

## **Southeast Milk Inc. Check-Off Program / Project Summaries**

Active and Recently Completed Projects per July 30, 2004

### **Project # 219**

Title: **Use of BST in Management of Transition Dairy Cow to Increase Feed Intake, Improve Milk Yields and to Decrease Health Problems.** H. Head

Our objectives were to identify an appropriate amount of bST we could supplement to transition dairy cows to improve their feed intake and that also would have positive effects on blood metabolites and hormones, reduce health problems, and improve their subsequent milk production. In the first study, using 23 multiparous Holstein cows we compared three different amounts of bST (POSILAC; 5.1, 10.2, 15.3 mg bST/day). The two greatest amounts of bST tested before and after calving (10.2 and 15.3 mg/day) caused the desired increases in hormones and also resulted in an increase in feed consumption both before and after calving. Importantly, no apparent negative effects of supplementing bST were seen. In a second study, 48 multiparous Holstein cows were used to evaluate the effects of low doses of bST supplemented beginning 3 weeks before calving, after calving (supplementation starting at calving), or before and after calving compared to non-supplemented controls. Using this evaluation process we showed that bST-supplementation increased feed consumption and several important hormones without causing any negative effects on other hormones and metabolites needed for milk synthesis. The cows supplemented with bST produced more milk, consumed more feed, and better maintained their body weight (BW) and body condition (BCS).

Building upon the first two studies, a total 193 Holstein cows were used during two consecutive years to evaluate effects on milk production, BCS, BW, hormones and some important metabolites. Biweekly supplementation of bST began 21 d before expected day of calving and were continued through 60 days after calving (C vs. I; 0 vs. 10.2 mg bST/d, POSILAC®). After 60 days no cows were injected with bST. We did this to see if there were positive effects of the bST that were maintained even after the injections were stopped. During year 1, IGF-I, INS, NEFA and glucose were measured in plasma samples from 82 cows. During year 2, effects of bST on BCS and BW of 112 Holstein cows were evaluated, but no blood samples were collected. Milk yields of all 193 cows through 100 d were merged and analyzed.

Prepartum supplementation with bST positively affected concentrations of ST, INS and numerically greater non-esterified fatty acids (NEFA) in plasma but bST did not affect mean plasma concentrations of glucose or IGF-I. Postpartum injections of bST resulted in increased concentrations of NEFA, but no effects on the other measures. Mean body condition score (BCS; 1-5 scale) did not differ prepartum, around parturition, or postpartum. Greater milk production was observed for bST-supplemented group during first 30-d (+7.8%) and first 60-d (+6.7%) of lactation. No difference in milk yield was observed during first 100-d period, which included 40-d when cows were not supplemented. Number of cows that were culled due to health problems was not affected by bST supplementation.

Because of the positive effects on 60-day milk yields, BCS and body weight we conclude that the bST likely improved feed intake. Overall, we showed that when we cause small changes in important hormones and were able to modify important metabolites by supplementing bST prepartum and postpartum, that overall these changes had beneficial effects on the cow during the transition from pregnancy into lactation. These beneficial effects were seen as increased feed consumption, increased efficiency of milk production, as well as greater milk production. There were no apparent negative effects on health, and our initial

analyses indicate that there may have been positive effects of bST supplementation on health. This project is considered complete.

### **Project # 220**

Title: **Importance of Protein Amounts and Type of Ratio to Energy Intake for Growth Rates and Milk Yields of Heifers.** H. Head

One hundred twenty heifers were assigned to treatments. All, except one heifer completed the growth phase and then all were moved to the heifer breeding herd when they were > 750 lbs., irrespective of their age. We evaluated four protein-energy groups and one-half of heifers in each group also was supplemented with small quantity of bST until they reached breeding age (the peripubertal growth period). Heifers on high energy diets grew faster and, on average, reached breeding age 3 weeks earlier than heifers fed lower energy diets. Heifers supplemented with bST grew slightly more rapidly no matter which diet they were fed, but the increase in growth rate through 750 lb of body weight was fairly small (~3-4% increase) and probably did not justify the cost and labor to do it. Heifers born during Fall-Winter, that had their major growth during the cooler months of year, grew more rapidly than those born during Spring and Summer that had their major growth period during the hotter months of year.

Ninety-six of these heifers calved (about 80%) and 88 heifers (74%) provided usable milk production records (at least 90 days of milk production) to evaluate associations of diet, season they calved, and their body weight and body condition, and on the amount of milk they produced during their first lactation. We also recalculated all the growth rate associations again using only the records for the 88 heifers that actually contributed the milk production records.

For these 88 heifers, no differences in the number of inseminations, age they calved, or in their body condition score or body weight at calving were seen no matter what diet they were fed, or whether they had been supplemental bST, or due to the season they calved. Average milk production through the first 150 days of lactation did not differ due to the diet they were fed during the peripubertal growth period. Supplementing bST also did not improve milk production. Heifers that calved in the cooler months of the year did produce more milk (about 6.2 lb/day more for the first 150 days in the lactation). The body weight and body condition scores of the heifers that contributed milk production records did not differ due to peripubertal growth rates, diets fed, or supplemental bST. Overall, no positive or negative effects of feeding different protein and energy diets or supplementing bST were seen in the breeding or calving traits or on milk production. Therefore, recommendations on growth rates recommended in the new NRC (2001) seem to be adequate to allow growing heifers to meet their energy and protein requirements and allow them to express their full milk production potential during first lactation. Supplementing bST had very limited benefits on growth rates during this stage of life and had no benefits on milk production. This project is complete.

### **Project # 240**

Title: **Nutrient Handling Systems on Florida Dairies.** R. Giesy

Nutrient handling systems continue to evolve. Several demonstration projects are currently studying the feasibility of different systems or products thought to be effective in helping dairies control nutrients and use them to best advantage. Unbiased analysis of these new systems is needed to assist producers in selection of systems most appropriate to their situation. Additionally, an effort will be taken to evaluate the economic efficiency of these systems. This is a continuing program.

### **Project # 246**

**Title: Management of Transition Period in Cows with Short Dry Periods.**

H. H. Head

Effects of short dry periods (30 days) on milk production of cows were evaluated during two experiments. In the first, forty (40) multiparous Holstein cows were assigned and 87 cows were used during the second, when one-half of all cows also were supplemented with bST (0.4 ml, 10.2 mg/day of Posilac) during both prepartum and postpartum periods. Cows were assigned to one of six treatments to evaluate effects of dry period length (60 vs. 30days), use of estrogen (ECP, 15 or 20 ml) to speed up regression of mammary tissue during dry-off, feeding anionic or cationic diets, and use of supplemental bST. Daily feed intake and blood sample collection began at 28 days before expected calving. Body weights and body condition scores were taken beginning at dry-off and biweekly through 70 days postpartum. Milk yields and composition were taken through 100 days of lactation. All health incidences and treatments were evaluated through 100 days of lactation including effects of feeding anionic or cationic diets prepartum on milk production.

For all 124 cows that completed the experiments, no positive or negative effects of using Estradiol Cypionate (ECP) at time of dry-off to speed up mammary involution were detected. We concluded that there was no benefit to injecting estrogen compound to speed up the dry-off process. Importantly, the cows with shorter dry periods had similar body weight and body condition score changes as cows given the standard 60 day dry period, and they also consumed just as much dry matter before and after calving. Overall, results on milk production and feed intake were similar no matter whether cows were fed anionic or cationic diets prepartum.

