PROCEEDINGS OF THE 41ST ANNUAL

FLORIDA DAIRY PRODUCTION CONFERENCE

University of Florida, Gainesville • May 5, 2004

Watercolor by Mary Margaret Steele, DRMS, Raleigh, NC

UNIVERSITY OF FLORIDA

IFAS EXTENSION

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

Department of Animal Sciences

PO Box 110910
Gainesville, FL 32611-0910

May 5, 2004

To: **Florida Dairymen, Allied Industry and Others**

Re: **41st Annual Florida Dairy Production Conference**

Welcome to this year's conference! This provides an opportunity for representatives from all phases of the Florida Dairy Industry to focus on information and ideas for improving profitability and sustainability for the future.

The planning committee and Department faculty have planned this program in hopes that you will take home some information that will be of benefit in the operation, planning and decision-making of your business. The speakers have been chosen with careful consideration for subject matter of timely significance. We hope it will be useful to you.

This proceedings is provided as a reference and record of the conference. Additional copies may be available by contacting the Department of Animal Sciences. You will also see them on the Dairy Extension section of the Department's internet web site at http://dairy.ifas.ufl.edu.

Thanks for your participation in this year's conference. Please feel free to provide any comments that can be used in planning future Dairy Production Conferences.

Dan W. Webb
Co-chair of
2004 Dairy Production Conference

James E. Umphrey
Co-chair of
2004 Dairy Production Conference

Location

Hilton University of Florida Conference Center
1714 SW 34th Street
Gainesville, FL 32607

2004 Dairy Production Conference Planning Committee

Dan Webb (co-chairman)*	Albert de Vries*
James Umphrey (co-chairman)*	Charlie Staples*
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Program Schedule

Tuesday, May 4, 2004

PM — *Hilton Board Room*

3:00 Southeast DHIA Board Meeting

Wednesday, May 5, 2004

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Glen Hembry, Chair, Department of Animal Sciences, University of Florida

10:15 Bedding Strategies in Free-stall Barns
John Bernard, Tifton Research Center, University of Georgia

10:50 Strategies for Dairying Success in the Future
Richard Waybright, Mason Dixon Farms, Inc., Gettysburg, Pennsylvania

11:30 Latest on Tunnel Barns for Cow Comfort
Dave Bray, Department of Animal Sciences, University of Florida

PM

12:15 Lunch and Awards

1:30 Can Dairy Farming be Profitable in 2010?
Terry Smith, Dairy Strategies, LLC, Madison, Wisconsin

2:25 Break

Joint Session with the Beef Cattle Short Course (Century Ballroom)

2:45 Under Construction: U.S. Animal Identification Program
Glenn Smith, AgInfoLink, Macon, Georgia

3:30 Political Climate of BSE and COOL: How Does it Affect You at the Ranch?
Bryan Dierlam, NCBA, Washington, DC

4:00 Have Marketing Plans Changed Given Ramifications of BSE?
Randy Blach, Cattle-Fax, Inglewood, Colorado

4:45 Adjourn to Trade Show

5:00 Allied Industry Trade Show and Reception
Sponsored by Allied Industry Exhibitors. Hors d'oevres provided compliments of exhibitors. Cash bar.

Thursday, May 6, 2004

AM — *Room 151 Department of Animal Sciences, UF Campus*

9:00 PCDART Workshop

Speakers and Program Participants

John Bernard, Associate Professor, Coastal Plains Experimental Station, University of Georgia, Tifton

Randy Blach, Cattle-Fax, Inglewood, Colorado

Hines Boyd, Chief, Bureau of Dairy Inspection, Florida Dept. of Agriculture & Consumer Services, Tallahassee

David Bray, Milking Machine and Mastitis Specialist, Dept. of Animal Sciences, IFAS, University of Florida, Gainesville

Bryan Dierlam, NCBA, Washington, DC

Frankie Hall, Assistant Director of Commodity Activities, Florida Farm Bureau Federation, Gainesville

Mary Beth Hall, Associate Professor, Dept. of Animal Sciences, IFAS, University of Florida, Gainesville

Glen Hembry, Chair, Dept. of Animal Sciences, IFAS, University of Florida, Gainesville

Glen Smith, Ag InfoLink, Macon, Georgia

Terry Smith, President and CEO, Dairy Strategies, LLC, Madison, Wisconsin

Charles Staples, Professor, Dept. of Animal Sciences, IFAS, University of Florida, Gainesville

Todd Thrift, Assistant Professor**,** Dept. of Animal Sciences, IFAS, University of Florida, Gainesville

Richard Waybright, Consultant, Mason Dixon Farms, Inc., Gettysburg, Pennsylvania

2004 Program Sponsors

Per 4/23/2004

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Rick Hedrick

Lextron Southeast
Tommy Lynn

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Brent Lawrence

2004 Florida Farm Bureau Dairy Farm Family of the Year

The 2004 Florida Farm Bureau Dairy Farm Family of the year is the John Peachey Family. John Peachey was born on a dairy farm in Ontario, Canada. John's father Steve was a minister and dairy farmer who upon retirement decided to move his wife Ruth and three young sons Steve Jr., Paul and John to Sarasota in 1953. There was an older sister Ester who was already in college and did not move with them. Steve and Ruth Peachey, uneasy in their retirement, purchased a dairy farm in the Ellenton area in 1955 when John was about 20 years old, but the family sold it less than two years later due to the death of John's father and other changes in the dairy industry as it was at that time the dairy industry in Florida was switching from milk cans to bulk tanks.

John married the love of his life Ms. Carol in 1958 and they purchased their first dairy farm as a couple in 1963. The Manatee County dairy farm was a Guernsey herd producing milk for Land O' Sun producers and at that time they became members of Tampa Independent Dairy Farmers, Inc. (TIDFA). John was elected to TIDFA's board as a director and later as their Vice President. In 1998 TIDFA and Florida Dairy Farmers merged into what is now Southeast Milk, Inc. where John has served as a director and an alternate.

It was during this time in Manatee that John and Carol started their family. Ms. Carol devotes a great deal of her time to the Bethel Mennonite Church and to the community. They have 4 boys and 2 girls. John the oldest is a missionary and has had the opportunity to travel the world. Troy farmed with his dad from 1988 till 1993. Glen is currently a partner with his dad. The two girls Marsha and Mary were an important part of the farm growing up and Marsha served as a Florida Dairy Princess. A fourth son Mark was tragically killed in a farming accident in 1988 at the young age of 14. He truly loved working with his dad on the farm.

John and Carol sold their Manatee County farmland in 1988 and purchased land in Sarasota County to build a new dairy. John's son, Glenn, graduated that same year from the University of Florida with a degree in Dairy Management and came home to work on the dairy. Glenn started his own herd in 1995. He is very involved locally with the DHIA board and Farm Bureau. Glen and his wife Dean have three sons John Glen, Mark and Oden. Currently, John and Glenn are milking 1000 head combined.

From 1970 to the present John has served on the Dairy Farmers, Inc. board. He served as President from 1986-1993. In 1990 John was appointed to National Dairy Promotion and Research Board and was elected chairman of the Nutrition and Research Committee in 1991. John represented Southeast Milk on Dairy Farmers of America, Southeast Council board from 2000-2002.

John has served on IFAS Dairy Advisory Committee, Florida Dairy Herd Improvement Association (DHIA) Board, and West Coast DHIA as President, Manatee County Dairy Advisory Board, and Manatee County Overall Advisory Board. He has been a member of the Dairy herd Improvement Association for 30 years and he has also served as a member of the National Dairy Board.

At the present time John serves on the Dairy Cooperative Marketing Association as a board member and as Secretary and Treasurer. John is currently serving as a board member of Southeast Dairy Cooperative Association and as Vice President. He serves as chairman of the Milk Quality Committee for Southeast Milk, Inc. and is a delegate to National Milk Producers Federation and United Dairy Industry Association. In 1996, John was selected for Manatee County's Outstanding Agriculturist Service Award and was named to the Manatee County Agriculture Hall of Fame.

Peachey Dairy, Inc. has been on annual Farm City Week Agriculture Tours for both Manatee and Sarasota Counties for many years. The Peachey's also provide educational tours for preschooler up to adult's year around. John has a special interest in youth, especially the 4-H program. He was co-founder of the Manatee Youth Livestock Committee and served as a member of the Manatee Youth Livestock Committee for 10 years. The entire Peachey Family has been involved in 4-H programs for many years.

It is with great pleasure that the John Peachey Family has been named the 2004 Florida Farm Bureau Dairy Farm Family of the year.

2003 Florida Dairy Quality Honor Roll

Dairy Division – Florida Department of Agricultural and Consumer Services

Dairy Name	Location	Rank	SPC	SCC	Milk Cows	Score
Kurtz & Sons Dairy (2)	Live Oak	1	655	205,000	91	95
Sipple Dairy (2)	Thonotossassa	2	1,430	394,000	138	100
Norman Nickerson Dairy (6)	Wauchula	3	2,989	211,250	350	100
Brantley Dairy Farm, Inc.	McAlpin	4	2,630	339,090	310	93
Larson's Dairy #3	Okeechobee	5	3,650	284,471	1877	92
T. J. Smith & Son Dairy	Brooksville	6	2,890	390,909	296	98
C & A Dairy (7)	Dade City	7	4,541	298,333	244	99
Montag Dairy Farms	O'Brien	8	3,661	381,538	80	93
Ariana Dairy #3	Brooksville	9	4,583	348,333	264	92
C & C Dairy	Frostproof	10	4,008	399,166	258	100
Melear Dairy #2	Avon Park	11	5,358	305,833	678	93
M & B of Tampa, Inc.	Tampa	12	5,023	326,923	116	96
Gore Dairy #2 (3)	Zephyrhills	13	6,254	277,272	600	96
H W Rucks & Sons #2	Okeechobee	14	5,075	360,000	814	95
Oak Shade Farms (3)	Century	15	5,345	344,545	91	96
White Oak Dairy, Inc.	Mayo	16	5,930	314,545	281	95
Maple Lane Cattle Co. Inc	Temple Terrace	17	5,137	396,853	200	94
Aurora Dairy of Florida, LLC	Bell	18	7,989	264,444	2116	90
Oak Ridge Dairy	Grand Ridge	19	5,615	378,333	157	97
Palm River Dairy (3)	Crystal Springs	20	6,416	357,500	330	96
TOP 20 AVERAGE			4,459	328,917	465	95
FLORIDA AVERAGE			18,300	449,309	566	92

(*) Indicates consecutive years on Top 20 Honor Roll

NOTE: "Top 20" producers were determined by multiplying the average annual bacteria count (SPC) by the average annual somatic cell count (SCC). To be considered for the "Top 20", a producer must have met the following minimum standards during the year:

a) No drug residue violations.

b) An average inspection score of 90 or more.

c) An average bacteria count of less than 15,000/ml.

d) An average somatic cell count of less than 400,000/ml.

