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DAIRY PRODUCTION
CONFERENCE

"Effective Management"

UNIVERSITY OF FLORIDA, GAINESVILLE
MAY 1-2, 1979

Sponsored by
Department of Dairy Sciences
Cooperative Extension Service
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Institute of Food and Agricultural Sciences
with Cooperation of State Dairy Organizations
The Wilmer W. Bassett, Sr. Family's Dairy at Monticello received the Distinguished Dairy Family Award, sponsored by Florida Farm Bureau Federation and presented by Rayford Farrington & J. B. Strickland. The Bassett Brothers (left to right) are Ray, Wilmer, Curry, J. C., and Burt Bassett.

Dr. Dan Webb, Extension Dairy Specialist at University of Florida received the distinguished Extension Service Award from Mike Bond, President of Florida Purebred Dairy Cattle Asso. Also shown seated is Kent Price, Okeechobee County Extension Director.

This publication was promulgated at a cost of $1,286.91, or 86 cents per copy, to inform interested persons of current trends in dairy production.
TO: FLORIDA DAIRYMEN AND THOSE IN RELATED ENTERPRISES

SUBJECT: SIXTEENTH ANNUAL FLORIDA DAIRY PRODUCTION CONFERENCE
MAY 1-2, 1979

Dear Dairy Cooperator:

The 16th Annual Florida Dairy Production Conference brought together authoritative speakers on topics of current major interest. The Dairy Advisory Committee, consisting of the DFI Board of Directors, is given specific thanks for their help in planning the 1979 program.

Special appreciation is expressed to Dairy Farmers, Inc. (DFI), South Florida Independent Dairy Farmers Association (IDFA), the Tampa IDFA, the Upper Florida Milk Producers Association, and the U.S. Sugar Corporation for helping to finance the Dairy Production Conference.

Special thanks is given to the Dairy Division of the State Department of Agriculture and Consumer Services, the Federal Land Bank & Production Credit Associations of Florida, the Florida Farm Bureau Federation, PDCA, and State DHIA Board for their support and participation in the awards program on Tuesday evening, May 1.

There were 15 displays presented at the 1979 Conference. We would like to express appreciation to the following representatives of those displays: Mr. Walter Oelfke, NOBA; Rodney Moore, Curtiss Breeding Service; George Manter, American Breeders Service; Danny Yant, Select Sires; Ellis Guilege, Miller Machinery; Don Riesenberg, Masonite Corp.; Bill Isaacs, Surge; Book Cunningham, Ag Bag; Mike Ciferri, Donovan Enterprises, Inc.; Herbert Weimer, Feed Additives; Joseph Militello, Top Quality Dairy Equipment Company; James Ziegler, JAS Herd Supplies; Morris Hicks, Vita Ferm; Jack Bridges, Sheffield Agri Systems; and Dersk Hutchinson, Church & Dwight Co., Inc.

A list of those attending the conference is included.

H.H. Van Horn
Chairman, Dairy Science
Department

Barney Harris, Jr.
Conference Chairman
Extension Dairyman

BHjr: jr
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BANQUET GUEST SPEAKER

by

Mr. Louis Larson
President, National Milk Producers Federation, and Okeechobee Dairyman

It has been said that people rarely succeed at anything unless they have fun doing it.

This is my position in having the privilege of serving as President of National Milk Producers Federation. I would like to thank the members of the Dairy Industry here in Florida as I took on this honor and am trying to carry out the responsibility that goes along with it; for this support and enthusiasm.

I bring you greetings from the officers and staff of National Milk Producers Federation, and would like to tell you a little about the organization. National Milk is going on 63 years of active service to the Dairy Industry. This makes it one of the oldest commodity-farm organizations in our country. Its membership today includes nearly all of the Dairy Marketing Coop's in the nation. The size ranges from very small ones with just a few members to such large ones as AMPI - MID AM - DI with thousands of members. It is made up of 66 member organizations with our 220,000 Dairy Farmer members. The major responsibility of the Federation is to assume the American Dairy Farmers thru their Coop's membership in NMPF that they will have a voice and that this voice is united, decisive, qualified and powerful enough to be heard and understood by the Legislative and Administrative bodies of this nation. To accomplish this we have an office in Washington, DC with a qualified and experienced staff of about 20 people. We have a annual budget of just our 1 million dollars. The membership elects a board of directors with one or more board members coming from each member organization, depending on the lbs of milk marketed by each. The board of the three elected officers making up a 21 member Executive Committee. This committee attempts to carry out the policies established by the Board of Directors through the staff to the best interest of the dairy farmer members and the consuming public. We do not win all the battles, but we do have a good task record. We do work with other Farm and Industry organizations to obtain common goals on the National Level.

