PROCEEDINGS OF THE 44th ANNUAL
FLORIDA DAIRY PRODUCTION CONFERENCE

Hilton University of Florida Conference Center
Gainesville • Florida • May 1, 2007

Sponsored by the Department of Animal Sciences, Florida Cooperative Extension Service and the Agricultural Experiment Station of the Institute of Food and Agricultural Sciences, with the cooperation of State Dairy Organizations and Allied Industry
Gainesville, May 1, 2007

To: Florida Dairy Producers, Allied Industry and Others
Re: 44th Annual Florida Dairy Production Conference

Welcome to the 44th Annual Florida Dairy Production Conference! This conference provides an opportunity for representatives from all aspects of the Florida Dairy Industry to focus on information and ideas for improving profitability and sustainability of the Florida dairy industry.

The planning committee has planned this program in hopes that you will take home some information that will be of benefit in the planning and operation of your business. The speakers have been chosen with careful consideration for subject matter of timely significance. We believe that their information will be useful to you.

The proceedings are provided as a reference and record of the conference. Additional copies are available by contacting the UF/IFAS Department of Animal Sciences. You will also find the proceedings posted on the Florida Dairy Extension website at http://dairy.ifas.ufl.edu.

Thank you for your participation in the 2007 conference. Please feel free to provide any comments that can be used in planning future Florida Dairy Production Conferences.

Geoffrey E. Dahl
Chair, Department of Animal Sciences

Albert De Vries
Coordinator, 44th Florida Dairy Production Conference
Planning Committee

The Florida Dairy Production Conference is organized by the dairy extension specialists and dairy agents at the University of Florida / IFAS. For more information about the Florida Dairy Production Conference, please contact:

Conference Information
Albert De Vries
UF/IFAS Department of Animal Sciences
Phone: (352) 392-5594 * Fax: (352) 392-5595
E-mail: devries@ufl.edu

Conference Sponsorships
David R. Bray
UF/IFAS Department of Animal Sciences
Phone: (352) 392-5594 * Fax: (352) 392-5595
E-mail: drbray@ufl.edu

Conference Registration
Pam Gross
UF/IFAS Department of Animal Sciences
Phone: (352) 392-1916 * Fax: (352) 392-9059
E-mail: pjg352@ufl.edu

PCDART Workshop
Dan W. Webb
UF/IFAS Department of Animal Sciences
Phone: (352) 392-5592 * Fax: (352) 392-5595
E-mail: dwwebb@ufl.edu

These proceedings were edited by Albert De Vries. Proceedings from past Florida Dairy Production conferences are available at Florida Dairy Extension website at http://dairy.ifas.ufl.edu.
Table of Contents

Program Schedule ................................................................. 1
Speakers and Program Participants ........................................ 2
2007 Program Sponsors .......................................................... 3
Hot Issues that Affect Milk Production (Inter) Nationally
Steven A. Larson ................................................................. 5
Feeding Dairy Cows when Corn Prices are High
Charles R. Staples ............................................................... 7
Improving Dairy Cow Fertility through Genetics
Peter J. Hansen ................................................................. 23
The Direction of Milk Marketing: from r-BST-Free to the Future of Federal Orders
Mary Keough Ledman .......................................................... 31
Employee Management for Producing Results on Your Dairy
Jorge Estrada ............................................................... 51
Employee Management: Producer Panel
Moderator Steven A. Larson .................................................... 68
Appendices:
  2005 Dairy Business Analysis Project Financial Summary .......... 69
  2006 Southeast DHIA Production Recognition of High Florida Herds ........ 71
  2006 Southeast DHIA Breed Comparisons for Southeast States .......... 72
  2006 Southeast DHIA Data for Southeast Herds .............................. 73
  2006 Southeast DHIA Comparison of Southeast Herds to DRMS Herds ....... 74
  2006 Florida DHIA Herd Performance Averages ............................. 75
  Southeast Milk, Inc. Dairy Check-Off Program: Project Summaries ........ 76
Program Schedule

Tuesday, May 1, 2007

**Century Ballroom**

**AM**

**9:45** Welcome and Remarks  
**Geoffrey Dahl, Chair, Department of Animal Sciences, University of Florida, Gainesville**

**10:00** Hot Issues that Affect Milk Production (Inter) Nationally  
**Steven Larson, Hoard's Dairyman, Fort Atkinson, WI**

**11:00** Feeding Dairy Cows when Corn Prices are High  
**Charles Staples, Department of Animal Sciences, University of Florida, Gainesville**

**11:45** UF/IFAS Dairy Update  
**Geoffrey Dahl, Chair, Department of Animal Sciences, University of Florida, Gainesville**

**PM**

**12:00** Luncheon  
**Presiding - Adegbola Adesogan, Department of Animal Sciences, University of Florida, Gainesville**

**1:00** Improving Dairy Cow Fertility through Genetics  
**Peter Hansen, Department of Animal Sciences, University of Florida, Gainesville**

**1:45** The Direction of Milk Marketing: from r-BST-Free to the Future of Federal Orders  
**Mary Keough Ledman, Keough Ledman Associates, Inc., Libertyville, IL**

**2:45** Refreshment Break

**3:15** Employee Management for Producing Results on Your Dairy  
**Jorge Estrada, Leadership Coaching International, Inc., Graham, WA**

**4:15** Employee Management: Producer Panel

Participants: **Ron St. John, Don Bennink, John Gilliland, Jorge Estrada**.  
**Moderator: Steven Larson**

**5:00** Reception  
**Hors d’oeuvres and a cash bar are available for your enjoyment.**

Wednesday, May 2, 2007

**Dogwood Room**

**AM**

**9:00** PCDART Workshop  
**Dan Webb, Department of Animal Sciences, University of Florida, Gainesville**

**PM**

**12:00** Adjourn
Speakers and Program Participants

Adegbola Adesogan, Associate Professor, Department of Animal Sciences, University of Florida, Gainesville, FL

Don Bennink, Dairy Producer, North Florida Holsteins, Bell, FL

Geoffrey Dahl, Professor and Chair, Department of Animal Sciences, University of Florida, Gainesville, FL

Albert De Vries, Assistant Professor, Department of Animal Sciences, University of Florida, Gainesville, FL

Jorge Estrada, President, Leadership Coaching International, Inc., Graham, WA

John Gilliland, Dairy Manager, McArthur Farms, Okeechobee, FL

Peter Hansen, Professor, Department of Animal Sciences, University of Florida, Gainesville, FL

Mary Keough Ledman, Principal, Keough Ledman Associates, Inc., Libertyville, IL

Steven Larson, Managing Editor, Hoard’s Dairyman, Fort Atkinson, WI

Ron St. John, Dairy Producer, Alliance Dairies, Trenton, FL

Charles Staples, Professor, Department of Animal Sciences, University of Florida, Gainesville, FL

Dan Webb, Professor, Department of Animal Sciences, University of Florida, Gainesville, FL
# 2007 Program Sponsors

*We thank the following sponsors who provided support for the 44th Annual Florida Dairy Production Conference*

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monsanto Dairy</td>
<td>Darren McGee</td>
</tr>
<tr>
<td>Pfizer Animal Health</td>
<td>Heath Graham</td>
</tr>
<tr>
<td>Southeast Milk</td>
<td>Maggie Murphy</td>
</tr>
<tr>
<td>Agpro, Inc.</td>
<td>Tracey Lamm</td>
</tr>
<tr>
<td>West Central Soy</td>
<td>Terry Creel</td>
</tr>
<tr>
<td>Paul Mueller Co.</td>
<td>Frank Bird</td>
</tr>
<tr>
<td>Schering-Plough Animal Health</td>
<td>Katherine Cregg</td>
</tr>
<tr>
<td>WaterBedsForCows.com</td>
<td>Bob Nutt</td>
</tr>
<tr>
<td>WS Southeast</td>
<td>Jim Dupree</td>
</tr>
<tr>
<td>Elanco Animal Health</td>
<td>David Waagner</td>
</tr>
<tr>
<td>Lakeland Animal Nutrition</td>
<td>Skip Heeg</td>
</tr>
<tr>
<td>Zinpro Performance Minerals</td>
<td>Charles Gay</td>
</tr>
<tr>
<td>Alta Genetics</td>
<td>Elena Nielsen</td>
</tr>
<tr>
<td>Alltech</td>
<td>Brent Lawrence</td>
</tr>
<tr>
<td>Embogen</td>
<td>Jeremy Block</td>
</tr>
<tr>
<td>Furst McNess Company</td>
<td>Roger Boland</td>
</tr>
<tr>
<td>Modern Agricultural Systems Designs</td>
<td>Daniel Meyer</td>
</tr>
</tbody>
</table>
Hot Issues that Affect Milk Production (Inter) Nationally

Steven A. Larson
Hoard’s Dairyman
Fort Atkinson, WI
slarson@hoards.com

We are pleased to be a part of your conference. We look forward to sharing our perspectives on a number of issues that we consider timely and important to the U.S. dairy industry and also how our industry relates to the rest of the world.

Among the issues discussed will be:

• The ethanol industry and its many ramifications within our industry and beyond
• Federal order issues
• 2007 Farm Bill issues
• Immigration policies and impacts
• Shifting patterns of U.S. milk production
• Consolidation in the U.S. livestock industry
• Observations on milk-per-cow trends
• Dairy cattle research needs and priorities
• Future threats to how we operate

Copies of the presentation will be available at the conference.
**Hot issues that affect milk production (Inter-) nationally**

There's a Chinese curse: “may you live in interesting times.” Well, these indeed are interesting times in the dairy industry. There are a number of factors, forces, and issues at work in our industry now. Many of them are hitting us in the pocketbook now, and many will affect how and where milk is produced in the future.

The title and topic assigned to me provides enough leeway to pretty much give me an open field. I plan to cover a lot of ground, without plowing too deep in any one area. I'll be throwing out a lot of numbers, and I apologize for that. For those of you interested in the details, we'll make sure you get a copy of my presentation.

It’s good to be out traveling when the future looks a little brighter. As many of you know, Class III futures between May and December have been averaging well over $17 per hundredweight. We could end up with the highest milk prices in history by the end of the year. I'll leave the forecasting to Mary Ledman. I'm looking forward to what she has to say.

But the price relief we're getting can't come soon enough. And for some, it's coming too late. People across the country have been telling us 2006 was the toughest year financially in memory. It was the double whammy of low prices and higher costs.

We looked at it this way. The average Class III price last year, the benchmark that drives mailbox prices for you folks as well as those of us up north, was $11.89. The last time the annual average Class III price was in that range was 1995, when it was $11.98. However, during the past 11 years, feed has gone up 23 percent (it's a lot higher than that now); seed, 65 percent; fertilizer, 49 percent; ag chemicals, 11 percent; fuel, 172 percent; supplies/repairs, 29 percent; farm machinery, 56 percent; building materials, 33 percent; interest, 34 percent; taxes, 46 percent; wage rates, 51 percent; and family living, 33 percent.

Presented May 1, 2007, at the Florida Dairy Production Conference by Steve Larson, Managing Editor, Hoard's Dairyman, Box 801, Fort Atkinson, WI 53538 U.S.A., 920-563-5551, slarson@hoards.com.
In addition to this severe cost/price squeeze, we know many of you have experienced some pretty devastating hurricane and tornado damage. We don’t need to remind you about the decline in dairy operations throughout the Southeast. But, in some respects, we’re surprised it hasn’t been even more drastic.

I know there are attempts to fix what we might call the Southeast problem. You can only do so much about the heat and humidity, so you see the need to work on the marketing side. I know you are taking a serious look at how federal orders can be changed to your benefit.

I did learn more about milk marketing in the Southeast when I read an article by Bill Herndon at the University of Mississippi which is the Milk Check Outlook column in our May 10 issue being mailed soon.

Bill documents the rising population and declining milk production in this region. He wrote that 72 percent of milk processed in Southeast plants during the year 2000 was produced within the region. By last year, that had dropped to 55 percent.

Each day of the year, 6 million pounds of milk (120 trailer loads) must be imported from other states just to fill the raw milk requirement of your processors. One co-op operating in this area estimated it cost between $5 and $7.50 per hundredweight last year to move milk from Clovis, New Mexico, to major cities in the Southeast. And you folks know better than anybody who is paying the freight. Bill Herndon’s article puts the cost to the Southeast dairy industry at around $30 million a year.

People outside of this region who read that article will have a better understanding of the supply/demand dilemma you folks have been facing for years.

The reasons for giving federal orders every benefit of the doubt vary from region to region. Obviously, you folks have issues you feel you need to work on.
But we would like to remind our readers that, among other things, producers vote on how federal orders determine the minimum prices that are to be paid by processors, including those for fluid milk, and those prices provide the framework for over-order premiums. This is one of the most compelling reasons for retaining federal orders.

Class I differentials added $107 million to Florida order milk checks last year and $142 million to Southeast order checks. With your high Class I utilization, you may feel you can maintain those prices without a federal order. Whether or not that is possible is a very crucial point. Across all federal orders, Class I differentials added almost $1.2 billion to milk checks last year or nearly $19,000 per farm.

Interestingly, there is a misconception that fluid milk contributes little to checks in the Upper Midwest.

If fact, some people back home believe that action that improves Class I prices — anywhere — is bad. We wonder why. Upper Midwest Class I milk is big business. That order accounts for about 10 percent of all federal order Class I milk. Class I differentials added $78.5 million to Order 30 milk checks last year. On top of that, over-order fluid premiums have added an average of another $97 million to order milk checks during each of the past three years.

The thinking in that region is that any action that raises Class I revenues across the country creates overproduction elsewhere and stimulates production of cheese and butter, lowering manufacturing milk prices here in the Upper Midwest. But, clearly, it is NOT the high Class I use areas that are expanding milk production. It is the areas with lowest Class I use . . . Idaho, the Southwest, and California.
Now let’s shift gears a little. Ethanol, ethanol, ethanol. Is it possible to pick up a magazine or newspaper without reading something about ethanol, renewable energy, or energy dependency? And, of course, there’s all the distillers grains that will be available and how well people can make use of them in dairy rations. I’m looking forward to what Charlie Staples has to say. (What this country really needs are recipes that make chicken breasts palatable and rations that make distillers grains usable.) Of course, there are questions about how good a buy distillers will become. Last week, a Wisconsin ethanol plant manager told me that it costs little to ship distillers to Asia. It goes as a backhaul with the containers we import our gadgets and gizmos in.

There’s plenty of concern about the impact of high corn prices and related feed costs on the livestock industry. And with good reason. Feed costs make up the greatest proportion of cash expenses for all of animal agriculture, and we expect to see higher feed grain prices for another four to five years. We noted the article in the Sarasota paper that quoted Albert de Vries and Maggie Murphy from Southeast Milk. That was well done.

On the other hand, we get irked when we read and hear about how the nearly manic interest in ethanol will usher in a new heyday for U.S. agriculture and transform rural America. Land prices are shooting up, rents are skyrocketing, and have you been watching John Deere’s stock?

But wait a minute. Just what role does corn itself play in the agricultural community?

Corn ranked first in share of farm receipts in just two states in 2005 . . . Illinois and Indiana. In 13 others, soybeans, wheat, greenhouses (that would include Florida), sugar cane, or apples ranked first. In all other states, dairy, cattle in general, hogs or broilers ranked first. (The exception was Kentucky where horses ranked first.)
Dairy income was first in nine states; it ranks seventh here in Florida. Other cattle ranked first in 13 states. Broilers led in nine states, hogs in two. Nationally, cattle ranked first contributing more than $50 billion out of $240 billion in farm cash receipts.

Corn prices are going to be a blow to the agricultural economies in many states. We will see wholesale (and retail) prices of livestock products go up. However, before that happens in any significant, lasting way, there's going to be a lot of pain felt by dairy farm families and other livestock producers.

Along that line, already we're tired of hearing and reading about higher food prices. We would have a couple of brief messages for consumers and the fear-mongering media that fuel their anxieties.

First, U.S. consumers spend less than 10 percent of their disposable income on food. That's the lowest in the world.

Second, wholesale food prices are going up, but there are many other factors that have more bearing on what grocery store scanners reveal. Here's why.

Considering an entire market basket of food products, the farmer's share has averaged 21.6 cents out of each $1 over the past three years. The difference — 78.4 cents out of each $1 spent — goes to assembling, processing, transporting, distributing, and retailing, and the profits associated with those activities.

Let's look at the 2006 marketing year farm share of a retail dollar: meat products, 31.6 cents; dairy products, 27.1 cents; poultry, 37.7 cents (think consolidation and vertical integration); eggs, 29.7 percent; cereal and bakery, 6.3 cents; fresh fruits and vegetables, about 18 cents.

Now, to be fair, we realize that businesses further down the supply chain have to deal with escalating costs . . . wages, employee benefits, diesel fuel, interest rates, rents, and so on. Of course, these are exactly the same higher expenses that those of us who produce milk and other food are facing also.
We expect to see a greater decline in dairy farm numbers due to feed prices. Our aging population of dairy farmers will have to choose between continuing to milk on one hand and the possibility of selling $4 corn or getting a cash rent of $200 per acre on the other.

It will be interesting to see whether, and if, the high feed grain costs affect where milk will be produced in the future. We've already talked about what has gone on here in the Southeast. And, of course, we all know how milk production has shifted West. During the past five years, milk production in the western states has gone up 21 percent, compared to 9.8 percent for the U.S. The West has added 430,000 cows, while the nation’s cow herd has remained the same size.

But things are slowing down in California and Idaho. Both states have some real environmental issues. Californians are really seeing their feed and energy costs shoot up. The people in Idaho, without their federal order which was voted out in April 2004, are being taken advantage of by the cheese companies. Some months they are getting paid as little as $2 below the Class III price. Now the big growth area is west Texas and New Mexico . . . not necessarily good news for us in the Midwest. That puts cheese made in the Southwest that much closer to the East Coast markets we like to serve.

I mentioned consolidation and vertical integration. Our May 10 issue will include a 10-year perspective on changes in the livestock industry. It’s probably no surprise that other livestock industries are more concentrated than dairying, with a couple of interesting exceptions.

One complication in making comparisons is the incredible number of small, part-time owners of beef cows and layers, especially. For example, 84 percent of farms that have layers have 100 birds or fewer. More than three-fourths of those with beef cows have fewer than 100 head.
Looking at the past 10 years, the decline in hog operations has been greatest (-60 percent). That was followed by operations with dairy cows (-43 percent) and beef cows (-5 percent of those with 50 head or more). There actually were more broiler operations in 2002 than there were in 1992 and more commercial feedlots in 2005 than in 1996.

One measure of concentration is the number of operations that contain half of all the animals or birds. Here is what we found:

- Just less than half (48 percent) of the nation’s dairy cows can be found in 3,143 herds. That is 4.2 percent of all dairy operations.
- By contrast, 51 percent of cattle on feed are in just 125 feedlots. But that’s almost 6 percent of the total number of lots.
- The hog business is really concentrated. Only 115 operations (0.2 percent of total operations) have 54 percent of all hogs and pigs.
- The egg business also is quite concentrated. Fewer than 500 operations (0.5 percent of the total) have more than 75 percent of the birds.

Our industry is changing rapidly. But, the degree of consolidation among other types of livestock is much greater. Without cooperatives to bargain for dairy farmers and without federal orders to spread milk revenue over all producers, our industry could look much different. Fortunately, dairying still has a long way to go before it will resemble the poultry and swine industries.

As you can see from the proceedings, I threatened to say something about the 2007 Farm Bill. Everyone in Congress says they want to have a bill before the President by the end of September. That’s probably wishful thinking. Plus, based on some of what we have been hearing out of Washington, it is not a done deal that there will be a new farm bill. We still could see an extension of the 2002 bill.
We believe it is safe to say that budget limitations, environmental concerns, and energy policy all will play major roles in the farm-bill debate. With the Doha Round of WTO negotiations pretty much at a standstill, trade won’t be as much a part of the debate as in the past. There will be less pressure to move farm policy toward “market orientation” following the change in Congressional leadership last fall.

This go-round, there are a lot more people around the table. For example, the nation’s fruit and vegetable growers have become much more organized and more vocal. They feel like they have been left out of past farm bills, and they have to a great extent, and their voice will be heard. The most populous states, those with the most Representatives, are major producers of fruits and vegetables. Of course, conservationists, animal welfare groups, and environmental groups want to be involved. The Environmental Defense Fund has hired an additional 30 staff members to work on farm bill issues.

Not unexpectedly, there has been and will be concerns about the cost and beneficiaries of farm program payments. We can expect some graphic misrepresentations. USDA deserves some blame for the antiquated way the agency portrays today’s farms and farm families.