2003 DHIA Production Recognition of High Florida Herds‡

Herd	City	lbs. Milk	Milkings
Condale Farms	Anthony	26,211	3X
B & D Farms	Greenville	23,451	3X
North Florida Holsteins	Bell	22,222	3X
Suwannee River Dairy	Live Oak	22,102	3X
Univ FL Dairy Research	Gainesville	22,056	3X
M & M Dairy Inc	Jacksonville	21,619	3X
Eicher Dairy	Walnut Hill	21,204	
Aurora FL Unit 2	Branford	20,386	3X
J-Lu Farms	Live Oak	20,249	3X
Shenandoah Dairy	Live Oak	20,177	3X
Shivers Dairy	Mayo	20,106	
Suwannee Dairy Inc	McAlpin	20,062	
Aurora FL Unit 3	Morriston	19,940	3X
Mecklenburg Farm	Baldwin	19,898	3X
Aurora FL Unit 1	Bell	19,571	3X
T.J. Smith & Son Dairy	Brooksville	18,982	3X
T.K. Hatten Dairy Inc	Brooksville	18,877	3X
Calvin Johnson	Jacksonville	14,446 *	
Rex Run Farm	Hawthorne	12,423 **	

Production as of December 31, 2003
* Guernsey
** Jersey

‡ Southeast DHIA – Testing cows in Florida and Georgia

2003 Florida DHIA Herd Performance Averages*

	1993	1995	1999	2000	2001	2002**	2003***
No. Cows	55,648	43,476	34,452	37,278	33,488	30,879	56,366
No. Herds	122	90	61	57	52	47	92
Average Herd Size	456	483	532	654	644	657	613
% Days in Milk	86	87	87	86	84	85	84
Pounds of Milk	17,761	17,906	18,295	19,054	18,661	19,461	18,160
Peak Milk - 1st Calf (lbs./day)	67	68	68	71	69	72	70
Peak Milk - 2nd & Later (lbs./day)	88	87	84	88	87	87	88
Fat %	3.5	3.7	3.6	3.5	3.6	3.7	3.8
Pounds of Fat	622	656	655	676	672	729	683
Pounds of Protein	592	607	602	610	593	599	541
Value of Milk ($)	2,658	2,595	3,115	2,779	3,048	3,065	2,579
Projected Minimum Calving Interval	14.1	14.4	15.4	15.2	15.7	15.6	15.8
Days Dry	69	67	70	72	74	75	78
% Cows Dry > 70 Days	19	18	19	19	21	21	37
Days to 1st Breeding	77	83	97	96	97	102	107
Days Open	148	158	189	183	197	194	197
% cows Open > 100 days at 1st Breeding	14	16	28	29	34	22	33
No. Breedings per Conception	4.0	4.1	3.4	3.1	3.5	3.3	3
% Possible Breeding Serviced	52	48	33	29	26	28	26
Age at 1st Calving (months)	25	25	25	25	25	25	25
Age - All Cows (months)	44	43	43	43	44	65	44
% With Sire Identity	34	36	33	29	33	33	23
Average PTA$ Sires	151	67	92	124	147	177	86
Average PTA$ Service Sires	210	141	146	111	298	329	344
% Left Herd	40	40	34	32	33	34	39

* 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)

Bedding Strategies in Free-stall Barns

John K. Bernard
Department of Animal and Dairy Science
University of Georgia, Tifton

There are many types of bedding which can be used in free stalls. Although there is no one ideal bedding for all operations, there are several fundamentals that producers should consider when choosing a bedding material to use in free stalls. First, the free stalls must be sized for your cows and maintained in good condition. The bedding material must provide a clean, comfortable surface for the cow to lie down. The choice of bedding also influences daily labor requirements for maintenance and grooming. Failure to maintain adequate amounts of bedding in the free stall will result in stalls that are not as comfortable or result in hock injuries. Also, any soiled bedding must be removed to prevent any buildup of mastitis causing bacteria. Economics of bedding must be considered including initial investment as well as daily maintenance cost. The most common types of bedding include sand, composted manure solids, and mattresses built from materials such as ground rubber, foam, carpet padding, and rubber. This presentation will discuss several bedding strategies that may be used in free stall barns.

Organic bedding

Organic materials used for bedding include sawdust, wood shavings, straw and composted manure solids. These materials contain nutrients required for growth by bacteria and typically have higher concentrations of mastitis causing bacteria than inorganic materials such as sand. When properly handled, these materials have been used successfully by dairy producers. However, if the free stall management is less than desirable bacteria populations can increase greatly resulting in increased subclinical and clinical mastitis. Hogan et al. (1989) reported significantly higher moisture content and concentrations of gram negative bacteria, coliforms, *Klebsiella* species and *Streptococcal* species in free stalls bedded with sawdust or chopped straw compared to those bedded with sand or limestone.

Dehydrated or composted manure solids have been shown to be good alternatives to sawdust for bedding free stalls (Keys et al., 1976). Dehydrating or composting decreases bacterial concentrations compared to the original material, but bacterial concentrations increase after the material has been placed back into the free stall and moisture content increases (Britten, 1994). These results stress the importance of maintaining low moisture concentrations in free stalls to maintain low bacterial concentrations. Limited research has been conducted on the use of composted manure on mattresses, but past research suggests that it should be suitable if the material is kept dry and managed properly.

Sand

Sand is frequently rated highest for udder health, cow cleanliness and cow comfort by dairy producers (Bewley et al., 2001; Stowell and Inglis, 2000). However, it does require a considerable amount to maintain free stalls and manure management can be more troublesome than mattresses. Sand normally does not contain carbon or nitrogen required for bacterial growth. It also has a low water holding capacity and has a loose texture which shifts with the cow and provides good footing. Compared with other bedding materials, most studies indicate greater cow preference for sand than mattresses; however, when cows have a choice between sand and mattresses during the winter in colder climates the preferences for sand decreases (Thoreson et al., 2000). This seasonal effect is related to sand's ability to conduct heat away from the body of the cow, providing a cooler surface which is an advantage in hotter climates.

To reduce the amount of sand in manure, some producers have incorporated equipment or facilities into their waste handling system to collect sand. Recycling sand collected from dairy waste will reduce bedding cost and increase return on investment in sand collecting equipment or facilities. Recommendations of less than 3% organic matter (OM) are commonly cited as the upper limit before bacterial concentrations increase, but data defining the relationship of OM content and concentration of bacteria in recycled sand are very limited. Rates of clinical mastitis caused by environmental organisms are related to bacterial concentrations in free stall bedding (Hogan et al., 1989), so it is important to minimize bacterial populations. No differences were detected in somatic cell counts of cows housed in free stalls bedded with recycled sand collected from a settling basin compared with that of cows housed in free stalls bedded with fresh sand (Meriwether et al., 2000). Bacterial concentrations in the recycled sand were not measured in this study, so it is not known what impact the use of recycled sand had on exposure to pathogenic organisms. One strategy suggested to minimize bacterial concentrations is to bed more frequently so that fresh bedding is always present and solid bedding is not in direct contact with the udder.

Another problem associated with sand is the amount required to maintain desirable amounts of bedding in the free stalls. General estimates of the amount of sand required to maintain free stalls vary from 30 to 50 lb/d. Several sand retaining devices are marketed to dairy producers to reduce the amount of sand required to maintain free stalls and to maintain the desired slope in the free stall. Questions related to the effectiveness of these retaining devices to reduce the amount of sand required and potential for greater retention of OM under normal operating conditions have not been adequately addressed.

We conducted two trials at the Tifton Dairy Research Center to determine the effect of using recycled sand in free stalls fitted with sand retaining devices on bacterial concentrations in the free stall. A second objective was to measure the effectiveness of sand retaining devices on sand usage. Treatments included two sources of sand for bedding (fresh or recycled) and three commercial sand retaining devices plus a control. Two sections of 16 free stalls adjacent to the feed alley in a four-row free stall barn were blocked into groups of four. One section was bedded with fresh sand and the second section was bedded with recycled sand. Within each section of free stalls for trial one, each block of four free stalls was randomly fitted with one of four free stall treatments:

control; Pack Mat® (Promat LTD); Sand Trap™ (Topper, Inc.); and Sand Mizer (Don Themm Enterprises, Inc.). In the second trial, we compared the control with the Agriweb™ (Presto Products Company).

Free stalls were stocked at 90 to 100% of capacity throughout the year with a combination of lactating Holstein (approximately 75%) and Jersey (approximately 25%) cows. Fresh sand was dug from a pit and delivered to the dairy by a local contractor. Recycled sand was collected from a sand settling basin after each flush. This basin is located at the end of a cross alley on the west side of the free stall barn and is approximately 2 ½ inches deep. All flush water runs through this basin before going into a gravity separator designed to collect manure solids and any sand washed out of the sand settling basin. The recycled sand was pushed out of the basin twice daily, allowed to drain, and piled outside until needed for bedding. Free stalls were bedded each week to maintain a constant amount of sand in each stall. The amount of sand used on each block of stalls was recorded weekly for six months. Free stalls were hand raked twice daily to remove any manure or wet sand and to maintain the desired shape of the free stall surface. The free stall barn is equipped with fans and a high pressure mister system that operates when the ambient temperature is above 75? F and the relative humidity is below 80%.

The DM concentration of the fresh and recycled sand used for bedding was similar (Table 1). Recycled sand contained more OM and had greater concentrations of most bacteria than fresh sand. Concentrations of *Bacillus* gram positive were higher during May, June, and July than other months of the year for both fresh and recycled sand, but the increase was greater for the recycled sand. A similar increase was observed for *Coryne* sp. from May through September.

Concentrations of bacteria and OM observed in the fresh sand were minute and should not be considered to be a problem. The settling basin used to collect the recycled sand effectively removed most of the manure based on OM concentrations. As noted previously, all flush water is channeled through this settling basin and the recycled sand is removed from the settling basin twice daily. Although differences in bacteria concentrations were detected, concentrations were less than 1,000,000 cfu/g of sand and would not be expected to increase exposure to mastitis causing organisms.

There were no interactions of sand source and sand retaining device. Free stalls bedded with fresh sand had slightly lower concentrations of DM and OM than the recycled sand (Table 2). It is doubtful that these differences would have any biological significance given the minute difference in actual values. Concentrations of *Bacillus cereus*, *Bacillus subtilis, Bacillus* gram negative, and *Staph. sp*. were higher and *Streptococcus dysgalactiae* and yeast were lower in recycled sand than fresh sand collected from free stalls.

Concentrations of DM and OM were not affected by sand retaining devices in the free stalls and averaged 98.1% DM and 1.4% OM (Table 3). Minor differences in bacterial concentrations were observed among sand retaining devices for *Bacillus cereus*, *Bacillus subtilis*, *Proteus* sp. and *Step. dysgalactiae*. In general, concentrations of these bacteria were highest in free stalls fitted with Pack Mat and lowest for the control free stalls or those fitted with Sand Trap, but differences in concentrations were relatively small. Interactions of sand retaining device and sampling date were observed for *Bacillus cereus*, *Bacillus subtilis*, *Coryne* sp*., Proteus* sp., and *Pseudomonas* *aeruginosa*. Concentrations of these bacteria were similar during the initial months of the study and then increased during the warmer months before declining in cool weather. The increase tended to be greater in free stalls fitted with Pack Mat compared with Sand Trap. In the case of *Coryne* sp., concentrations were higher for Sand Trap during March and then declined for the duration of the study whereas concentrations isolated in the control free stalls and those fitted with Sand Mizer were much higher from June through September than the remainder of the study. Similar results were observed in the second trial.