When Dr. Harris talked to me about speaking here tonight, I asked him about a subject. He suggested both state and national issue's affecting us currently and in the future. It has been said by many successful people that the future belongs to those who plan for it. It reminds me of a champion golfer who was in the lead in a tournament when his caddy developed the hiccups. Now this golfer was a deliberate putter, and the golfer flinched with each hiccup. On the last hole facing the winning putt, he hesitated, then stroked the ball. It stopped within a fraction of the hole. You and your hiccups he snorted at the caddy. "But, sir, I didn't hiccup". "I know, I know" said the champion "but I had allowed for it". The morale of this is, that you cannot always win! But, you can certainly try again!
Now to the issues of the current time. Here within the State of Florida we have a strong and viable Dairy Industry. In the early 1900's, it was the common belief by many people here in Florida and elsewhere that we could never economically produce all the fluid milk needed for our growing population. The tropical climate, insects such as the fever tick, severe common flies and mosquitoes, poor soils, no local sources of quality concentrate feeds and numerous other problems. Most of the fluid milk consumed in extreme South Florida was hauled down from Jacksonville or St. Augustine by mail in 10 gallon cans - iced down to keep it fresh for use in Miami. Today we produce enough fluid milk state wide except for some seasonal shortages.

I would like to call this cracker ingenuity rather than Yankee know how because most of the problems were solved by the fore runners of today's industry and some right here at the University of Florida. Even though many of our present day dairymen and industry people come from other states, some even being Yankee's, they have adopted established methods and added some of their own to make ours a very competitive industry and one to be proud of.

Inflation is our greatest current issue today and it touches on most of the others. It is making our job of producing milk at a price which consumers can afford extremely difficult. It is our responsibility to produce enough milk to supply the needs of the public at a price they can afford, or yield these markets to others, such as has already started here in Florida. If we leave the door open long enough, someone is going to come in. This is competitive forces at work and this is or it should be, although it may not be a popular idea within our industry.

1. Feed usually takes at least 1/2 or our milk check. Feed is high, however the milk feed price ratio for March, 1979 was 1.58. This means that nationally one lb of milk will purchase 1.58 lbs of 16% dairy feed. But the same feed we purchase is now a world commodity including citrus pulp and we have to compete for these products with our cheap dollars.

2. Labor is probably our second highest cash cost and we have to pay a employee enough to live on or else. I feel we should not offer him a job. The cost of labor will probably follow inflation and we have no choice but to pay him a living wage.

3. Machinery and equipment is one way to cut labor costs and get more milk per hour of labor - but have you bought or installed any new equipment lately? Bulk tanks, feeding systems, milking system, field equipment - these items have really been going up.

4. Suppliers of all sorts, dairy and vet, seem to go up with each purchase.

5. Replacement cow prices have advanced more this past year than anytime I can remember. And if you raise your own, the cost of growing them out is also going up. Of course, the price we receive for our cull cows is up too. It takes about 2 culls to buy back one replacement. The only problem is it takes more capital. This leads me to . . . .

6. Cost of Money. Our industry as we know it is a capital intensive enterprise. We do not know how long the cost of money will stay as high as it is today but, I have a good idea that it will stay close to the rate of inflation. Thus double digit inflation will equal double digit interest costs.
7. Taxes. We all know that we have taxes to pay and some of these are continually going up. If you stop and make a list such as Real Estate Land Taxes, Tangible Property Taxes, Social Security Florida and Federal Unemployment taxes, Sales Taxes, Federal Incomes Taxes and if you are incorporated you have the State Corporation Income Tax, Privilege Tax, Intangible Corporation Tax and probably some I have failed to mention.