Tim Wise of Tufts University hammers home the USDA problem in a pithy working paper about common errors in presenting farm statistics.

First there’s the statement “Only a minority of farmers get payments.” The problem is that USDA says there are 2.1 million farms. In truth, only a third of them are farming as a business. The others are “rural residence farms” with little or no cash farm receipts. The reality is that more than 80 percent of commercial-sized family farms receive government payments. Nearly 85 percent of the nation’s dairy farmers received MILC payments on their entire milk sales.
Something else you’ll hear is that “Farmers are better off financially than the general population.” When USDA reports that farm households have annual incomes 118 percent of the average home, we see how misleading averages can be. Well over half of full-time farmers have sales of less than $100,000 a year and have average incomes only 86 percent of the U.S. average, including their off-farm income. The averages for farm household income includes the rural residence farms with household incomes approaching $100,000 but negative farm income. Among typical family farm operations, 30 percent of income is nonfarm. Yet, it is counted as farm household income by USDA.

“Big farms get bigger payments.” With most programs linked to production, it is not surprising that larger farms get bigger checks. But, in 2003, the largest family farms (sales of $500,000 or more) produced 44 percent of total farm output but received just 32 percent of main commodity-program payments.

“Farm programs make some farmers filthy rich.” There was not one individual farm among the top 20 recipients in 2003. There were 11 corporations, five Indian tribes, two cooperatives, one trust, and one nonprofit, Ducks Unlimited.

I mentioned the Doha Round trade talks, but I would be remiss if I didn’t comment on dairy imports and exports. There is a world shortage of milk protein and we are exporting a lot of product . . . and it’s adding to our milk checks and will for some time. On a milk solids basis, we’re exporting much more than we’re importing. However, because of specialty cheeses and other higher-value products being brought in, imports exceed exports on a dollar basis.

We need to be prepared to take advantage of international markets, but we wouldn’t want to bet the farm on them. There always are going to be lower cost milk producers . . . now the attention is turning from Australia and New Zealand to Argentina, Brazil, and Eastern Europe. The world’s middle class is growing rapidly and, with it, demand for meat and milk products. The question is whether that demand and the money to pay for it will grow faster than world milk and meat production.
Along this line, the demand for milk protein, consider recent nonfat dry milk prices, is raising concern about a structure surplus of milkfat. CWT-assisted exports have given us a foot in the door at many new markets . . . largely with higher fat products . . . cheese, butter, and anhydrous milkfat. In that small way, CWT may help take milkfat off the market, as well as bolster milk prices through reducing cow numbers.

Now let’s look at some threats and challenges to our industry. The attention being paid to the demand for BST-free milk troubles us. Here’s why:

- All the clamor about BST-free (and organic) milk has caused consumers to question healthfulness and safety of the general milk supply.
- The issue gives zealots — with a variety of motives — another wedge to drive between consumers and dairy products.
- With no milk test to confirm whether BST has or has not been used, there is temptation to cheat. Maintaining consumer trust in our word and our products is absolutely essential.
- It looks like another way processors and retailers can jack up the price without passing more margin back to dairy farmers.
- We wonder how much BST-free demand is being driven by consumers and how much by processors and retailers trying to differentiate themselves in the marketplace. Marketers who label their milk as BST-free absolutely should be using FDA’s “no-difference” disclaimer.
- Selling BST-free milk mars FDA’s credibility, negates the wealth of BST-related research, and undermines all scientific investigation.

These concerns should bother everyone in our industry. But the sad reality is that there is not a lot any of us can do about this continually nagging issue. Monsanto could quit marketing BST, but we don’t anticipate that.
In a perfect world, one could just wave a magic wand, and people would understand that there is no human health risk with milk from cows given supplemental BST. But you can’t instill understanding overnight, and you can’t alter consumer perceptions through confrontation.

Some have been critical of certain co-ops and other processors for knuckling under to the demands for BST-free milk supplies. That’s easy to say from a distance. It’s another matter when a major customer is sitting across the desk and there are competitors in the waiting room.

Some have said BST’s supplier and others in the biotech community haven’t done enough to educate the public. Consumer education is important, but this issue is not going to get resolved by a debate at the dairy case. Our best long-term hope to preserve and increase milk consumption is to stay the course by getting young people to drink more milk.

Providing that the incentives and motivations are adequate and lasting, some consumers will buy BST-free milk, milk handlers will assemble it, and dairy farmers will provide it. If not, the niche market for so-called BST-free milk will go away . . . again. Processors have asked a premium for BST-free milk in the past and quit.

One earmark of the dairy industry is that, we, for the most part, sooner or later give consumers what they want. Reduced fat milk comes to mind. We must never lose sight of the fact that customers, be they concerned consumers or marketers looking for a niche, are always right . . . regardless of what they ask for.

We’re in a similar situation with organic milk. Based on grocery store scanner data (not including Wal-Mart), organic milk volume has been climbing at more than 20 percent per year. Still, organic’s share of the fluid milk market remains just a little over 2 percent.
Top cities for organic milk sales last year were San Francisco (7 percent of milk volume), Denver (6.5 percent), Seattle/Tacoma (6.4 percent), and New York City (6.0 percent). However, two of the top markets, Denver and San Francisco, had been experiencing drops in organic milk volumes compared to year-earlier levels.

Two executives in the organic milk business have been quoted recently as saying that there is a surplus of organic. One told the New York Times there is a “serious oversupply”. We have been concerned about how long organic processors will be able to pay the kind of premiums they have.

Shifting gears again, we’re concerned about federal support for disease control and production research. Let’s use Johne’s as an example.

Federal Johne’s funding for fiscal years 2004 and 2005 was $18 million. For the past fiscal year, funding had been cut to $13.3 million. Funding for the current fiscal year has not been been pinned down, but the outlook was not good. The Senate version of the ag approps bill included $10 million for Johne’s. The amount in the House bill was $7.7 million.

Our industry lost Jesse Goff from National Animal Disease Center to industry. Many of you will know of Jesse for his important work on milk fever. Jesse could have stayed at USDA, but he knew he never would have been funded well enough to do significant work. The money was going to research related to bio-terrorism and studying TB in bison at Yellowstone Park.

Unless Congress and the USDA and NIH are approached about something involving national security, bio-defense, conservation or energy, it’s pretty much dead on arrival. At the same time, we’re struggling with bovine TB, BVD, Johne’s, and a variety of other diseases and disorders that are taking money out of our pockets every day of the year.

We commend you for your research check-off and for what those dollars have enabled your investigators to accomplish. It is an idea that should spread to many more states.
Our strategies may have to change in other areas too. We have just learned that 10 Midwestern universities have formed a dairy coalition. They will be cooperating on undergraduate and graduate programs, coordinated use of state dairy extension specialists, and research funding and priorities. We understand such a concept was considered for the Southeast some years ago. Perhaps, it is time to take another look at the idea.

At the end of the day, you have to ask whether you want to view the glass as half empty or half full. We’ve got our challenges. You have your gestation crate ban and, now, so does Arizona. In 2005, the U.S. Humane Society Fund for Animals took in $120 million, PETA took in $26 million, the Physicians Committee on Responsible Medicine took in $7 million. These folks want to shut us down.

But let’s don’t sell the farm. Fluid milk consumption per capita actually went up for the first time in decades. Cheese consumption continues to climb although more slowly. One opinion poll shows that the public’s confidence in the food supply has not changed one iota during the past six years. This, despite mad cow, bad spinach, BST-free and organic milk, *E. coli* outbreaks . . . you name it.

But that does not mean that we should not remain diligent.

The May issue of *Scientific American* cites U.S. agricultural productivity as one of the least appreciated but most remarkable developments of the past 60 years. Sounds good! But the article ends by saying:

“Modern agriculture is not without a dark side. Runoff of fertilizers, antibiotics, and hormones degrade the environment and can upset the local ecology. If not grown properly, genetically modified crops could spread their DNA to conventional species. And the industrial approach to food has contributed to America’s obesity epidemic as well as to sporadic but widespread *E. coli* outbreaks.”

Thus are the mixed messages consumers get about us.

Those of us in the dairy industry and agriculture, in general, have done a great job. But we still have a lot of work ahead of us.
Feeding Dairy Cows When Corn Prices are High

Charles R. Staples
Department of Animal Sciences
University of Florida, Gainesville
staples@animal.ufl.edu

Take Home Messages

• The diversion of corn away from livestock to the production of ethanol is likely to increase in the future, so corn prices at the dairy farm are likely to remain high for the foreseeable future. Corn prices are about 50% greater now compared to 8 months ago.

• Alternative grain sources high in starch are too expensive or unavailable in Florida. Hominy can partially replace corn because it contains about 75% of the starch level of corn and is priced about 30% less than corn. However the cost per unit of starch still favors corn.

• Although the ideal starch concentration in the diet of the lactating cow is between 24% and 26%, it may be reduced by replacing it with byproducts that contain highly digestible fiber such as corn gluten feed and soybean hulls. Due to their lower price, ration costs may be decreased by $0.20 per cow/day when they are fed at 10% of ration dry matter and starch concentration is reduced by 2.5% units (gluten feed) to 4% (soybean hulls) by partially replacing corn.

• Although dried distillers grain with solubles is very low in starch, it is an excellent source of protein (30.3%), fat (13%), and digestible fiber and therefore has an energy density very similar to corn. One pound of distillers can replace about 0.6 pounds of corn and 0.4 pounds of soybean meal. If corn and soybean meal are priced at $182 and $266 per ton, then the breakeven price for DDGS is $215/ton.

• Growing corn silage hybrids having higher starch contents can reduce the need of ground corn in the diet.

• Glycerol, a byproduct of making diesel fuel from animal or vegetable fat, can be fed at 5 to 10% of ration DM as a corn replacement. Concentrations of methanol in glycerol-based products that exceed 0.015% prevent glycerol from being considered a safe feed by FDA.

• Close attention must be paid to ensure that byproducts have consistent and high quality nutrients over time. Elevated phosphorus, fat, and damaged protein should be monitored for regularly in for most byproducts.

Introduction

Corn has been a staple ingredient in lactating dairy cow rations for a hundred years. That corn has been “home-grown.” The 10 Midwestern states of Iowa, Illinois, Nebraska, Minnesota, Indiana, South Dakota, Wisconsin, Ohio, Kansas, and Missouri have traditionally contributed about 80% of the total number of acres of corn grown in the U.S. Florida accounts for only 0.08% of corn acres grown. As a result, Florida dairy farms import corn as a commodity from the Midwest to feed to their dairy cows. The price of this imported corn has been fairly stable the last 25 years for Florida dairies.
In recent times, the U.S. government is trying to reduce our dependence on foreign oil by supporting efforts to produce fuel (ethanol) from renewable resources like corn or cellulose. There is widespread public support for incorporating ethanol into our fuel-burning vehicles (gasoline and diesel) because ethanol addition results in greater combustion of these fuels and is nontoxic and biodegradable in the water and the soil. In 2005, the U.S. Congress passed legislation called a renewable fuels standard (RFS) that will at least double the use of ethanol and biodiesel by the year 2012. The number of U.S. plants producing ethanol from corn equal 100; 33 new plants are under construction. This growth in ethanol production has reduced the amount of corn available for livestock feed and concurrently increased its market price. Corn marketed in Florida has risen from about $125 to $185 per ton, a 50% increase in the last few months. For a ration containing 18% corn on a dry matter basis, this increase in corn price increases the cost of the ration by about $0.31 per cow per day. In order to compensate for this increase in ration cost, the price of milk would need to rise from $15.00 to $15.50 per hundred pounds. Alternatively, partially replacing corn with other less expensive feedstuffs may be an effective strategy.

Alternate Ration Strategies

Other grain sources of dietary starch
Grains, like corn, are an excellent source of starch, and starch is highly fermentable by ruminal microorganisms. Ruminal bacteria multiply well and produce a lot of propionic acid when offered starch. The propionic acid produced by the bacteria is converted to glucose by the cow’s liver and the glucose is used to make milk. In addition, the bacteria provide about 50 to 60% of the protein needs of the cow as they are washed out of the rumen and are digested in the abomasum and small intestine. To optimize milk production, starch should make up 24 to 26% of the dietary dry matter. Since grains are the best source of starch and corn has become so expensive, what about barley or wheat for Florida cows? Barley production is concentrated in the far north-central states and is limited in supply and too expensive to bring into the south. According to Mike Casey of Furst McNess, ground wheat (63% starch) can be purchased and delivered in Georgia, South Carolina, and North Carolina for about 75 days from May into July at a cost of about $165 per ton which would make it a better buy than corn for a limited time period. Shifting cow diets between corn and wheat needs to be done slowly. The starch in wheat is more rapidly available compared to corn so quick dietary changes can result in digestive upsets and lowered ruminal pH. Wheat flour can sometimes be bought for $10 per ton less than corn, but it is very dusty and potentially explosive so it is often avoided by mills. Some in the field have reported that it might ‘paste up” in the rumen, so it is not a popular feed ingredient.

Hominy contains less starch (about 53% starch) but more protein, fiber, and fat compared to corn, however their energy density is similar (Table 1). Hominy can be brought to the farm for about $30 per ton less than currently-priced corn. Replacing all of the corn (at 18% of diet) with hominy will reduce the dietary starch concentration about 3 percentage units (~25% to 22%). (This may be an acceptable decrease but more will be said later about reducing the starch concentration in the diet.) Dietary costs would be reduced by ~$0.20 per 100 lb of dry TMR or ~$0.11 per cow per day. If no milk is lost in this shift, then profit is improved. Experiments comparing performance of cows fed ground corn versus
hominy could not be located. However, many Florida dairies feed hominy successfully. Even replacing half the corn with hominy can be a reasonable strategy, possibly saving $0.05 to 0.06 per cow per day in feed costs. Because hominy is higher in fat and phosphorus than corn, care should be taken to avoid overfeeding these nutrients.

Table 1. Chemical composition (DM basis) of select feedstuffs used in Florida dairy diets

<table>
<thead>
<tr>
<th>Feedstuff</th>
<th>% starch</th>
<th>% sugar</th>
<th>% CP</th>
<th>% NDF</th>
<th>% P</th>
<th>NEL, Mcal/lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa hay</td>
<td>2.2</td>
<td>9.0</td>
<td>21.2</td>
<td>38.7</td>
<td>0.28</td>
<td>0.625</td>
</tr>
<tr>
<td>Brewers grains</td>
<td>5.3</td>
<td>2.7</td>
<td>29.9</td>
<td>48.1</td>
<td>0.68</td>
<td>0.806</td>
</tr>
<tr>
<td>Citrus pulp</td>
<td>3.1</td>
<td>25.0</td>
<td>6.9</td>
<td>23.9</td>
<td>0.12</td>
<td>0.740</td>
</tr>
<tr>
<td>Corn grain</td>
<td>70.6</td>
<td>3.3</td>
<td>9.5</td>
<td>9.8</td>
<td>0.32</td>
<td>0.946</td>
</tr>
<tr>
<td>Corn bran</td>
<td>36.4</td>
<td>7.1</td>
<td>11.2</td>
<td>43.7</td>
<td>0.64</td>
<td>0.885</td>
</tr>
<tr>
<td>Corn gluten feed</td>
<td>16.3</td>
<td>6.4</td>
<td>23.5</td>
<td>36.1</td>
<td>1.09</td>
<td>0.771</td>
</tr>
<tr>
<td>Corn silage</td>
<td>30.3</td>
<td>3.5</td>
<td>8.3</td>
<td>44.6</td>
<td>0.24</td>
<td>0.713</td>
</tr>
<tr>
<td>Cottonseed</td>
<td>1.2</td>
<td>5.0</td>
<td>24.2</td>
<td>52.8</td>
<td>0.715</td>
<td>0.917</td>
</tr>
<tr>
<td>Distillers grains</td>
<td>5.9</td>
<td>4.9</td>
<td>30.3</td>
<td>33.5</td>
<td>0.92</td>
<td>0.936</td>
</tr>
<tr>
<td>Hominy</td>
<td>53.4</td>
<td>5.5</td>
<td>10.5</td>
<td>17.9</td>
<td>0.59</td>
<td>0.937</td>
</tr>
<tr>
<td>Molasses</td>
<td>1.1</td>
<td>55.3</td>
<td>9.3</td>
<td>0.8</td>
<td>0.28</td>
<td>0.740</td>
</tr>
<tr>
<td>Oat silage</td>
<td>3.4</td>
<td>6.2</td>
<td>13.0</td>
<td>59.0</td>
<td>0.331</td>
<td>0.542</td>
</tr>
<tr>
<td>Rice bran</td>
<td>19.0</td>
<td>7.3</td>
<td>14.6</td>
<td>29.2</td>
<td>1.82</td>
<td>0.937</td>
</tr>
<tr>
<td>Rye silage</td>
<td>1.8</td>
<td>8.1</td>
<td>14.8</td>
<td>58.4</td>
<td>0.36</td>
<td>0.553</td>
</tr>
<tr>
<td>Sorghum silage</td>
<td>10.0</td>
<td>5.7</td>
<td>9.4</td>
<td>57.4</td>
<td>0.24</td>
<td>0.531</td>
</tr>
<tr>
<td>Soybean hulls</td>
<td>1.6</td>
<td>3.8</td>
<td>14.2</td>
<td>61.4</td>
<td>0.20</td>
<td>0.664</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>2.0</td>
<td>13.2</td>
<td>51.4</td>
<td>13.1</td>
<td>0.77</td>
<td>0.840</td>
</tr>
<tr>
<td>Wheat grain</td>
<td>62.8</td>
<td>6.0</td>
<td>13.7</td>
<td>13.9</td>
<td>0.43</td>
<td>.884</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>22.5</td>
<td>8.3</td>
<td>17.4</td>
<td>41.0</td>
<td>1.13</td>
<td>0.711</td>
</tr>
<tr>
<td>Wheat midds</td>
<td>25.8</td>
<td>8.2</td>
<td>18.4</td>
<td>37.4</td>
<td>1.11</td>
<td>0.802</td>
</tr>
</tbody>
</table>

*Average values from Dairy One (http://www.dairyone.com/Forage/FeedComp/disclaimer.asp).

Low starch feedstuffs as possible substitutes for corn

Because other grain sources rich in starch such as barley or wheat are not economically available in Florida for most of the year, other commodity feeds must be considered. Those ingredients that are priced less than corn may be successfully used to partially replace corn. As shown in Table 1, all of the commonly fed feedstuffs contain quite a bit less starch than corn. The best starch sources after corn include corn silage at 30%, wheat midds at 26%, wheat bran at 23%, rice bran at 19%, and corn gluten feed at 16% (DM basis). Everything else is less than 10% starch. Replacing some of the corn with these feeds will reduce dietary starch to less than 25%. How far can dietary starch be reduced without significantly affecting milk production? Experiments examining the replacement of corn with these feedstuffs will be helpful in answering this question.

Wheat midds. Wheat midds contain 26% starch (Table 1) and 18% protein. They are priced about $30 to $35 per ton lower than corn if the midds are contracted at the right time of the year (August to September). Wheat midds have not been evaluated as a
substitute for corn in many experiments. In a recent study, wheat midds were fed at about 7.5% of the diet by replacing some of the corn and soybean meal (Knowlton et al., 2001). Corn in the diet dropped from 34.1 to 28.9%. Cows fed wheat midds tended to eat less feed dry matter (45.7 vs. 50.7 lb/day) but milk production (72.4 vs. 77.3 lb/day) and milk composition were not affected. This reduced feed intake may have been because wheat midds have a high water-holding capacity, thus increasing gut fill with fiber. Cows fed wheat midds appeared to have looser manure than those fed more corn and soybean meal. In a second study, wheat midds were fed at 0 or 22.4% of the diet, replacing 35% of the ground corn and 30% of the soybean meal (Bernard and McNeill, 1991). Intake of feed dry matter (46.8 lb/day average), production of milk (61.3 lb/day), and milk composition were not different between the two groups of cows which averaged 150 days in milk at the start of the study. However the digestibility of dry matter and neutral detergent fiber were lower by cows fed wheat midds. Therefore wheat midds do not appear to be an effective feed replacement for ground corn except for lower producing cows.