The amount of sand required to maintain free stalls was lower for those stalls bedded with fresh sand (35.7 lb/stall/d) compared with those bedded with recycled sand (39.5 lb/stall/d). The recycled sand had a more crystalline texture which was probably a result of the flush washing out any clay residues that were in the fresh sand. When hand raking the free stalls, those stalls bedded with recycled sand were easier to level than those bedded with the fresh sand.

Control free stalls required 41.5 lb/stall/d of sand to maintain the desired fill and slope. The amount of sand required to maintain the free stalls was lowest for stalls fitted with the Sand Trap (28.0 lb/stall/d) compared to all treatments. Free stalls fitted with the Pack Mat and Sand Mizer required 40.1 and 40.8 lb/stall/d, respectively. In the second trial, the control free stalls required 43.3 lb/stall/d of sand to maintain the desired fill and slope compared with 29.0 lb/stall/d for those fitted with the Agriweb. The amount of savings in sand required for maintaining free stalls with the Sand Trap and Agriweb varies depending on the cost of sand delivered to the dairy, but would range from $12.68 to 35.51/stall/year for sand costing $5 to 14/ton. The savings would be greater for recycled sand depending on the cost of the sand separating equipment or facilities.

These results indicate that recycled sand can be used to bed free stalls without greatly increasing the exposure of cows to mastitis causing bacteria. Sand retaining devices did not greatly affect bacterial concentrations although differences exist among these devices. Of the products tested, only the Sand Trap and Agriweb reduced the amount of sand required to maintain free stalls.

Free Stall Mattresses

There are numerous free stall mattresses available for use in free stalls including those constructed from ground rubber, foam, or carpet padding as well as water beds. Compared to sand and other types of organic and inorganic bedding materials, the initial cost is greater, but labor cost associated with maintenance should be much lower. Most mattresses do require light bedding to prevent hock abrasions and make clean up easier. The major considerations when selecting a mattress are cow comfort and longevity. In general, cows prefer soft rather than hard surfaces (Natzke et al., 1982). The materials used in some mattresses tend to pack or shift over time and lose their softness reducing comfort and increasing leg problems or injuries (House et al., 1994; Rodenburg et al., 1994). Early versions of mattresses using ground rubber covered with fabric without any dividers or cells to keep the rubber in place tended to move resulting in poor comfort or extensive maintenance to move the rubber back under the cow.

One of the more common complaints relates to the durability of the cover. There have been considerable improvements in the covers used on mattresses. I recommend that anyone considering mattresses should visit farms that have had mattresses in place for several years so they can evaluate the durability of the mattress and covering.

Cow preference tends to change over time as cows become acclimated to mattresses. Belgium researchers compared 11 different types of mattresses over four months. There were obvious differences in the preference of cows for mattresses which were softer than most of the other choices and these differences became more distinct over time (Figure 1). The percent of cows using each type of mattress changed from January, when the cows were first introduced to the new mattresses, to April after approximately three months of use. When given a choice, the cows did not use the harder surfaces (A = control free stall with a concrete base covered with sawdust).

We have conducted two studies comparing difference free stall bedding materials. In the first trial we compared free stalls bedded with either Sand Trap™ , Pasture Mat®, Alanta® Waterbeds, or a solid rubber mat (Bernard et al., 2000). Free stalls bedded with sand were used almost 100% of the time. Initial usage of the solid rubber mat was second greatest but usage declined so that by the end of the trial usage was limited. Usage of both the Pasture Mat® and Alanta® Waterbeds was limited initially but increased throughout the trial with equal usage by the end of the trial. In the second trial, we compared usage of free stalls fitted with Pasture Mat ® (Promat LTD), Alanta® Waterbeds (Georgia Duck and Cordage), Comfy Cow Mattress (Sikkema's Equipment) or System 2000 (Don Themm Enterprises, Inc.). The free stalls were stocked at 75% capacity so cows were not forced to use a stall they did not prefer. The percentage of cows laying on each mattress was greatest for the Comfy Cow mattress (54.1%) followed by the System 2000 (41.5%) and Pasture Mat (30.0%) and lowest for the Alanta waterbed (3.8%). Usage of the water bed was much lower than observed in the previous study and may reflect reluctance of the cows to use a mattress that moved when they moved into the free stall (Bernard et al., 2002).

Conclusions

The most important aspect to remember when selecting a bedding material for free stalls is that it must be clean, dry, and comfortable. Failure to meet all of these criteria will result in reduced cow comfort which limits milk yield and increases stress and exposure to mastitis causing organisms. In regards to bedding material, sand is the most desirable but the sand does not work well in most manure handling systems if it is not separated from the waste. Recycled sand can be used for bedding free stalls if the organic matter content is kept below three percent and stalls are properly managed. Free stall mattresses can reduce daily labor requirements, but the initial costs are greater and they do not completely eliminate bedding. There are many mattress systems to choose from and there is no one ideal product for all operations. Producers interested in installing mattresses should visit dairies that have experience with mattresses to get first hand information on cow use, maintenance requirements, and durability.

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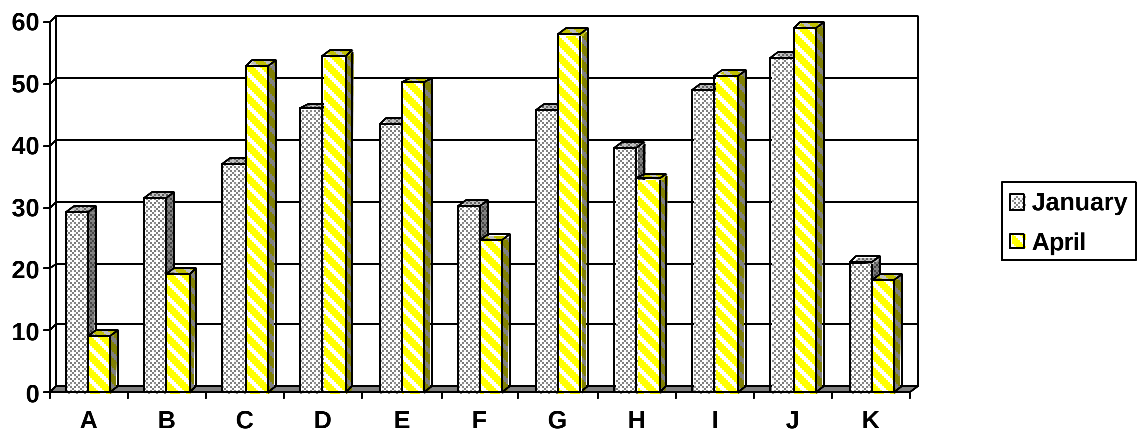

Figure 1. Percent of free stalls fitted with different mattresses when initially installed in January and after approximately 3 months use in April (Sonck et al., 1999).

Table 1. Analysis of fresh and recycled sand used to maintain free stalls.

Item	Fresh	Recycled	SE	P <
DM, %	96.6	96.3	0.3	0.48
Ash, % of DM	99.4	98.9	0.09	0.001
OM, % of DM	0.6	1.1	0.09	0.001
	----------------- cfu/g of sand -----------------			
Bacillus cereus	3,818	22,898	4,010	0.01
Bacillus subtilis	1,455	9,855	1,806	0.01
Bacillus gram negative	5,271	79,471	10,480	0.001
Bacillus gram positive	32,363	60,663	5,615	0.01
Coliform	0	400	156	0.10
Coryne sp.	23,091	31,191	4,317	0.22
Nocardia sp.	182	0	141	0.34
Proteus sp.	3,817	0	2,976	0.36
Strep. uberis	3,273	4,873	1,329	0.42
Staph. sp.	1,364	7,164	3,815	0.31
Mold	182	982	418	0.21
Yeast	0	800	432	0.22
Klebsiella sp.	1,273	9,673	2,648	0.05

Table 2. Analysis of fresh and recycled sand collected from free stalls.

Item	Fresh	Recycled	SE	P <
DM, %	97.97	98.21	0.08	0.05
Ash, % of DM	98.86	98.36	0.03	0.001
OM, % of DM	1.14	1.64	0.03	0.001
	------------------ cfu/g of sand ------------------			
Bacillus cereus	14,519	22,734	1,692	0.001
Bacillus subtilis	9,931	12,126	1,009	0.05
Bacillus gram negative	79,888	121,749	9,598	0.05
Bacillus gram positive	272,217	331,123	177,042	0.21
Coliform	40,668	21,062	10,373	0.29
Coryne sp.	76,496	85,731	6,896	0.34
Nocardia sp.	2,607	2,785	339	0.82
Proteus sp.	58	96	67	0.31
Pseudomonas	94	53	51	0.31
Strep. dysgalactiae	5,406	1,498	749	0.01
Strep. faccalis	5,854	1,942	1,827	0.16
Strep. uberis	26,999	23,437	2,385	0.49
Staph. sp.	18,630	30,573	3,367	0.05
Mold	3,028	3,700	598	0.48
Yeast	2,525	1,304	409	0.04
Klebsiella sp.	2,649	4,171	576	0.20

Table 3. Analysis of sand in free stalls equipped with sand retaining devices.

	Control	Pack Mat	Sand Mizer	Sand Trap	SE	P <
DM, %	98.10	98.15	97.95	98.14	0.11	0.52
Ash, % of DM	98.63	98.58	98.56	98.66	0.04	0.25
OM, % of DM	1.37	1.42	1.44	1.34	0.04	0.25
	------------------------ cfu/g of sand --------------------------					
Bacillus cereus	14,674[b]	22,875[a]	21,531[a]	15,427[b]	2,404	0.01
Bacillus subtilis	9,489[b]	14,292	10,512[b]	9,822[b]	1,434	0.01
Bacillus gram negative	128,902	87,875	106,960	79,538	13,640	0.25
Bacillus gram positive	332,973	368,708	254,729	250,272	33,422	0.10
Coliform	43,530	18,625	47,861	13,445	14,742	0.27
Coryne sp.	87,191	86,833	86,611	63,820	9,800	0.15
Nocardia sp.	3,524	2,792	2,444	2,023	483	0.27
Proteus sp.	83[ab]	250[a]	0[b]	0[b]	92	0.00
Pseudomonas	26	0	85	185	73	0.13
Strep. dysgalactiae	2,794[b]	5,458[a]	5,506[a]	50[c]	1,064	0.01
Strep. faccalis	3,774	667	8,372	2,790	2,596	0.14
Strep. uberis	22,212	29,500	24,770	24,391	3,390	0.49
Staph. sp.	26,812	30,833	23,394	17,367	4,785	0.13
Mold	4,256	3,917	3,330	1,950	850	0.18
Yeast	1,521	2,292	2,073	1,770	581	0.80
Klebsiella sp.	4,021	2,666	2,293	4,659	819	0.35

[a,b]Means within a row with unlike superscripts differ ($P < 0.10$)

Notes

Strategies for Dairying Success in the Future

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29 Steps to Successful Dairying

1. Set vision goals (at least ten years ahead/dream possible potential).

2. Visit trend setting farms at least twice a year.

3. Read everything you can get your hands on. Think outside the box. You can't make an omelet without breaking the shell.

