clinical mastitis. Bacterial pathogens isolated included *E. coli*, *Strep. non-ag. spp.*, *Staph. spp.*, and gram-positive spp. Milk yield data was collected before and after diagnosis. Milk protein was determined by Lowry assay, and samples were analyzed by SDS-PAGE in 4 M Urea. Mean milk yields for the -5, 0, and +5 milkings relative to diagnosis of clinical mastitis were 20.2, 13.7, and 18.5 kg/milking ($\pm$ 2.2 SEM), respectively. There was a consistent trend for increased total protein in mastitic compared to control milk samples. Degradation of caseins was significant in all of the mastitic milk samples. Densitometric analysis of bands in gels from infected versus control milk samples indicated that there was a reduction of 37.9 $\pm$ 21.4 % in α_s-casein, with somewhat less degradation of β-casein. Degradation of α_s-casein was more extensive than that of β-casein, and this trend was common across pathogens. As further evidence of proteolytic activity, smaller molecular weight fragments appeared in the mastitic milk samples. In addition, an increase in immunoglobulins and albumin in mastitic milk was apparent. Results show that the degradation of α_s- and β-caseins are consistently observed among the mammary pathogens detected.

Key Words: Casein, Mastitis, Proteolysis

959 Cottage cheese manufactured using transglutaminase enzyme for increase in yield. K. Nielsen* and D.R. Henning, *South Dakota State University, Brookings*.

The purpose of this study was to confirm and quantitate the recovery of whey proteins from skim milk into cottage cheese curd when using

a food grade enzyme, transglutaminase. Other food processing methods have used this enzyme to crosslink proteins in the presence of calcium. The enzyme has been used to produce a curd. In our study, three replicate trials with unfortified skim milk and direct set cottage cheese manufacturing were completed. Experimental vats were manufactured using 10 units of transglutaminase enzyme per gram of total protein in the skim added immediately after the glucono delta lactone acidogen. Three washes of the cooked curd were completed. Samples of the skim milk, whey, wash waters, and curd were collected for a mass balance. All trials resulted in more protein recovery in the experimental cheese compared with the control cheese. The magnitude of the increased recovery was not significant. All experimental vats contained less protein in the whey than the corresponding control; however the magnitude of decreased protein was not significant.

Key Words: Cottage Cheese, Yield, Transglutaminase

960 Analysis of financial measures comparing 3 management styles. W. T. Wencl* and G. Hadley, *University of Wisconsin, River Falls*.

The objective of this research was to determine if management style influenced profitability. The management options compared included: Management Intensive Rotational Grazing (MIRG), a stored feed group, and a mixed feeding group. Survey results were used to define management style. MIRG was defined as a producer who used pasture as the major forage source of feed. The stored feed group was defined as farms that had no pasture access for animals. Finally the mixed feeding group was defined as farms that provide minimal grass for grazing, but pastures are not managed intensively. The number of farms whose survey results indicated the different management styles were: MIRG-30 farms, stored feed-226 farms, and mixed feeding-26 farms. There were nineteen different financial ratios used in this research; they dealt with issues of: liquidity, solvency, profitability, repayment capacity, and financial efficiency. Dupont analysis was performed on the financial ratio measures calculated from the Agricultural Financial Advisor (AgFA) database. This database contains the financial information of 600 Wisconsin dairy farms. The results were analyzed using a statistics program to test for statistical significance between results. Based on the results, MIRG is at least a competitive option for dairy producers.

Key Words: Financial, Grazing

961 Wastewater treatment to reduce phosphorus losses from dairy farms. L. D. Hughes*, K. F. Knowlton, N. G. Love, A. M. Gamboni, and C. M. Parsons, *Virginia Polytechnic Institute and State University, Blacksburg*.