Corn gluten feed. Corn gluten feed (CGF) is a byproduct of the manufacture of corn sweeteners, corn starch, corn syrup, and corn oil using the wet milling process. The corn starch is used to make ethanol. The CGF consists of the corn bran and a steep liquor (fermented nutrients extracted from water used to soak corn grain) mixed in approximately a 2:1 ratio. It is marketed in the wet or dry form but Florida dairies see it as a dry commodity. It contains 16% starch, 36.1% NDF, and 23.5% protein, the protein being highly degradable in the rumen (Table 1). It is priced about $40 per ton less than corn. Table 2 lists those studies in which CGF was asked to serve as a concentrate, in that it replaced only the corn and soybean meal in the diets of lactating dairy cows. Table 3 lists those studies in which CGF was asked to serve as both a concentrate and a fiber source, in that it replaced both concentrate and traditional forages. The CGF was generally included between 10 and 45% of the diet although some studies went higher. When CGF was fed at about 20% of ration DM, milk production was decreased statistically in 1 study (Staples et al., 1984), increased in 1 study (VanBaale et al., 2001), and unchanged in 9 other studies. Cows in these studies were milking between 50 and 90 pounds per day. Increasing the CGF to 30, 40 or even 57% of the diet did not reduce milk in any study with the exception of Staples et al. (1984). In two studies, in which CGF was fed between 38 and 40% of the diet replacing both forage and concentrate starting at calving, average milk yield was increased significantly by feeding the corn gluten feed (Boddugari et al., 2001; Kononoff et al., 2006; Table 3).

Because CGF contains less starch than corn, adding CGF reduces dietary starch. Very few studies report the starch values for their experimental rations so I calculated a dietary starch value for all of the diets listed in Tables 2 and 3 using “book values” and plotted dietary starch against milk production in Figure 1. Each box represents one diet. Boxes connected by a line represent diets fed in the same study. Those data points to the right of the “26% starch” line were diets that contained more than the targeted 24 to 26% starch concentration. To the left of that same “26% starch” line, are the boxes that represent diets that were below the target. As more CGF replaced more corn, the dietary starch concentrations dropped, going as low as 15% in some cases. In spite of lowered starch intake, milk yield did not drop significantly. The bulk of these studies indicate that dietary starch could be reduced by replacing some corn and protein meals with the digestible fiber found in CGF.
Table 2. Dry matter intake and milk yield of dairy cows fed wet (WCGF) or dry corn gluten feed (DCGF) in partial replacement of grains and protein meals.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Dietary Treatments</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staples et al., 1984 (IL)</td>
<td>0% WCGF 20% WCGF 30% WCGF 40% WCGF</td>
<td>CGF replaced up to 82% of corn/SBM in a corn silage-based TMR; (just past peak milk)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>52.9 (a) 51.4 (b) 48.9 (c) 47.4 (d)</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>67.2 (a) 65.9 (b) 61.9 (c) 61.9 (d)</td>
<td></td>
</tr>
<tr>
<td>MacLeod et al., 1985 (Canada)</td>
<td>0% WCGF 20% WCGF 40% WCGF</td>
<td></td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>44.3 41.7 40.1</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>72.3 66.6 64.6</td>
<td></td>
</tr>
<tr>
<td>Armentano and Dentine, 1988 (WI)</td>
<td>0% WCGF 11.1% WCGF 22.6% WCGF 33.6% WCGF</td>
<td>CGF replaced up to 77% of corn/SBM in a corn-alfalfa silage-based TMR; older cows; (71 DIM)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>49.6 48.9 48.9 50.0</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>67.2 67.9 68.8 67.9</td>
<td></td>
</tr>
<tr>
<td>Gunderson et al., 1988 (CO)</td>
<td>0% WCGF 10% WCGF 20% WCGF 30% WCGF</td>
<td>CGF replaced up to 68% of hominy /SBM in a corn silage-alfalfa oat hay-based TMR; (190 DIM)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>47.2 47.2 46.3 46.3</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>50.5 50.7 50.9 51.1</td>
<td></td>
</tr>
<tr>
<td>Fellner and Belyea, 1991 (MO)</td>
<td>21% DCGF 38% DCGF 57% DCGF</td>
<td>CGF replaced up to 100% of corn, wheat, &amp; SBM in a corn silage-alfalfa hay-based TMR (103 DIM)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>54.9 49.8 54.5</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>59.3 58.9 58.9</td>
<td></td>
</tr>
<tr>
<td>Boddugari et al., 2001 (NE) (^1)</td>
<td>0% WCGF 21.9% WCGF 33.8% WCGF 45.3% WCGF</td>
<td>CGF replaced up to 100% of ground corn and SBM; (64 DIM); Gain in BW was less for CGF-fed cows</td>
</tr>
<tr>
<td>DM intake, % BW</td>
<td>4.30 (a) 4.00 (b) 4.05 (b) 3.85 (b)</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>67.0 67.2 67.9 65.0</td>
<td></td>
</tr>
<tr>
<td>Coomer et al., 1993 (GA)</td>
<td>4% DCGF (+)SBH (2) 13.8% DCGF (+)SBH 25.2% DCGF (+)SBH</td>
<td>CGF &amp; SBH replaced up to 59% of ground corn and wheat in a sorghum silage-based TMR (45 DIM)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>55.6 53.6 53.6</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>89.1 85.8 84.9</td>
<td></td>
</tr>
<tr>
<td>Mowrey et al., 1999 (MO)</td>
<td>8.5% DCGF (+)SBH (3) 15.5% DCGF (+)SBH 22.5% DCGF (+)SBH</td>
<td>CGF, SBH, and WM replaced up to 49% of corn and SBM in corn silage/alfalfa hay based TMR (112 DIM)</td>
</tr>
<tr>
<td>DM intake, lb/day</td>
<td>53.1 50.9 51.4</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>63.1 58.6 62.6</td>
<td></td>
</tr>
</tbody>
</table>

\(1\) Corn gluten feed mixed with corn gluten meal and additional sources of RUP.  
\(2\) SBH = soybean hulls.  
\(3\) WM = wheat midds.  
\(a,b,c,d\) Values with different letters are statistically different from one another.
Table 3. Dry matter intake and milk yield of dairy cows fed wet (WCGF) or dry corn gluten feed (DCGF) in partial replacement of both forages and concentrates.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Dietary treatments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernard and McNeill 1991 (TN)</td>
<td>0% WCGF, 22.4% DCGF</td>
<td>CGF replaced 32% of corn/SBM &amp; 13% of corn silage (150 DIM)</td>
</tr>
<tr>
<td></td>
<td>DM intake, lb/day</td>
<td>47.0 48.5</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>61.1 63.1</td>
</tr>
<tr>
<td></td>
<td>CGF replaced 32% of corn/SBM &amp; 13% of corn silage (150 DIM)</td>
<td></td>
</tr>
<tr>
<td>Bernard et al., 1991 (TN)</td>
<td>0% WCGF, 27.1% DCGF</td>
<td>CGF replaced 32% of corn/SBM and 19% of corn silage (2 to 24 wk postpartum)</td>
</tr>
<tr>
<td></td>
<td>DM intake, lb/day</td>
<td>45.9 46.3 48.7</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>65.7 65.5 68.1</td>
</tr>
<tr>
<td>VanBaale et al., 2001 (KS)</td>
<td>0% WCGF, 19.2% WCGF, 26.5% WCGF, 33.6% WCGF</td>
<td>CGF replaced up to 43% of ground corn and 42% of alfalfa hay-corn silage</td>
</tr>
<tr>
<td></td>
<td>DM intake, % BW</td>
<td>4.25 b 4.42 a 4.43 a 4.20 b</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>83.3 a 91.7 b 91.7 b 91.7 b</td>
</tr>
<tr>
<td>Boddugari et al., 2001 (NE)</td>
<td>0% WCGF, 40% WCGF</td>
<td>CGF replaced 51% of corn/SBM and 31% of corn silage/alfalfa silage (at calving)</td>
</tr>
<tr>
<td></td>
<td>DM intake, lb/day</td>
<td>57.8 a 54.9 b</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>85.1 a 96.8 b</td>
</tr>
<tr>
<td>Schroeder et al., 2003 (ND)</td>
<td>0% WCGF, 15% WCGF, 30% WCGF, 45% WCGF</td>
<td>CGF replaced up to 59% of barley/SBM/sunflower seeds/beet pulp and 34% of corn &amp; alfalfa silage (83 DIM)</td>
</tr>
<tr>
<td></td>
<td>DM intake, lb/day</td>
<td>48.3 53.8 49.4 48.3</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>63.5 74.3 65.5 58.9</td>
</tr>
<tr>
<td>Kononoff et al., 2006 (NE)</td>
<td>0% WCGF, 37.9% WCGF</td>
<td>CGF replaced 49% of ground corn/SBM and 37% of forage (305 days of lactation)</td>
</tr>
<tr>
<td></td>
<td>DM intake, lb/day</td>
<td>46.7 a 56.0 b</td>
</tr>
<tr>
<td></td>
<td>Milk, lb/day</td>
<td>68.6 a 77.2 b</td>
</tr>
</tbody>
</table>

1 Corn gluten feed mixed with corn gluten meal and additional sources of RUP.

a,b Values with different letters are statistically different.
Dropping dietary starch from 26 to 21% may be an acceptable compromise. Feeding CGF at 0%, 10%, and 20% of the diet reduced the dietary starch from 25.9 to 23.5% to 20.9% in the rations described in Table 4. As CGF increased in the diet, the proportion of extruded soy meal increased in order to keep the ruminally undegradable protein constant in the diet. In addition, the proportion of whole cottonseed had to be reduced in order to keep the dietary crude protein from exceeding 17%. The cost of these diets decreased from $4.42 to $4.22 to $4.00 per cow per day. As long as milk production remains unchanged, then increased profit should result. This is the million dollar question. The studies in Tables 2 and 3 provide some assurance that milk and feed intake will be maintained when CGF is fed at 20% of dietary DM. But feeding CGF at 10% of the diet may be a preferred approach initially to “play it safe.” Some signs to watch for that may indicate that the dietary starch has gotten too low include dropped milk production, stiffer manure, increases in milk urea nitrogen, and loss of body condition.

The drying of CGF can reduce the digestibility of the protein if the drying temperature is too high. This is determined by analyzing CGF for acid detergent insoluble protein (ADIN). Bernard et al. (1991) reported that dried CGF had higher concentrations of ADIN than wet CGF. In recent years, high ADIN may not be as big of a problem in CGF based upon analyses reported by Dairy One. The ADIN values were less than 5% of the nitrogen in the majority of samples; ADIN is usually not considered a problem until it makes up 10% of the total nitrogen in the feed.

Commodities need to have some consistent level of nutrient density from delivery to delivery in order to keep the daily ration nutrients consistent for the cows. Dairy One lists on their web site the normal range and standard deviation of the nutrients of most
Table 4. Ingredient, chemical composition, and cost of sample diets formulated to contain 0, 10, or 20% corn gluten feed (CGF).

<table>
<thead>
<tr>
<th>Feedstuff</th>
<th>0% CGF</th>
<th>10% CGF</th>
<th>20% CGF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of dietary DM</td>
<td>% of dietary DM</td>
<td>% of dietary DM</td>
</tr>
<tr>
<td>Corn silage</td>
<td>32.8</td>
<td>32.8</td>
<td>32.8</td>
</tr>
<tr>
<td>Sorghum silage</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Bermuda hay</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Corn gluten feed</td>
<td>0</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Corn</td>
<td>20.2</td>
<td>14.6</td>
<td>8.8</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>9.4</td>
<td>5.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Extruded soy</td>
<td>4.0</td>
<td>5.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Citrus pulp</td>
<td>4.1</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Wet brewers grains</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Whole cottonseed</td>
<td>3.3</td>
<td>1.4</td>
<td>0</td>
</tr>
<tr>
<td>Molasses</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Mineral mix</td>
<td>3.7</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch, % of DM</td>
<td>25.9</td>
<td>23.5</td>
<td>20.9</td>
</tr>
<tr>
<td>Protein, % of DM</td>
<td>17.0</td>
<td>17.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Sugar, % of DM</td>
<td>7.9</td>
<td>7.9</td>
<td>7.8</td>
</tr>
<tr>
<td>NDF, % of DM</td>
<td>30.8</td>
<td>33.0</td>
<td>35.6</td>
</tr>
<tr>
<td>ADF, % of DM</td>
<td>18.3</td>
<td>18.9</td>
<td>19.5</td>
</tr>
<tr>
<td>Fat, % of DM</td>
<td>4.2</td>
<td>4.2</td>
<td>4.3</td>
</tr>
<tr>
<td>NEL, Mcal/lb</td>
<td>0.772</td>
<td>0.757</td>
<td>0.742</td>
</tr>
<tr>
<td>Phosphorus, % of DM</td>
<td>0.35</td>
<td>0.38</td>
<td>0.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intake and cost</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake, lb/day</td>
<td>53.4</td>
<td>53.4</td>
<td>53.4</td>
</tr>
<tr>
<td>Cost, $/day</td>
<td>4.42</td>
<td>4.22</td>
<td>4.00</td>
</tr>
</tbody>
</table>

† Prices used to calculate daily ration cost were $182/ton for corn, $134/ton for CGF, $266/ton for soybean meal, $258/ton for extruded soy, of the feeds they have analyzed over the past 6 years. The standard deviation is a mathematical expression of how consistent a measure is. The mean and standard deviation for protein, NDF, starch, fat, and phosphorus for 7 feeds are listed in Table 5. For example, the average starch value for corn is 70.6%. The standard deviation is 5.1%. This means that two-thirds of the samples that were analyzed ranged between 65.5% and 75.7% which is 5.1% units added to or subtracted from the mean of 70.6%. This also means that one-third of the samples analyzed were outside this range. This is a fairly narrow range compared to the byproducts. The starch in CGF samples has a typical variation between 8.6% and 24.0% with a mean of 16.3%. This large variation is likely due to the fact that the production of CGF is not standardized from corn mill to
corn mill. Likewise, starch in hominy typically ranges between 42.9% and 63.9% with a mean of 53.4%. By feeding these byproducts in smaller amounts, the potential negative effect of nutrient variation on cow performance is reduced. When contracting for these commodities, an acceptable range in variation between loads should be agreed upon ahead of time. Loads delivered outside this agreed-upon-range would be refused.

<table>
<thead>
<tr>
<th>Feed</th>
<th>Crude protein</th>
<th>NDF</th>
<th>Starch</th>
<th>Fat</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn silage</td>
<td>8.3 ± 1.03</td>
<td>44.6 ± 6.1</td>
<td>30.3 ± 7.6</td>
<td>3.3 ± 0.5</td>
<td>0.24 ± 0.04</td>
</tr>
<tr>
<td>Corn</td>
<td>9.5 ± 1.6</td>
<td>9.8 ± 3.2</td>
<td>70.6 ± 5.1</td>
<td>4.4 ± 1.3</td>
<td>0.32 ± 0.10</td>
</tr>
<tr>
<td>Corn gluten feed</td>
<td>23.5 ± 7.0</td>
<td>36.1 ± 6.8</td>
<td>16.3 ± 7.7</td>
<td>3.9 ± 1.8</td>
<td>1.09 ± 0.26</td>
</tr>
<tr>
<td>Distillers grains</td>
<td>30.3 ± 3.6</td>
<td>33.4 ± 4.9</td>
<td>5.9 ± 3.4</td>
<td>13.0 ± 2.9</td>
<td>0.92 ± 0.14</td>
</tr>
<tr>
<td>Hominy</td>
<td>10.5 ± 1.9</td>
<td>17.9 ± 5.7</td>
<td>53.4 ± 10.5</td>
<td>7.2 ± 2.6</td>
<td>0.59 ± 0.22</td>
</tr>
<tr>
<td>Soybean hulls</td>
<td>14.2 ± 6.8</td>
<td>61.4 ± 9.8</td>
<td>1.6 ± 1.2</td>
<td>3.1 ± 2.7</td>
<td>0.20 ± 0.25</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>51.4 ± 4.6</td>
<td>13.1 ± 5.2</td>
<td>2.0 ± 1.2</td>
<td>3.6 ± 3.7</td>
<td>0.77 ± 0.12</td>
</tr>
</tbody>
</table>

**Dried Distillers Grains Plus Solubles (DDGS).** Dry corn put through the dry-milling process will produce ethanol, carbon dioxide, and DDGS. Each 56-pound bushel of corn processed through the dry milling process results in 2.85 gallons of ethanol, 18 pounds of carbon dioxide, and 18 pounds of DDGS. Plants using the dry milling process are less expensive to build than the plants using the wet milling process, thus about 75% of the ethanol produced from corn comes from the dry milling process. The production of DDGS increased tenfold between the years 1980 and 2000, increasing from 320,000 to 3.5 million metric tons (1 metric ton = 2205 pounds). It doubled between 2000 and 2004 to over 7.3 million metric tons (Kaiser and Shaver, 2007). Every dairy cow in the U.S. would need to consume 7.3 pounds per day of DDGS over a 305-day lactation in order to use up this supply, but of course DDGS is also fed to other livestock and is exported. China will backhaul products like DDGS in ships as they bring their exports to the U.S.

During the production of ethanol from corn, a syrup product and a cake product are produced. The plant adds them together in different proportions to form DDGS. Depending on the plant, the DDGS may be a mixture of syrup to cake ranging in proportion from 35:65 to 55:45. Because of the variation in the ratio of syrup to cake used by different plants to form DDGS, the nutrient concentration of the DDGS will vary from one plant to another. However the variation looks to be less than that of CGF
The mean and standard deviations of the major nutrients in DDGS are given in Table 5. Although DDGS is very low in starch, it is an excellent source of protein (30.3%) and fat (13%) and therefore has an energy density very similar to corn. In addition, the ethanol-making process increases the digestibility of the fiber. Unlike CGF, DDGS is a very good source of ruminally undegradable protein (RUP) but if the temperature of the drying process is too high, the protein can be rendered indigestible. Purchasers of DDGS should analyze DDGS for ADIN regularly.

Kalscheur et al. (2005) reviewed 24 experiments in which 98 comparisons were made between cows fed diets containing DDGS and those not fed DDGS. Table 6 shows the performance of the cows broken down by the proportion of DDGS in the ration. Cows fed DDGS at up to 30% of the ration produced as much milk as those not fed any DDGS (about 73 lb/day). In spite of decreasing starch content, milk production was maintained. In a study conducted at the University of Florida, whiskey DDGS were fed at 0% or 20% of a 55% concentrate:45% forage diet. The forage was all corn silage in one set of diet and 50% corn silage:50% rhizome peanut silage in another set of diets. The DDGS replaced around 40% of the corn and soybean meal. Milk production was increased from 59.0 to 60.7 pounds per day without changing milk fat test. The effect of DDGS was the same regardless of whether the forage was totally corn silage or an equal mixture of corn silage and rhizome peanut silage. However, a maximum feeding level of DDGS might be 15% in order to prevent the overfeeding of protein, RUP, unsaturated fat, and phosphorus. Increased corn oil in the DDGS can also be a problem by decreasing milk fat so fat content of DDGS should be monitored regularly. Feeding DDGS at 20% of the diet will increase the fat in the diet by 2.6%. This will likely be a concern if the diet also contains other supplemental fats. Dietary fat should be kept below 6%. The feeding of one pound of DDGS can replace about 0.6 pounds of corn and 0.4 pounds of soybean meal. If corn and soybean meal are priced at $182 and $265 per ton, then the breakeven price for DDGS is $215/ton. Current market price for DDGS in Florida is around $160/ton.

Table 6. Dry matter (DM) intake, milk yield, milk fat, and milk protein concentration of dairy cows fed diets containing wet or dried corn distillers grains with solubles (DGS).1

<table>
<thead>
<tr>
<th>% DGS in ration</th>
<th>DM Intake (lb/day)</th>
<th>Milk Fat (%)</th>
<th>Protein (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>48.7b</td>
<td>72.8ab</td>
<td>3.39</td>
</tr>
<tr>
<td>4 – 10</td>
<td>52.2a</td>
<td>73.6a</td>
<td>3.43</td>
</tr>
<tr>
<td>10 – 20</td>
<td>51.6ab</td>
<td>73.2ab</td>
<td>3.41</td>
</tr>
<tr>
<td>20 – 30</td>
<td>50.3ab</td>
<td>73.9a</td>
<td>3.33</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>46.1c</td>
<td>71.0b</td>
<td>3.47</td>
</tr>
<tr>
<td>Standard error</td>
<td>1.8</td>
<td>3.1</td>
<td>0.08</td>
</tr>
</tbody>
</table>

a,b,c Values within a column followed by a different superscript differ (P < 0.05).

1Adapted from Kalscheur (2005) as reported by Schingoethe (2007).
**Soybean Hulls (SBH).** During the processing of soybeans for oil and meal, the hulls are separated, ground, and sold as soybean hulls. They consist largely of the outer covering of the soybean so they are high in fiber (~61% NDF) and contain moderate amounts of protein (~14%) but very little starch (Table 1). The protein concentration will depend upon how well the hulls are cleaned. Positive characteristics include a high content of lysine (0.72%), a low content of phosphorus (0.2%), and a highly digestible fiber (~90% if left in a ruminal environment for 96 hours). Its fat content can vary widely. The availability of SBH is likely to increase in coming years as more acres are planted to soybeans in order to use soybean oil for biodiesel production.