4. Facts of dairying are what we think are right. New concepts are put into practice by people who allow themselves to ask the question "why do we do things this way?"

5. We in farming are controlled by four basic parameters:

   A. The weather - can't do much about it.
   B. Cost of inputs - can nickel and dime suppliers but must pay the market price.
   C. We get a milk check twenty days after sending to market for what they thought it was worth.
   D. Efficiency - produce the desired result with a minimum of labor, expense, and maximum production.

   Of these four, efficiency is the only thing that we as dairy farmers control to a large extent. Put your efforts into your operation and don't spend much gas running to government to solve our so called problems. I believe in less dependence on begging and more power in bargaining. Learn to bargain with strength by volume of milk with the highest quality. So let's zero in on efficiency, which is the opportunity which we have direct control over.

6. We" think" that finances are the limiting factor when it really is not the issue. A well planned concept that has a three to five year payback will always catch the banker's approval. Adversity could happen to make it take two more years which won't cause it to fail. If it doesn't meet this criterion, it's not worth the investment. To dairy with a lesser plan should cause you to stop dairying and invest in the stock market instead. Aim to dairy profitably, then it's exciting and challenging and not so stressful.

7. Now we are ready to begin an exciting, enjoyable, and efficient dairy system.

8. First, put that new born calf in a good environment so that it will be able to express

its true genetic potential. Bottle feed colostrum from frozen milk from the older cows in its first half hour of life. Don't let it nurse the cow period. Be sure to dip its navel with iodine at least twice in the first four hours of life. Repeat with like colostrum for second feeding with a nipple bottle.

9. Day two. Train it to drink from a bucket to save labor. Provide free choice nipple water supply in order to guarantee fresh water. It has the natural instinct to suck and will drink more of it; it's low cost and good for the calf. Hand feed in its mouth after the milk feeding with a good starter ration for at least three days to encourage ration consumption. Sour the cows' three day colostrum plus any hospital milk in an old bulk tank at 45 degrees F for twenty days. This milk is better and virtually free (not a $50 bag of powdered milk per calf). Save money wherever you can.

10. Should be able to stop feeding milk in four to five weeks, not 60 days or so. Saves labor and cost of milk. The calf will do well.

11. Leave in same pen for one week after weaning to observe its individual grain consumption better.

12. Group it with not more than six calves of similar age in order to cut down on competition in a three sided shed facing southeast. Begin to feed corn silage and the same calf starter feed.

13. Three weeks after weaning blend starter ration with a good grower calf pellet for a week self feed. Fourth week, change to growers pellets. They are cheaper.

14. When they are eating four pounds of grower pellets per day then introduce TMR feeding.

15. Eye score them monthly and adjust ration to maximize growth.

16. It takes good groceries to get the heifer to 750 pounds by thirteen months. They are ready to be artificially bred with semen of known calving ease. Continue to maximize growth with a well balanced ration so that they weigh at least 1200 pounds at calving. For every month delayed calving cost is about at least $75 per month and no milk check to support its cost.

17. I'm going to skip over the cow care area in order to keep to my 29 points, but raising the heifer well is where the profit starts to take place. Do it well with a goal of less than 2% mortality instead of as much as 10% to 15% experienced on many farms. If you accomplish this, the cow will have the ability to stay in the herd for five or more productive lactation, not the average three lactations of many farms. Remember it takes the second lactation to begin to see a net profit. So let's equip them to have the potential to be profitable. This system takes less labor, feed, and has the potential for much higher profit.

18. The dairy cow profitability is often limited by forages that were made weeks too late (not at the right stage of maturity). Remember also after the crop is cut it aspirates nutrients at the rate of 2% lost per day until it is sealed in the silo. Don't chop too fine and use a silage preservative, cost thirty cents per ton. Remember to do a "great" job of covering it after filling to minimize lost. Forget hay making and feeding; not needed.

19. Have well planned cattle facilities in order to maximize labor input: a one person parlor as an example.

20. Invest in buildings, equipment, quality animals and well trained motivated people who can meet the above pay back guidelines.

21. Have a goal of one cow and replacement per acre of cropland. Fertilize with manure and some bought nitrogen fertilizer to meet goals.

22. Get culling rate below 25% in order to maximize profits. Thirty per cent of culls should be done because of below average production.

23. Have a good record keeping system in order to be able to measure progress. Compare your achievements with the top ten per cent of dairymen. Remember if yours is just average you're working for minimum wages and not much profit.

24. Pick the low hanging fruit first where the greatest profit potential is.

25. Don't invest in land until you have the dairy system working. Buy land with cow profits. $3000 land per acre at eight per cent interest equals $240 per year for interest plus $10 taxes, principal payment over twenty years at $150 per year equals $400 annual cost. For this you may have $100 net cropping profit. You are short $300 per year. Investing in a well designed dairy should buy a per cow cost of $3500.

    $1200 heifer ready to freshen.
    $1000 six row free stall barn built for a twenty year life and then self destruct, its obsolete!
    $ 800 parlor facility with equipment for ten year life, then obsolete.
    $ 500 silo and etc.
    $3500

26. A 24,000 herd average should net at least $700 per year per cow, not a short fall of $300 per year in land investment.

27. Be willing to hire others to do what you are not good at. Be sure you know what you do well.

28. Take time off in order to recharge your optimism and enjoy life.

29. Select successful mentor dairymen and then copy them.

Get off dead center and move ahead with your plan. Nobody is going to do it for you. Take control of your destiny. Be happy and enjoy life. Your children will then want to be farmers too! Stay tuned for more info from the PA stake holders who are committed to profitable dairying with a future.

Notes

Latest on Tunnel Barns for Cow Comfort

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Hot Humid Weather causes heat stress in dairy cows which leads to a decline in feed intake, milk production, and fertility. Somatic cell counts also increase for herds in the Southeast in the summer months. In the past fifteen years, much work has been done in reducing the effects of heat stress on dairy cattle. These include the use of shade, consisting of hard roofs and shade cloths. Fans and low pressure sprinklers in feed and free stall barns, high pressure foggers and fans in barns, and cooling ponds (Bucklin et al, 1991).

Tunnel Barns in the Southeastern United States

The poultry and swine industries have used tunnel ventilation for many years in the south. These barns are usually low and long with side curtains and large fans on one end of the barn. Cooling was provided by evaporative cooling of the air to reduce air temperature and raising humidity in the barns. This cooling was provided by running water over “cool cells” or fiber pads in the opposite end of the barn from the fans.

Early work on this technology was done in Florida in a small barn using a small number of cows. It provided adequate cooling to keep cows in the thermo-neutral zone, but it was very hard to keep running due to air loses in the ill- designed barn (Taylor et al, 1986). A small tunnel barn was built in Mississippi with cool cells and they reported that these cows stayed cooler and produced more milk than cows housed in an open free stall with both fans and sprinklers (Chapa et al, 2003).

2001 Florida Study: Fan and Sprinkler Tunnel Free Stall Barn vs. Fan and Sprinkler Open Free Stall Barn

In 2001, an open free stall barn was converted to a tunnel barn. The barn is 100 feet wide by 400 feet long with an eave height of 15 feet, 4:12 roof slope with a closed ridge vent. The underside of the metal roof was sprayed with insulating foam. The barn has canvas curtains on the side walls and an open front. It is a four row, tail to tail, free stall barn with a drive through feed alley (Figures 1&2). Evaporative cooling was provided by sprinklers mounted above the feed face. Ventilation was provided by 30 belt driven, 48” exhaust fans with 1 hp motors. One half of the fans were activated when the barn temperature exceeded 72? . At 75? all fans were activated. The sprinklers were also activated at 72? and ran for 1.5 minutes every five minutes.

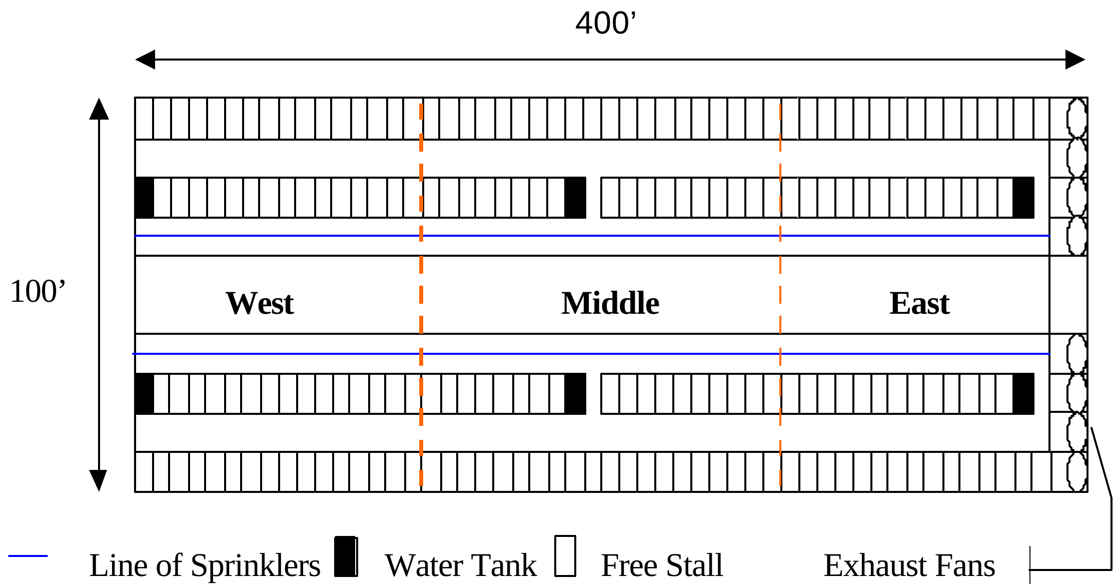

Figure 1.

Environmental conditions were read hourly by data-loggers located next to the exhaust fans (east), in the center of free stalls and at the end opposite the exhaust fans (west) as shown in Figure 1. Ambient dry bulb temperature and relative humidity were recorded and was used to calculate THI as a comfort index.

Environmental conditions observed in the tunnel ventilated barn were compared to conditions in another free stall barn 500 Feet away. Dimensions of both barns were the same. The second barn was open sided with a roof ridge vent one yard wide. Roof slope was 4:12 (33%), the same as the first barn, but the metal roof was not insulated. The second did not have exhaust fans. Instead, it was ventilated with three 23 Foot diameter, ten blade, ceiling fans driven by 0.75 hp motors. The fans were mounted in the middle of the barn over the feed alley (Figures 2 & 3).