8. Energy. There are some of us that are learning about fuel allocation. This is just starting. I do not know of any easy solution except conservation and development of new energy sources. Here at the University of Florida and IFAS they have put a special emphasis on energy research. We all realize that Florida Agriculture is energy intensive. We use more fertilizer, Pesticide, Herbicides, water for irrigation and haul our products longer distances to market than in most states. Energy is probably the largest root problem in inflation today.

9. Environment problems. The dairy industry and in particular dairy farms have been identified as contributing to pollution problems. Especially as far as waterways, streams and lakes go. Many of us have spent thousands of dollars to correct this problem either by diking in farms, or building lagoons or building a recyling system. This is good however, we still have some probelms and if you know or think you may have a problem, develop a plan and carry it out. The D.E.R. and other government agencies will make it extremely uncomfortable for you if you don't. Probably going as far as stopping you from selling milk in the future.

10. Disease. Brucellosis is still a problem but with the advent of A/V and good management practices you have a better chance of overcoming it. T.B. although not a problem for most, thank goodness, it is a very real problem for any who may have an infection. Foot and mouth - here in Florida we are sitting ducks for this problem. The Federal Disease People say it is not a question will it ever happen but just when. The large amount of smuggling that is currently in the news and many of these planes and boats coming from countries that are not F&M free is a real danger. A F&M outbreak would paralyze the dairy industry because on VHT pasturization kills the virus and most plants are not so equipped and all our milk would probably be held on the farms.

Some of our problems on a national level that I have not included in my preceeded remarks are:

1. Maintaining the dairy price support program. It is a very complex economic tool that continually needs refinerny. We must always be sure that we ask for a level that will produce enough milk for the consumers of America and a small amount of reserves.

   We have asked for the 80% pint level again this year and that the law be extended there is also a bill being offered by Sen. Gaylord Nelson of Wisc. to make a minimum of 80% permanent.

2. The Federal Milk Marketing order program in its nearly 50 years of service to markets has demonstrated its ability to move with the demands of the markets it servers. We are very sincere in our efforts to allow it to continue being an effective milk marketing instrument. We are very familiar with this program here in Florida through our three marketing orders #6-12 and 13. Its primary functions are that we have an audit of the milk plants as to classification usage of milk B.P. Testing weights and measures. It also sets a class I milk price which is a minimum and all handlers know they are all paying the same price which should provide the consuming public with a adequate supply of milk.
3. The Multi-National Trade Negotiation with our government has been engaged in and now has a trade package to present to the senate for ratification is of great concern to the dairy farmers of America. It must be passed in its entirety with no changes or amendments. The dairy farm leaders of national milk have taken a firm stand against this trade treaty because it will displace about 1% of our domestic milk production to make room for imports from other countries. It actually means that about 2000 dairy farmers will either have to sell their production to the CCC or go out of business.

4. The national commission for Revenue of Anti-Trust Laws and Procedures is of concern to the dairy industry. This commission was appointed by the press to look into among other things, The Capper Volstead Act. This is the law that allows farmers to join together into a Coop to jointly market their products. We are watching this very closely and some hearings have been held in early March, but have been suspended.

5. Last year most of you can remember we fought the ice cream war with Food and Drug. We won on that issue, however, this year they are out to change the standards of identity for milk, cream and cheese. Their primary thrust is to establish a standard for imitation and substitute cheese. This would give these products government sanction and they would compete directly with the real products. We feel that the word cheese is the property of the dairy industry and if it is not made out of dairy products it can not be cheese.

Forecast: This year 1979 being the last of the decade of the 1970's, many organizations and professional forecasters are starting to make predictions for the 1980's. If you do this, you are in the forecasting game and there are two rules you must follow. They are that you must use dates and numbers. If you are smart you will use them both - but never at the same time. This will not allow you to lose - but you won't win either. I feel that our Domestic Dairy Industry will follow this rule in the years ahead, that is and will remain strong. That we will continue to produce adequate supplies of dairy products for our domestic consumption. I feel that we will continue to have a voice in Legislative and Administrative affairs of both our state and federal government as long as we have unity among the majority of the dairy farmers themselves.