In 13 separate experiments published between 1976 and 2002, SBH (fed at up to 20% of the dietary DM) successfully replaced ground corn or high moisture corn in rations for lactating cows (Ipharraguerre and Clark, 2003). In most of these studies, the dietary starch levels were probably greater than what is recommended today, based upon the proportion of corn in the diets fed in these studies (between 34 and 48% corn). Therefore the replacement of corn with SBH still left enough starch to support adequate intake and milk production. One study (Stone, 1996) did feed a more conservative amount of corn in their control diet that deserves further attention here. The control diet was 23% high moisture corn, 26% corn silage, and 26% alfalfa silage. Adding SBH to the diet at 14% of the dietary DM reduced the corn to 9% of the diet. This dropped the starch from roughly about 25% to 15%, based upon my calculations because Stone (1996) did not provide starch values. The diets were fed starting at 8 days fresh. Lactating cows ate more feed DM when offered the ration containing SBH (49.8 vs. 45.6 lb/day) but milk production was not changed (92.4 versus 89.7 lb/day). Lactating heifers fed SBH ate the same amount of feed (37.7 versus 36.6 lb/day) and produced the same amount of milk (69.4 versus 69.4 lb/day) as those not fed SBH. Concentrations of milk fat (3.6%) and protein (2.9%) were unchanged. Replacing 60% of the corn with SBH, so that SBH made up 14% of the ration, was effective to support high milk production in early lactation. With loose SBH priced at $125 per ton, a savings of $0.30 per cow/day was achieved.

Even though dietary NDF increases in the diet when SBH replace corn, feed intake has not been decreased. This is in contrast with the well-documented fact that as traditional forage replaces concentrate in the diet, concentration of dietary NDF increases and feed intake decreases. However the NDF in nonforage fiber byproducts like SBH do not have the same physical characteristics as the NDF in traditional, properly chopped forage. The fiber in SBH is highly digestible and it is very short and has a specific gravity that allows it to move out of the rumen quickly (Ipharraguerre and Clark, 2003) so that SBH fiber does not pack the rumen like forage fiber would if fed at similar NDF concentrations. In order to use SBH most efficiently, the diet should contain sufficient “effective” fiber from traditional forages.

**Corn Silage.** Corn silage hybrids differ in the proportion of grain making up the crop at harvest. Selecting to plant corn silage hybrids that contain more starch will reduce the amount of ground corn you need to purchase. In a test of 55 corn silage hybrids grown in Gainesville in 2006, starch concentration ranged from 22% to 35% of silage dry
matter, with an average of 29.3%. (You can see the results of the corn hybrid tests at http://dairy.ifas.ufl.edu). Selecting a corn silage hybrid that is a good source of starch and digestible fiber, while at the same time yields good tonnage, could be a good choice if one is trying to reduce corn costs in the ration. For example, Vigoro V58YR2 has had very good starch and digestible fiber contents in hybrid tests in 2005 and 2006 although yields have been average. How much could be saved? If a corn silage hybrid had 33% starch instead of 30%, and if the corn silage was fed at 33% of the ration dry matter, the ground corn could be reduced in the diet from 18% to 16.5%, which is about 1 lb/day less ground corn. The cost savings would depend upon the price of the commodity(s) used to replace the pound of corn. For instance, if citrus pulp priced at $100 per ton replaced the pound of ground corn at $180 per ton, the cost savings would be $0.04 per cow per day.

Corn silage contains much more starch than the other forages we feed in Florida. Feeding more corn silage in the ration and less sorghum silage, cottonseed hulls, or bermudagrass will increase the starch in the diet and allow for less ground corn to be fed. If corn silage inventory allows, increasing the corn silage from 33 to 38% of the diet DM by replacing another forage like sorghum silage, will allow ground corn to be reduced by 1.5 percentage units, resulting in a cost savings of about $0.08 per cow/day.

**Glycerol.** Glycerol is a byproduct made as plant and animal fats are processed to make diesel fuels. This diesel fuel produced from fat burns cleaner, as there is no soot or particulate matter produced. Starting with animal fat to make diesel fuel is more profitable than starting with vegetable oil because animal fats are cheaper. However, diesel made from animal fat may not work as well in colder climates because it “clouds up.” This process is expanding worldwide and therefore the supply of glycerol in the future is likely to increase. Ten pounds of glycerol result from every 100 pounds of biodiesel produced.

The purity of this byproduct can vary widely. The more impure the product, the more water, methanol, phosphorus, and potassium it contains. A product with these contaminants is labeled glycerin. The glycerin fed in a German study contained 2.2% potassium and up to 2.4% phosphorus. Methanol is present due to its use in the manufacture of biodiesel. Although the ruminal bacteria can detoxify methanol, it can be problematic if it is a large contaminant of glycerol. According to the FDA, glycerin is considered a substance that is GRAS (Generally Recognized as Safe) for general purpose use in animal feed, unless methanol is present at concentrations exceeding 150 ppm (0.015%). The energy content of glycerol is similar to corn (~0.90 Mcal/lb of DM) when fed in high starch diets. Dietary glycerol would be converted mainly to propionate and butyrate by ruminal bacteria. As a feed ingredient, it could substitute for corn or molasses. Prices vary from about $100/ton in Florida to $160/ton in Georgia.

Little research has been done regarding the feeding of glycerol to dairy cows. South Dakota State University reported that lactating dairy cows (average of 192 days in milk) fed glycerol (1.3% methanol) at either 0%, 2.7%, or 5.3% of dietary dry matter ate the same amount of feed (41.1 lb of feed DM) and produced the same amount of milk (65
lb/day) (Linke et al., 2006). Milk composition was unchanged with the exception that milk urea nitrogen concentrations were lower in cows fed glycerol. Efficiency of fat-corrected milk production was improved from 1.46 to 1.59 and 1.60 lb of FCM yield per lb of feed dry matter intake. Interesting, animals of other species consumed more water when they were fed glycerol. This may have a benefit to dairy cows managed under heat stress conditions. German researchers fed glycerol up to 10% of ration DM successfully. If 25% of the corn could be replaced with glycerol, a savings of $0.11 per cow per day could be realized with glycerol at $100/ton. Glycerol appears to be a good pelleting agent when added at 5%.

Future new byproducts from new technologies to improve ethanol production. As the ethanol manufacturing industry works at improving the efficiency of conversion of corn to ethanol, different byproducts will become available. Applegate et al. (2006) lists the following potential corn byproducts. 1) Called the "quick germ quick fiber method," an enzyme is added to the water used to soak the ground corn, causing the germ and fiber to float before the fermentation process begins. The product from this process contains 28% protein, 5% fat, and 25% NDF. 2) Collecting the pericarp fiber and germ prior to fermentation by modifying the dry grinding process (drum degeminator) results in a product that is 24% protein, 8-9% fat, and 28% NDF. 3) Removing the fiber by sieving and air aspiration (elusieve process) results in a product that is 40+% protein, 15% fat, and 20% NDF. 4) Modifying the yeasts used to ferment the sugar to ethanol could allow for an increased concentration of lysine in DDGS, thus giving DDGS a more favorable amino acid profile. As each mill adopts what they consider the best ethanol-producing technology, the feeding industry will be faced with a variety of byproducts on the market which will need to be properly identified prior to purchase.

Summary

With the increased price being paid to corn growers due to the increased demand for ethanol, farmers will be planting more of their acres to corn. This will reduce the number of acres committed to other crops, such as cottonseed. This shift will likely have a large impact on the market price of a number of feed commodities. The availability and price of each commodity will need to be followed closely and attention paid for timely contracting. There are some acceptable alternative feeds that would allow some reduction of corn grain in the diet of lactating dairy cows.

References


Schroeder, A. and K.H. Sudekum. Glycerol as a by-product of biodiesel production in diets for ruminants. Schroeder@aninut.uni-kiel.de


Improving Dairy Cow Fertility through Genetics

Peter J. Hansen
Department of Animal Sciences
University of Florida, Gainesville
pjhansen@ufl.edu

Introduction

Dairy cows today produce twice as much milk per lactation as cows did in 1957 (Figure 1). This improvement has come about because of genetic selection for milk yield, improved feeding practices and other changes in management. Unfortunately, reproductive function has declined steadily for most of that period, and has only recently made a slight recovery. The reasons for the decline in fertility are complex and not completely understood. Inbreeding, lack of selection for reproduction, stress of lactation, and changes in cow environment have all been implicated. This paper discusses two effective genetic solutions to the problem of infertility in dairy cattle: crossbreeding and selection for reproductive traits.

![Figure 1. Trends in milk yield (●) and Daughter Pregnancy Rate (○) for US Holsteins. Data are from USDA-ARS Animal Improvement Programs Laboratory, February 2007 (available at http://aipl.arsusda.gov/ARSWeb/eval/summary/trend.cfm).](image-url)
Crossbreeding

Crossbreeding in dairy cattle is generating renewed interest. Concern over inbreeding is a major reason. As shown in Figure 2, the inbreeding coefficient for US Holsteins and Jerseys has increased steadily from 1960 to 2007 (1960 is the ‘base’ year for U.S. inbreeding calculations; the inbreeding coefficient for animals born that year is assumed to be zero).

Cattle have about 21,000 functional genes on 30 pairs of chromosomes. As pairs, the chromosomes carry paired (2) copies of each gene—one inherited from the father and one from the mother. Inbreeding increases the likelihood that the two inherited copies of a gene are identical. The negative effects of inbreeding are seen when identical undesirable genes are inherited from both parents. An inbreeding coefficient is an estimate of the percentage of these identical genes pairs inherited by an animal. As a rule of thumb, mating selection should keep the inbreeding coefficients of offspring to less than 6.25%. Average inbreeding coefficient for animals born in 2007 was estimated at 5.1% for Holsteins and 7.5% for Jerseys. Thus, many animals in both breeds surpass the 6.25% threshold.

Crossbreeding takes advantage of heterosis (improved performance of offspring over the average performance of parents). Essentially, heterosis results from the opposite of inbreeding depression. Increasing the chances that gene pairs include a different copy from each parent increases the chances that a ‘better’ version is used by the animal.

**Figure 2.** Trends in inbreeding coefficient for US Holsteins (●) and Jerseys (○). Data are from USDA-ARS Animal Improvement Programs Laboratory, February 2007 (available at http://aipl.arsusda.gov/ARSWeb/eval/summary/trend.cfm).
Crossbreeding also provides opportunities to exploit superior fertility and health traits of some dairy breeds. Researchers from the University of Minnesota have been studying the performance of the Holstein crosses of several of these breeds including Normande, Montebeliarde and Scandinavian Red (includes Norwegian Red and Swedish Red breeds). The most recent data are posted by the University of Minnesota at: http://www.ansci.umn.edu/research/crossbreeding.htm. This research has shown that crossbreeding can improve fertility and longevity at the expense of a decrease in milk yield.

As can be seen in Table 1, days open during first lactation averaged 19-27 days less for the crossbred groups than for purebred Holsteins. In addition, conception rate at first insemination was significantly higher for Normande x Holstein and Montebeliarde x Holstein than for Holstein. Note, however, that Holsteins had higher milk yields. For first lactation, Holsteins produced 2,706 lb more milk than Normande x Holstein, 1,317 lb more milk than Montebeliarde x Holstein and 1,050 lb more milk than Scandinavian Red x Holstein (Table 1). The difference between breed groups in milk yield increased in second lactation: the 305-day milk yield averaged 26,194 lb for Holstein, 21,863 for Normande x Holstein, 23,547 for Montebeliarde x Holstein and 23,683 for Scandinavian Red x Holstein.

Table 1. Reproduction and lactation traits in first lactation for purebred Holsteins and Holstein crossbreds

<table>
<thead>
<tr>
<th>Trait</th>
<th>Holstein</th>
<th>Normande x Holstein</th>
<th>Montebeliarde x Holstein</th>
<th>Scandinavian Red x Holstein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days to first breeding</td>
<td>69</td>
<td>62**</td>
<td>65*</td>
<td>66</td>
</tr>
<tr>
<td>Conception rate at first insemination</td>
<td>22</td>
<td>35*</td>
<td>31**</td>
<td>30</td>
</tr>
<tr>
<td>Days open</td>
<td>150</td>
<td>123**</td>
<td>131**</td>
<td>129**</td>
</tr>
<tr>
<td>305-day milk yield, lb</td>
<td>21,511</td>
<td>18,805**</td>
<td>20,194**</td>
<td>20,461**</td>
</tr>
</tbody>
</table>

a Data are from Heins et al. (2006ab)
b Number of observations varies from 245-536
c Scandinavian Red is a term to describe both Swedish Red and Norwegian Red sires. Differences with Holsteins indicated by * (P<0.05) and ** (P<0.01).

In addition to improvements in reproduction traits, the California study also indicates advantages in reduced stillbirths and increased cow longevity associated with crossbreeding. Despite the beneficial effects of crossbreeding, there are at least two concerns about this breeding practice. The first relates to the loss of heterosis and loss of uniformity in the offspring of the crossbreds. The loss of heterosis can largely be prevented by the use of a three or four-breed rotation in sires. Use of a three-breed
rotation allows a herd to maintain 86-88% of the heterosis of the first cross and use of a four-breed rotation maintains 93-94% of the maximum heterosis possible. The second concern with crossbreeding relates to the loss of milk yield as compared to pure Holsteins. No single answer can be given as to whether the improvements in fertility and health traits caused by crossbreeding compensates for this loss of milk yield. Rather, differences between farms or regions in milk price, feed costs, fertility, etc. mean that crossbreeding may be economical for some operations and not for others. In Florida, there is little information on the production responses to crossbreeding although an upcoming nationwide study to evaluate Norwegian Red x Holstein cattle is currently planned to include some Florida dairy farms.

Selection for Reproduction – Daughter Pregnancy Rate

Until recently, there has been little interest in using genetic selection to improve reproduction in dairy cattle. Because the heritability of reproductive traits is relatively low compared to production traits like milk yield, it is more difficult to make genetic improvement. Heritability is the proportion (percentage) of the observed variation in a trait that is due to genetics. When heritability is low, it is difficult to make much progress in genetic selection because the probability that the best animal is best for genetic reasons is relatively low.

Heritability estimates for reproductive traits are 0.05 or less. In other words, less than 5% of the variation between cows in their reproductive function is caused by differences in genes. This is not surprising because reproduction is greatly affected by non-genetic factors – level of feeding, air temperature, skill of the inseminator, etc. It is a mistake, however, to conclude that low heritability means that there are no genes controlling reproduction. In fact, scientists are now finding specific genes that affect reproduction function.

In 2003, the USDA began estimating the genetic merit of bulls for reproduction. The trait used is Daughter Pregnancy Rate (DPR). This term is calculated from days open and is directly related to the proportion of females eligible to become pregnant in a 21-day period that actually become pregnant (i.e. the 21-day pregnancy rate).

The heritability of DPR is only 0.04 but work is underway to control for some factors affecting days open to improve the accuracy of the estimate of genetic ability for reproduction. Weigel (2006) reported that the top 10% of Holstein bulls had a DPR 4.9% higher than bulls in the lowest 10%. This difference corresponds to a difference in days open of 20 days (a 1% difference in DPR is equal to a 4 day difference in days open).

Although low heritability makes progress more challenging, reproduction can be improved through genetic selection. As shown in Figure 1, the continual decline in DPR from 1959 to 1995 was arrested in the latter 1990s and has been increasing since 2000. This increase is likely to have resulted from increased management attention to reproduction and the implementation of timed artificial insemination protocols.
Additionally, selection for Productive Life (first evaluated in 1994), which is highly related to reproduction, has likely contributed to recent improvements. Changes in sire and cow breeding value for DPR are shown in Figure 3. It is apparent that the long-term decline in genetic merit for fertility also stopped beginning in the mid-1990s and has since improved slightly.

![Figure 3](image.png)

**Figure 3.** Trends in the sire (●) and cow (○) breeding value for DPR as a function of birth year for US Holsteins. Data are from USDA-ARS Animal Improvement Programs Laboratory, March 2007 (available at http://aipl.arsusda.gov/ARSWeb/eval/summary/trend.cfm).

Alta Genetics, which markets bulls with high breeding values for DPR, has posted data on their website that support the idea that selection of bulls for DPR can affect cow fertility. In one dairy, fertility of two-year old daughters of Blastoff, the number one ranked Holstein bull for DPR, was compared to fertility of contemporary herd mates. As can be seen in Table 2, reproductive function in Blastoff daughters was much better than for contemporary controls. Caution should be used when interpreting these data – number of Blastoff daughters was low and data are not from an independently-conducted, controlled experiment.
Table 2. Reproductive performance of daughters sired by Blastoff as compared to contemporary controls in a Midwestern dairy.\textsuperscript{a}

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Conception rate (%)</th>
<th>Pregnancy rate (%)</th>
<th>Days open</th>
<th>Milk yield, 305-day mature equiv. (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blastoff daughters</td>
<td>58</td>
<td>51</td>
<td>29</td>
<td>94</td>
<td>23,398</td>
</tr>
<tr>
<td>Two-year old herd mates</td>
<td>755</td>
<td>30</td>
<td>16</td>
<td>120</td>
<td>22,836</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Data from Alta Genetics (http://www.altagenetics.com).

Improvements in DPR will pay off economically. De Vries (personal communication) has estimated that a 1-percentage unit increase in 21-day pregnancy rate is worth about $20/cow/year. The value is greater when pregnancy rates are low. The marginal return on 1 lb extra milk achieved by genetic selection is about $0.10/lbs. In other words, improving 21-day pregnancy rate by 1\% is equivalent economically to improving milk yield by 200 lb per cow per year.

Take Home Messages

- Dairy cattle fertility is determined largely by environmental factors but the genetic component should not be ignored.
- The decline in fertility in dairy cattle that has occurred in the last 50 years was caused in part by changes in genetic composition of dairy breeds.
- Crossbreeding can result in an improvement in fertility and longevity and a decrease in milk yield.
- The profitability of crossbreeding will vary from farm to farm; good estimates of the economic value of crossbreeding have not been made.
- A genetic evaluation tool for reproduction now exists in the form of Daughter Pregnancy Rate and one can expect that daughters of bulls with high Daughter Pregnancy Rates will be more fertile that contemporary herd mates.

Acknowledgements

The author is grateful to Ashley Sanders for editing the paper and providing useful input and to Albert De Vries for pointing out economic aspects of DPR.

References


The Direction of Milk Marketing: from r-BST-Free to the Future of Federal Orders

Mary Keough Ledman
Keough Ledman Associates, Inc.
Libertyville, IL
mkledman@msn.com

The Direction of Milk Marketing

Mary Keough Ledman
Keough Ledman Associates, Inc.
Libertyville, Illinois
mkledman@msn.com
847 680 9693

Outline

• Overview of U.S. and Regional Milk Production
• Future of Federal Orders
• Changing Milk Markets
U.S. Milk Production

- 2004: 170.9 Bil. Lbs., +0.3%
- 2005: 177.0 Bil. Lbs., +3.5%
- 2006: 181.8 Bil. Lbs., +2.8%

U.S. Milk Production Per Cow

- 2004: 18,967 lbs., +1.1%
- 2005: 18,585 lbs., +3.2%
- 2006: 19,951 lbs., +2.0%

Krough Leiman Associates, Inc.
Milk Production Per Cow
(23 selected states, 30-day months)

- Chg. vs. Feb. '06: +1.7%
- Chg. vs. Mar. '07: +0.4%
- YTD Avg: +0.3%

K. Leiman Associates, Inc.

Milk Cows
(23 selected states)

- Chg. vs. Feb. '07: +2.4%
- Chg. vs. Mar. '07: +0.9%
- YTD Avg: +0.9%

K. Leiman Associates, Inc.
Regional Supply

2006 U.S. Milk Production By Region and Percent of Total
Western Region
Monthly Milk Production

Southwestern Region
Monthly Milk Production

Krouth Lehman Associates, Inc.
The Future of Federal Orders
Federal Milk Marketing Orders

- Federal milk marketing orders were set up in 1937 to establish “orderly” marketing conditions for inter-state commerce, income parity for farmers, and to increase bargaining power of farmers.

- Federal Orders establish a market-average price according to the use of milk within the market

- Federal Orders audit processors to assure that producers are paid the regulated market-average prices
Federal Orders – The Outlook

- The Upper Midwest came close to voting out its order in December 2006.
- The Western Order was voted out in 2004.
- Outlook....