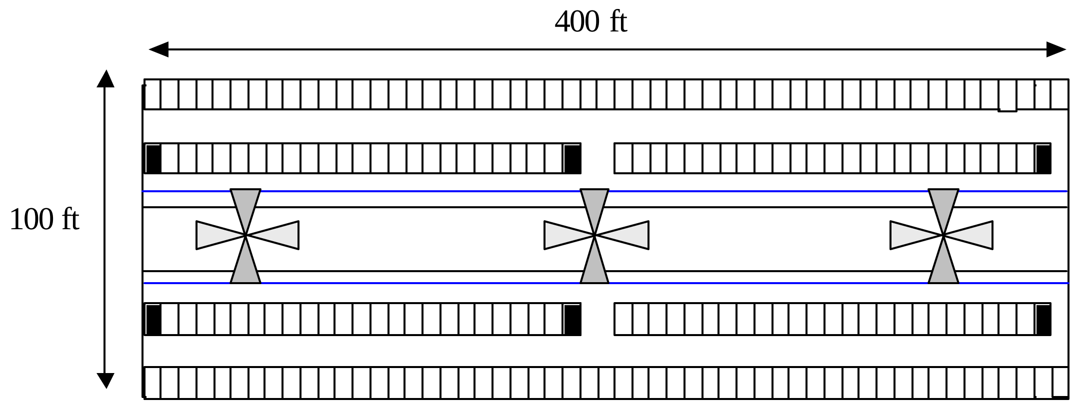

Figure 2.

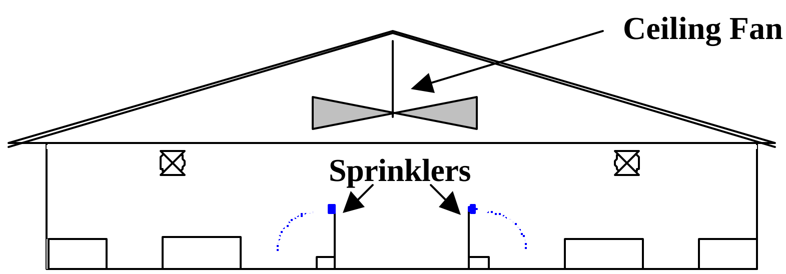

Figure 3.

In addition to ceiling fans, forty- 36" diameter, (0.5 hp) fans were located over the free stalls. These fans were located 16 Feet apart, 10 Feet above the floor. The sprinklers were identical to those in the tunnel barn using same timing and temperature set points.

Temperature and relative humidity were measured manually each hour from 11am to 4 pm. Data was collected at three locations inside the barns and the average of the three values was used with Equation 1 to calculate THI values. SAS (SAS Institute, Inc.) was used to analyze results using randomized block design and Tukey's Test at 5% probability.

As shown in Table 1 and Figure 4, environmental conditions in both the barn equipped with the sprinkler evaporative cooling system and in the barn equipped with ceiling fans were more comfortable for cows than conditions observed outside.

Table 1. Comparison of hourly averages of dry bulb temperature, relative humidity, and THI for sprinkler evaporative cooling (TUN) combined with tunnel ventilation, ceiling fans (CF), and the outside environment.

Time Observed	Temp? Out	TUN	CF	RH (%) Out	EVAP	CF	THI Out	TUN	CF
11 am	88.3a	80.4b	82.0ab	61.4a	66.6a	65.1a	82a	76b	77ab
Noon	92.0a	82.9b	83.5b	53.2a	60.1a	60.7a	83a	77b	78b
1 pm	94.6a	85.2b	85.1b	49.7b	53.8ab	56.8a	84a	78b	79b
2 pm	95.9a	85.5b	87.8b	43.3b	51.3a	50.2ab	84a	78b	79b
3 pm	94.5a	86.0b	88.5b	47.2a	52.8a	52.5a	83a	78b	79b
4 pm	91.6a	84.9b	86.0b	45.5a	51.4a	47.0a	81a	78b	78b

Averages followed with equal letters for the same parameter; do not differ among themselves for Tukey Test at 5% probability.

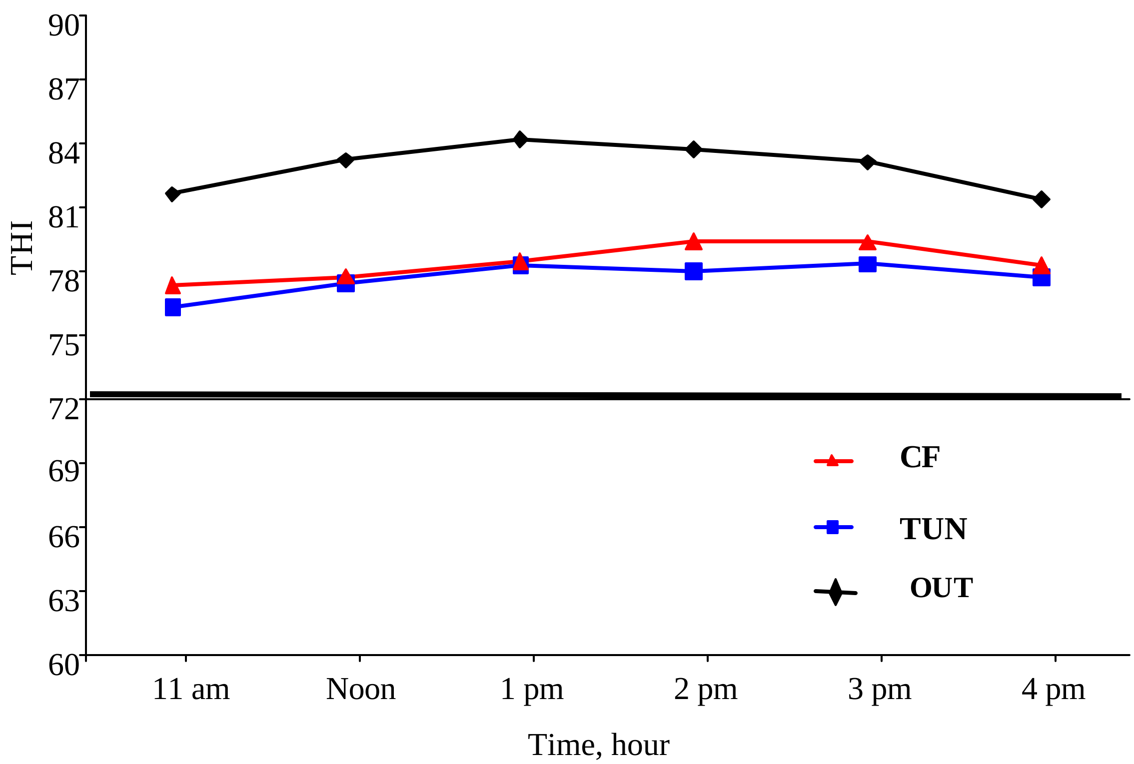

Figure 4. 64-day average values of THI for each treatment. TUN- sprinkler cooling with tunnel ventilation; CF- sprinkler cooling with ceiling fans; OUT- outside.

Environmental conditions inside the two barns were not statistically different. THI values above 72 are considered to produce heat stress for producing cows (Armstrong,1994). The average THI value was 83 for the external environment and 78 for the two barns.

Body Temperatures

Cow body temperatures were taken at various times in the barns. There was no difference in cow temperatures in various barns.

Summary of 2001 Study

In this initial study, there was no difference in THI between a tunnel barn and an open free stall barn.

2002 Study: North Florida Holsteins

In this study, we compared three different barns: the original tunnel barn, the original open free stall barn, and added another tunnel barn.

The third barn was a converted free stall barn. 100 Feet wide by 600 Feet long, 12.5 Feet at the eaves and a 1:12 roof pitch. This barn had the identical sprinkler system with thirty-eight, 50"belt driven, 1hp fans. These barns are designed for at least one air change in the barn per minute. This longer barn had 1,000,000 Cfm's capacity.

Barn Data

Temperatures and relative humidity were recorded every 15 minutes, from the open end, middle, and fan end of the barn, and outside of the barn. There was no difference in the temperature or relative humidity by location inside the barn.

Cow Temperatures

Cow body temperature was taken every 15 minutes by sensors placed in the cows ears. There was basically no difference in body temperature of the cows by barn because the method of cooling the cows was wetting the cows back with water and using air flow to evaporate the water and cool the cows. In the tunnel barns, we used big fans at one end of the barn, in the open free stall many small fans were used (Figure 5).

The only data collected on the large ceiling fans was one day when all the small fans were shut off and only three large ceiling fans were used to evaporate the water from the cows' backs. The result of this study was that these fans did not have enough air movement to evaporate the water off the cows' backs and the cows exhibited open mouth breathing. The little fans were turned back on.

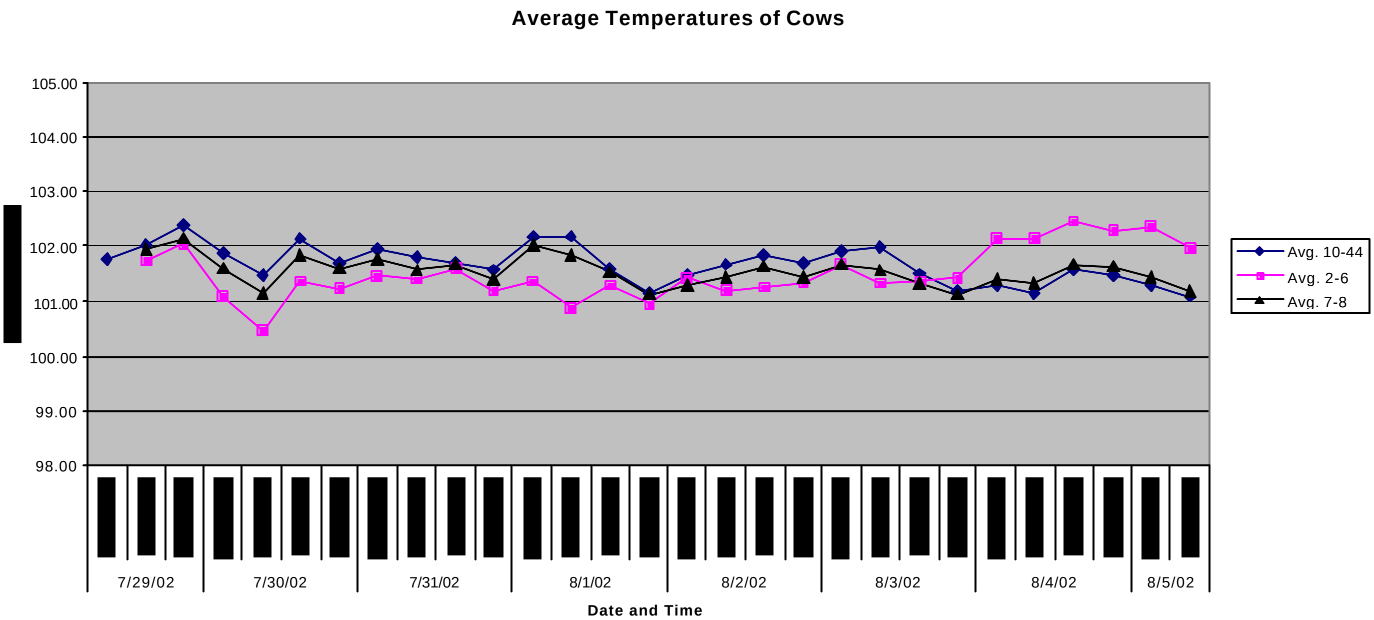

Figure 5.

Other Observations of These Studies

1. Cows got over heated at night if the sprinklers were not run. No matter what type of barn you have, on hot summer nights in Florida run sprinklers all night. Set thermostats in barns to 70-72? .