It has been said "no one can make you feel inferior without your consent". I am proud to be a dairy farmer and to have a part in producing food for the consumers of our country - thank you.
EFFECTS OF SERVICE SIRE ON PERFORMANCE 
OF THE COW AFTER CALVING

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Introduction

Growth of the mammary gland and initiation of milk secretion are closely synchronized with prepurium hormonal changes and initiation of parturition (calving). Clearly, stimulation of the mammary gland to secrete milk at the time of calving is a biological process to provide continued nourishment for the calf after its delivery from the uterus. Nourishment of the growing calf before birth (fetus) was through its placental attachment to the mother. There is an abundance of evidence that the fetus has a number of effects on the mother while in the uterus. For example, the time of parturition is controlled to a considerable degree by the fetus itself. If the fetus has an adrenal abnormality (for example, absence of adrenal tissue) parturition will be delayed. Gestation length is a heritable trait ($h^2 = .40$) which indicates that sire of fetus (service sire) controls to some degree variability in gestation length. Thus the fetus is influencing the maternal unit. The placenta is a major hormone producing unit during pregnancy, and both the fetus plus placenta (conceptus) contribute to the hormonal changes found in the maternal circulation in late pregnancy. A major question of practical importance is whether variation in conceptus and maternal hormones of pregnancy may influence the amount of milk produced during lactation after delivery of the calf and placenta. An additional question is whether the conceptus and/or its hormones secreted in pregnancy influence various reproductive traits in the postpartum period. The major portion of mammary gland growth occurs during pregnancy and the conceptus is the stimulant of this growth. Therefore it seems reasonable that variation in milk production and postpartum performance may be related to differences among conceptuses and perhaps their hormonal production rates. We have attempted to test these concepts with analyses of herd records and evaluating hormonal differences among pregnant cows bearing genetically different conceptuses (fetus and placenta) selected for milk yield.

Herd Record Analyses

Analyses were conducted to evaluate service sire effects on several milk production responses of the dam after delivery of its calf. Records were utilized from Florida, Georgia, North Carolina and South Carolina DHI
cows from 1968 to 1976. Analyses included 27,200 Holstein and 3,731 Jersey records. Many different statistical analyses were used and results indicated that, among the cows in this population, approximately 3 to 11% of the variation in milk yield could be attributed to service sire. The amount of variability attributed to service sire varied with each statistical analysis; however, we always detected service sire effects or some higher order interaction involving service sire. Results from other laboratories in Sweden, New Zealand, England and New York also have detected service sire effects with estimates in the 1 to 2% range. In our study, approximately 4% of the variation in days open among cows, in their lactation after delivery of the calf, was associated with the service sire. Such service sire effects could have extensive practical importance relative to use of dairy sires, increased repeatability of AI proofs and potential to improve milk yield via the service sire.

A real practical question of interest to the producers is whether a relationship exists among the sires ranked for their service sire effect on milk yield and their predicted difference values for milk yield (estimated breeding values). Our analyses indicated that there was no relationship when evaluated among 50 Jersey sires. Research elsewhere agrees. Thus at the present time producers should not change their practices of selecting sires for high P.D. milk yields.

The above analyses justified a more detailed approach utilizing production and reproduction records from the Fla. Agr. Exp. Sta. Dairy Research Unit herd for 1954-76. Analyses included from 963 to 2999 records depending upon the statistical analyses undertaken. Once again ample evidence of service sire effects were detected. Service sire effects of appreciable magnitude were detected for milk yield, milk fat yield, protein yield and lactose-mineral yield, whereas effects for compositional percentages were appreciably lower. These results indicated that the service sire effect appears to be influencing general mammary gland function not just selective aspects of milk production. This would be consistent with the idea that general gland growth is affected by the service sire, and that cows may begin their lactation with varying degrees of mammary gland growth possibly influenced by the service sire through the conceptus. Effects of service sire persisted through at least one additional lactation (one subsequent to the one immediately following parturition). There was no evidence that service sire effects were greater for first-calf heifers than for older cows.

Service sire effects were appreciable on such traits as dystocia, metritis, birth weight of calf and days to first service during the lactation after delivery of calf. These responses add further support to the concept that the conceptus has important influences on the maternal unit.
If the conceptus (fetus + placenta) influences milk yield, perhaps some indirect measurement of the conceptus, such as calf birth weight, may be related to milk yield of the mother. We did detect significant positive relationships between calf birth weight and milk yield when measured after 1047 Jersey and 702 Holstein parturitions (Figure 1). Milk production increased 227 lbs. in association with a birth weight range of 41 to 65 lbs. for Jerseys and 347 lbs. for a birth weight range of 76 to 100 lbs. for Holstein cows. The lactation records (305-day, two milkings per day) were adjusted for age of cow which removes for the most part variation due to differences in cow size. These results imply that calf birth weight may be associated with some function of the conceptus that stimulated the maternal production of milk. Perhaps calf birth weights were associated with placental size or placental activity.