Importantly, for the 40 cows no positive or negative effects on milk production of cows given 30-day or 60-day dry periods were seen and milk production through 70, 150 and 305-days did not differ between the two dry periods. Similarly, for the 84 cows the average milk production was not affected positively or negatively during the first 150 days of lactation. The full lactation milk yields for the 30-day and 60-day dry period cows also did not differ. Our results support the idea that the short dry period procedure can be used as a management tool with no loss in subsequent milk production of dairy cows. Changes in concentrations of blood hormones and metabolites were improved by supplemental bST and milk production was increased without any negative effects on health. In fact, there was evidence that transition health status was improved in the bST supplemented cows. We are further evaluating this finding by merging all transition cows health records and evaluating disease incidences for this larger group and we consider this project complete.

### **Project # 248**

**Title: Improving Forage Productivity During Late Fall and Early Winter by Making Grass Less Sensitive to Short Days.** P. Mislevy

Research supported by the Milk Check-off Grant program has indicated that the reason bahiagrass does not grow during the winter is due to short day length. Studies during the past several years have focused on developing a new bahiagrass that will produce more forage than Pensacola and Tifton 9 bahiagrass from October through March. Three cycles of breeding have been conducted, incorporating winter production, cold tolerance, seed yield, spreading ability, etc. Two years of harvesting Florida Cycle 3 has just terminated. Clipping results from 2002 to

2004 indicated dry biomass yields during the winter were 3.1, 2.4, and 1.5 T/A for Florida Cycle 3, Tifton 9, and Pensacola bahiagrass, respectively. Dry yields during the summer (April - September) were 7.0, 6.5, and 5.2 T/A for Cycle 3, Tifton 9, and Pensacola, respectively. Digestibility of Florida Cycle 3 averaged 54 and 68% during October and January and was 4 and 1% higher than Tifton 9 and 8.4 and 1.9% higher than Pensacola during the above harvest months. Crude Protein was about 2.0% lower for Tifton 9 and Florida Cycle 3 than Pensacola during the winter period. These 2 yr-data indicate that Florida Cycle 3 out-yielded Tifton 9 and Pensacola bahiagrass by 0.7 and 1.6 T/A dry forage during the winter period, respectively, along with increased forage digestibility. This project is complete.

### ***Project # 267***

Title: **Evaluating the Effect of Seasonality on Financial Performance of Southeast Dairy Businesses.** A. de Vries (M. J. Hoekema)

The goal of this project is to study the effect of seasonality found in DHI data on the financial performance of Southeast dairies that participate in DBAP. The 2002 DBAP data has been added to the database and collection of the 2003 data is almost completed. With this larger dataset, it may be easier to estimate the effect of seasonality on dairies' financial performance. Completion is expected in 2005 and is currently ongoing.

### ***Project # 268***

Title: **Effect of Monensin on Incidence of Calving-Related Disorders, Milk Production and Reproductive Performance in Florida Transition Cows Fed Diet Containing Citrus Pulp.** P. Melendez

This project has been completed. Objectives of the study were successfully accomplished. Results of this research were part of Dr. Melendez' Ph.D program, who is now assistant professor at College of Veterinary Medicine, University of Florida. Currently two papers are being written to be sent to a scientific journal (Journal of Dairy Science, Journal of American Veterinary Medical Association).

Monensin demonstrated to be beneficial on transition dairy cows, especially cows dried-off with low body condition score. Monensin increased body condition score from dry-off to calving in these skinny cows, therefore lactational performance was improved. In addition, monensin increased calving assistance probably due to larger calves at parturition.

### ***Project # 269***

Title: **Effect of Monensin on Volatile Fatty Acids, NH<sub>3</sub> Rumen Concentration, Rumen pH and Blood Metabolites in Transition Cows Fed TMR Containing Citrus Pulp.** P. Melendez

This project has been successfully completed. Results of this research were part of Dr. Melendez' Ph.D program, who is now assistant professor at College of Veterinary Medicine, University of Florida. Currently, one paper was written and submitted to the Journal of Dairy Science. Another paper is being written to be sent to the same journal. The most important finding of this study was that cows supplemented with monensin had less subclinical ketosis than cows without monensin at 14 days postpartum.

### **Project # 275**

Title: **Construction of a Rotational Shade Circle for Livestock on Pasture or Outside Lots.** K. Bachman

Design concepts for the rotational shade circle have been developed with the focus on structural integrity, ease of movement, and shaded area provided. Allocation of fifty square feet per mature cow would require a very large shade structure for even a small number of mature cows. Consequently, construction of the prototype will take place at the heifer replacement unit for the breeding group aged 13 to 15 months (750-850 lbs). This project is ongoing.

### **Project # 279**

Title: **Alleviating The Stresses of Concrete Floors in Florida Feed Barns IV.**  
D. Bray

This project is ongoing. We will check for longevity.

### **Project # 284**

Title: **How Do We Get the Best Performance When Feeding Citrus, Corn or Molasses in the Milking Herd?** M. Hall

The project was completed in 2004. So we have a better idea of how to work with different byproduct feeds in rations, the study evaluated the effects on production and ruminal effects of changing the type of carbohydrate fed in rations with more or less bypass protein. Rations were formulated so that carbohydrates came from predominantly from starch (corn meal), soluble fiber (citrus pulp), or sugar (molasses + table sugar); less or more bypass protein was provided by feeding all 48% soybean meal, or substituting an expeller soybean meal for part of the 48% soy. The bottom line for the results of the animal study:

- ◆ Different nonfiber carbohydrate sources give different milk yields and protein feed efficiencies. More starch gave the best protein feed efficiency; the citrus diet gave the lowest milk and milk protein yields.
- ◆ Cows responded differently to bypass protein with the different carbohydrates – for milk and fat yields and feed efficiencies, the responses increased for citrus and sugar when bypass protein was fed, but decreased for starch.
- ◆ Fiber digestion in the rumen differed by carbohydrate source, bypass protein amount, and the combination of the two.
- ◆ Some things we did not expect at all: the carbohydrate source appeared to change use of protein breakdown products in the rumen. This may change how we need to formulate for protein by carbohydrate source.
- ◆ Rumen acidity changed with bypass protein treatment when sugar was fed (lower pH with more degradable protein).

The study gave information we can use in ration formulation on how carbohydrates and protein supply function together. The study raised questions about how some byproduct feeds change the rumen fermentation and how that affects animal performance. Setting up more research funded by USDA to address those questions.

### **Project # 286**

Title: **Can We Use individual Feed Intake Data to Estimate Group Responses During Transition Cow Experiments to Reduce Cost of Transition Experiments.** H. Head

We continue to collect and assemble data from completed and ongoing transition cow experiments to construct a working data set. We selected experiments that provide both feed intake and milk production responses (yield and composition) and some measures of animal body condition, body weights and health status during the transition period and subsequent lactation. We have assembled > 400 individual cow data records that provide the needed measures. Thus far data have been merged and some sorting of data have been completed. Once results of all transition cow studies have been compiled and the data verified we will initiate the data analyses. We consider this project ongoing.