2. The greatest drop in cow body temperature occurred at milking time. These cows were run through a cow wash pond. They were washed with floor mounted cow washers, then were fanned and sprinkled in the holding area. Many cow temperatures dropped to sub normal, 99? ; therefore cow washing is a good thing.

3. One of the problems with fan and sprinkler systems is keeping the fans clean. In the open barn systems we have natural air movement even if the fans were shut off or dirty. This air movement will dry some water off the cows back and aid in the cooling process in warm weather. In cold weather conditions, this natural air movement and an open ridge vent will remove heat, moisture, and gasses from the barns. In tunnel barns we need 5-8mph air movement where cows are located,(laying and eating). If fans are not cleaned within six months air movement will drop to 3mph or less. This leads to hot cows and ammonia filled barns.

4. Tunnel barns need to be ventilated all year around. Fan thermostats temperature should be set by more than just temperature. A few fans may keep barn temperature at a desired level, but the humidity and ammonia in the barn will make it uncomfortable for cows and humans.

5. Tunnel barns are only effective if the barn doors are closed. Care must be taken when feed cleanout is done and during the actual fed delivery process, also during the manure scraping process if done. If not monitored the back door maybe kept open and no cooling will take place.

6. Rear-door technology needs to be improved. It takes a good garage type door to withstand a million Cfm's. Thoughts of an enclosed turn around in the fan bay area might be in order.

7. Tunnel barns might allow southeast dairymen the opportunity to use modified daylight schemes because of the enclosed barn.

8. If tunnel barns are to be used only as fan and sprinkler barns, before building one compare the price between that and an open free stall barn. Open barns are usually much less expensive.

9. It seems that "cool cell" technology is too expensive to purchase and maintain. The new high pressure fog systems may give the opportunity to cool the air in tunnel barns. This would give cows a cool environment any where in the barn and eliminate sprinkler water mess, except at night when sprinklers may be needed to cool cows at night.

Summary

1. Cool cows.
2. Tunnel barns need more maintenance of fans since it is the only way to get air in the barn.
3. Visit, visit, visit.
4. Build what you like.

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Notes

Can Dairy Farming be Profitable in 2010?

What you should consider to position your business for success

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"You've got to be careful if you don't know where you're going, because you might not get there" -- Yogi Berra

Can Dairy Farming be Profitable in 2010?

While it is tempting to respond to my assigned title for this presentation, with a resounding *"YES"*, I think it is important to consider the dynamics of rapid change within the industry from both an **internal** (to your business) perspective (Strengths, Weaknesses), and an **external** perspective (Opportunities and Threats) (SWOTs) facing your business and the dairy industry, as you consider how to best position your business for the next 5-10 years and beyond. I believe the following five areas (**5**-**M**'s) should be considered **key drivers** to the current and future positioning of your dairy business and the industry.

Marketing

- De-regulated environment, reduction/elimination of Federal Milk Marketing orders
- Increased emphasis on risk management strategies (inputs and outputs)
- Alliances, partnering, merging, increased "grass-roots" vertical integration
- "Designer genes - designer cows" – a niche for some
- Consumers "make the rules": food safety issues (biotech), animal care, environmentally friendly
- ____________________

Management

- Business vs. "way-of-life"
- Business management skills
- Personnel management – operational systems (Quality Management Systems eg. ISO-9001:2000)
- Integrate decision-support systems for improved decision-making
- Adoption of profitability enhancing technology and management practices
- Positioning to grow the business (sustained growth)
- __________________

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Manure

- Environmental regulations - variations by state and county, region - will EPA level playing field? (regulations & investments)
- Competitive advantages/disadvantages by region of the US
- Sharing the investment burden (15-20% increase in capital investment for environmental management) with public
- Nutrient management / crediting, continued focus on water quality, increased focus on air quality and emissions (CERCLA, Safe Harbor), digesters (CH_4 (co-generation) and H – fuel cells?)
- Implementing Environmental Management Systems (EMS) – ISO-14001
- ___________________

Money

- Access to capital for re-capitalization and growth
    - Increased use of equity/investor capital, equity-gap financing
    - Loan guarantee programs
    - Lenders that understand dairy
- Development Instruments
    - TIF districts
    - State/regional economic development initiatives
        - Recruiting initiatives
    - Industrial Revenue Bonds
    - Jobs training
- ___________________

Mind-Set

- Business/industry attitude
    - Positive, proactive, progressive
    - Business mind-set (control the things you can)
    - Industry leadership/representation?
    - Promoting community, state economic impacts
    - "Great place to produce and market milk"
- Why do "relocators" go where they go?
    - Agribusiness-friendly
    - Economic vitality, employment, growth-mentality
- ___________________

While the 5-M's above, provide a framework for consideration it is important for you to drill-down with respect to your business using a SWOT (Strength, Weaknesses, Opportunities and Threats) as you position for the future. The following is only an example, that will hopefully encourage you to start with an empty table and complete it for **your** dairy business.

Table 1. Example SWOT Analysis Framework Across "5-M's".

Area	Strengths	Weaknesses	Opportunities	Threats
Marketing	Increased use of risk management tools	Seasonality of supply/demand, replacement rate and downer-cows/marketing culls	CWT or similar initiatives, international market development	Potential for increased vertical integration, elimination of Federal Orders
Management	Commitment to people and systems	Shortage of management talent / lack of attraction to the industry	Career path in dairy management	Human resource development and growth
Manure	Compatible with cropping systems	Water and air, contaminants, odor, flies, dust, nutrient management	Digesters (CH4 or H?), credits (carbon, green energy)	Confusion of regulation, non-science-based citizen groups, public hearings
Money	Favorable returns will attract debt and equity capital	Lenders that understand the dairy business	Growth in equity capital for dairy, international,	Lenders and/or investors don't see or understand opportunities
Mindset	Willingness to develop strategic relationships	Desire to maintain autonomy ("us and them" mentality)	Community economic impacts	Continue with doing business in a traditional fashion as the rate of change accelerates

Dairy Industry Overview, Challenges and Opportunities

Long-run returns (excluding asset appreciation) in the dairy sector have been quite low, making it difficult for many producers to justify making the necessary capital investments needed to take advantage of new technology, economies of size and scale and improved production and management systems. Capital investments in the dairy sector have typically resulted in low returns (2-4% Return on Assets (Fair Market Value Basis), ROA), due in great part to the over-investment in machinery, buildings, equipment and land. The challenge for the future as margins continue to tighten is to focus on the operational systems that produce cost-effective levels of milk output while employing assets that will provide the greatest returns and reducing (or resisting) investments in the lower return assets. In many situations this may mean increasing the level of specialization within a dairy farm business and having other businesses provide inputs and services (feed, heifers, contract breeding and veterinary services, contract manure handling, etc.) to the business.

Profitable dairy farm businesses can be characterized by high production efficiencies, excellent cost control and high capital efficiency. A business's expectations of the possible future gains from an investment or change in management practices or technology, must be based in part on past performance, and in part on forecasts of expected future performance within the expected business climate. The dairy profit equation is quite simple— profit = (price - cost) x volume.

Therefore, there are three ways to increase profitability:

- Increase price
- Decrease costs (operating and capital costs)
- Increase output volume

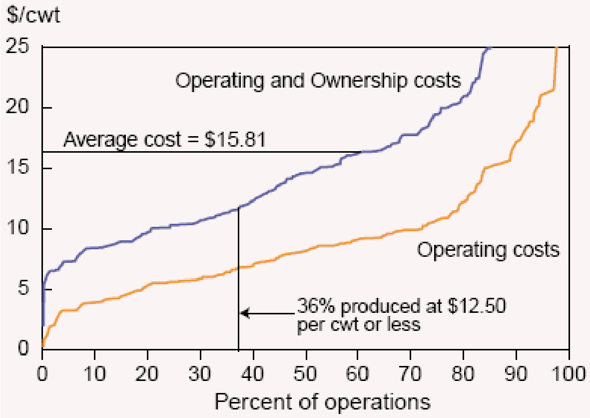
These are the dairy manager's three primary control factors for maintaining or increasing profits. Management is challenged to find the best balance among these three factors. A change in cost, volume or price will likely affect one or both of the other two factors.

The best a business can do is to estimate the range of possible future costs and expected returns and the relative chances of earning a high or low profit on the particular investment(s). All dairy managers faces this complex of operational and investment decisions as they position their businesses for the future, the same as does any business.

Characteristics of US Dairy Operations – Operating and Total Costs

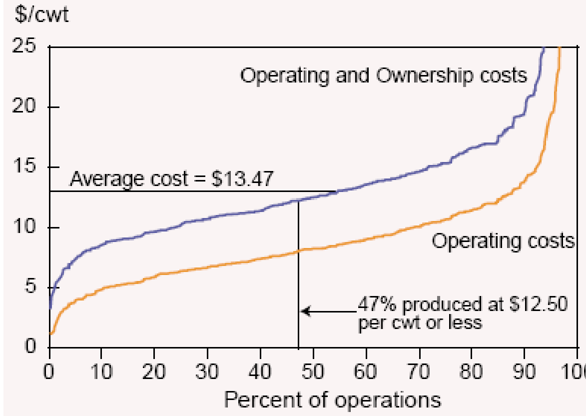
The following figures from a recent USDA-ERS publication (While*McElroy, et. Al., 2002. Agricultural Income and Finance Outlook. USDA-Economic Research Service. AIS-79. Sept. 26, 2002*) depict the average estimated operating and full cost of production by size of business. These average cost and relationships reinforce the well-known economies of size characteristic of the US dairy farming sector.

Figure 24
Small dairy operations (less than 50 cows)



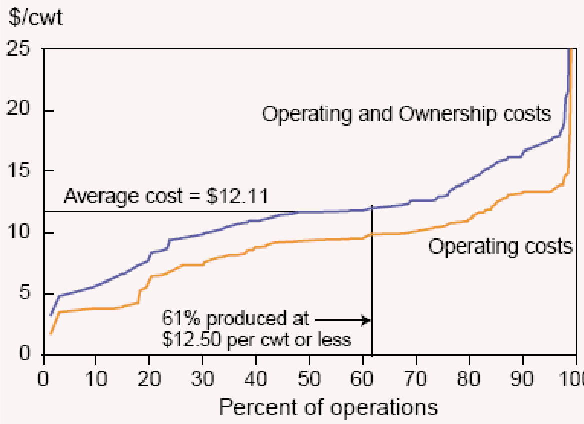
Source: 2000 dairy ARMS survey.

Figure 25
Medium dairy operations (50-199 cows)



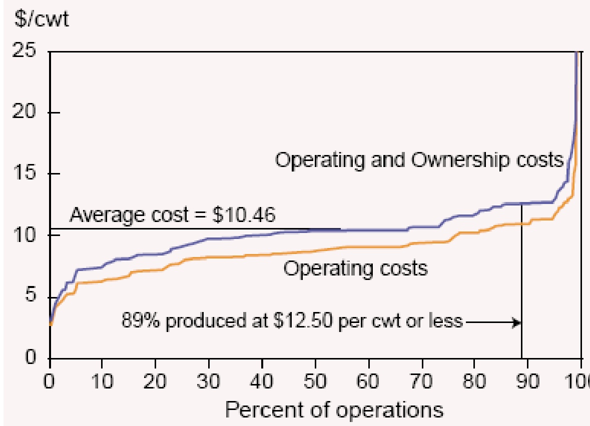
Source: 2000 dairy ARMS survey.