House Sub-Committee Hearing

- All dairy producers that spoke favored the F.O.
- Why wasn’t a producer from the Upper Midwest that voted “no” not on the panel?
- No one addressed the cost of the orders
Federal Orders - Background

- This is not a free market system
- This is a government closely controlled system ...so how can we make it more responsive

Producer Panel Priorities

- Decouple Class I from cheese (NE Producer)
- Set time line for decisions – several voiced
- Have just one order – WI suggestion
- Give Secretary ability to increase milk prices quickly
- Provide for greater interaction with USDA pre-hearing testimony
Processor Panel Priorities

- Improved dairy farmer safety net
- Revenue insurance and expanded forward contracting
- Blue Ribbon Commission to identify needed improvements in nation’s milk pricing system
- Repeal of dairy import assessment

Federal Order - Outlook

- Potential Use of the 2007 Farm Bill
Changing Milk Markets

Milk Segmentation

- Milk
- “Natural” or “Raw” Milk – non-pasteurized
- Organic Market
- “bST-Free”
Post bST Introduction

• In February 1994 FDA approved the use of bST.
  – This led to the introduction of bST-free milk
  – And, left conventional milk as that milk that may or may not come from comes treated with bST

Krough Liedman Associates, Inc.

Post bST Introduction

• For over a decade this was a non-issue
• Allocation period brought bST back into the media spot light
• Growth in Organics

Krough Liedman Associates, Inc.
**Organic Milk**

*National Dairy Leaders Conference*

*April 17, 2007*

---

**Triggers for Entry into Organic Food**

<table>
<thead>
<tr>
<th>Presence of children</th>
<th>Health conditions</th>
<th>Social influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy</td>
<td>Cancer</td>
<td>College</td>
</tr>
<tr>
<td>Birth of child</td>
<td>Allergies</td>
<td>Mom groups</td>
</tr>
</tbody>
</table>

*Note: Any Organic – not specific to dairy*
**Organic Milk Buyers – Who are They?**

- Consumer data shows...
  - In 2006, 4.9% of households purchased organic milk
  - Above average purchase:
    - Kid households
    - More highly educated
    - Above average incomes
    - Hispanics & Asians
    - Vegetarians

- Organic milk buyers describe themselves as...
  - Well-educated/well-read
  - Moms who care more
  - Knowledgeable in health and food
  - Quality conscious
  - Physically fit

---

**Less than ¼ of Consumers View Organic Milk as Healthier/Safer than Regular Milk**

<table>
<thead>
<tr>
<th></th>
<th>% Agree</th>
<th>Neutral</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic milk is healthier than regular milk</td>
<td>23.6%</td>
<td>39.5%</td>
<td>36.9%</td>
</tr>
<tr>
<td>Regular milk is just as pure, safe, &amp; delicious as organic milk</td>
<td>44.7%</td>
<td>35.3%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Source: DMI
Most Consumers do not Believe that there are Hormones, Antibiotics, or Pesticides in Regular Milk that Pose a Health Risk

```
I believe there are __ in regular milk that pose a health risk to my family

<table>
<thead>
<tr>
<th></th>
<th>% Agree</th>
<th>Neutral</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hormones</td>
<td>23.8%</td>
<td>29.6%</td>
<td>46.5%</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>20.9%</td>
<td>30.1%</td>
<td>48.8%</td>
</tr>
<tr>
<td>Pesticides</td>
<td>17.3%</td>
<td>30.7%</td>
<td>52.0%</td>
</tr>
</tbody>
</table>
```

Source: (10)

Organic Milk Share of Market Remains Small

```
MM Gallons

<table>
<thead>
<tr>
<th>Year</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>30.1</td>
</tr>
<tr>
<td>2003</td>
<td>37.0</td>
</tr>
<tr>
<td>2004</td>
<td>46.7</td>
</tr>
<tr>
<td>2005</td>
<td>63.8</td>
</tr>
<tr>
<td>2006</td>
<td>79.3</td>
</tr>
</tbody>
</table>

Q1 2007
- 23% growth
- 2.3% share

Sources: (11) Organic milk share is a share of the total liquid milk sales

Share refers to share of total fluid milk share
```
The West, California, & the Northeast are Strong Regions for Organic Milk

% of Population vs % Organic Milk Volume

Factors Driving Organic Milk Gains:
Distribution, # Items, Increased Sales per Store

In Q1 ’07, 12 organic milk items on average per store - double that of Q1 ’02
“Natural” & “Organic” Positioning Claims Continue to Generate Interest

<table>
<thead>
<tr>
<th>Year</th>
<th>Natural</th>
<th>Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>923</td>
<td>1,506</td>
</tr>
<tr>
<td>2003</td>
<td>2,127</td>
<td>2,159</td>
</tr>
<tr>
<td>2004</td>
<td>1,688</td>
<td>1,228</td>
</tr>
<tr>
<td>2005</td>
<td>740</td>
<td>1,337</td>
</tr>
<tr>
<td>2006</td>
<td>1,065</td>
<td>1,620</td>
</tr>
</tbody>
</table>

Summary

- Shoppers' interest in organic foods is steadily growing and organic milk sales are on the rise
- While organic holds a small share of fluid at 2%, we expect it to grow in the near term
- As rbST-free milk continues to advance in the marketplace, we expect that it will pull buyers from both organic & conventional
Employee Management for Producing Results on Your Dairy

Jorge Estrada
Leadership Coaching International, Inc.
Graham, WA
j.estrada@rmi.net

Employee Management for Producing Results on Your Dairy

Florida Dairy Production Conference
Gainesville, FL
May 1, 2007

Jorge M. Estrada
Leadership Coaching International, Inc.
j.estrada@rmi.net
(360) 481-0133

Recruitment and Selection
5 Steps to Recruiting and Selecting

1. Consider the needs of the position and the business
2. Build an applicant pool
3. Evaluate the applicants
4. Make a selection
5. Hire and train

HRM Practices that create organizational commitment

- **AFFECTIVE COMMITMENT**
  - Level of off farm training
  - Adequacy of initial training
  - Adequacy of continuing training
  - Satisfaction with training
  - Informal feedback was provided
  - Satisfaction with feedback
  - Employee participation
  - Satisfaction with performance reviews

- **NORMATIVE COMMITMENT**
  - Adequacy of initial training
  - Adequacy of continuing training
  - Satisfaction with training
  - Informal feedback was provided
  - Satisfaction with feedback
  - Employee participation
  - Satisfaction with performance reviews

Source: Rich Stup, HRM and Dairy Employee Organizational Commitment, 2006
Why is it so hard to manage people?

- They don’t do it the way I do it
- They don’t push the hours I do
- They ought to know what I am thinking

Tell Them Where You Are Heading
Have a Vision of where you want to go and tell them

- Give 'em the big picture
- Formulate a concise vision, strong pull
- Engages people
- Communicate it (leaders under-communicate 10:1)
- The clearer it is to you, the easier to convey it and enroll people into following you
- EXAMPLE: “The State Largest and Most Productive Dairy”

Managers Attitude, Leadership and Management
Your Management Style Affects Your Employee Performance

- Your attitude affects ALL your people
- Self-awareness, body language, EQ
- How do you get feedback on what kind of manager you are?
- If they don’t know, they will make it up!
- Tools: self assessments, 360° feedback

Respect & Trust
Respect and Trust

- The most important qualities of top Ag employers
- Respect who people are, where they come from, what they bring to the table - appreciating differences
- Showing our appreciation
- Make their opinion and ideas count – enroll them
- Trust - everyone treats it differently
give trust earn trust
trust openly don’t trust

Who do you trust/not trust?
Who do you need to trust?
How do you build trust?

The Organization of Work
Organize the dairy

- Institute an organizational structure
- Establish departments/processes by function
- Setting objectives and goals - records
- Processes and SOP’s – understanding flow
- Who is my “go-to-person”

Establish boundaries, rules, discipline

- Does the dairy have general rules and policies, and are they enforced?
- Does the dairy have a disciplinary system or process? And is it enforced?
- Don’t let this be the driver or you demotivate people.
- Let the driver be SOP’s and expectations you set on people.
Effective Communications

Effective Communication

- # 1 challenge — the language barrier (excuse)
- Hidden aspects — non-verbal communication
- Speaking a foreign language, large barrier
  www.rosettastone.com
- Create a culture of open communication
- Build relationships based on respect & trust
- Encourage people to come to you
- Listen to their concerns and help address them
- Group mtgs./one-on-one mtgs
Habit 5
“Seek First to Understand, Then to Be Understood”

Stephen R. Covey – The 7 Habits of Highly Effective People.

Tell People What is Expected of Them and Measure It
Set Expectations, Measure Performance

- They can’t guess what you expect
- Set clear expectations, repeat, review
- Clarify job responsibilities
- Expectations align with goals, procedures
- What expectations do I have of myself/others?
- People perform better when they know performance is being measured and reported
- Balanced Score Card (KPI’s)

Provide Training
Expand Their Skills
Provide Training
Expand Their Skills

- I don’t like to train them because then they leave
  - What if you don’t train them and they stay?
- What do they need to learn? What tools do they need to perform effectively?
- The cost of not training – Treating animals with wrong medication, killing an animal
- Frequency, procedural drift
- Performance improvements (feed efficiency)

Set Goals
Measure Performance
Providing Feedback
Tell People How They Are Doing – Provide Feedback

- Feedback mechanisms, intricate part of people systems
- What people don’t know, they will make up!
- 3 problems with feedback
  a) it is not given, people hesitant to do it
  b) if given, it is mostly seen/given as negative
  c) people have no knowledge, effective process for giving it
- Always try to catch people doing something right!

A Simple Approach for Giving Feedback

a. Tell people what to do
b. Show them what to do
c. Let people try, get out of the way)
d. Observe performance
e. Provide feedback
   praise progress
   redirect

Focus the feedback on a specific, single occurrence observed, the behavior, don’t focus or hammer the person.
Is the workforce allowed to work legally in the U.S.?

- Immigration laws changing as we speak
- Have all your paperwork ready
- Research and learn ways to help employees
- Talk to your state representatives
- The Agricultural, Jobs, Opportunity, Benefits and Security Act of 2003 (AgJOBS)
  Title I: allow them to become legal
  Title II: reform the H2A program

Motivating Employees
Motivating Your Multi-cultural workforce

- Perform better when:
  a. They know what is expected of them
  b. They know how they are doing
  c. They don’t have barriers to perform

- The power of “Por Favor” and “Muchas Gracias”

- Sense of Achievement

- Match their abilities to their responsibilities
  “For purposes of self-motivation, nothing is more powerful than the desire to demonstrate your talents.” - Counselor and author Richard Leider

- Opportunity for advancement and personal growth

Social gathering
and
Team development
Fair Pay

- Current pay structures - clarify
- What pay for the value they offer
- Communicate economic challenges
- Money as incentive
- Pay is rarely # 1
- If $$$ is a complaint, usually other issues are behind

---

Most common answers to the question, what keeps you in your job?

- Exciting work, challenge
- Career growth, learning & dev
- Autonomy, creativity
- Fair pay
- Good boss
- Recognition, valued, respect
- Benefits
- Meaningful, make a difference
- Pride in business, mission, product
- Great work environment, culture
- Flexibility: work hours, dress
- Great people
- Job security & stability
- Location
- Diverse, changing work
- Fun
- Being part of a team
- Responsibility
- Loyalty & commitment
- Comfort on the job

Summary

- The future of the dairy industry hinges on how well we can lead, organize and motivate our people for them to be effective.
- Develop yourself as a multi-cultural workforce manager – learn more about the culture differences.
- Develop a strategy for the organization of people, and tactics for development of employees.
- Develop yourself in leadership and people management abilities.

Thank You!

Muchas Gracias!

Jorge M. Estrada
Leadership Coaching International, Inc.
j.estrada@rmi.net
(360) 481-0133
Employee Management: Producer Panel

Moderator: Steven Larson
Participants: Don Bennink, Jorge Estrada, John Gilliland, Ron St. John

Notes
# 2005 Dairy Business Analysis Project Financial Summary

Russ Giesy, University of Florida, (352) 793-2728, giesyr@aol.com  
Lane Ely, The University of Georgia, (706) 542-9107, laneely@arches.uga.edu  
Albert De Vries, University of Florida, (352) 392-5594, devries@ufl.edu

Full report on the DBAP website: http://dairy.ifas.ufl.edu/dbap

Table 1. DBAP 2005 Summary - Business size and production efficiency by state and overall average, median, and standard deviation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>State Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Median</td>
</tr>
<tr>
<td>Number of farms</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td><strong>Business Size:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average number of cows</td>
<td>1,045</td>
<td>575</td>
</tr>
<tr>
<td>Average number of heifers</td>
<td>538</td>
<td>290</td>
</tr>
<tr>
<td>Milk sold (million lbs)</td>
<td>20.21</td>
<td>10.99</td>
</tr>
<tr>
<td>FTE² workers</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Acres of pasture + cultivated land</td>
<td>569</td>
<td>320</td>
</tr>
<tr>
<td><strong>Production Efficiency:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk sold (lbs / cow / year)</td>
<td>18,322</td>
<td>18,168</td>
</tr>
<tr>
<td>Cows / FTE worker</td>
<td>51</td>
<td>52</td>
</tr>
<tr>
<td>Milk sold / FTE worker (million lbs)</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>Cull rate</td>
<td>36%</td>
<td>32%</td>
</tr>
</tbody>
</table>

¹ Standard deviation  
² Full-time equivalent
Table 2. DBAP 2005 Summary - Revenues and expenses by state and overall average, median, and standard deviation ($/cwt).

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>State Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Median</td>
</tr>
<tr>
<td>Number of farms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk sold</td>
<td>18.24</td>
<td>18.28</td>
</tr>
<tr>
<td>Raised, leased cow sales</td>
<td>0.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Heifer sales</td>
<td>0.45</td>
<td>0.36</td>
</tr>
<tr>
<td>Gain on purchased livestock sales</td>
<td>(0.13)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Other revenues</td>
<td>1.28</td>
<td>0.78</td>
</tr>
<tr>
<td>Total revenues</td>
<td>20.73</td>
<td>20.24</td>
</tr>
<tr>
<td>Personnel</td>
<td>3.50</td>
<td>3.08</td>
</tr>
<tr>
<td>Purchased feed</td>
<td>7.22</td>
<td>6.81</td>
</tr>
<tr>
<td>Crops</td>
<td>0.41</td>
<td>0.13</td>
</tr>
<tr>
<td>Machinery</td>
<td>1.11</td>
<td>1.00</td>
</tr>
<tr>
<td>Livestock</td>
<td>2.01</td>
<td>1.92</td>
</tr>
<tr>
<td>Milk marketing</td>
<td>1.22</td>
<td>1.30</td>
</tr>
<tr>
<td>Buildings and land</td>
<td>0.74</td>
<td>0.44</td>
</tr>
<tr>
<td>Interest</td>
<td>0.67</td>
<td>0.56</td>
</tr>
<tr>
<td>Depreciation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>1.11</td>
<td>0.97</td>
</tr>
<tr>
<td>Machinery</td>
<td>0.81</td>
<td>0.40</td>
</tr>
<tr>
<td>Buildings</td>
<td>0.39</td>
<td>0.25</td>
</tr>
<tr>
<td>Other expenses</td>
<td>1.01</td>
<td>1.03</td>
</tr>
<tr>
<td>Total expenses</td>
<td>20.20</td>
<td>18.73</td>
</tr>
<tr>
<td>Net farm income from operations</td>
<td>0.53</td>
<td>0.84</td>
</tr>
<tr>
<td>Gain on sale of capital assets</td>
<td>(0.46)</td>
<td>0.00</td>
</tr>
<tr>
<td>Net farm income</td>
<td>0.07</td>
<td>0.84</td>
</tr>
</tbody>
</table>

¹ Standard deviation
### 2006 Southeast DHIA Production Recognition of High Florida Herds
Production as of September 30, 2006

<table>
<thead>
<tr>
<th>Producer</th>
<th>City</th>
<th>BRD</th>
<th>Milkings</th>
<th>RHA Milk</th>
<th>RHA Fat</th>
<th>RHA Protein</th>
<th>Data Collection Rating</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHITE OAK DAIRY</td>
<td>Mayo</td>
<td>H</td>
<td>24,323</td>
<td>24,196</td>
<td>847</td>
<td>720</td>
<td></td>
<td>94.9</td>
</tr>
<tr>
<td>NORTH FLA HOLSTEINS</td>
<td>Bell</td>
<td>H</td>
<td>3X</td>
<td>23,475</td>
<td>991</td>
<td>697</td>
<td></td>
<td>74.6</td>
</tr>
<tr>
<td>ELJIM DAIRY</td>
<td>Grandin</td>
<td>H</td>
<td>22,755</td>
<td>21,519</td>
<td>852</td>
<td>687</td>
<td></td>
<td>96.7</td>
</tr>
<tr>
<td>SHENANDOAH DAIRY</td>
<td>Live Oak</td>
<td>H</td>
<td>21,274</td>
<td>21,264</td>
<td>727</td>
<td>644</td>
<td></td>
<td>94.0</td>
</tr>
<tr>
<td>ATR DAIRY</td>
<td>Mayo</td>
<td>H</td>
<td>20,477</td>
<td>20,526</td>
<td>741</td>
<td>624</td>
<td></td>
<td>96.6</td>
</tr>
<tr>
<td>SHIVER DAIRY</td>
<td>Mayo</td>
<td>H</td>
<td>20,467</td>
<td>20,483</td>
<td>712</td>
<td>620</td>
<td></td>
<td>96.6</td>
</tr>
<tr>
<td>FULL CIRCLE DAIRY LLC</td>
<td>Umatilla</td>
<td>H</td>
<td>20,067</td>
<td>20,060</td>
<td>779</td>
<td>629</td>
<td></td>
<td>95.1</td>
</tr>
<tr>
<td>HAYMURPH FARM LLC</td>
<td>Live Oak</td>
<td>H</td>
<td>20,067</td>
<td>20,060</td>
<td>779</td>
<td>629</td>
<td></td>
<td>95.1</td>
</tr>
<tr>
<td>MILK-A-WAY</td>
<td>Webster</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>UNIV FLA DAIRY RESEARCH</td>
<td>Hague</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>V &amp; W FARMS INC</td>
<td>Avon Park</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>DPS GEORGIA</td>
<td>Baconton</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>DPS BELL FARM</td>
<td>Bell</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>BRIAN MCADAMS</td>
<td>Mayo</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>EICHER DAIRY</td>
<td>Walnut Hill</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>SUWANNEE DAIRY INC</td>
<td>Mc Alpin</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>DPS BRANFORD FARM</td>
<td>Branford</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>BRANTLEY DAIRY FARM INC</td>
<td>Mc Alpin</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
<tr>
<td>WALKER &amp; SONS FARMS INC II</td>
<td>Monticello</td>
<td>H</td>
<td>20,000</td>
<td>20,000</td>
<td>696</td>
<td>617</td>
<td></td>
<td>98.1</td>
</tr>
</tbody>
</table>

Southeast DHIA - Testing cows in Florida and Georgia
# 2006 Southeast DHIA Breed Comparisons for Southeast States