Results of the above record analyses indicate that the conceptus is having appreciable effect on the maternal unit during the postpartum period.

Hormonal Analyses

An experiment was designed to determine if hormonal differences existed among two groups of Jersey cows, bearing conceptuses selected for milk yield. We wanted to determine if measurable differences could be detected in various hormones produced by the conceptus and mother that may be related to differences in milk yield among cows. These may be the hormonal agents that account for the ability of the service sire to influence milk yield of the cow after delivery of its calf.

The experiment was conducted in the Fla. Agr. Exp. Sta. Dairy Research Unit herd. Seven cows in the selection (S) group were sired by and bred to bulls selected for a high predicted difference for milk yield (+891 lbs.), whereas seven cows in the control (C) group were sired by and bred to bulls with a zero estimated breeding value for milk yield. All animals were bled daily for the period of approximately 3 weeks prepartum and 4 weeks postpartum. The following blood or plasma measurements were made: blood hematocrit (HCT, %), and plasma measurements of protein (FP, g/100 ml), estrone (E1, pg/ml), estradiol (E2, pg/ml), estrone sulfate (E1SO4, pg/ml), progesterone (P4, ng/ml), glucocorticoids (GC, ng/ml), luteinizing hormone (LH, ng/ml) and prolactin (Prl, ng/ml). Selection cows had significantly higher concentrations of hematocrit (HMT) and progesterone (P4) than control cows, whereas concentrations of estrone (E1), estrone sulfate (E1SO4), prolactin (PRL) and luteinizing hormone (LH) were lower in selection cows compared to control cows during the prepartum period. This is the first reported evidence that genetically different conceptuses cause changes in hormone and hematocrit concentrations within the maternal blood of cows. The significantly different patterns and mean concentrations of estrogens (E1 and E1SO4)
between groups are important because the conceptus is the primary source of these estrogens and indicate these differences reflect the function of genetically different conceptuses.

The higher level of P₄ and low level of E₁ in S cows probably were responsible for the difference in prolactin (Prl) concentrations between the two groups (S < C). Concentrations of Prl were decreased in the selection group until just prior to parturition when levels increased dramatically. The rise at parturition was greater for the selection group and may be important for initiating a high level of milk secretion. The difference in Prl concentration between groups prepartum (S < C) was also reflected in differences of Prl response to an injection of TRH (a prolactin releaser) at 10 days postpartum (S < C). This suggests that the selection and control difference was maintained until 10 days after delivery of the calf.

A reasonable question that any producer would now ask is, "What does all this hormonal information mean?". To put things in perspective, the above hormonal results indicate that: the conceptus does appreciably influence the hormonal concentrations of the mother during late pregnancy, conceptuses that differ genetically based upon selection for milk yield cause different hormonal levels and patterns in their mother's plasma, various hormones differ between the two groups that may influence milk yield and subsequent reproductive performance, various hormones have been identified that may be some of the agents that account for the service sire effects described earlier with the record analyses.

We also examined relationships among the 14 cows. For example, the rise in prolactin at parturition was positively correlated with 28-day milk yields (r = .51) and plasma E₁ prepartum was negatively correlated (r = -.73) with 28-day milk yields. Plasma progesterone prepartum was negatively correlated with calf birth weight (r = -.52). Once again some meaningful relationships were detected between various hormones and production traits of the mother.

In summary, the conceptus (fetus and placenta) appears to regulate the maternal unit, either directly by its own hormones or indirectly by altering hormonal secretions of the mother. Considerable attention should be directed towards future research to elucidate the mechanisms of how conceptus functions influence maternal milk production and reproductive efficiency. These areas of investigation may lead to major improvements in animal productivity as related to types of matings and management of cows in late pregnancy.
A HERD REPRODUCTIVE HEALTH PROGRAM

by

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Low breeding efficiency is a major problem in dairy cattle management. The consequences of low fertility are difficult to quantitate precisely, but gross income is reduced as a result of lower milk production, fewer calves and decreased herd improvement potential. The need for additional replacements, veterinary services, medication and repeat service adds to input costs.