Figure 26
Large dairy operations (200-499 cows)



Source: 2000 dairy ARMS survey.

Figure 27
Industrial-scale dairy operations (500 cows or more)



Source: 2000 dairy ARMS survey.

The well managed smaller-sized operations can be very cost competitive with larger sized dairies in relationship to operating costs or operating efficiencies as depicted in the four figures above (Figures 24-27, from McElroy, et. al., 2002). **Note in particular that the percent of farms with operating costs below say $10/cwt are reasonably similar across herd size ranges.** However, the advantage is typically reduced when ownership costs and other fixed costs are added to arrive at total economic costs of production (operating and ownership costs, see figures, above). Therefore, the short-run survivability of many dairy farm businesses is achievable while not being concerned with capital replacement costs, which of course are real costs and must also be accounted for when planning for the longer-term viability and sustainability of the business. In the short-run, a focus on improving operational efficiencies (e.g. operating expense ratio) will help improve operating profits. However, a dairy business with high capital investments per cow (or pound or cwt of milk sold) will negatively impact the ability of the business to grow, which is characteristic of many small and average-size dairy operations in the US. Many dairy farm businesses are over-capitalized and/or have invested in lower-return assets that dramatically impact the ability of the business to produce competitive returns. Taking a critical look at both the operating efficiency and capital efficiency of any business is important to the future success and sustainability of the business. Businesses with Return on Assets (Fair Market Value basis, ROA) greater than the average cost of capital have the opportunity to use leverage (debt capital) effectively to enhance the opportunity for the business to grow, which is a characteristic challenge for many average-sized dairy businesses across the US.

The typical 90 cow dairy operation will have a work force of 2-3 full-time equivalents, comprised of the owner and family members, providing all labor and management to the business. In contrast, the typical 1,800 cow dairy operation will have a work force of 15-20 full-time equivalents, comprised of one or two full-time herd managers, a dairy operations manager and/or general manager, outside or feed manager and a parlor manager. The ability of these businesses to specialize in specific areas of responsibility is quite different. The larger business, in addition to being able to capture the economies of size, will typically also achieve greater levels of specialization due in great part to the depth of management. The smaller sized dairy businesses will typically be more diversified business operations, often raising their own forages, raising their own replacement heifers thereby spreading their management thin across the respective cost and profit centers under their control.

More and more of the larger dairy operations are specialized milking operations and are typically having their replacement heifers custom-raised or sell heifer calves and buy springing replacements, as needed. If and when there are seasonal milk production needs that are somewhat predictable, within their annual marketing plans, there is obviously a greater opportunity to adjust herd inventories (and number of cows milked) by managing within-herd milk production levels and herd numbers. A larger specialized dairy operation can more easily decide to milk a portion of their herd 3-times per day and the balance of the herd 2-times per day, thereby adjusting their level of output and also managing operating expenses, particularly milking labor. Due to the fact that the larger producer uses primarily purchased feeds versus home-raised feeds (or pasture in many cases), the seasonality of milk production is usually less of a management challenge as there is a greater ability to target the feed purchase decisions to the herd and milk market needs from a planning standpoint. The larger more specialized operations have a much lower risk exposure in most situations to the risks associated with farming/cropping operations and are typically forward contracting both forages and concentrates and byproduct feeds, often a year in advance, thereby having much more control over the variability of input costs than the diversified operations (usualy the smaller dairies that are producing their forage and even some of their grain).

The larger dairy operation has the ability to market tanker-load quantities of milk every day, which is a clear competitive advantage from a milk marketing standpoint than the average-sized producer. The larger dairy operation is in a much more favorable position to consider the application of on-farm milk concentration technologies (reverse osmosis and ultra-filtration) as another means of effectively matching their milk production more closely with their local market needs, while having the flexibility to move concentrated milk to more distant markets in a cost-effective manner.

While any dairy business has the ability, often through their milk marketing organization to take advantage of the price risk management tools available to them, the larger operations, with more depth of management and/or with greater ability and willingness to hire consultants, to assist with the development and implementation of a comprehensive marketing and risk management program, are more likely to have an input and output price risk management program. The milk futures and options markets available on the CME (Chicago Merchantile Exhange), while available to all dairy producers to manage their milk price risk, have contract sizes of 200,000 lbs. which are more compatible with the larger producer than average-sized producers. The minimum contract size coupled with the transactions costs and management time required to manage milk price risk tends to favor the larger dairy operations ability to implement them.

The capital intensiveness of the dairy farming business represents a challenge for all dairy producers. However, the corresponding economies of size in milk production are real and certainly favor the larger dairy operations that are in a position to make the level of investment needed to capture these economies while still maintaining a high level of operational efficiency.

Investing in Productive Assets Allows for Improving Capital Efficiency, Growth and Sustainability

Figure 1 below shows the impact of asset utilization, measured by asset turnover ratio (ATO) on business growth over a period of 40 years. The two farm businesses (Farm 1 and Farm 2) both started with $750,000 in total assets. Farm 1 had an average asset turnover of .50 over the course of 40 years compared to .25 for Farm 2. In addition, Farm 1 had an operating efficiency (operating profit / value of farm production) of 40% compared to 25% (more typical of the average dairy farm business) for Farm 2. The combination of these two factors (which when multiplied together result in Return on Assets (ROA) has an obvious impact on the growth potential of a business. Both farms were utilizing 25% of operating profit each year for growth of the business. Many dairy farm businesses are over-capitalized and/or have invested in lower-return assets that dramatically impact the ability of the business to produce competitive returns. Taking a critical look at both the operating efficiency and capital efficiency of any business are important to the future success and sustainability of the business. Businesses with Return on Assets (ROA) greater than the average cost of capital have the opportunity to use leverage effectively to enhance the opportunity for the business to grow over time.

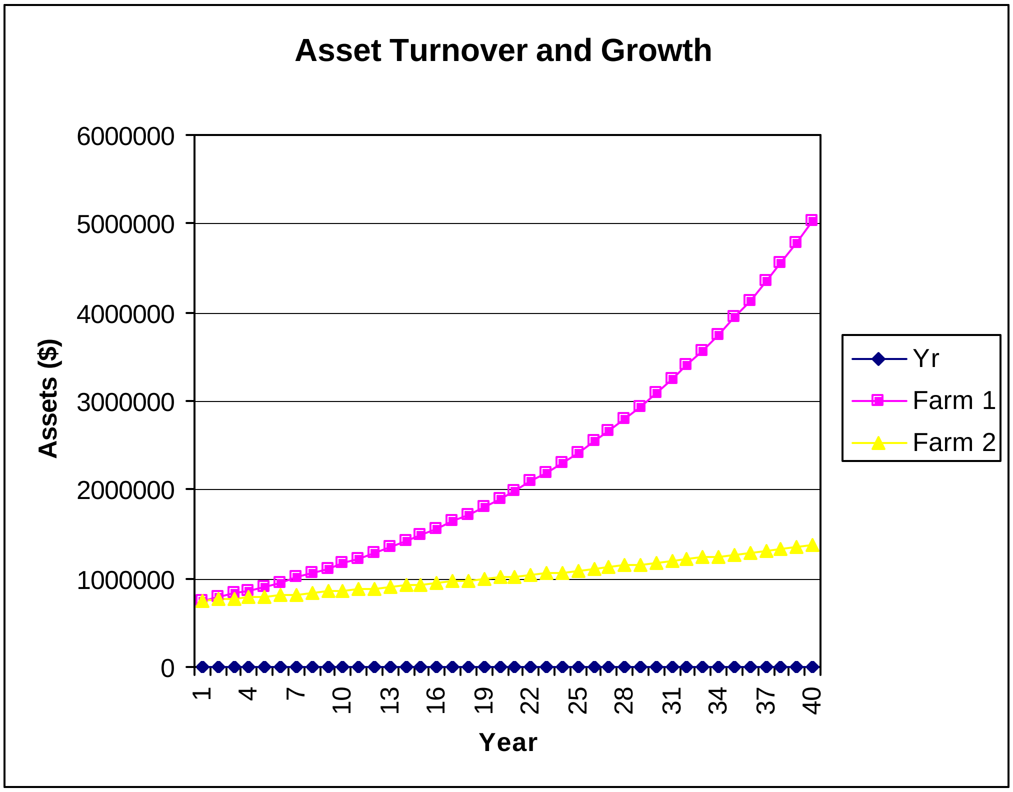


Figure 1. Impact of asset utilization on growth

Summary

The progressive dairy manager of today and the future recognizes the importance of adopting and implementing profitability-enhancing production and management practices and techniques, with a keen eye on the “bottom-line”. He/she views the dairy farm as a business and him/herself as a business manager striving to achieve business and family goals through the operation of a profitable dairy farm business, now and into the foreseeable future. Performing a SWOT analysis and using benchmarking (e.g. DBAP) are ways to identify impending problems and assist in pointing a business toward the opportunities for improvement. Using objective measures of performance assists in focusing attention where attention is most needed and allows for learning, that should translate into continuous improvement within the business. Careful scrutiny of all investments (improving capital efficiency) and vigilant cost control (improving operational efficiency) will go a long way toward increasing the chances of success for most dairy businesses, today and in the future.

“What gets measured gets done, has never been so powerful a truth” – from: “Thriving on Chaos, Tom Peters

References

McElroy, R., R. Strickland, J. Ryan, C. McGrath. R. Green, K. Erickson and W. McBride. 2003. Agricultural Income and Finance Outlook. USDA-Economic Research Service. AIS-79. Sept. 26, 2002.

Notes

Under Construction: U.S. Animal Identification Program

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The livestock industry in the USA appears to be rapidly moving toward the adoption and implementation of a national animal identification plan. The purpose of such a system is to improve the ability of the industry and state/federal regulatory officials to provide satisfactory animal herd health surveillance and respond to outbreaks of significant disease threats. These disease threats may be a result of naturally occurring disease outbreaks or a result of intentional terrorist introduction of disease to the nation's herds. The goal of the proposed national animal identification program is to enable 48-hour traceback of a foreign animal disease outbreak.

The ability of state and federal regulatory officials to monitor the health of the nation's livestock herds has been greatly diminished in recent years. National surveillance has traditionally been reliant upon state/federal testing for brucellosis and tuberculosis. With these diseases nearly eradicated and annual herd testing having been greatly curtailed, sufficient sampling is no longer available to regulatory officials.

The need for increased herd surveillance is growing. Animal disease threats (Bovine Spongiform Encephalopathy (BSE), Foot-and-Mouth Disease (FMD), etc.) are very real in today's world. In addition to the animal health impact of such a disease outbreak, industry is also faced with significant economic impacts through loss of market opportunities. This was vividly illustrated in the recent BSE cases in North America. The diagnosis of a single case of BSE in Alberta, in May, was a strong wake-up call for USA producers. The "other shoe dropped" on December 23, 2003, when a single BSE case was diagnosed in Washington. The resulting loss of key export markets (including Japan, Korea, and Mexico) fueled remarkable price drops and price volatility. This market disruption underscores the economic risk that industries face without traceability that enables identification and containment of product or categories of product. As a result of these incidents, the USA livestock industry now appears to be more supportive of implementing a national livestock identification program.