### **Project # 287**

Title: **Smoothing Progress Through the Transition Period by Feeding Glucogenic and Energy Compounds.** H. Head

Multiparous Holstein dairy cows were used to evaluate effects of feeding different glucogenic precursors to cows during the 3 weeks before calving through the first 4 weeks of lactation (the transition period). We evaluated daily feed intake, blood levels of important metabolites, energy status, health variables, and the subsequent milk production of all of the cows. Equal numbers of cows were assigned to be fed 1) cationic diet, 2) cationic diet plus Ca Propionate (NutroCal™), 3) cationic diet plus a mixture of Ca and Na propionates plus propylene glycol and fat (Metaxerol™), or 4) propylene glycol during this approximately 7 week time period. After calving all cows were switched to the herd lactation diet. We measured feed intake, body weights and body condition scores and collected blood samples throughout the trial. Milk yields were recorded during the lactation at each of the 3 daily milkings through 150 days and milk samples were measured through 70 days of lactation. A subset of 40 cows (10/diet treatment) were used to collect liver samples for measure of lipid accumulation and expression of steady state expression of three liver enzymes at -21 prepartum and at +2, +14, and +28 days of lactation (see project # 327). Daily health records were collected for each of these trial cows.

We had 124 cows complete their feeding and lactation periods (29, 33, 31, 31 cows in control or fed the three glucogenic precursors). Overall, these cows were all fed the test diets for at least 14 days before they calved normally, and then completed at least 100 days of the lactation. The feed intake during the time before calving did not differ, except that control cows ate more than those fed NutroCal™. The amount of feed that cows consumed decreased 17-31 % the week before calving but the decrease was similar across the four diets, but was greatest during the 2 days before the cows calved. After calving all cows rapidly increased their consumption of feed. Overall, the increase in feed intake after calving was similar across the different diet groups, so it was not affected by the supplements fed.

Milk production of the four groups did not differ during the first 4 weeks after calving, the time when glucogenic supplements were being fed. The only exception was that cows fed propylene glycol produced slightly less milk, perhaps due to reduced palatability. Milk production during 28-70 days after calving and during 4-100 days after calving was essentially the same across all the groups. As we usually observe, cows produced less milk during the hot season of the year and also ate less feed, even though they were housed in a free-stall barn equipped with misters and fans. We saw no effects of feeding supplements on body weight or body condition scores. Overall, cows had similar patterns of feed consumption during the 7 weeks the

supplements were added to their TMR diets, they produced the same amount of milk during early lactation and during the first 100 days of lactation, and all maintained body weight and body condition score equally well. We concluded that there were no positive or negative effects of adding glucogenic supplements to the total mixed ration during the transition period. We consider this project ongoing.

### **Project # 289**

Title: **Efficacy of a New Vaccine to Prevent Abortion in Dairy Heifers Naturally Infected with *Neospora caninum*.** J. Hernandez

*Neospora caninum* is a protozoan parasite originally identified in dogs but now recognized as an important pathogen associated with abortions in cows and occasionally with encephalomyelitis in congenitally infected calves. Despite the recent discovery that dogs can serve as a definitive host for *N caninum*, congenital infection is generally accepted as the primary means of transmission and maintenance of *N caninum* in cattle. During pregnancy, some fetal infections culminate in abortion, whereas most result in a new generation of chronically infected cattle. In commercial dairy herds, the economic importance of infection with *N caninum* is reportedly attributable to costs associated with abortion, increased number of culled cows, and decreased milk production. In dairy herds in which congenital infection is recognized as the major confirmed method by which infection is maintained in herds, producers and veterinarians are interested in developing strategies of selective culling and replacement for control and eradication of the disease. The objective of this study is to assess the efficacy of a commercial vaccine to prevent abortion in cows naturally infected with *N caninum*.

An initial study: Risk of abortion associated with *Neospora caninum* in dairy cows during different lactations and evidence of congenital transmission (J Am Vet Med Assoc 2002;221:1742-1746) revealed that 102 (22%) of 460 cows were classified as seropositive to *N caninum*. Incidence of abortion during the current lactation was 19% (19/102) in seropositive cows and 14% (50/358) in seronegative cows. In order to test the efficacy of the commercial vaccine, two groups of 363 *N caninum* seropositive cows are required in each group (vaccinates vs nonvaccinates) to declare an abortion rate reduction from 19% to 14% as statistically significant (type I error = 0.10; type II error 0.20). The vaccine trial has been postponed until one or two additional herds with a high prevalence of *N caninum* are included to complete the sample size requirements of this study. This project is ongoing.

### **Project # 296**

Title: **Improving Forage Quality with Fiber-Degrading Enzymes (year 1 of 2).** A. Adesogan

Milk Check-Off dollars funded an investigation that examined the effect of fibrolytic enzyme treatment on the fermentation of Tifton 85 bermudagrass harvested for silage. Four commercial enzyme products were compared (Promote® Agribrand, Canada, Biocellulase X-20® and Biocellulase A-20®, LodeStar, IL, USA; Cattle-Ase® Animal Feed Technologies Inc, Greeley, CO, USA and Biocellulase A-20® LodeStar, IL, USA). Five week regrowths of bermudagrass were harvested, chopped and preserved in mini-silos without treatment or after treatment with each of the enzymes. The enzymes were applied at the rate recommended by the enzyme manufacturer or at half or twice the recommended rates.

Applying the Promote enzyme increased DM recovery and increased the digestibility of DM and that of the usually less digestible fiber fractions. In addition, it resulted in greater sugar concentrations, lower pH values and lower concentrations of ammonia nitrogen, acetic acid, NDF and ADF. This indicates that applying the enzyme reduced shrinkage, and losses of

important nutrients like sugars and protein, while improving the quality of the fermentation, and fiber digestibility. These effects probably occurred because the enzymes increased the digestion of the fibrous components in the grass and converted them into sugars. The sugars are required for the growth of lactic acid bacteria and the production of lactic acid which inhibits the growth of undesirable bacteria by lowering the pH. Shrinkage and nutrient losses are minimized when the growth of desirable lactic acid bacteria is optimized in silage.

Application of the other enzymes produced some improvements in fiber digestion, but none was as effective as the Promote enzyme. This suggests that the Promote enzyme has potential for improving the intake and digestibility of bermudagrass, and hence increasing milk production from cows fed enzyme-treated bermudagrass silage. This theory will be tested this fall in an experiment that will examine the effect of the following treatments on milk production in dairy cows:

1. Promote enzyme application to bermudagrass at ensiling
2. Promote enzyme application to bermudagrass at feeding
3. Promote enzyme application to the concentrate at feeding
4. Promote enzyme application to the TMR at feeding.

The results of the study described above were presented at the recently completed joint meeting of the American Dairy Science Association and the American Society of Animal Science at St. Louis in July. We gratefully acknowledge funding for the work from the Milk Check-Off. This project is complete.

### ***Project # 299***

Title: **Multi-Lingual Milking Videos for Florida Dairies.** D. Bray

We have completed forty videos made on Florida dairy farms. In addition to these, we have also completed an SMI driver training video. This project is complete.

### ***Project # 301***

Title: **When to Purchase Replacement Animals, How Many, and What You Can Afford to Pay for Them.** A. de Vries

In this project methods are developed to study the economics of cow replacement, give general guidelines, and be able to do farm specific analyses. Cow replacement has consequences for the number of cows that are milking, dry, open and pregnant over time. Coupled with the seasonality in milk production, reproduction, and involuntary culling, a systems analysis is needed to account for all effects and calculate the best course of actions. A computer program has been completed that is able to optimally rank cows in the herd for future profitability, support culling decisions, and suggests when to enter heifers in the herd. The program has been extended to calculate the economics of different reproductive strategies. An article has been accepted in Journal of Dairy Science. The program has been used in various extension meetings. Talks are underway with DRMS in Raleigh, NC, about implementation of the program in their software (e.g. PCDart). This project is ongoing.