One of the indices of fertility is the calving interval. Long calving intervals result in low milk production. For each month added to the calving interval the calf crop is reduced 8.33%. Interestingly enough, the calving interval, or days open, is not calculated for cows with serious problems which never conceive again. A second insidious factor is that today's mistakes are not charged until 10-12 months later, or 2-3 years later when it comes to replacement heifers.

Delayed first services are a primary cause of a poor fertility status. Most of these are due to failure to detect heat. We further know that conception rates are reduced after long cycles, short cycles and such conditions as retained placenta and severe uterine infections. Most dairymen are aware of these problems but have difficulty in coping with them. Large herd owners must concentrate on their breeding program more than small herd owners if they expect to achieve breeding efficiency. Even in large herds individual cow decisions need to be made.

Management of the breeding program requires team work by the herdsman, the inseminator and the veterinarian, and the systematic approach of a fertility control program. The purpose of a dairy herd fertility control program is: 1) to raise the first-service conception rate, 2) to decrease the number of services per conception, and 3) to decrease the calving interval. Essential components of any fertility program are, easy identification of individual cows, individual records and effective heat detection. In addition there must be adequate facilities for rectal and vaginal examination of the cows. It should be remembered that the percentage of calves born after on insemination of a group of cows, is the product of several factors including the fertility of the herd, management of the herd, quality of the semen used and the efficiency of the inseminator. This product is always lower than the lowest factor involved. Much of it comes back to such basics as sanitation at the time of calving, disease control, nutrition and heat detection.

Initiation of a new fertility program usually starts with a complete rectal inventory of the entire herd to establish a baseline. The frequency of subsequent visits depends on the herd size. Herds with 50 - 100 cows are visited every 4 weeks, 100 - 200 cows every 3 weeks, 200 - 400 cows every 2 weeks and herds with more than 400 cows weekly. Prior to each visit by the veterinarian, the manager selects all the cows in the following three categories: 1) cows fresh 30 days, 2) cows bred 40 days previous which have not returned to
heat, and 3) problem cows. The latter includes all cows that had difficulty in calving, cows with retained placenta, cows with abnormal vaginal discharges persisting after two weeks postpartum and cows with irregular cycles. Each cow is examined per rectum and the findings are recorded. I prefer to record the measurements of the diameter of the cervix and each of the horns, the tone of the uterus and the ovarian activity, be it a corpus luteum or a follicle. For cows with a history of no heats the approximate day of the cycle is recorded. A vaginal examination is done on all postpartum cows after thorough washing with soap and water. Any vaginal, cervical or uterine discharges are noted and again recorded. Treatment is given as indicated. Any cow which is treated is marked down for a recheck at the next visit. This system allows for early recognition and disposition of breeding problems. Reproductive culls, for instance cows with extensive adhesions of the uterus, are identified and no further effort or semen is expended on them. This saves labor and later feed costs. The program permits early breeding on the first heat after 45 days postpartum of all cows that pass the postpartum check.

One of the keys to success of the program is that the examinations be conducted on a regular basis on a specific day of the week, that the manager have the cows ready and that the veterinarian is on time.

Last year, the California Milk Advisory Board commissioned Dr. John W. Kendrick of the University of California, Davis to conduct a study of the cause, prevention and treatment of uterine disease. This study included 3,582 cows on nine dairies ranging in size from 135 - 800 cows. Each dairy had a reproductive program similar to the one outlined above. At 30 days after calving each cow was placed in one of three groups according to the condition of the uterus. Group A, Normal uterus; Group B, Moderately affected with endometritis. The diameter of the large uterine horn in these cows was between 30 and 40 mm and there was a 5 to 10 mm difference between the large and small horn. There was evidence of a small to moderate amount of pus in the vagina. After Group B cows were identified by the practicing veterinarian, they were randomly assigned to a treatment and control group. Those placed in the control group were not treated while those in the treatment group received a single intra-uterine infusion of antibiotics. Group C, Severely affected. The large uterine horn was greater than 40 mm in diameter and there was 5 mm or more difference between the two horns, the tone of the uterus was abnormal and in some cases, fluid could be palpated in the uterus. There was evidence of a purulent discharge from the vagina which at times was copious and had a bad odor. These cows received several intra-uterine infusions with antibiotics. For the study, all cows remained in the group to which they were originally assigned.