The USA is not the only country in the world implementing national animal identification. In fact, the USA is behind many of the other major beef producing nations by putting in place traceability systems. Canada began implementation of a national animal tagging program in the late 1990s. This program became mandatory in 2001, and now requires that all cattle be tagged with an approved Canadian Cattle Identification Agency (CCIA) tag before leaving the farm of origin. Beginning in January 2005, the approved tags will all be radio frequency ear tags (RFID). The European Union (EU) has in place a passport system required for the movement of any livestock. Australia has implemented the National Livestock Identification System (NLIS) and is

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working toward its' mandatory national adoption. The South American nations of Brazil, Uruguay, and Paraguay are also in varying stages of implementing national identification systems. Mexico is developing a national system as well, and there is a desire to make the CAN-USA-MEX system as harmonious as possible. Japan identifies all animals as well. The key message in the global picture is that mandatory national individual animal identification systems are quickly becoming the *de minimus* standard. The USA will need an animal identification system to compete effectively in the global marketplace.

United States Animal Identification Plan (USAIP)

The framework for this national identification effort has already been developed and is known as the United States Animal Identification Plan (USAIP). USAIP was developed as a public-private collaboration. USDA is now reviewing this plan and formulating an implementation plan for national animal identification. It is anticipated that USDA, in its final implementation plan, will utilize much of the work outlined in USAIP.

USAIP Executive Summary

The following is the executive summary from the USAIP plan:

"Protecting American animal agriculture by safeguarding animal health is vital to the wellbeing of all U. S. citizens. It promotes human health; provides wholesome, reliable, and secure food resources; mitigates national economic threats; and enhances a sustainable environment. Essential to achieving this goal is an efficient and effective animal identification program. Building upon previously established and successful animal health and animal identification programs involving many animal industries, an industry-state-federal partnership, aided by the National Institute for Animal Agriculture (NIAA), was formed in 2002 to more uniformly coordinate a national animal identification plan. This resulting plan, requested by the United States Animal Health Association (USAHA) and facilitated by USDA's Animal and Plant Health Inspection Service (APHIS), was formulated in 2003 for presentation at the October, 2003 annual meeting of the USAHA. More than 100 animal industry and state-federal government professionals representing more than 70 allied associations/organizations collectively assessed and suggested workable improvements to the plan to meet future U. S. animal identification needs.

"Fundamental to controlling any disease threat, foreign or domestic, to the nation's animal resources is to have a system that can identify individual animals or groups, the premises where they are located, and the date of entry to that premises. Further, in order to achieve optimal success in controlling or eradicating an animal health threat, the ability to retrieve that information within 48 hours of confirmation of a disease outbreak and to implement intervention strategies is necessary. The USAIP is focused on utilizing state-of-the-art national and international standards with the best available and practical technologies. It is dynamic and flexible, and will incorporate new and proven technologies as they become available. States' needs in implementing animal identification will receive priority within the uniformity provided by federal oversight.

”The USAIP currently supports the following species and/or industries: bison, beef cattle, dairy cattle, swine, sheep, goats, camelids (alpacas and llamas), horses, cervids (deer and elk), poultry (eight species including game birds), and aquaculture (eleven species). Implementation will be in three phases: Phase I involves premises identification; Phase II involves individual or group/lot identification for interstate and intrastate commerce; and Phase III involves retrofitting remaining processing plants and markets and other industry segments with appropriate technology that will enhance our ability to track animals throughout the livestock marketing chain to protect and improve the health of the national herd. Initial implementation will focus on the cattle, swine, and small ruminant industries. In transition, the USAIP recommends that: all states have a premises identification system in place by July 2004; unique, individual or group/lot numbers be available for issuance by February 2005; all cattle, swine, and small ruminants possess individual or group/lot identification for interstate movement by July 2005; all animals of the remaining species/industries identified above be in similar compliance by July 2006.

“These standards will apply to all animals within the represented industries regardless of their intended use as seedstock, commercial, pets or other personal uses.

”It is well acknowledged that costs associated with the USAIP will be substantial and that a public/private funding plan is justified. Significant state and federal costs will be incurred in overseeing, maintaining, updating, and improving necessary infrastructure. Continued efforts will be required to seek federal and state financial support for this integral component of safeguarding animal health in protecting American animal agriculture.”

USDA Direction

In comments presented at House and Senate oversight committee hearings in March, USDA indicated that a comprehensive national animal identification program in the USA should meet these goals:

1) Producer flexibility to utilize existing systems and adoption of new systems. Producers should not be burdened with having multiple identification numbers, systems, or requirements.
2) System should be technology neutral so that all existing technologies and emerging new technologies can be utilized.
3) Build upon the data standards developed by USAIP. Provisions to ensure data confidentiality are an essential part of this objective.
4) System must not preclude producers from being able to use the framework with production management systems that respond to market incentives.
5) The system must not unduly increase the role and size of the government.

USDA is proceeding with implementation plans for a national livestock identification program under the existing statutory authority of the Animal Health Protection Act. However, concerns over confidentiality of private business information and accessibility of this information by other agencies or the general public are issues that will likely spur USDA and industry to ask Congress for additional protection.

USDA is proceeding with a phased implementation plan. A national Premises Identification “allocator” is to be completed in 2004. This system will enable state veterinarians, through cooperative agreements with USDA, to issue unique uniform premises identifications to producers. USDA’s next focus would be on setting of standards for data collection and sharing into a national database. USDA would likely attempt to fund some additional infrastructure needs such as reader systems in strategic locations. USDA has said they do not envision use of significant federal funding for purchase of electronic ear tags. Starting in fiscal year 2004, USDA would also focus on identifying and qualifying third parities, such as private industry and trade associations, that have identification products or programs, so they could be integrated into the national system. In early fiscal year 2005, USDA would then be in a position to issue premise and animal identification numbers to third parties and to begin receiving information from third parties into the system.

Industry Solutions

A number of commercial firms today offer various components needed for a national animal identification program. Utilization of these existing pieces in a national plan is essential in order to reduce the burden on producers, quickly put a workable system in place, and to limit the role and size of government. Many of these technologies are already being utilized by producers for improved management and for participation in value driven programs. One challenge that exists today with private systems is a lack of interchange between systems.

In response to that need, the Beef Information Exchange (BIE) has been created as a platform for exchange of information across private, proprietary systems. The founding partners of the BIE (AgInfoLink, APEIS, eMerge, IMI Global, and MicroBeef Technologies) are demonstrating how private firms can cooperate to share information for the benefit of the regulatory community and producers. The BIE offers to their customers a method of data management that meets the requirements of national animal identification for limited information sharing with government while maintaining the confidentiality and privacy of the participating producers.

The private sector should be a significant partner with government in designing and implementing a national identification program. The critical role of government in this process is in establishing standards for data to be collected and shared. Private industry will provide the solutions for meeting those standards.

Conclusion

The USA is likely to implement a mandatory, national animal identification program over the next several years. Such a program will support improved animal herd health surveillance and improve the industry's ability to access global markets where traceability is a requirement. National animal identification and traceability will not prevent the outbreak of a foreign animal disease. It will, however, enable rapid identification and containment of that disease, with a goal of minimizing animal health impacts and reestablishing trade to limit economic impacts.

Producers have the opportunity to take advantage of the framework enabled under a national animal identification program. Individual animal identification and traceability can create new opportunities for the livestock industry. Identification enabled "individual animal management" coupled with "value traceability" will enable the creation and capture of new values for the food industry. Animal identification solely for the purpose of regulatory compliance will add costs to the industry. When such an identification program is also utilized by industry for improved management, producers can realize a positive return on the investments made in animal identification.

References

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USDA-APHIS-Veterinary Services	www.aphis.usda.gov
Beef Information Exchange (BIE)	www.beefinformationexchange.com
AgInfoLink	www.aginfolink.com
National Institute for Animal Agriculture	www.animalagriculture.org
US Animal Health Association	www.usaha.org

Notes

2004 Funded SMI Milk Check-Off Projects

The following proposals by faculty from the Universities of Florida and Georgia were funded in March 2004 by the Southeast Inc. Milk Check-Off Committee. For more information about the Southeast Inc. Milk Check-Off, contact Dr. F. Glen Hembry, Chair, Department of Animal Sciences, University of Florida.

<u>Adesogan,Staples,Wasdin,Chambliss</u> - Determining When to Harvest Stay-Green Corn Varieties for Silage Production

<u>Archbald,Bartolome,Melendez,Risco</u> - Comparison of Timed Insemination and Exogenous Progesterone for Treating Ovarian Cysts in the Lactating Dairy Cow

<u>Bachman</u> - 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

<u>Bernard,West,Cooke</u> - Effect of Supplemental Energy Source on the Performance of Lactating Dairy Cows Fed Diets Based on Sorghum and Ryegrass Silage

<u>Bernard,Worley,Bray</u> - Effectiveness of Two Cooling Systems for Cooling Cows in Free Stall Barns

<u>Bray,Natzke,Belsito,Bucklin</u> - Environmental Modifications for Reducing Summer Stress on S. E. US Dairy Farms

<u>Bray,Boyd</u> - Multi-Lingual Milking Videos for Florida Dairies

<u>Bray,Bucklin</u> - Development of A Milking Machine Monitoring System to Determine Milking Performance

<u>Bucklin,Shearer,Bray,Giesy</u> - Alleviating the Stresses of Concrete Floors in Florida Feed Barns - 2004

<u>Buergelt</u> - Use of Real-Time Blood-PCR and Milk-PCR for Detection of Cattle Infected with Mycobacterium avium subsp. Paratuberculosis

<u>De Vries</u> - Florida Dairy Students Participate in the 3rd Annual North American Intercollegiate Dairy Challenge

<u>De Vries,Bray,Webb,Natzke,Broaddus,Belsito</u> - 2004 Mastitis and Somatic Cell Count Reduction Study

<u>Donovan,Maunsell,Olson</u> - Antibody Response to Ovalbumin as a Measure of Genetic Disease Resistance of Dairy Cows

<u>Ely</u> - Dairy Business Analysis Project-Georgia-2004

<u>Hansen</u> - Improved Pregnancy Rate in the Summer Using Embryo Transfer-Development of an Embryo Freezing Protocol

<u>Hembry</u> - Milk Check-Off Recovery

<u>McDowell,Staples,Alosilla</u> - Vitamin A Stability in the Rumen and Concentrations in Milk

<u>Scully,Hall</u> - The Development of Corn Silage Varieties and Year-Round Cropping System for Florida Dairy Farms

<u>Thatcher,Bartolome</u> - Resynchronization of Ovulation and Timed Insemination in Lactating Dairy Cows Using the CIDR Insert 14 or 18 Days After Previous Insemination

<u>Umphrey,Gilson,Graves,Bachman</u> - Support for Florida and Georgia Youth Programs, 4-H Dairy Activities and Youth Events, Dairy Judging Team Support and Undergraduate Programs and Scholarships