### ***Project # 303***

Title: **Dairy Business Analysis Project – Georgia.** L. Ely

The Dairy Business Analysis Project had 41 dairies submit financial data for 2001. Thirty-nine dairies were included in the summary with complete data. Of these, 27 were located



in Florida, 11 in Georgia and 1 in Alabama. The average herd size was 977 cows and 477 heifers with 17,170 lbs. of milk sold per cow. The average culling rate was 36%. There was an average of 10 FTE workers per farm with 51.5 cows per FTE worker and 880,000 lbs. Milk sold per FTE worker. Total revenue per cwt. was \$20.00/cwt. with \$18.24/cwt. milk income. The average total expense was \$17.75/cwt. The largest expense items were purchased feed, \$7.32/cwt.; labor, \$2.69/cwt. and livestock, \$1.64/cwt. Net farm income from operations was \$2.25/cwt. and net farm income was \$2.39/cwt. The debt to equity ratio was .72, rate of return on assets was .09, rate of return on equity was .11, operating profit margin ratio was .09 and asset turnover rate was .90. The net farm income for herd size was \$1.88/cwt for <400 cows, \$2.31/cwt. for 400-900 cows and \$2.76/cwt for >900 cows. The net farm income for level of production was \$1.98/cwt. for <16,000 lbs./cow, 42.25/cwt. for 16,000-18,000 lbs./cow and \$2.94/cwt. for >18,000 lbs./cow. This project is complete.

### ***Project # 306***

Title: **Pilot-Scale Recovery of Phosphorus from Flushed Dairy Manure.** W. Harris

The objective of this project was to demonstrate the possibility of recovering phosphorus from flushed dairy manure. Recovery of nutrients in a form that can be managed by dairy farmers could ultimately alleviate restrictions and high land area requirements for sprayfields, while also reducing environmental risks and liabilities. Our process is based on utilizing a fluidized-bed reactor to recover calcium phosphate as a pellet formed by crystallization on a suitable seed material, e.g. sand. The overall goal is to “harvest” phosphorus from flushed dairy manure wastewater as a recoverable nutrient rather than producing a high-phosphorus waste sludge.

We have completed the development and construction of a pilot-scale reactor (15 gal) at the UF/IFAS Dairy Research Unit. The unit is made of molded polyethylene, stands 5 foot high, and has an 8 inch top access hatch. The reactor is a tapered column design. Since the column widens at the top, the greater cross-sectional area decreases the upflow velocity, which promotes sand retention. Wastewater from the top of the column is recycled back into a central duct leading to the apex. This internal recirculation of the wastewater creates a uniform flow velocity for sand fluidization and also facilitates the sand-bed fluidization independent of process flow.

Our efforts are now focused on phosphorus precipitation and recovery at this scale. In order to crystallize the phosphorus onto the seed material, a driving force is created by pH adjustment. The high buffering capacity of the flushed dairy manure wastewater means that alkali addition for pH elevation poses both a materials handling and cost challenge. However, using our reactor design, we have demonstrated the efficacy of air sparging for pH elevation. This achievement obviates the need for and cost of alkali addition. Also, air sparging will not permanently elevate the pH of the final effluent, since CO<sub>2</sub> will be generated by microbial activity during storage. Non-chemical pH adjustment also avoids increasing the salinity of the wastewater. This project is complete.

### ***Project # 308***

Title: **Effects of Lameness on Ovarian Activity, Maintenance of Pregnancy, Reproductive Performance, Milk Production and Efficacy of Corrective Foot Trimming Procedures to Prevent Lameness in Dairy Cows (year 1 of 3).**

J. Hernandez

Lameness is one of the top 3 health problems that cause premature culling of dairy cows in the United States. The National Animal Health Monitoring System Dairy 2002 Study reported that lameness was the reason for culling 16% of dairy cows sent to slaughter. The economic importance of lameness is reportedly attributable to cost of treatment and control methods, impaired reproductive performance, decreased milk yield, increased risk of culling, and decreased carcass value of culled cows. In addition, because of the pain, discomfort, and high incidence of lameness in dairy cows, this disorder is an animal welfare issue of concern. Four studies were designed to (1) to examine the relationship between lameness and delayed ovarian cyclicity during the first 60 d postpartum, (2) lameness and milk yield, (3) lameness and the calving-to-conception interval, and (4) to assess the efficacy of corrective hoof trimming at dry-off and mid-lactation (200 DIM), compared correcting hoof trimming at to dry-off only in Holstein cows.

The first study has been completed: *Effect of lameness on ovarian activity in postpartum Holstein cows* (J Dairy Sci 2004, in press). We hypothesized that because lame cows experience a more pronounced loss in body condition (hence a prolonged state of negative energy balance) during the early postpartum period, lame cows are at higher risk of delayed ovarian cyclicity than non-lame cows. Two hundred and thirty-eight cows from a 600-cow dairy that calved during a 12-mo period were used (rolling herd average milk production, approx 12,000 kg). Cows were classified into 1 of 6 categories of lameness during the first 35 d postpartum by using a locomotion scoring system. Cows were blood-sampled weekly for detection of plasma progesterone ( $P_4$ ) concentrations during the first 300 d postpartum. Analysis of results of the study reported here support the hypothesis that lameness has a detrimental effect on ovarian activity in Holstein cows during the early postpartum period. Cows classified as lame (score = 4) had 3.5 times greater odds of delayed cyclicity than non-lame cows (score  $\leq$  2) ( $P = 0.04$ ). Delayed ovarian cyclicity in lame cows would be reduced by 71%, if lameness had been prevented. Cows classified as moderately lame (score = 3) had 2.1 times greater odds of delayed cyclicity than non-lame cows (score  $\leq$  2) ( $P = 0.15$ ). Although cows classified as moderately lame (score = 3) did not have significantly greater odds of delayed cyclicity than non-lame cows ( $P = 0.15$ ), the relationship was numerically in the same direction as for lame cows with a score of 4. We recommend that preventive measures such as examination of cows feet and use of corrective foot trimming techniques be targeted at moderately lame cows (score = 3), as they represented 42% of the study population. This project is ongoing.

### **Project # 310**

Title: **Risk Balancing Strategies for Florida Producers.** R. Kilmer

The study compares the minimum risk level attainable using futures and options under various policy, production risk and capital structure scenarios. This research found that the minimum risk hedge ratio decreases drastically when the producer is completely covered under MILC. The preceding result can be explained by the fact that the deficiency payments received under MILC are similar to the payments received from an option. This yields a substitution effect limiting the effectiveness of class III futures and options. Production risk also decreases the minimum risk hedge ratio although not nearly as drastically. The firm's use of debt shifts the risk measure by the amount the producer pays in interest. The producer's ability to risk balance is limited by the risk faced. Michael Zylstra finished his dissertation in May 2004. Project is completed.