Dairy farms are a major source of phosphorus (P) contamination of surface water. One approach to reduce P runoff from farms is to apply biological wastewater treatment techniques to reduce the nutrient content of land-applied waste. Enhanced biological P removal (EBPR) is a system used to reduce the P content of municipal waste. EBPR involves treating waste in a reactor with alternating anaerobic and aerobic conditions. P-accumulating microorganisms in the waste sequester P, yielding a P-depleted liquid and a P-enriched biomass for export. Our objectives were to evaluate the compositional suitability of dairy manure for EBPR, and to evaluate the effects of diet and manure separation on parameters important to reactor design. Waste samples were collected from 9 cows fed a high P diet (0.47%P), a low P diet (0.32%P), or low P with exogenous phytase (0.32%P), in a Latin square design. Total collection of urine and feces was conducted, a mixed slurry was created, and slurry was separated mechanically to generate liquid effluent. Slurry and effluent samples were analyzed for P and chemical oxygen demand (COD). COD:P, reflecting energy available to drive P removal, was calculated. Phytase had no effect on waste composition, but the P content of slurry and effluent from cows fed low P (with and without phytase) was lower than from cows fed high P (224 and 242 vs. 375 mg/l), and the COD content tended to be higher (47,078 and 51,081 vs. 45,282 mg O_2/l; $P < 0.09$). The COD:P ratio of all wastes was sufficient to support EBPR, but waste from cows fed low P had a higher COD:P ratio than cows fed high P (310:1 and 289:1 vs. 149:1). Effluent had less COD and P than slurry, but the COD:P ratio was similar in the two wastes. These results indicate that dairy manure slurry and effluent will support EBPR, and that diet affects waste composition in a way that will affect reactor design. More work is needed to assess reactor performance and the economic feasibility of applying EBPR to dairy waste.

Key Words: Enhanced Biological Phosphorus Removal, Wastewater Treatment, Manure Composition

Dairy Production Undergraduate Paper Presentations

962 Leptin: What is its role in the dairy cow? D. C. Barbour* and E. H. Jaster, *California Polytechnic State University, San Luis Obispo*.

Dairy cows in early lactation experience a negative energy balance that often pre-disposes them to metabolic disorders. Ketosis, periparturient paresis, and displaced abomasum are examples of these disorders that arise from insufficient energy levels at parturition and freshening. Negative energy balance occurs in the dairy cow because the amount of energy expended for body maintenance and production exceeds the amount of energy available from dietary sources. Leptin is a peptide hormone produced by white adipose tissue that acts on the hypothalamus as its primary target organ. Leptin has been demonstrated to be closely associated with metabolic traits that maintain homeostasis despite negative energy balances in early lactation. Leptin is also thought to regulate processes that are highly dependent on positive energy supply. Some of these are developmental processes which include the onset of puberty, ovarian function, and formation of mammary secretory tissue, as well as other processes including responses to stress and general reproductive and immune functions. Research has determined that leptin serves as a mediator of nutrition, and an indicator of nutritional status and body conditioning in dairy cattle. Recent discoveries in nutritional biochemistry and DNA technology indicate that leptin has been shown to contribute to fat deposition, nutritional status, reproductive function, and immune response in dairy cattle.

Key Words: Leptin, Dairy Cattle

963 Managing an ovulation synchronization program with PCDART. J. C. Roberts*, *Louisiana State University, Baton Rouge*.

Ovulation synchronization is the use of exogenous hormones to induce the onset of ovulation in dairy cattle. Ovulation synchronization is a common practice on many US dairy farms. It can increase profitability on a dairy farm by reducing the average days to first breeding and consequently the average days open per cow on the farm. It can also improve the labor efficiency on the farm by reducing the need for heat detection. Ovulation synchronization requires that specific hormonal events be given to individual animals at specific time intervals. One disadvantage of using ovulation synchronization is the difficulty in coordinating several events associated with the protocol on a large number of animals in a dairy herd when different animals require different events on a particular day. Another disadvantage of using ovulation synchronization is the need to keep accurate records on which events were given to which animals during a given time frame. There would be no way of knowing which event an animal should receive at what time without this information. This would quickly render the program ineffective. PCDART is a computerized record keeping system for use in dairy herds. PCDART is used to manage all of the information recorded on individual animals such as milk production, breeding, calving, etc. PCDART can also be used to manage ovulation synchronization programs in a dairy herd. Dairy farmers can use default ovulation synchronization protocols that are built into the program or they can design their own protocols. After setting up an ovulation synchronization protocol the farmer wants to use, they then tell PCDART which cows are going to be synchronized. PCDART will then create daily or weekly reports telling the farmer which cows receive which hormonal treatments on a given day. This process greatly reduces the amount of time the farmer has to spend de-