Results as of October, 2006

<table>
<thead>
<tr>
<th></th>
<th>DRMS Holstein</th>
<th>Southeast Holstein</th>
<th>Southeast Jersey</th>
<th>Southeast Other Breeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Herds</td>
<td>11908</td>
<td>421</td>
<td>59</td>
<td>52</td>
</tr>
<tr>
<td>No. Cows / Herd</td>
<td>139</td>
<td>297</td>
<td>156</td>
<td>183</td>
</tr>
<tr>
<td>No. 1st Lact</td>
<td>51</td>
<td>107</td>
<td>55</td>
<td>63</td>
</tr>
<tr>
<td>% 1st Lactation</td>
<td>37%</td>
<td>36%</td>
<td>35%</td>
<td>34%</td>
</tr>
<tr>
<td>Avg Days in Milk</td>
<td>192</td>
<td>207</td>
<td>180</td>
<td>195</td>
</tr>
<tr>
<td>% Left Herd</td>
<td>33</td>
<td>35</td>
<td>36</td>
<td>39</td>
</tr>
<tr>
<td>% Died</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>% Left Repro</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Rolling HA Milk</td>
<td>20,925</td>
<td>18,892</td>
<td>14,384</td>
<td>16,733</td>
</tr>
<tr>
<td>Rolling HA Fat</td>
<td>777</td>
<td>686</td>
<td>646</td>
<td>640</td>
</tr>
<tr>
<td>Rolling HA Prot</td>
<td>638</td>
<td>576</td>
<td>508</td>
<td>535</td>
</tr>
<tr>
<td>Summit Milk 1st Lac</td>
<td>69</td>
<td>65</td>
<td>47</td>
<td>58</td>
</tr>
<tr>
<td>Summit Milk 3rd+</td>
<td>91</td>
<td>85</td>
<td>64</td>
<td>76</td>
</tr>
<tr>
<td>Peak Milk 1st Lac</td>
<td>76</td>
<td>72</td>
<td>53</td>
<td>63</td>
</tr>
<tr>
<td>Peak Milk 3rd+</td>
<td>100</td>
<td>95</td>
<td>71</td>
<td>83</td>
</tr>
<tr>
<td>Proj 305ME Milk</td>
<td>22,954</td>
<td>21,418</td>
<td>16,216</td>
<td>19,242</td>
</tr>
<tr>
<td>Std 150-day Milk</td>
<td>70</td>
<td>66</td>
<td>50</td>
<td>59</td>
</tr>
<tr>
<td>SCC Actual</td>
<td>350</td>
<td>477</td>
<td>445</td>
<td>534</td>
</tr>
<tr>
<td>SCC Score</td>
<td>3.1</td>
<td>3.7</td>
<td>3.7</td>
<td>3.9</td>
</tr>
<tr>
<td>SCC Score 1st Lact</td>
<td>2.7</td>
<td>3.3</td>
<td>3.4</td>
<td>3.5</td>
</tr>
<tr>
<td>SCC Score 2nd Lact</td>
<td>3.0</td>
<td>3.5</td>
<td>3.4</td>
<td>3.7</td>
</tr>
<tr>
<td>SCC Score 3rd Lact</td>
<td>3.6</td>
<td>4.2</td>
<td>4.1</td>
<td>4.4</td>
</tr>
<tr>
<td>% SCC Score &lt;4</td>
<td>59</td>
<td>48</td>
<td>47</td>
<td>42</td>
</tr>
<tr>
<td>PregRate Current mo</td>
<td>10</td>
<td>13</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Actual Calving Int</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Days to 1st Serv</td>
<td>97</td>
<td>108</td>
<td>95</td>
<td>98</td>
</tr>
<tr>
<td>1st Serv Conce Rate</td>
<td>42</td>
<td>49</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td># Calvings</td>
<td>139</td>
<td>286</td>
<td>156</td>
<td>181</td>
</tr>
<tr>
<td># Calves per 100 cows</td>
<td>100</td>
<td>96</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>%Dry &lt; 40 days</td>
<td>16</td>
<td>14</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>%Dry &gt; 70 days</td>
<td>23</td>
<td>31</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>%Bred to Proven bulls</td>
<td>63</td>
<td>64</td>
<td>64</td>
<td>56</td>
</tr>
<tr>
<td>%Bred to non-AI</td>
<td>23</td>
<td>37</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td>%Heifers with Sire ID</td>
<td>85</td>
<td>76</td>
<td>89</td>
<td>80</td>
</tr>
<tr>
<td>%Cows with Sire ID</td>
<td>68</td>
<td>49</td>
<td>90</td>
<td>54</td>
</tr>
</tbody>
</table>

Southeast - includes 6 southeastern states
DRMS - includes all herds processed by DRMS
2006 Southeast DHIA Data for Southeast Herds
Data from DRMS - October, 2006

<table>
<thead>
<tr>
<th>Holstein Herds</th>
<th>Alabama</th>
<th>Florida</th>
<th>Georgia</th>
<th>Miss</th>
<th>SC</th>
<th>Tenn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Herds</td>
<td>19</td>
<td>63</td>
<td>146</td>
<td>27</td>
<td>36</td>
<td>130</td>
</tr>
<tr>
<td>No. Cows / Herd</td>
<td>155</td>
<td>793</td>
<td>262</td>
<td>238</td>
<td>232</td>
<td>148</td>
</tr>
<tr>
<td>No. 1st Lact</td>
<td>51</td>
<td>273</td>
<td>98</td>
<td>95</td>
<td>89</td>
<td>53</td>
</tr>
<tr>
<td>% 1st Lactation</td>
<td>33%</td>
<td>34%</td>
<td>37%</td>
<td>40%</td>
<td>38%</td>
<td>36%</td>
</tr>
<tr>
<td>Avg Days in Milk</td>
<td>192</td>
<td>208</td>
<td>208</td>
<td>211</td>
<td>207</td>
<td>206</td>
</tr>
<tr>
<td>% Left Herd</td>
<td>35</td>
<td>37</td>
<td>34</td>
<td>31</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>% Died</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>% Left Repro</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Milk Price</td>
<td>13.84</td>
<td>15.64</td>
<td>15.13</td>
<td>13.45</td>
<td>13.78</td>
<td>13.78</td>
</tr>
<tr>
<td>Rolling HA Milk</td>
<td>17,120</td>
<td>18,158</td>
<td>18,770</td>
<td>19,667</td>
<td>20,378</td>
<td>19,043</td>
</tr>
<tr>
<td>Rolling HA Fat</td>
<td>555</td>
<td>641</td>
<td>672</td>
<td>700</td>
<td>742</td>
<td>706</td>
</tr>
<tr>
<td>Rolling HA Prot</td>
<td>516</td>
<td>547</td>
<td>572</td>
<td>594</td>
<td>629</td>
<td>576</td>
</tr>
<tr>
<td>Summit Milk 1st Lac</td>
<td>60</td>
<td>65</td>
<td>65</td>
<td>67</td>
<td>68</td>
<td>65</td>
</tr>
<tr>
<td>Summit Milk 3rd+</td>
<td>77</td>
<td>83</td>
<td>84</td>
<td>89</td>
<td>92</td>
<td>85</td>
</tr>
<tr>
<td>Peak Milk 1st Lac</td>
<td>67</td>
<td>73</td>
<td>72</td>
<td>74</td>
<td>75</td>
<td>72</td>
</tr>
<tr>
<td>Peak Milk 3rd+</td>
<td>89</td>
<td>94</td>
<td>94</td>
<td>99</td>
<td>102</td>
<td>95</td>
</tr>
<tr>
<td>Proj 305ME Milk</td>
<td>19,444</td>
<td>20,687</td>
<td>21,262</td>
<td>22,124</td>
<td>22,999</td>
<td>21,621</td>
</tr>
<tr>
<td>Std 150-day Milk</td>
<td>60</td>
<td>64</td>
<td>66</td>
<td>66</td>
<td>69</td>
<td>67</td>
</tr>
<tr>
<td>SCC Actual</td>
<td>502</td>
<td>550</td>
<td>468</td>
<td>487</td>
<td>419</td>
<td>481</td>
</tr>
<tr>
<td>SCC Score</td>
<td>3.7</td>
<td>3.9</td>
<td>3.7</td>
<td>3.6</td>
<td>3.8</td>
<td>3.6</td>
</tr>
<tr>
<td>SCC Score 1st Lact</td>
<td>3.1</td>
<td>3.6</td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
<td>3.2</td>
</tr>
<tr>
<td>SCC Score 2nd Lact</td>
<td>3.6</td>
<td>3.7</td>
<td>3.6</td>
<td>3.7</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>SCC Score 3rd Lact</td>
<td>4.1</td>
<td>4.4</td>
<td>4.2</td>
<td>4.2</td>
<td>4.2</td>
<td>4.1</td>
</tr>
<tr>
<td>% SCC Score &lt;4</td>
<td>46</td>
<td>43</td>
<td>47</td>
<td>48</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>PregRate Current</td>
<td>14</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Actual Calving Int</td>
<td>16</td>
<td>14</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Days to 1st Serv</td>
<td>109</td>
<td>114</td>
<td>109</td>
<td>99</td>
<td>99</td>
<td>107</td>
</tr>
<tr>
<td>1st Serv Concep Rate</td>
<td>40</td>
<td>55</td>
<td>51</td>
<td>42</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td># Calvings</td>
<td>157</td>
<td>775</td>
<td>245</td>
<td>227</td>
<td>233</td>
<td>140</td>
</tr>
<tr>
<td># Calves per 100 cows</td>
<td>101</td>
<td>98</td>
<td>94</td>
<td>95</td>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>%Dry &lt; 40 days</td>
<td>18</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>%Dry &gt; 70 days</td>
<td>29</td>
<td>34</td>
<td>30</td>
<td>26</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>%Bred to Proven bulls</td>
<td>66</td>
<td>56</td>
<td>68</td>
<td>68</td>
<td>57</td>
<td>64</td>
</tr>
<tr>
<td>%Bred to non-AI</td>
<td>27</td>
<td>44</td>
<td>32</td>
<td>27</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>%Heifers with Sire ID</td>
<td>73</td>
<td>62</td>
<td>76</td>
<td>70</td>
<td>88</td>
<td>81</td>
</tr>
<tr>
<td>%Cows with Sire ID</td>
<td>44</td>
<td>25</td>
<td>46</td>
<td>58</td>
<td>66</td>
<td>59</td>
</tr>
</tbody>
</table>
### 2006 Southeast DHIA Comparison of Southeast Herds to DRMS Herds

<table>
<thead>
<tr>
<th>All Breeds</th>
<th>2005 Southeast</th>
<th>2006 Southeast</th>
<th>2005 DRMS**</th>
<th>2006 DRMS**</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Herds</td>
<td>577</td>
<td>533</td>
<td>13,774</td>
<td>13,693</td>
</tr>
<tr>
<td>No. Cows / Herd</td>
<td>261</td>
<td>270</td>
<td>133</td>
<td>135</td>
</tr>
<tr>
<td>No. 1st Lact</td>
<td>97</td>
<td>97</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>% 1st Lactitation</td>
<td>37%</td>
<td>36%</td>
<td>35%</td>
<td>36%</td>
</tr>
<tr>
<td>Avg Days in Milk</td>
<td>206</td>
<td>203</td>
<td>193</td>
<td>191</td>
</tr>
<tr>
<td>% Left Herd</td>
<td>34</td>
<td>35</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>% Died</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>% Left Repro</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Milk Price</td>
<td>16.39</td>
<td>14.50</td>
<td>15.23</td>
<td>12.74</td>
</tr>
<tr>
<td>Rolling HA Milk</td>
<td>18,083</td>
<td>18,168</td>
<td>20,090</td>
<td>20,311</td>
</tr>
<tr>
<td>Rolling HA Fat</td>
<td>671</td>
<td>675</td>
<td>746</td>
<td>763</td>
</tr>
<tr>
<td>Rolling HA Prot</td>
<td>561</td>
<td>562</td>
<td>616</td>
<td>624</td>
</tr>
<tr>
<td>Summit Milk 1st Lac</td>
<td>61</td>
<td>62</td>
<td>66</td>
<td>67</td>
</tr>
<tr>
<td>Summit Milk 3rd+</td>
<td>80</td>
<td>82</td>
<td>87</td>
<td>88</td>
</tr>
<tr>
<td>Peak Milk 1st Lac</td>
<td>68</td>
<td>69</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>Peak Milk 3rd+</td>
<td>89</td>
<td>91</td>
<td>96</td>
<td>97</td>
</tr>
<tr>
<td>Proj 305ME Milk</td>
<td>20,160</td>
<td>20,613</td>
<td>22,049</td>
<td>22,264</td>
</tr>
<tr>
<td>Std 150-day Milk</td>
<td>61</td>
<td>63</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>SCC Actual</td>
<td>496</td>
<td>478</td>
<td>366</td>
<td>350</td>
</tr>
<tr>
<td>SCC Score</td>
<td>3.6</td>
<td>3.7</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td>SCC Score 1st Lact</td>
<td>3.2</td>
<td>3.3</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>SCC Score 2nd Lact</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>SCC Score 3rd Lact</td>
<td>4.1</td>
<td>4.2</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>% SCC Score &lt;4</td>
<td>49</td>
<td>47</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>PregRate Current</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Actual Calving Int</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Days to 1st Serv</td>
<td>103</td>
<td>105</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>1st Serv Concep Rate</td>
<td>47</td>
<td>48</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td># Calvings</td>
<td>253</td>
<td>261</td>
<td>134</td>
<td>135</td>
</tr>
<tr>
<td># Calves per 100 cows</td>
<td>97</td>
<td>97</td>
<td>101</td>
<td>100</td>
</tr>
<tr>
<td>%Dry &lt; 40 days</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>%Dry &gt; 70 days</td>
<td>31</td>
<td>30</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>%Bred to Proven bulls</td>
<td>65</td>
<td>63</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>%Bred to non-Al</td>
<td>34</td>
<td>35</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>%Heifers with Sire ID</td>
<td>77</td>
<td>78</td>
<td>84</td>
<td>85</td>
</tr>
<tr>
<td>%Cows with Sire ID</td>
<td>53</td>
<td>54</td>
<td>69</td>
<td>69</td>
</tr>
</tbody>
</table>

* Southeast - includes 6 southeastern states
** DRMS - includes all herds processed by DRMS
### 2006 Florida DHIA Herd Performance Averages

**September 30, 2006**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Cows</td>
<td>55,648</td>
<td>33,488</td>
<td>56,366</td>
<td>57,510</td>
<td>54,375</td>
<td>54,978</td>
</tr>
<tr>
<td>No. Herds</td>
<td>122</td>
<td>52</td>
<td>92</td>
<td>82</td>
<td>71</td>
<td>66</td>
</tr>
<tr>
<td>Average Herd Size</td>
<td>456</td>
<td>644</td>
<td>613</td>
<td>698</td>
<td>766</td>
<td>833</td>
</tr>
<tr>
<td>% Days in Milk</td>
<td>86</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>86</td>
<td>85</td>
</tr>
<tr>
<td>Pounds of Milk</td>
<td>17,761</td>
<td>18,661</td>
<td>18,160</td>
<td>18,307</td>
<td>18,987</td>
<td>18,835</td>
</tr>
<tr>
<td>Peak Milk - 1st Calf (lbs./day)</td>
<td>67</td>
<td>69</td>
<td>70</td>
<td>68</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Peak Milk - 2nd &amp; Later (lbs./day)</td>
<td>88</td>
<td>87</td>
<td>88</td>
<td>87</td>
<td>85</td>
<td>91</td>
</tr>
<tr>
<td>Fat %</td>
<td>3.5</td>
<td>3.6</td>
<td>3.8</td>
<td>4</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Pounds of Fat</td>
<td>622</td>
<td>672</td>
<td>683</td>
<td>672</td>
<td>716</td>
<td>687</td>
</tr>
<tr>
<td>Pounds of Protein</td>
<td>592</td>
<td>593</td>
<td>541</td>
<td>546</td>
<td>577</td>
<td>546</td>
</tr>
<tr>
<td>Value of Milk ($)</td>
<td>2,658</td>
<td>3,048</td>
<td>2,579</td>
<td>3,210</td>
<td>3,211</td>
<td>2,982</td>
</tr>
<tr>
<td>Projected Minimum Calving Interval</td>
<td>14.1</td>
<td>15.7</td>
<td>16</td>
<td>15.6</td>
<td>15.5</td>
<td>15.7</td>
</tr>
<tr>
<td>Days Dry</td>
<td>69</td>
<td>74</td>
<td>78</td>
<td>77</td>
<td>75</td>
<td>72</td>
</tr>
<tr>
<td>% Cows Dry &gt; 70 Days</td>
<td>19</td>
<td>21</td>
<td>37</td>
<td>36</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Days to 1st Breeding</td>
<td>77</td>
<td>97</td>
<td>107</td>
<td>106</td>
<td>112</td>
<td>110</td>
</tr>
<tr>
<td>Days Open</td>
<td>148</td>
<td>197</td>
<td>197</td>
<td>192</td>
<td>193</td>
<td>196</td>
</tr>
<tr>
<td>% cows Open &gt; 100 at 1st Breeding</td>
<td>14</td>
<td>34</td>
<td>33</td>
<td>28</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>No. Breedings per Conception</td>
<td>4.0</td>
<td>3.5</td>
<td>3</td>
<td>3</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>% Possible Breeding Serviced</td>
<td>52</td>
<td>26</td>
<td>26</td>
<td>25</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Age at 1st Calving (months)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Age - All Cows (months)</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>43</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>% With Sire Identity</td>
<td>34</td>
<td>33</td>
<td>23</td>
<td>25</td>
<td>29</td>
<td>35</td>
</tr>
<tr>
<td>Average PTA$ Sires</td>
<td>151</td>
<td>147</td>
<td>86</td>
<td>149</td>
<td>98</td>
<td>119</td>
</tr>
<tr>
<td>Average PTA$ Service Sires</td>
<td>210</td>
<td>298</td>
<td>344</td>
<td>354</td>
<td>239</td>
<td>304</td>
</tr>
<tr>
<td>% Left Herd</td>
<td>40</td>
<td>33</td>
<td>39</td>
<td>33</td>
<td>31</td>
<td>34</td>
</tr>
</tbody>
</table>

---

* September 30, of the respective year
** Cows in herds on official types of test (01 - 34)
*** Cows in herds on all types of test (01-74)
Southeast Milk, Inc. Dairy Check-Off Program: Project Summaries
Active and Recently Completed Projects as of July 7, 2006

Project # 240
Title: Nutrient Handling Systems on Florida Dairies.  R. Giesy

See summary report from 2005.  Project is considered 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 2004 DBAP data has been added to the database. A DHIA data set with records from 1990 through 2004 was obtained from DRMS in Raleigh, NC. Analysis is on-going.

Project # 275
Title: Construction of a Rotational Shade Circle for Livestock on Pasture or Outside Lots.  K. Bachman

Increased awareness of hurricanes factored into the limited progress that has been made in the construction of the shade structure. Optimistic that labor can be focused on the construction of the prototype as planned. This project remains ongoing.

Project # 289
Title: Efficacy of a New Vaccine to Prevent Abortion in Dairy Heifers Naturally Infected with Neospora caninum.  J. Hernandez

No summary report submitted.

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. Papers are available on http://www.animal.ufl.edu/devries/publications.html and results have been presented in meetings around Florida. A user-friendly version of the program will be finished in the summer of 2006 and available on http://dairy.ifas.ufl.edu. 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

No summary report submitted.

**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. avium subspec paratuberculosis (MAP)* in infected cattle, by sub iliac 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 sub iliac lymph node biopsy techniques for early detection of Johne’s disease.  

Procedures: About 150 cattle will be utilized (84 animal samples have been processed at present, others are pending). 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 study number, age, sex, breed, and evaluated by weight, body condition scores, and previous results of Johne’s ELISA tests. Blood is collected for ELISA. A 100 gm fecal sample is cultured for *MAP*. 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 (Ziehl Neelson) for microscopic evaluation. The remainder of the lymph node is placed in formalin for later histopathological evaluation.

<table>
<thead>
<tr>
<th>ELISA test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymph node</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>Pending</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Tentative results: The causative organism *MAP* has not been detected in peripheral lymph nodes of the 67 animals thus far evaluated. In 8 of 19 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 # 332**  
**Title:** Thin Soles in Dairy Cattle. Investigation of Factors Affecting Sole Wear.  
S. Van Amstel

The purpose of the claw capsule (horny shoe of the hoof) is to protect the underlying sensitive tissues which contain the vascular supply and nerves of the corium (horn-forming connective tissue including the digital cushion). As dairies expand their facilities to accommodate a larger numbers of animals the need for cows to walk longer distances on concrete flooring surfaces becomes inevitable. Concrete, and particularly wet concrete, can be a very abrasive surface leading to rapid wear of the soles of cows’ claws. As a consequence, excessive wear and thinning of the soles of cows has become a major cause of lameness in herds throughout the United States. Our work to date suggests that there are several factors that may predispose to the problem of thin soles including: 1) the abrasiveness of flooring surfaces, 2) distance cows walk, 3) moisture content of claw horn, 4) stage of lactation, 5) parity, 6) type
of bedding (sand may increase claw wear rates, and recycled sand which is coarser may accelerate wear rates), 7) seasonality (incident seems to be higher during summer months), 8) size and/or weight of the cow, 9) effect of laminitis on quality of claw horn (particularly the horn cell keratinization rate and horn hardness), and 10) poor cow comfort, with respect to design and use of stalls which affects lying or resting time. In November of 2006 we will be presenting results of our studies from 2 large dairies affected with thin soles at the International Symposium on Lameness in Ruminants in Uruguay (see below publications #5 and #6). In one of the studies to be presented, preliminary observations indicate that thin soles accounted for nearly 33% of all lameness problems presented to the trimmer over a 12-month period. This was second only to digital dermatitis (37.4%) which was the most common lameness disorder recorded. The highest incidence of thin soles occurred in cows between 61 to 350 days in milk. Incidence of thin soles was also seasonal with the highest incidence occurring between August to December. In an effort to cope with the problem the dairy installed rubber in all barns, walkways and holding areas. Frequency of lameness in first calf heifers diminished from 66.9% for the 9 month period prior to, and 32.6% after, the installation of rubber. The thin sole rate in heifers decreased from 21.8% to only 4% following the installation of rubber. Although evaluation of these results is continuing, preliminary information suggests that rubber may be a very important flooring modification for the management of thin soles in dairy cattle. Observations from a second study herd demonstrated an average monthly incidence of lameness of 4.6% with a low of 1.9% during the month of February, and a high of 12.2% in September. As suggested by these data, statistical analysis revealed a strong relationship between lameness and season for all lameness conditions with the exception of digital dermatitis. Claw disorders (white line disease (29%), ulcers (26%), thin soles (11%), punctures of the sole (5%) and sole hemorrhages (3%)) were the predominant lesions recorded on cows presented to the trimmers for evaluation of lameness disorders. Close inspection of these data reveals an unusually high incidence of white line disease that when broken down according to claw zone affected demonstrates a preponderance of lesions (71.6%) occurring in the toe (zones 1 & 2). It is the experience of these authors that white line disease in these zones (1 & 2) represents an important predisposing factor in the development of toe abscesses in thin sole herds. This project is complete.