**Project # 313**

Title: **Testing Dairy Cattle Embryos for Enhanced Embryo Survival and Reduced Embryo Transfer Costs.** K. Moore

Maintenance of recipient cows is the most expensive component of embryo transfer, especially if the fetus is lost late in gestation. Improving our ability to select embryos that are genetically normal will increase chances of survival to term and decrease costs associated with maintaining open recipients. This will make the newer reproductive technologies, such as embryo transfer, in vitro embryo production, cloning, and genetic selection more economically feasible for the dairyman. The goal of this project was to develop genetic tests for pre-screening dairy cattle embryos prior to transfer, allowing us to quickly eliminate genetically abnormal embryos and even select for embryos with beneficial traits. The first objective, which was to optimize embryo biopsy and fusion techniques for producing metaphase spreads for genetic analysis has been completed. Three methods are now available, cell fusion, piezo injection and our latest improvement chemically induced condensation. The later is the method of choice, as it bypasses the fusion and injection procedure, making it easier and more efficient. Substantial progress has also been made on the second objective, through optimizing karyotyping procedures. Future efforts will complete the project by optimizing the process of fluorescent in situ hybridization. A University of Florida Opportunity Grant was obtained to further the progress of this project. The proposed project is not yet complete.

**Project # 314**

Title: **A New Approach and Evaluation for Detection of *Mycobacterium paratuberculosis* (Johne's disease) in cattle.** O. Rae

Objectives: To explore an alternative method for detection of *M. paratuberculosis* in infected cattle, by subiliac lymph node biopsy; to assess the sensitivity and specificity of individual and serial test results using different diagnostic methods in Johne's positive cattle; and to explore methods to improve the sensitivity of subiliac lymph node biopsy techniques for early detection of Johne's disease.

Procedures: About 150 cattle will be utilized (67 animal samples have been processed at present). Animals have been selected from Johne's-ELISA tested animals at IFAS research units. Animals are from 2-10 years of age, and may or may not have signs suggestive of Johne's disease. Each study animal is identified by number, age, sex, breed, and evaluated by weight, body condition scores, and previous results of Johne's ELISA tests. Blood is collected for ELISA and AGID Johne's testing. A 100 gm fecal sample is cultured for *M. paratuberculosis*. A subiliac lymph node biopsy is taken or a whole lymph nodes taken at slaughter/necropsy. An impression smear of the lymph node cut-section is stained on a microscope slide (Zeihl Neelson) for microscopic evaluation. The remainder of the lymph node sample is placed in formalin and saved for later histopathological evaluation.

Peripheral lymphnode biopsy results (LN) compared to agar gel immunodiffusion (AGID) and ELISA test results for *Mycobacterium avium subspecies paratuberculosis* in study cattle.

| AGID  | LN  | ELISA test results |      |      |      |      | Total |
|-------|-----|--------------------|------|------|------|------|-------|
|       |     | Neg                | Susp | LPos | MPos | HPos |       |
| Neg   | Neg | 17                 | 16   | 8    | 21   | 3    | 65    |
|       | Pos | 0                  | 0    | 0    | 0    | 0    | 0     |
| Pos   | Neg | 0                  | 0    | 0    | 2    | 0    | 2     |
|       | Pos | 0                  | 0    | 0    | 0    | 0    | 0     |
| Total |     | 17                 | 16   | 8    | 23   | 3    | 67    |

Tentative results: The causative organism *M. paratuberculosis* has not been detected in peripheral lymph nodes of any sampled animals. In 6 of 17 study animals that were followed to markets or necropsy, the organism was recovered and identified in gut wall tissue and(or) mesenteric (gut) lymph nodes. The project is ongoing.

### **Project # 318**

Title: **Feeding Value of Whole Fuzzy Cottonseed with Elevated Concentrations of Free Fatty Acids.** J. Bernard

Twenty-four lactating Holstein cows were used in an 8 wk randomized block trial to determine the effect of feeding whole cottonseed with elevated concentrations of free fatty acids in the oil on intake and performance. Three lots of whole cottonseed were obtained that contained 6.8 (Control), 24.1 (HFFA1), and 22.3% (HFFA2) free fatty acids in the oil. Compared with control and HFFA1, the HFFA2 contained slightly more moisture, less oil, and were discolored. There were no differences in concentrations of ADF, NDF, or minerals among treatments. Cows were fed one of three experimental diets differing in source of cottonseed which was included at 14% of the total dry matter. Dry matter intake (DMI) was highest ( $P < 0.01$ ) for cows fed the diet containing HFFA2 (51.7 lb/d) compared with control and HFFA1 (47.5 and 48.4 lb/, respectively). No differences in milk yield (average 76.4 lb/d) were observed among treatments. Milk fat percent was lower ( $P < 0.01$ ) for diets containing WCS with elevated FFA (4.22, 3.64, and 3.58% for control, HFFA1, and HFFA2, respectively). Percentage of milk protein, lactose, and SNF was similar among treatments. The efficiency of converting DMI to milk tended to be lower ( $P < 0.07$ ) for diets containing whole cottonseed with elevated concentrations of free fatty acids (1.62, 1.55, and 1.50 lb milk/ lb DMI, respectively). No differences were observed in concentrations of MUN although values were numerically higher ( $P = 0.15$ ) for diets containing WCS with elevated FFA.

Results of this trial indicate that feeding WCS with high concentrations of FFA does not alter intake or milk yield. The reduced concentration and yield of milk fat suggest altered ruminal fermentation and fiber digestion. In our previous trial ruminal pH decreased linearly as the FFA concentration increased, but not differences were observed in concentrations of volatile fatty acids typically associated with decreased milk fat percentage when Holstein steers were fed diets containing WCS with FFA up to 18%. The fatty acid profile of the oil in WCS with 3 and 12% FFA was similar in our previous research, so reduced milk fat percent is not likely related to changes in dietary fatty acids that would alter transfer of fatty acids into the mammary gland. The FFA content of WCS used in both trials was higher than that used previously, so

ruminal fermentation may have been altered in a manner to reduce milk fat synthesis but did not limit total protein or energy availability in support of milk and milk protein synthesis. This project is complete.

**Project # 319**

Title: **\$1000 Milk Check-Off Scholarship.** K. Braun

**Project # 320**

Title: **Evaluation of Environmental Bedding Materials for Mastitis Pathogens.** D. Bray

We continue to acquire samples of various bedding materials from dairies in Florida and Georgia. This project is ongoing.

**Project # 321**

Title: **Multi-Lingual Milking Videos for Florida Dairies.** D. Bray

We continue to do new videos and are starting to remake previous videos as dairymen change their procedures. This project is ongoing.

**Project # 322**

Title: **Environmental Modifications for Reducing Summer Stress on S. E. US Dairy Farms.** D. Bray

This year's project pointed out the need to continue feed line sprinklers during the nighttime hours. Found that cooling fans in tunnel ventilation barns became dirty faster than in open barns. This project is completed.

**Project # 323**

Title: **Florida Mastitis and SCC Reduction Study.** D. Bray

This was the first year of this project. We acquired mastitis data on 10 dairy farms on DHIA and are developing a program to use the "Hot List" more effectively. We also obtained volumes of data on bulk tank and cow pathogens, and their effect on mastitis levels and bulk tank SCC levels. This project continues.