The summary of the findings and conclusions were:

1. Cows with severe uterine infection have lower fertility and treatment commonly used do not return fertility to normal in these cows. Treatment may improve fertility in these cows but this experiment was not designed to show this.

2. Cows with moderate uterine infections are difficult to accurately diagnose, have the same fertility as normal cows whether treated or not, but do include some "problem cows" that do not conceive within 150 days of calving.

3. Penicillin is the most effective antibiotic for the treatment of bacteria found in the uterus. Terramycin is also effective but a higher
concentration is necessary. Both penicillin and terramycin appear to maintain therapeutic levels in the uterus for 24 hours when used at the currently accepted dosage. Some uterine bacteria were resistant to furacin and all uterine bacteria were resistant to dihydrostreptomycin.

4. Treatment at 24 hour intervals is necessary to maintain therapeutic levels of antibiotic in the uterus.

5. Crystalline penicillin at doses used in the experiment appeared in the milk within 20 minutes. It was present in the milk in low levels three to six hours after treatment in seven out of 56 cows and was not detected 15 to 18 hours after treatment in any cows. Procaine penicillin at a dose level of 1,600,000 I.U. was found in the milk of one of 50 cows three to six hours after treatment and not found in the milk at any time when a dose of 1,000,000 I.U. was used. Terramycin and dihydrostreptomycin were not detected in milk.

These findings once again suggest that uterine infections need not be a major cause of infertility in cattle. Effective and efficient fertility control is possible with a systematic approach and a constant surveillance.
Epidemiology of Bovine Leukemia Virus Infection in Dairy Cattle

by

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The bovine leukoses are highly fatal malignant neoplastic conditions of cattle characterized by the development of lymphosarcomata in almost any organ. Each lymphosarcoma is an aggregation of neoplastic lymphocytes formed into a firm white tumor mass. Two distinct types of bovine leukosis are seen in dairy cattle:

1. Sporadic bovine leukosis which is rare, affects cattle less than 3 years of age, and occurs in single animals in a herd with no evidence of spread. There are three forms of the disease:
   a) Calf form which affects cattle less than 6 months old and is characterized by sudden enlargement of all lymph nodes.
   b) Thymic form which affects cattle 6-30 months old and is characterized by massive enlargement of the thymus.
   c) Skin form which affects cattle 18-30 months old and is characterized by cutaneous plaques.

2. Enzootic bovine leukosis which is more common, affects mainly adult cattle more than 3 years old, and spreads slowly through an infected herd. It is causally related to bovine leukemia virus infection.

Bovine leukemia virus infection and the associated disease, enzootic bovine leukosis, will form the subject of this review.

Bovine Leukemia Virus

Bovine leukemia virus (BLV) is an oncornavirus (RNA tumor virus) that has a widespread geographical distribution. It is readily destroyed by physical agents such as heat, including pasteurization of milk.

Host Range

Cattle are the important host of BLV. Sheep and goats have been experimentally infected with BLV, but natural infection in these species appears to be rare. BLV infection has never been detected in either man or wild animal species.

Prevalence of BLV Infection

BLV infection has been detected serologically in dairy cattle throughout the United States. Herd prevalence has varied from 0-79%. Prevalence of BLV infection, as detected by serological tests, increases with age of dairy cattle during their first 5 years of life.
Clinical Signs

The majority of cattle infected with BLV never show overt signs of disease. The incubation period of enzootic bovine leukosis is long with most cases occurring a number of years after initial infection with BLV. Clinical signs commonly seen in dairy cattle include enlargement of superficial lymph nodes, loss of appetite, and marked drop in milk production. Animals lose condition rapidly and die within weeks or a few months of the first signs of disease. A small proportion of cases run a peracute course and die suddenly without showing prior signs of illness.