Publications prepared on this topic thus far:


Project # 333
Title:  Dairy Herdsman Seminars and Cow College in Spanish.  J. Shearer

We were awarded funding through the Dairy Check-Off to establish training programs for multi-cultural Spanish-speaking employees on dairy farms. This past year we conducted 4 training sessions on the topic of reproduction: 1) Artificial Insemination in Dairy Cattle, 2) Detection and Management of Open Cows (via ultra-sound and palpation), 3) Obstetrics and Management of Problems Associated with Calving, and 4) Management of the Cow during the Postpartum Period. All courses and training materials
were presented entirely in Spanish. All participants received handout materials prepared in Spanish and a certificate recognizing their participation in the training program. The specifics of these programs are described below:

On February 1-3, 2005, we conducted our first course on “Artificial Insemination” in Spanish. We utilized Mr. Earl Ingram, technical services specialist from Select Sires, Inc., in Latin America to present our lectures and lead the laboratory sessions. A total of 15 participants took the 3-day course which included laboratory exercises with cadaver specimens and live cows. A follow-up with several of the participants has confirmed that most of the attendees are currently breeding cows with good success on a daily basis.

On April 25-26, 2005, we conducted a course entitled “Detection and Management of Open Cows”. This 2-day course attracted 12 (2 from as far away as Oregon) participants who were instructed in palpation and ultra-sound techniques used in the detection of open cows. In addition, students learned strategies for the rapid return of these animals to estrus so that a minimum of time may be lost during the breeding period. Lead instructor for the course was Dr. Bartolome, assisted by Dr. Carlos Risco and myself.

On August 17-18, 2005, we conducted a course entitled “Management of Obstetrics and Problems Associated with Calving”. This 2-day course attracted 25 participants from Florida and the southeastern United States. Attendees learned techniques for managing dystocia and other calving-related problems in a laboratory equipped with fetal cadavers and phantoms for learning fetal manipulation procedures. Instructors were Drs. Carlos Risco, Pedro Melendez and myself.

On December 21-22, 2005, we conducted a course entitled “Management of Cows during the Postpartum Period”. This was a 1 ½ day course that attracted 17 people from Florida and the southeastern United States. The course included one full day of lecture and a ½ day laboratory conducted at Dairy Production Systems, in Branford, Florida. Here participants were able to see a model postpartum program in action.

This program is on-going.

Project # 337
Title: Determining When to Harvest Stay-Green Corn Varieties for Silage Production. A. Adesogan

Several Florida dairy producers have observed an increased incidence of digestive upsets, Variable Manure syndrome and Hemorrhagic Bowel syndrome in their cows in recent times. These problems have greatly affected the productivity of such herds, and many producers attribute the problem to feeding corn silage made from hybrids with high staygreen rankings. To address this problem, the University embarked on a series of studies aimed at understanding the influence of the staygreen ranking on the nutritive value of corn hybrids and milk production. This summary presents the results of the first of those experiments, which aimed to determine the effect of maturity at harvest on the nutritive value and aerobic stability of corn hybrids differing in staygreen ranking. One high staygreen corn hybrid and one average staygreen hybrid with similar relative maturity (118 d) were selected from Pioneer Hi-bred and Croplan genetics hybrids. The high staygreen hybrids were Croplan genetics 827 and Pioneer 31Y43, while average staygreen hybrids were Croplan genetics 799 and Pioneer 32D99. The four hybrids were grown on four replicate, 1 x 6 m plots. The hybrids were harvested at 26 (Cut 1), 34 (Cut 2), and 39 (Cut 3) % DM, yield was assessed and some selected plants were separated into ear and stalk fractions for chemical analysis. The rest of the forage from each plot was ensiled (15 kg) within plastic bags in mini-silos for 100 days and then analyzed.

In the freshly harvested plant, yield was similar at Cuts 1 and 2, and higher at Cut 3. High staygreen hybrids had greater stalk crude protein concentration, lower stalk DM and lower stalk sugar concentration than average staygreen hybrids. Whole plant digestibility was also lower in higher staygreen hybrids than average staygreen hybrids.
The staygreen ranking or source (seed company) of the hybrids did not affect silage fermentation, but high staygreen hybrids had greater crude protein and lower starch concentrations than average staygreen hybrids. High staygreen silages tended to be less digestible, than average staygreen hybrids. This suggests that processing is required to improve the digestibility of high staygreen hybrids.

Dry matter and starch content increased with maturity while residual (post fermentation) sugar and crude protein content decreased. Silage pH increased with maturity while ammonia-N, lactic acid and acetic acid concentrations decreased. Yeasts increased with maturity while molds decreased but aerobic stability was unaffected by maturity.

This study therefore indicates that staygreen corn hybrids should be harvested at the intermediate maturity stage (34% DM, Cut 2) to optimize nutritive value and yield. High staygreen hybrids seem more likely to have lower DM and sugar concentrations than low staygreen hybrids and such high staygreen hybrids should be processed to improve their digestibility and ensure proper starch release from the kernel. Staygreen ranking did not affect the normal fermentation indices. Further work on the effects of staygreen on milk production in cows is currently being done. This project is considered complete.

Project #339
Title: Use of Low-Dosage ECP estradiol cypionate to Reduce the Financial Risks Associated with 30-d Dry Period When an Earlier-Than-Expected Calving Occurs. K. Bachman

Milk lactose in the blood of cows indicates that the tight junctions between the epithelial cells in mammary tissue have become leaky. Leaky tight junctions are an early indicator that the mammary tissue has begun to involute or dry-off. Blood samples collected from cows that received various dosages of ECP are being tested for blood lactose to determine the minimal dose needed to initiate involution (dry-off). Categories of dairy animals from which blood is being analyzed for lactose include: 1) heifers <365d old, 2) dry cows > 40d to expected calving date, 3) cows from late dry period through early lactation, 4) cows at dry-off that received or did not receive various dosages of estrogen (ECP) to accelerate involution, 5) cows in lactation that were milked while receiving various dosages of estrogen (ECP or estradiol). This project is ongoing.

Project #341
Title: Effectiveness of Two Cooling Systems for Cooling Cows in Free Stall Barns. J. Bernard

Summary: A trial was conducted over two years to compare two different fan systems for cooling cows in free stall barns. Treatments included cooling with either a high speed fan or a high volume low speed fan (HVLS). A high pressure mister system was used for both fan systems. Cows were fitted with a vaginal temperature probe that recorded body temperature every six minutes. Air speed for the HVLS fans ranged from 2.5 to 5 mph compared with 5 to 8 mph for the high speed fans. Average body temperature of cows cooled with the HVLS was higher than that observed for cows cooled with the conventional high speed fans, 102.7 and 103.1 F, respectively. Results were similar for both 2004 and 2005.

The body temperature of both groups of cows tended to peak at approximately 5:00 p.m. and decreased until10:00 p.m. when body temperatures increased again until approximately midnight. At approximately 10:00 p.m. high pressure mister system shut off because the relative humidity had increased above 85%.

The results of this trial indicate that the HVLS fans do not provide adequate air flow to cool cows as effectively as the high-speed fans under extremely hot, humid conditions. The results also suggest fans alone do not adequately keep body temperatures from rising in the evening after the mister system has shut off (above 85% humidity). Although the HVLS fans did not cool lactating cows as efficiently as the high speed fans in the hot, humid environment common to Florida and Georgia, they may possibly be useful for cooling animals that do not produce as much heat reducing overall energy cost. This project is complete.
Project #344
Title: Development of a Milking Machine Monitoring System to Determine Milking Performance.
D. Bray

We checked many dairies and vacuum stability on almost all dairies with proper working equipment was stable and the determining factor was cleanliness of the vacuum controller if that was the control method, dairies with speed drives had adequate control also. Pulsation function was dependent on age of the pulsators and cleanliness of them, on our large dairies in the S.E. Us with our high humidity, excessive insect population it is evident that a complete new pulsation system should be installed at least every 4-5 years to prevent pulsators malfunction caused by wear due to age. A automatic pulsation monitoring system seems a good way to prevent milking machine damage to teats. This project is completed.

Project #346
Title: Use of Real-Time Blood-PCR and Milk-PCR for Detection of Cattle Infected with Mycobacterium avium subsp. Paratuberculosis. C. Buergelt

A total of 164 blood and milk samples were tested and compared against the nested PCR developed in our laboratory. These samples were obtained from 3 dairy herds with 500, 550 and 60 milking cows, respectively. The following results were obtained:

Of the blood samples 7 were positive; of the milk samples, 13 were positive with real-time PCR. There was good correlation between the two test systems in that with one exception parallel results were obtained. One blood sample that was negative on nested PCR was positive on real-time PCR.

Conclusion: Both tests are field applicable and standardized in our laboratory. They are cost effective. While the nested PCR requires a 1-2 day turnaround time, the real-time PCR can be performed within hours. While the nested PCR is an all or nothing event, real-time PCR is quantitative and more direct requiring only one step procedure. It is believed that both tests are user friendly and equal in strength. This project is complete.

Project #348
Title: 2004 Mastitis and Somatic Cell Count Reduction Study. A. De Vries et al.

We measured milking-to-milking variation for 15 milkings in a row (5 days) in 400 cows at the UF Dairy Research Unit in September 2004. The trial was repeated in December with 3 milkings in a row. Another herd was sampled for 3 days in a row (1 milking per day). The observed variation in all studies was large and many cows had spikes with over 1 million SCC in one milking while dropping to below 250,000 the next milking. A poster was presented at an NMC meeting in Tampa (http://www.animal.ufl.edu/devries/publications.html). An article describing the results will appear in Hoard’s Dairyman in the summer or fall of 2006. This project is complete.

Project #349
Title: Antibody Response to Ovalbumin as a Measure of Genetic Disease Resistance of Dairy Cows. A. Donovan

No summary report submitted.

Project #350
Title: Dairy Business Analysis Project – Georgia – 2004. L. Ely

Twenty-seven dairies submitted financial data in 2003. Twenty-six dairies were included in the summary results. Of these, 17 were located in Florida, and 9 in Georgia. The average herd size was 1,316 cows and 619 heifers with 17971 lbs. milk sold per cow. The average culling rate was 40%. There was an average of 24 FTE workers per farm and 0.96 million lbs milk sold per FTE worker. Total revenue per cwt. was $17.66 / cwt with $15.89 / cwt milk income. The average total expense was $18.27 / cwt. The largest expense items were purchased feed ($7.16 / cwt), labor ($3.22 / cwt), and livestock ($1.95 / cwt). Net
farm income from operations was on average $-.61 / cwt and net farm income was $-.51 / cwt. The debt to equity ratio was .62, the rate of return on assets was --0.01, the rate of return on equity was -0.18, the operating profit margin ratio was -0.06. There is no clear association income, expenses or returns with herd size in 2003. Milk price / cwt was lowest for <500 cows ($15.45) but other income was highest ($1.94 / cwt). Total expenses were highest for the smallest herds ($19.26 / cwt) resulting in the lowest net farm income from operations ($-1.66 / cwt). Milk price and total income decreased with production level. Net farm income was highest for lowest production level. Data collection for 2004 is being conducted. This project is considered complete.

**Project #354**  
Title: *The Development of Corn Silage Varieties and Year-Round Cropping System for Florida Dairy Farms. B. Scully*  
This project is complete.

**Project #355**  
Title: *Resynchronization of Ovulation and Timed Insemination in Lactating Dairy Cows Using the CIDR Insert 14 or 18 Days After Previous Insemination.*  
W. Thatcher  
The project had two Experimental Phases involving the use of the Progesterone CIDR device as part of a Presynch-Ovsynch program and a Resynchronization program.

Experimental Phase I: This was reported on in last year's report and is summarized as follows: When a CIDR was inserted as part of a Presynch-Ovsynch program, first service-pregnancy rates (PR) at Day 30 and 55 were increased in cows of Presynch-Ovsynch-CIDR Group that had high progesterone at the time the Ovsynch protocol was started (42.3 and 40.2 %; respectively) compared to cows in the Presynch-Ovsynch-CIDR Group with low progesterone (30.0 and 27.5 %; respectively) and control cows (i.e., Presynch-Ovsynch Group with no CIDR insert) with either low progesterone (32.6 and 28.0 %), or high progesterone (32.9 and 27.8 %; respectively). Pregnancy loss was reduced in the Presynch-Ovsynch-CIDR Group (7.0 %) compared to cows in the Presynch-Ovsynch Control Group (15.6 %). For second service, cows were re-synchronized with an Ovsynch protocol starting at day 23 after first service but cows received a CIDR or no CIDR insert for a 7 day period prior to GnRH (i.e., day 14 to 23 after first timed insemination). Pregnancy rates on Day 30 and 55 were reduced for cows inseminated at detected estrus (AIDE) in the Resynch-CIDR Group (28.6 and 26.8 %) compared to cows AIDE in the Resynch Control Group (38.8 and 36.2 %). Pregnancy rates on Day 30 and 55 were increased in cows with a CL at ultrasonography and TAI in the Resynch-CIDR Group (29.7 and 27.5 %; respectively) compared to cows with a CL and TAI in the Resynch Control Group (19.4 and 13.4 %; respectively). Pregnancy rates were reduced in cows without a CL and TAI in both groups (Resynch-CIDR: 10.0 and 7.5 %; Resynch Control: 15.4 and 15.4 %). There was no difference in pregnancy loss for second service between groups.

Based upon these results, the second phase of the project was conducted and is now completed to compare early resynchronization based on ultrasound at day 30 versus a later resynchronization based on rectal palpation of pregnancy at day 36.

Experimental Phase II. The resynchronization protocols have been altered following completion of Experimental Phase I to now include insertion of the CIDR device between GnRH and PGF$_{2\alpha}$ injections. Our objectives were to evaluate pregnancy rates to a resynchronization program following an early ultrasound pregnancy diagnosis (i.e., day 30 after AI) or a pregnancy diagnosis later by rectal palpation (i.e., day 35 after AI). Factored into the experiment is the use of a CIDR device during the Ovsynch protocol. In the ultrasound group, cows received GnRH +/- a CIDR at day 23 after AI and pregnancy diagnosis at day 30, whereas the rectal palpation diagnosis group received GnRH +/- a CIDR at day 29 after AI and pregnancy diagnosis at day 36. The intent is to test the efficiency of the resynchronization systems that provides producers with an progressive early pregnancy diagnosis versus a more traditional-practical system of pregnancy diagnosis.
Placing a CIDR device, following previous insemination for either the ultrasound or palpation group, had no effect on pregnancy rate to prior insemination (20% PR). Cows that were not pregnant to first service and were re-synchronized without a CIDR device had a lower second service pregnancy rate in the absence of a CL compared to the presence of a CL at pregnancy diagnosis with either ultrasound (6.7 < 35.2%) or rectal palpation (5.9 < 27.5%). In contrast there was no difference in pregnancy rates in absence of a CL compared to presence of a CL for cows with a CIDR device in either the ultrasound (36.0 and 37.2%) or the rectal palpation (30 and 21.7%) groups, respectively. Therefore, insertion of a CIDR device allowed for proper synchronization of ovulation for timed insemination in cows without a detected CL at pregnancy diagnosis. Overall pregnancy rates to cows that were inseminated to detected estruses, from time of first service to the second service timed insemination, did not differ between treatments (31.7%). When evaluating only timed inseminations, the early pregnancy diagnosis (i.e., day 30) and re-insemination gave a higher pregnancy rate (33.8%) than PR following a later pregnancy diagnosis by rectal palpation with a PR to second service of (23.1%). Overall results indicate that non pregnant cows following a previous service can be effectively re-synchronized and timed inseminated by 32 days after first service, with the use of ultrasound for pregnancy diagnosis and resynchronization with an Ovsynch protocol that includes a CIDR device. The lower pregnancy rate following a later diagnosis with rectal palpation and re-synchronization with TAI is likely do less control of follicle synchronization.

Producers can incorporate a timed insemination for first service and repeated services without the need for estrous detection in a programmed fashion with pregnancy rates at least comparable or perhaps better than first service. Implementation of such a program requires careful compliance by field staff that can be achieved by utilization of a timed insemination computer management program to precisely schedule cows for handling, diagnosis and injections of hormones etc. This project is complete.

Project # 357
Title: Multi-lingual Training Videos.  D. Bray

Over 20 videos have been produced in English and Spanish. This project is completed.

Project # 358
Title: Environmental Modifications for Reducing Summer Stress on S. E. Dairy Farms. D. Bray

Comparisons were made between an ultra high pressure fog cooled traditional free stall barn and a 200 PSI fogged barn; there was no difference in cow body temperature between the sides of the barn, use of feed face low pressure sprinklers lowered body temperatures during the night. This project is completed.

Project # 359
Title: Florida Mastitis and SCC Reduction Study. D. Bray

We have evaluated various SCC methods, SCC counts are not always repeatable, and more work on this is being done on another project. We are providing participating herds who supply us with their DHIA records with mastitis data from their herds comparing them with other herds on the project. This project is completed.

Project # 360
Title: Florida Dairy Students Participate in the 4th Annual North American Intercollegiate Dairy Challenge. A. de Vries

A team of Florida dairy science students participated in the 4th North American Intercollegiate Dairy Challenge (NAIDC) in State College, PA on April 1 and 2, 2005. This year’s contest was hosted by Penn State University. Created to inspire students and enhance university dairy programs nationwide, the NAIDC is a 2-day dairy management contest that incorporates all phases of a specific dairy business in a fun, interactive and educational forum. It enables students to apply theory and learning to a real-world dairy, while working as part of a team. The first day of the contest consists of a thorough analysis of a dairy farm’s records and a farm visit. The teams prepare a presentation outlining what they believe are strengths and opportunities, including their recommendations to the dairy farmer. The second day the
team presents these findings to a jury consisting of dairy farmers, allied industry, and educators. In addition to the contest, the NAIDC gives students and sponsors plenty of opportunity to interact and many students are recruited for internships or jobs. The Florida team did well and obtained a silver award. The NAIDC is supported financially through generous donations by industry and coordinated by a volunteer steering committee. More information about this exciting contest can be found at http://www.dairychallenge.org. This project is complete.

**Project # 361**  
**Title:** Dairy Business Analysis Project – 2005. L. Ely

Twenty-six dairies submitted financial data in 2004. Twenty-two dairies were included in the summary results. Of these, 15 were located in Florida, and 7 in Georgia. The average herd size was 1,170 cows and 585 heifers with 18207 lbs. milk sold per cow. The average culling rate was 31%. There was an average of 20 FTE workers per farm and 0.97 million lbs milk sold per FTE worker. Total revenue per cwt. was $20.89 / cwt with $18.98 / cwt milk income. The average total expense was $19.39 / cwt. The largest expense items were purchased feed ($8.13 / cwt), labor ($3.17 / cwt), livestock ($1.87 / cwt) and milk marketing ($1.13 / cwt). Net farm income from operations was $1.50 / cwt and net farm income was $1.58 / cwt. The debt to equity ratio was -0.24, the rate of return on assets was 0.06, the rate of return on equity was 0.05, the operating profit margin ratio was 0.06. Total expenses decreased and returns increased with herd size in 2004. Herds >1000 cows had the lowest total revenue ($20.78 / cwt) and the lowest expenses ($18.12 / cwt) resulting in the highest net farm income ($2.82 / cwt). The herds with the highest milk production (>19,500 lbs / cow / year) had the lowest total revenue ($18.86 / cwt) and the lowest expenses ($18.28 / cwt) resulting in the highest net farm income ($1.74 / cwt). This project is considered complete.