**Project # 325**

Title: **Dairy Business Analysis Project - Georgia-2003.** L. Ely

Twenty-nine dairies submitted financial data in 2002. Twenty-seven dairies were included in the summary results. Of these, 18 were located in Florida, 8 in Georgia and one in Alabama. The average herd size was 1,168 cows and 583 heifers with 16810 lbs. milk sold per cow. The average culling rate was 34%. There was an average of 20 FTE workers per farm and 1,010,000 lbs milk sold per FTE worker. Total revenue per cwt. was 17.67 / cwt with \$16.05 / cwt milk income. The average total expense was \$17.88 / cwt. The largest expense items were purchased feed (\$7.00 / cwt), labor (\$2.88 / cwt), and livestock (\$1.04 / cwt). Net farm income

from operations was on average \$-.21 / cwt and net farm income was \$-.10 / cwt. The debt to equity ratio was 1.10, the rate of return on assets was -0.02, the rate of return on equity was -0.08, the operating profit margin was ratio was -0.03. There is no clear association income, expenses or returns with herd size in 2002. Milk price / cwt was lowest for <500 cows (\$15.81) but other income was highest (42.25 / cwt) resulting in the highest total income (\$19.24 / cwt) and net farm income \$.57 / cwt. Milk price, total income, total expenses increased with production level. net farm income was highest for medium production level. Data collection for 2003 is being conducted. This project is complete.

### **Project # 326**

Title: **Do Carbohydrate Blends Give the Same Amounts of Nutrients as Individual Carbohydrates? (Do Associative Effects Help or Hurt Us?).** M. Hall

Continuing. The last of the fermentations for this study were completed in June 2004. Sample analysis is being completed. Project should be fully completed by December 2004.

### **Project # 327**

Title: **Use of Management Strategies Throughout the Transition Period of Dairy Cows to Improve Their Liver Function, Health and Milk Production.** H. Head

We studied whether multiparous Holstein transition cows fed glucogenic compounds (n=124) or supplemented with bST (n=103) showed changes in blood metabolites and liver fat accumulation and steady-state expression of mRNA of specific enzymes for glucose and lipid metabolism that favored better milk production and health. In the first group, multiparous Holstein cows (n=124) were used to evaluate effects of supplementing glucogenic compounds in daily TMR fed during the transition period (-3 wk to +4 wk). Some results of these treatments are described in project # 287. The second group of cows were given biweekly bST-supplementation (0.4 mL, 10.2 mg/d, POSILAC<sup>®</sup>), which began 21 d before expected calving and continued through 70 DIM. In the second experiment the TRT were I=no bST, n=26; II=bST postpartum, n=25; III=bST prepartum, n=27; IV= bST prepartum and postpartum, n=25. During both experiments, blood samples were collected 3 times a week from all cows during the transition period (21 d prepartum through 28 days of lactation) to measure non-esterified fatty acids (NEFA) and  $\beta$ -hydroxybutyrate ( $\beta$ -HBA) concentrations in plasma. Liver biopsies were taken from a subset of 9-11 cows/TRT (80 total cows) at ~-21 d, around calving, and +14 and +28 d postpartum and analyzed for total liver fat (wet weight basis) and steady state expression of messenger RNA for important liver enzymes [pyruvate carboxylase (PC), phosphoenolpyruvate carboxykinase (PEPCK), and microsomal triacylglycerol transfer protein (MTP-I)].

Overall, blood measures followed expected patterns for Holstein cows during this time period. Cows supplemented with MET and PPG had slightly higher mRNA abundance of PC compared to CON and NUT supplemented cows, but the other (PEPCK mRNA abundance) was similar across treatments and no differences in concentrations of glucose were detected across treatments. Abundance of MTP mRNA was unaffected by treatment and no incidences of fatty liver or treatment effects on percentage liver fat were detected, although liver of NUT supplemented cows had numerically greater fat percentage (+~30%) compared to CON and PPG supplemented cows, and ~58% more than MET supplemented cows. Greatest percentages of fat in liver was on d +14 (9.9%) compared to the other three sample days. Adding glucogenic compounds to TMRs fed in transition cow diets did not alter the expected

changes in plasma insulin, IGF-I, metabolites or liver lipids around calving, although small differences were detected due to including supplement in TMR during this period

bST supplementation did cause some changes in liver enzyme RNA levels for PC mRNA but they did not differ among bST-supplemented groups of cows. Results indicated that supplemental bST caused increased MY and postpartum plasma IGF-1 concentrations, but did not affect plasma glucose, or hepatic PC mRNA. Also for bST treatments, no effects were detected on NEFA and  $\beta$ -HBA – both were within the expected normal concentrations indicating no greater tendency of a ketosis. No effects were detected on amount of liver fat, but there was greater expression of MTP-I during the postpartum period. We concluded that when bST was supplemented only during the postpartum (TRT II),  $\beta$ -HBA was increased after calving. The fat clearance from the liver of these cows was not greater than for cows of other treatments. Associations of observed effects on liver measures and incidences of specific diseases are in progress. This project is ongoing.

### **Project # 328**

Title: **Milk Check-Off Recovery Funds.** G. Hembry

No summary report necessary.

### **Project # 329**

Title: **Evaluation of the Effectiveness of Decreasing the Dose of GnRH Used in Ovsynch Protocol for Synchronization of Ovulation and Timed AI in Dairy Cows.**

L. McKee

The objective of this study was to determine the effectiveness of decreasing the dose of GnRH (Cystorelin®, Merial Limited, Duluth, GA) used in the ovulation synchronization (Ovsynch) protocol. First service lactating Holstein cows (n=100) at the University of Georgia Dairy Center in Athens were randomly assigned to 1 of 4 treatment groups (25/trt). All cows received 25 mg of PGF2a (Lutalyse®, Pfizer Animal Health, New York, NY) 11 days (d -11) prior to starting Ovsynch. Cows in treatment 1 received 100  $\mu$ g GnRH on day 0, 25 mg PGF2a on day 7, and 100  $\mu$ g GnRH on day 9. Treatment 2 received 50  $\mu$ g GnRH on day 0, 25 mg PGF2a on day 7, and 100  $\mu$ g GnRH on day 9. Treatment 3 received 100  $\mu$ g GnRH on day 0, 25 mg PGF2a on day 7, and 50  $\mu$ g GnRH on day 9. Treatment 4 received 50  $\mu$ g GnRH on day 0, 25 mg PGF2a on day 7, and 50  $\mu$ g GnRH on day 9. All injections were given i.m. Blood samples were collected on days -11 and 0 for progesterone analysis. All cows were artificially inseminated (AI) 16-20 hours after the second GnRH injection. Pregnancy was checked via ultrasound at 35-40 days and 55-60 days after AI. Data was analyzed by Chi Square. The 100 cows averaged 2.3 lactations, 68 days in milk and 88 lb of milk on DHIA.

Pregnancy rates at 35-40 days were 52%, 32%, 44%, and 56% for treatments 1, 2, 3, & 4 respectively (P>.05, NS). At 55-60 days, the rates were 36%, 28%, 36%, and 48% (NS). Embryonic losses between day 40 and 60 were 16%, 4%, 8%, & 8%. Overall pregnancy rates were 46% at 40 days and 37% at 60 days (NS). A total of 14 of the 100 cows were considered to be noncyclic (both samples < 1.0 ng/ml) and only 2 of these were pregnant at 35-40 days versus 44 of the 86 cyclic cows (either or both samples > or = 1.0 ng/ml). A total of 28.8% of 28 were pregnant at 55-60 days when the highest temperature-humidity index (THI) on the day bred was > or = 80, 45.2% of 31 when the THI was between 70-79 and 36.6% of 41 when the THI high was 69 or < (NS). During the 11 months of this study, days open on DHIA decreased 34 days. This project is ongoing.

### **Project # 330**

#### **Title: The Value of Postpartum Rectal Temperature and Calving Status in the Prediction of Metritis and Milk Production in Dairy Cows. C. Risco**

Introduction: Metritis is a serious condition in dairy cows since it affects production, fertility and can be life-threatening. A better understanding of calving-related factors that predispose cows to metritis would aid in the prevention, diagnosis and treatment of this condition. The objectives of this study were to: evaluate the association of calving status, parity and season on the incidence of postpartum metritis in lactating dairy cows; examine the role of rectal temperature as a predictor of this condition, and document the effect of metritis on subsequent reproductive performance.

Materials and Methods: This prospective longitudinal study was conducted in a 1000-cow dairy farm in north Florida between August 1, 2002 and April 15, 2003. The farm employed a postpartum health monitoring program, and calving status was determined by whether or not the cow experienced dystocia, retained fetal membranes (RFM) and twins. Cows with a normal calving status (Nc) were those without any calving related problems. Cows with an abnormal calving status (Ac) were those with dystocia, RFM with or without dystocia or twins at calving. Daily rectal temperature (RT) of all cows was taken between 0700 and 0900 h from days 3 to 13 post partum, and health examinations were performed by the on-farm veterinarian. Cows that appeared sick (depressed, eyes tented) or had a RT = 103.0o F were examined for metritis. The criterion for diagnosis of metritis was the presence of a watery, brown-colored, fetid discharge from the vulva (noted after rectal palpation of the uterus), with or without a RT = 103.0o F. Cows diagnosed with metritis were treated with systemic antibiotics, anti-inflammatory agents, calcium and energy supplements. The thermal heat index (THI =  $td - [.55 - .55RH] [td - 58]$ ) was calculated using the daily ambient temperature (td) and percent relative humidity (RH) recorded at the closest weather station. Two seasons were defined based on THI: a cool season THI < 76.2 from October to April and a warm season THI = 76.2 from May to September. Data for the incidence of metritis by calving status, parity and season for the 13 days post partum period were analyzed by survival analysis (Proc Life test and Cox regression). Two-and three-way interactions between the main effects (calving status, season, parity) for the incidence of metritis were tested by the General Linear Model procedure of SAS. Data for daily rectal temperatures were analyzed from days 3 to 13 post partum and for the 5 days prior to diagnosis of metritis. Rectal temperatures were analyzed with the Mixed Model Procedure of SAS to evaluate the effect of calving status with or without metritis, parity and day as main effects as well as two-and three-way interactions. Repeated measurements of RT also were analyzed by testing homogeneity of regression curves for day trends. A single polynomial regression for day was fitted for RT, and the differences from fitting individual regressions for the effect of calving status, metritis, parity and their interactions were tested. Pregnancy was determined per rectum palpation of the uterus between 40 to 47 days after insemination. Accumulated pregnancy rate up to 150 days post partum was analyzed by Logistic Regression.

Results: Of the 450 calvings evaluated during the study period, 327 (73%) were normal and 123 (27%) were abnormal. Cows with a normal calving status had a lower incidence of metritis compared to cows with an abnormal calving status (43/327 [13%] vs. 51/123 [41%], respectively;  $P < 0.01$ ). For primiparous cows the incidence ( $\pm$  SE) of metritis was higher in the cool season regardless of calving status (Nc-cool:  $28 \pm 4$  % > Nc-warm:  $0 \pm 7$  %; Ac-cool:  $63 \pm 5$  % > Ac-warm:  $30 \pm 12$  %). In contrast, no difference in the incidence ( $\pm$  SE) of metritis was detected in multiparous cows for either cool or warm seasons (Nc-cool:  $6 \pm 3$  % and Nc-warm:  $13 \pm 6$  %; Ac-cool:  $27 \pm 5$  % and Ac-warm:  $28 \pm 7$  %; calving status x season x parity; [ $P < 0.01$ ]). In both primiparous and multiparous cows, rectal temperatures (during days 3 to 13 post partum and for 5 Days prior to the diagnosis of metritis) were higher in cows that developed



metritis regardless of calving status. Rectal temperature measurements delineated three categories of cows: without metritis and no change in RT (mean = 101.5o F; n = 356); metritis cows that had an elevated RT (mean = 102.0o F; n = 55) without an increase in RT during the last 48 hours prior to diagnosis; septic metritis, cows that had an elevated RT (mean = 102.2o F; n = 38) with an increased RT during the last 48 hours to a mean of 103.6o F at diagnosis. All cows experiencing metritis and septic metritis were treated therapeutically as described above. There were no detected differences in accumulated pregnancy rate by 150 days post partum (mean = 50%) among normal cows and cows experiencing metritis and treated for the condition. As expected, a season effect was detected (Cool season [40 %] > than warm season [28 %; P < 0.02]).

Significance: Occurrence of metritis was higher in cows experiencing an abnormal calving. Primiparous cows had a greater incidence of metritis in the cool season for both normal and abnormal calvings. In contrast, multiparous cows showed no seasonality in the occurrence of metritis. Evaluation of daily RT distinguished septic from non-septic metritis prior to diagnosis; sequential increases in RT on two consecutive days prior to the actual diagnosis can serve as a predictor of septic metritis and warrants an earlier treatment. Likewise, cows experiencing metritis had a mean increase in basal RT of 0.5o F. Early therapeutic treatment of all cows diagnosed with metritis or septic metritis resulted in pregnancy rates comparable to normal or abnormal calving status cows, not experiencing metritis. This project is complete.

### **Project # 331**

Title: **The Development of Corn Silage Varieties and a Year-Round Cropping System for South Florida Dairy Farms.** B. Scully

Corn Silage: Spring silage experiments were planted at sites in Okeechobee (1) Lorida (1), Avon Park (1) and Belle Glade (2). Additionally, three summer/fall corn experiments were planted in Avon Park (1), Okeechobee (1), and Belle Glade (1). For the spring crop over 2000 lbs of seed were distributed to five dairy farms growers including: 'Tex-Cuban', Cubano-Argentino, an 'Upright Leaf' population and an insect resistant population known as the 'CIMMYT' composite. The 'Upright-Leaf' population is being developed for crop densities of  $\pm 45,000$  plants/ac, while the 'CIMMYT' population is being developed as *refugia* variety with endogenous insect resistance.

In the spring, corn breeding blocks were planted in the Everglades Agricultural Area for the development at EREC in Belle Glade and a dozen inbreds were selected for the production of silage hybrids. In the fall, these inbreds along with those developed in previous years were crossed in various permutations. A total of 800 test hybrids were developed for the testing in the upcoming year. Among these new hybrids over forty brown-midrib hybrids were assembled. Winter Legume: Previously, a continual cropping system has been proposed to improve land productivity and Phosphate uptake. A three-crop cycle that begins with corn silage grown from March through June (Cycle #1); sorghum grown from July through October (Cycle #2); and a winter legume grown from November through February (Cycle #3). A number of freeze tolerant legumes have been considered such as the Faba bean, Austrian pea or Egyptian clover. Only the faba bean has proven robust enough to warrant consideration. This past fall an eight-acre test plot of the variety 'Banner' was planted at 23,000 plants/acre in Okeechobee County on November 11, 2004. Although yields were below expected plants attained an average height of 30 inches. This project is complete.