**Project # 362**  
**Title:** Milk Check-Off Recovery. G. Hembry

No Summary Required.

**Project # 363**  
**Title:** The Development of Corn Silage Varieties and a Year-Round Cropping System for Florida Dairy Farms. B. Scully

Corn Silage: Silage yields and acreage in the southern region of the state has steadily increased over the last five years. Fresh silage yields commonly range between 20 to 25 TPA, and in 2005 was produced on nearly 8000 acres. Over 1000 lbs. of seed from three different IFAS silage populations were distributed to dairy farmers in Avon Park (2), Lorida (1), and to one contract producer in Belle Glade. These included an "Upright–Leaf" population presently under development for high-density plantings of +45,000 plants/ac, and a "Tall" population under selection for maximum forage yield. The "CIMMYT" population is under selection for resistance to the fall armyworm, and is intended for use as a refugia variety to compliment the use of Bt hybrids. Preliminary results indicate that after four years of selection insect resistance has surpassed many of the refugia varieties, and in at least one planting resistance to the fall armyworm was comparable to a Bt hybrid. Additionally, field experiments were planted at IFAS research sites in Belle Glade (EREC) and Gainesville (PSREU). Experiments at EREC included the breeding and development of populations, inbreds and silage hybrids. Elite hybrids are now routinely submitted to the Silage Hybrid Performance Trials in Gainesville, and IFAS hybrids have improved relative to the current commercial hybrids.

Winter Legume: A year-round/continual cropping system is an ongoing goal of this research effort and has the potential to improve land productivity, feed quality and fertilizer-use-efficiency. The faba bean has proven sufficiently cold tolerant and robust enough to warrant consideration, and completes the year-round cropping system. In contrast to silage corn, faba bean yields have produced lower fresh yields that have ranged from 10 to 17 TPA. A preliminary comparison of quality indicates that the faba bean is superior to corn silage in some respects, but not others (Table 1).
Table 1: Cross-commodity comparison of the faba bean and silage corn.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Organic Matter</th>
<th>% Crude Matter IVOMD</th>
<th>% Crude Protein</th>
<th>Phosphorous Content %</th>
<th>NDF(af)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faba bean</td>
<td>89.1</td>
<td>44.7</td>
<td>12.0</td>
<td>0.55</td>
<td>64.2</td>
</tr>
<tr>
<td>Silage corn</td>
<td>94.6</td>
<td>65.1</td>
<td>7.1</td>
<td>0.12</td>
<td>69.2</td>
</tr>
</tbody>
</table>

In addition to adequate yields (≈ 50% of corn silage) and freeze tolerance these data suggest that the faba bean produces significantly higher protein levels and takes up more than four times the Phosphate than silage corn with less than half the Phosphate fertilizer requirement. This project is ongoing.

Project # 364
Title: Support for Florida and Georgia Youth Programs, 4-H Dairy Activities and Youth Events, Dairy Judging Team Support, Undergraduate Programs and Scholarships. (Umphrey) B. Broaddus

No Summary Required.

Project # 365
Title: Factors Affecting the Quality of Corn Silage Produced in Florida, and the Risk of Variable Manure Syndrome in Dairy Cows. A. Adesogan

Check-Off dollars funded a series of experiments aimed at addressing producer concerns about links between the quality of corn silage produced in the southeast and poor productivity or disease problems (Hemorrhagic Bowel Syndrome, HBS) in dairy cattle. The experiments focused on how certain climatic, plant and management factors affect the quality of silage made in hot, humid environments. The main findings are summarized below:

Rainfall at harvest and high temperatures (>100°F) during ensiling adversely affect the fermentation and quality of corn silage. Corn silage producers in hot, humid regions need to avoid harvesting corn in wet weather, and ensure that excellent silage management practices are followed to overcome these climatic challenges to quality silage production. Delayed sealing of bunkers for about three hours can be beneficial at reducing the adverse effects of moisture on the fermentation but prolonged delays (>10 h) can worsen the fermentation and increase deterioration.

Corn silage produced in hot, humid regions is highly prone to aerobic deterioration (within 24 h), but dual-purpose inoculants containing Lactobacillus buchneri can improve their aerobic stability. Doubling the rate of inoculant application was not more effective than the recommended rate at enhancing the quality or stability of corn silage. Producers should be advised to avoid this costly, ineffective strategy.

Though molasses application increases the sugar concentration of low-sugar corn hybrids, and therefore increases fermentable substrate levels, it encourages the growth of yeasts that produce ethanol instead of lactic acid, and enhance silage spoilage. Molasses application is therefore discouraged.

Corn hybrids with high stay-green rankings were found to have higher moisture and protein concentrations and lower starch content and DM digestibility values than average stay-green hybrids, but the fermentation process was unaffected by stay-green ranking. Stay-green hybrids should be harvested at about 34% DM (66% moisture) as this maturity stage gave the best combination of yield, nutritive value and low fungal counts. Due to the higher moisture content of high stay-green hybrids, they should not be harvested at DM concentrations below 30% particularly during rainfall or in wet years because excess moisture can cause undesirable fermentations. Kernel processing is recommended for high stay-green silage hybrids in order to increase energy availability from in dairy cow diets.
A dairy cow experiment confirmed that the efficiency of milk production was greater in corn harvested at 35% DM than at 26% DM. The study also showed that high hybrid stay-green rankings were associated with lower feed digestibility and intake and slightly higher rectal temperatures. However no direct link between staygreen rankings and HBS or digestive upsets was found. Indeed several researchers now consider the cause of HBS to be multifactorial. Several factors may contribute to the incidence of the disease including bad silage management practices such as inadequate consolidation, harvesting or ensiling while it is raining, feeding excess levels of readily fermentable carbohydrates etc. Although this work has not shown a direct link between HBS and stay-green ranking, it has demonstrated that high stay-green hybrids have poorer nutritive value than low stay-green hybrids. Also when high stay-green hybrids are ensiled with excessive surface moisture, silage yeast counts may be increased and rumen function in dairy cows may be impaired. A final part of the project which is yet to be completed is to determine if there were differences in the immune response and Aspergillus fumigatus or Clostridium perfringes counts in the cows fed the high and low stay-green diets. This project is ongoing.

**Project # 366**  
**Title:** Enhancing Nutrient Intake and Digestibility and Performance of Lactating Dairy Cows Fed Diets Based on Tifton 85 Bermudagrass. J. Bernard

Summary: Forty-four lactating Holsteins were used in an 8 week trial to determine the effectiveness of enzyme treatment on the utilization of diets based on corn silage plus either Tifton 85 bermudgrass haylage or alfalfa hay. The diets were formulated to provide similar concentrations of nutrients and included 12.1% of the ration DM as either Tifton 85 bermudagrass haylage or alfalfa hay. Third cutting Tifton 85 was chopped and ensiled in a bag prior to beginning the trial. The alfalfa hay was grown in the Western US and was purchased locally. The average nutrient content (DM basis) of the Tifton 85 was 14.2 % CP, 38.7 % ADF, and 72.4% NDF compared with 20.1% CP, 31.7% ADF, and 39.4% NDF for alfalfa hay.

There were no differences between treatments in dry matter intake (54.0 lb/d), milk yield (91.2 lb/d), milk fat percentage (3.69%), energy corrected milk yield (90.8 lb/d ) or dairy efficiency (1.68 lb ECM/lb DMI). We are currently completing the chemical analysis of the diets and will be conduct an economic analysis using the results of this trial and previous research. The initial results indicate that Tifton 85 can be used in rations for high producing cows without any decrease in intake or milk yield. Addition of an enzyme to the TMR did not improve performance of the cows in the current trial. This project is ongoing.

**Project # 367**  
**Title:** Use of Nested Real-Time PCR for the Detection of In-Utero Infection of Pregnant Cattle by Mycobacterium avium subsp. Paratuberculosis. C. Buergelt

Eleven pregnant Holstein cows were subjected to nested PCR (nPCR) testing for evidence of in-utero transmission with *Mycobacterium avium* subsp. *paratuberculosis* (Map). The following results were obtained:

Six dams (55%) were shown by nPCR to have positive PCR products in blood and/or milk. Tissues or fluid from fetuses were positive on 36% of the pregnancies; 2 of 4 placentomes tested gave positive PCR reaction products and 1 of 11 (9%) allantoic fluids. All pregnant cows were proven paratuberculosis positive through necropsy and microscopic examination. A percutaneous technique on the standing pregnant cow is described for antemortem collection of allantoic fluid for PCR testing.

**Conclusion:** It is technically possible to obtain allantoic fluid for prenatal Map testing and easily to perform aseptically in late pregnancy (>7 months) without inducing peritonitis or abortion. The positive nested PCR in the allantoic fluid of only 1/11 animals (9% success) is disappointing. More late term pregnant animals should be tested for a data base. The detection of Map DNA in various fetal tissues (45%) supports the concept of transuterine transmission of Map in addition to the oral-fecal or milk route of
transmission and should be of concern to the management of disease control by test and cull of only infected adult animals. This project is complete.

**Project # 368**  
**Title:** Economic Comparison of Ultrasound Versus Rectal Palpation to Detect and Resynchronize Open Cows.  A. De Vries

Objective is to compare the economics of ultrasound versus palpation to detect and resynchronize open cows using an Ovsynch (± CIDR) protocol. A study at a large dairy farm located in north central Florida was conducted to evaluate the physiological responses and pregnancy rates of cows assigned to one of both methods of pregnancy diagnosis and with or without the use of a CIDR insert. The results of this study are currently being finalized. These results serve as inputs for the economic analysis. A complete economic comparison considers all changes in future discounted cash flows due to the use of either ultrasound or rectal palpation. Factors to be considered are the cost of an ultrasound pregnancy diagnosis ($4) or palpation ($3), cost of ultrasound machine ($9,000), number of cows detected in estrus before resynchronization protocol, pregnancy rates, pregnancy losses, semen and drug cost, labor cost, and prices for milk, feed, replacement animals etc. A computer program is available that allows for a detailed consideration of physiological responses, as well as milk production, feed cost, culling policies etc (de Vries et al., 2006). The program is able to do the economics comparison after it has been extended with the resynchronization protocols and both methods of pregnancy diagnosis. Furthermore, typical conditions in Florida need to be incorporated (prices, lactation curves, etc) as it currently is designed for Minnesota herds. This project is ongoing.

**Project # 369**  
**Title:** The use of CIDR Insert Post AI to Decrease Early Embryonic Loss in Heat Stressed Animals and the Efficiency of Reusing a CIDR Insert.  J. L. Fain

Two experiments are being conducted to test the efficacy of using progesterone treatment post AI decreased embryonic mortality in dairy animals and to resynchronize estrus in heifers. In experiment 1, all animals were synchronized utilizing a single injection of 25 mg PGF$_{2α}$ and were inseminated 12 h after animals were observed in standing estrus. Cows and heifers were randomly assigned to 1) receive post AI progesterone therapy (cow n=11; heifers n=13) from d 14 to 21 after AI using the CIDR insert (1.38 g progesterone) (treatment) or 2) receive no further treatment post AI (cows n=5 cows; heifers n=9) (control). This trial was split and run in the summer and winter seasons to determine progesterone variability.

In experiment 2, heifers (44) were initially synchronized utilizing a new CIDR insert (1.38 g progesterone) (d-10) with a 5 cc injection of PGF$_{2α}$ at the time of CIDR removal (d-3). Animals were then artificially inseminated at 12 h after detected estrus (d 0). At 14 d post insemination (d 14), all animals received the same previously inserted CIDR for a second 7-d period until removal on d 21, followed by reinsemination occurring 12 h after detected estrus. This project is ongoing.

**Project #370**  
**Title:** Effect of Source of Supplemental Se (SellPlex, Alltech) on Reproduction, Uterine Health, and Lactation in Lactating Dairy Cows.  W. Thatcher

Objectives were to evaluate effects of organic Se on pregnancy rates (PR) at the 1st 2 postpartum (pp) services, pp uterine health and milk yield in the summer heat stress period. Cows were assigned (-23 ± 8 dpp) to 2 diets of organic Se (Se-yeast [SY; Sel-Plex®, Alltech; n=289] or inorganic Sodium Se [SS; n=285]) at 0.3 ppm in dry matter for >81d. Rectal temperature was recorded in AM for 10 dpp. Vaginoscopies were at 5 and 10 dpp. Cows within diet were assigned randomly to 2 reproductive management programs (Presynch-Ovsynch vs CIDR-Ovsynch [i.e., Ovsynch begins 3d after withdrawal of a 7d-CIDR]). All cows were resynchronized for a 2nd service with Ovsynch at 20-23d after 1st service and pregnancy diagnosis at 27-30d after 1st TAI. Cows in estrus following Presynchs were AI up to the 2nd TAI service. Strategic blood sampling determined anovulatory status at Ovsynch and ovulatory response after TAI to 1st service. PR at 2nd service was determined by rectal palpation at ~42 dpp. Blood was
sampled for Se (n=20 cows/diet) at -25, 0, 7, 14, 21 and 37 dpp. Plasma Se increased in SY fed cows (.087>.069 ± .004 μg/ml; P<.01). Milk yield (35.6 kg/d for 81d), milk somatic cells (291,618 cells/ml), and frequencies of retained fetal membrane (9.7%), mastitis (14.4%), anovulation (17.7%) and synchronized ovulation after TAI (82.5%) were not affected by diets or reproductive program. Diet failed to alter 1st service PR at ~30 (SY, 24.9% [62/249] vs SS, 23.6% [62/262]) or pregnancy losses between ~30 and ~42 [SY, 39.3% vs SS, 37.1%;]. Diet altered 2nd service PR [SY, 17% (34/199) vs SS, 11.3% (24/211); P<.05]. Diet altered frequency of multiparous cows detected with ≥1 event of fever (rectal temperature ≥ 39.5°C; SY, 13.3% [25/188] vs SS, 25.5% [46/181]; P<.05) but not in 1st parity (40.5%). Vaginoscopy frequencies at 5 and 10 dpp for clear (47.1% [217/460] vs 35.0% [153/437]), mucupurulent (43.4% [200/460] vs 47.8% [209/437]) and purulent (9.3% [43/460] vs 17.1% [75/437]) discharge scores were affected by SY and SS, respectively (P<.05). Organic Se (Se-yeast, Sel-Plex®) improved uterine health and 2nd service PR during summer.

Innate immunity (i.e., neutrophil function) was determined by phagocytic and oxidative burst capacity of neutrophils in whole blood using a dual color flow cytometric method. Samples were collected at -26, 0, 7, 14, 21 and 37 dpp for neutrophil function. Adaptive immunity (ability to induce an antibody response) was monitored with anti-IgG to Ovalbumin (Ovalb) following vaccination with Ovalb antigen (1 mg [i.m.]) dissolved in an E. coli J5 endotoxemia preventive vaccine at -60 and -22 ± 6 dpp (day of initiating of SY [n=38] and SS [n=47] diets) and again at parturition (day 0) with Ovalb dissolved in PBS with Quil-A adjuvant. Serum samples were collected on days of immunization and at 21 and 42 dpp. Percentage of gated neutrophils that phagocytized E. coli and underwent oxidative burst did not differ between diet groups at -26 dpp (44.6 ± 4.6%). For subsequent samples, a diet*parity*day interaction was detected (P<0.05): SY [Organic Se (Se-yeast, Sel-Plex®)] improved neutrophil function at parturition in multiparous cows (42 ± 6.14% > 24.3 ± 7.2%) and at 7, 14 and 37 dpp in primiparous cows (53.9 > 30.7, 58.6 > 41.9, 53.4 > 34.8%, respectively; pooled SE=6.8%). Anti-IgG to Ovalb did not differ between diets at -60 and -22 dpp (0.18 ± 0.01 and 0.97 ± 0.04 OD). Although Anti-IgG to Ovalb concentration did not differ between diet groups for primiparous cows (1.40 ± 0.08 OD), concentrations were higher in SY cows at 21 and 42 dpp (1.91 ± 0.1 > 1.24 ± 0.07, 1.44 ± 0.7 > 0.99 ± 0.07 OD, respectively; P<0.01). In summary, feeding organic Se as Organic Se (Se-yeast, Sel-Plex®) beginning at 26 days prepartum, elevated plasma Se concentrations, increased neutrophil function at the time of parturition, improved immuno-responsiveness in multiparous cows, improved uterine health and increased 2nd service PR during summer in early lactation. In conclusion, Se-yeast induced increases in immuno-competence at the time of normally suppressed immune activity at parturition, benefited subsequent postpartum health and pregnancy rate to 2nd service during summer heat stress in Florida, which is a selenium deficient area.

Figure 1. Percent Neutrophil phagocytosis and killing of bacteria in postpartum cows. Organic Selenium yeast increased neutrophil function compared to inorganic selenium.
**Project # 371**

**Title:** Use of Radio Frequency Identification (RFID) for Dairy Cattle Management. D. Webb

Objectives: To determine usefulness of electronic identification for collection of dairy cattle information including: heifer body weights, milk weights on test-day, reproduction and veterinary checks, health data and group movement.

Progress so far: Our group has been working to determine usefulness of electronic identification for collection of dairy cattle information including: heifer body weights, milk weights on test-day, reproduction and veterinary checks, health data and group movement. Animals were tagged with ear tags containing the RFID chip. Cows are identified in the chute or lockup stanchions by waving a wand near the ear, which transmits to a hand-held computer (Palm PDA). Using the newly developed PocketDairy for RFID program associated with PCDART from Dairy Records Management Systems, management data can be entered and automatically attached to the cow’s data file. This electronic identification can reduce labor required for record keeping and improve accuracy of records.

After the initial tagging of young animals, we have tagged all animals at the University of Florida, Dairy Research Unit including 527 adult milking cows, 354 heifers and 47 bulls. At two other cooperator herds, 390 cows and 268 heifers have been tagged.

Readability of tags has been variable. Our standard procedure was to apply the tag then read it with the Aglnfolink wand, immediately. All of the tags except one, read successfully, immediately after tagging. We attempted to read the tags again approximately two weeks after tagging. Only seven tags would not read at all after two weeks. These tags were removed and replaced. So far, we have used three different wand readers: 1) Aglnfolink’s Blue tooth, 2) Digital Angel Blue tooth, and 3) Allflex stick reader (wired). All three wands have given satisfactory reads, but the Allflex stick reader has performed the best in our study. Evaluation criteria included distance from the tag and successful read on first try. We found the two wireless wands to be different in that the Digital Angel wand reads from the tip and the Aglnfolink reads from the side. Keeping this in mind, similar read results were obtained. Charging and wireless connectivity characteristics have been better for the Digital Angel wand in our experience, so far.

Having RFID on all heifers has enabled us to evaluate the electronic weighing system manufactured and marketed by TruTest. We have used the XR3000 with the companion load bars and the Allflex stick reader. While heifer weighing at the DRU is usually associated with treatments and other management, we have been able to evaluate the system for collection and retrieval of body weight data. In our facilities, the weighing sequence goes like this: 1.heifer enters the approach chute; 2. we open the gate which allows her to enter the platform scale; 3. Identification is read by the wand; 4.press the button to record; 5.open gate to release heifer. This project is ongoing.
Project # 372
Title:  Can Diets Formulated for Low Heat Increment Reduce Body Heat Production and Heat Stress in Dairy Cows?  J. West

The objectives of this project were to formulate low and high heat increment (HI) rations, determine if heat stress could be reduced by a low HI ration, and determine if efficiency of feed to milk conversion could be improved by the low HI ration. The trial was conducted during the summer of 2005, and all analyses are completed and results will be presented at national meetings and then submitted for publication to the Journal of Dairy Science.

Increased dietary concentrations of soy hulls, whole cottonseed, fat and steam flaked corn were used for the low HI diets. Individual ingredient HI values were calculated and a TMR HI value generated (573 and 540 Kcal/Mcal HI for high and low diets). Cows fed the low HI restricted (LR) diet had DMI restricted so that the NEI intake of the HA cows and the LR cows was approximately equal. This was done to determine if a low HI improved efficiency of feed to milk conversion. The third treatment group was a low HI ad lib feeding group (LA). Milk yields for HA, LA and LR were 34.5, 34.6, and 33.0 kg. Increased efficiency for the LR group was observed for milk yield (kg)/DMI (kg) for HA, LA and LR with conversions of 1.4, 1.5, and 1.6, and for ECM (kg)/DMI (kg) of 1.3, 1.4, 1.5. Body temperatures and respiratory rates were lower for the LR group.

It appears that HI of the diet can be used to formulate rations to improve efficiency of production. This project is complete.