### **Project # 332**

Title: **Thin Soles in Dairy Cattle. Investigation of Factors Affecting Sole Wear.**

S. Van Amstel

Over the past 10-15 years dairy herds have continued to expand and in the process move more cows to confinement conditions. This has permitted improved feeding, heat stress and manure management, all of which have contributed to improved performance and environmental compliance on dairy farms throughout the southeastern United States. On the other hand, the confinement of cows to harder, wetter and more abrasive surfaces with varying amounts of manure slurry contamination have contributed to reduced foot health. One of the more common of lameness disorders in recent years has been "thin soles". The claw horn capsule's primary purpose is to protect the underlying corium (or quick). When it becomes so thin that it loses its ability to support the cow's body weight without damage to the underlying tissue, lameness occurs. The most common lesion, beyond direct bruising of the corium, is white line disease affecting the toe region. The initial lesion is associated with thinning of the sole and separation of the white line followed by abscess formation in the toe that frequently extends to the 3<sup>rd</sup> phalanx (bone within the claw capsule). Excessive wear is thought to be the primary cause of this problem, however experience has shown that over-trimming may also increase the risk of problems due to thinning of the soles in dairy cattle. Since 1996, these authors have addressed the trimming-related issues through the Master Hoof Care Program. A primary objective of this course is to train trimmers in techniques designed to avoid excessive trimming which might lead to lameness as described above. The over-trimming issue was also addressed by these authors in studies 1 and 2 listed below. The problem of excessive wear is equally complex, and prior to the initiation of this study not well understood. It is likely that excessive wear is a problem involving a combination of animal, feeding, housing (flooring), management and environmental factors. We began our study into thin soles through excessive wear by evaluating the moisture content of sole horn in thin soled and normal cows. High moisture content is believed to significantly reduce horn hardness. Results of our study (published in the Journal of Dairy Science and listed below) indicated that the moisture content of horn was higher in rear claws and in claws with thin-soles. Thirty percent of rear feet with thin soles had claw lesions: white line disease (72%) or sole ulcers (28%). This study supports the view that the moisture levels in claw horn are likely important contributing factors to the excessive wear rates and thin sole problems experienced in many dairy herds. Our work on this project is continuing as we will try to address other factors influencing the rate of claw horn wear in modern dairy facilities.

1. Van Amstel, SR, Palin, FL, **Shearer, JK**, and Robinson, BF: Anatomical measurement of sole thickness in cattle following application of two different trimming techniques. The Bovine Practitioner, 2002, 36(2):136-140.
2. Van Amstel, SR, Palin, FL, Rohrbach, BW, and **Shearer, JK**: Ultrasound measurement of sole horn thickness in trimmed claws of dairy cows. JAVMA, 2003, 223(4):492-494.
3. Van Amstel, SR, **Shearer, JK**, and Palin, FL: Moisture Content, Thickness, and Lesions of Sole Horn Associated with Thin Soles in Dairy Cattle. J Dairy Sci, 2004, 87:757-763.

### **Project # 333**

Title: **Dairy Herdsman Seminars and Cow College in Spanish.** J. Shearer

A significant number of employees on dairy farms in the southeast are Hispanic and speak no, or only a limited amount, of English. As a consequence, we proposed development of training programs, such as the Dairy Herdsman Seminar and Cow Colleges, in Spanish. Over the past year we have been preparing and/or acquiring training materials sufficient to

support training programs in the areas of reproduction, udder health and milk quality, replacement rearing, and hospital barn management. We are now in the planning stages for presentation of our first series of training programs. Participating faculty members decided that "Management of Obstetrics and Problems Associated with Calving" be our first offering in this series. This will be followed by programs on "Management of Cows in the Early Postpartum Period" and "Reproductive Management and Artificial Insemination Techniques". Select Sires has offered to assist with the AI training portion of the latter course. Future programs will address other key areas of dairy management. Present plan is to keep each of the training programs highly focused with emphasis on the "hands-on" training aspects. When possible, training programs will be limited to 1-day session (a half day of classroom instruction and half day of laboratory exercises). Of course, all training sessions and course materials will be in Spanish. Participants will receive a certificate of attendance for participation in the training programs. This program will continue and is expected to become an annual dairy extension program offering.

#### **Project # 334**

Title: **Reproductive Efficiency of Natural Service and Artificially Inseminated Dairy Herds in Florida and Georgia.** C. Steenholdt – summary by A. de Vries

We used DHI data (1995-2002) from all herds on DHI located in Florida and Georgia to study the effect off the breeding system (AI, natural service bulls, or a combination) on pregnancy rates and change in milk production. Pregnancy rates in the summer (18%) were twice as high as those in the summer (9%), but the effect the type of breeding system that the herd used was very small or non existent. Milk production was lower in the natural service bred herds, but the change in milk production over time was not significantly different. We submitted a paper to Journal of Dairy Science and are preparing a paper and talk to be presented at the Dairy Business Conference in October 2004. This project is complete.

#### **Project # 335**

Title: **Use of a Degradable Deslorelin Implant (2.1 mg) in Lactating Dairy Cows to Enhance Uterine Involution.** W. Thatcher

Holstein cows received subcutaneously one (DESL1, n=15) or two (DESL2, n=14) biodegradable DESL implants (2.1 mg) within 0.5 to 1.5 days postpartum (dpp) for comparison to control cows (CON, n=18). Enrollment consisted of normal cows (no dystocia, stillborns and milk fever) with BCS = 2.75. Cows diagnosed with retained fetal membranes were included. Ultrasound (US) was used to monitor number of ovarian follicles (Class 1, < 5 mm; Class 2, 6-9 mm; Class 3, = 10 mm), number of CL, diameters of previous pregnant (PH) and non-pregnant (NPH) uterine horns at 4 cm past the intercornual ligament, and diameter of cervix on  $8 \pm 1$ ,  $15 \pm 1$ ,  $22 \pm 1$ ,  $29 \pm 1$ ,  $36 \pm 1$  and  $43 \pm 1$  dpp. At  $44.5 \pm 2.4$  dpp, cows entered a pre-synch/Ovsynch protocol. DESL1 and DESL2 implants reduced mean diameter of the PH ( $2.64 \pm 0.08$ ,  $2.58 \pm 0.10 < 2.95 \pm 0.09$ ;  $P < 0.01$ ), NPH ( $2.20 \pm 0.05$ ,  $2.11 \pm 0.05 < 2.42 \pm 0.06$ ;  $P < 0.01$ ), and cervix ( $3.67 \pm 0.08$ ,  $3.53 \pm 0.1 < 3.82 \pm 0.08$ ;  $P < 0.05$ ) for the monitoring period. Cows that developed metritis had lower concentrations of Prostaglandin  $F_{2\alpha}$  measured in the blood compared to cows that did not have a metritis event. Lower concentrations of Prostaglandin  $F_{2\alpha}$  are indicative that their immune function may be less and these cows are predisposed to developing metritis. This observation provides us with new alternatives to increase uterine production of prostaglandins to improve uterine health (e.g., via feeding bypass fatty acids that may enhance prostaglandin production). The DESL treatments reduced

the frequency of cows cycling during presynch (14.81% [4/27] < 94.42% [17/18], P<0.01) and that ovulated following Ovsynch (37% [10/27] < 89% [16/18], P<0.01). The benefit of using a deslorelin implant is offset by the long period of suppressed ovarian activity. This project is complete.

***Project # 336***

Title: **Florida and Georgia Youth Programs, 4-H activities and Youth Events, Dairy Judging Team Support, Undergraduate Programs and Scholarships.** J. Umphrey

No summary report necessary.