Diagnosis

Hematology and serology are useful aids to the diagnosis of enzootic bovine leukemia but confirmation of diagnosis requires histological examination of the tumor masses:

1. Histology: suspect neoplastic material is examined microscopically to confirm that it is from a lymphosarcoma.
2. Hematology: in many cases there is a marked lymphocytosis (immature lymphocytes prominent) with lymphocyte counts rising from a normal of about 6,000 to 150,000 / cu. mm.
3. Serology: detection of antibodies in the agar gel immunodiffusion test using a BLV-glycoprotein antigen is indicative of past infection with BLV.

Transmission

Detailed knowledge of the transmission of BLV is very incomplete because of the long incubation period before development of clinical disease and the fact that sensitive and specific serological tests are of recent introduction.

1. Transmission between herds:
   a) Cattle movements: transmission between herds seems to depend largely on the introduction of infected asymptomatic animals. It appears that BLV infection was introduced into Great Britain in the early 1970s through the importation of infected Holstein cattle from Canada.
   b) Biological products: premunition against babesiosis using whole blood has been incriminated in situations where the donor animal was infected with BLV.
   c) Semen: there is no evidence of transmission of BLV via semen.
2. Transmission within herds:
   a) Prenatal infection: transplacental transmission of BLV from dam to fetus does occur, but it accounts for less than 20% of infected cattle.
   b) Colostrum: transmission of BLV from dam to calf via colostrum can occur, but it appears to be an infrequent event.
   c) Horizontal transmission: the major mode of transmission of BLV between cattle is unknown. There is some evidence that blood-sucking flies may be involved. Accidental transmission of BLV during routine blood sampling has occurred, emphasizing the importance of using a sterile needle for each animal during such procedures.
Economic Losses

Direct economic losses result from mortality and condemnation of carcases with lymphosarcoma at slaughter. The possible effects of asymptomatic BLV infection on dairy productivity are unknown.

Consequential losses from BLV infection may be the most serious economic effect for the dairy farmer. Eradication of enzootic bovine leucosis has been established as a goal in the European Economic Community (EEC) and pressure is increasing to introduce legislation to prohibit importation into EEC countries of cattle that are positive for BLV antibodies on the immunodiffusion test. Therefore, the mere presence of BLV infection in a herd might affect the ability of a farmer to export cattle to EEC countries in the future. In addition, many European importers of semen demand certification of freedom of the donor bull or its herd of origin from BLV infection even though transmission of virus via semen has never been demonstrated.

Research at the University of Florida

A joint research project between the College of Veterinary Medicine and the Dairy Science Department of the Institute of Food and Agricultural Sciences (IFAS) is studying BLV infection in cattle in Florida. Our initial work has concentrated on genetic aspects of BLV infection in the IFAS Dairy Research Unit herd. From that study, a heritability estimate of 0.48 was determined, suggesting considerable genetic influence on susceptibility to BLV infection. Since the heritability study considered only one dairy herd, the results must be confirmed by examination of an appropriate sample of dairy herds from throughout Florida. It is only after such work that the potential of genetic selection as a simple and inexpensive method for the control of BLV infection (and thus of enzootic bovine leucosis and bovine lymphosarcoma) can be evaluated.

Our future research program will be directed towards the solution of 4 unanswered questions:
1. What is the extent of BLV infection in Florida dairy herds?
2. What is the economic impact of BLV infection on dairy productivity? Consideration will be given to milk yield, milk quality, neonatal calf mortality, calf viability, and the possibility that BLV can act as an immunosuppressive agent and thus influence the susceptibility of dairy cattle to other diseases.
3. What is the extent of genetic influence on susceptibility of dairy cattle to BLV infection?
4. What are the methods of horizontal transmission of BLV and how important are prenatal and colostral transmission?

Review References


BRUCELLOSIS AND RESEARCH UPDATE

Paul Nicoletti DVM MS
College of Veterinary Medicine

There have been several significant events in the battle against brucellosis since the last Dairy Production Conference. In the short time available we can discuss a few of these and their possible impact on the future effort, to control this complex and often frustrating disease.

Report of the Brucellosis Technical Commission

During 1975 a number of organizations requested that a study be conducted of the national bovine brucellosis eradication program. The members of a commission were to be selected on the basis of expertise in brucellosis, economics, public health and the cattle industry.

A five member commission was formed in 1976 and a report was published in August 1978. Below are listed some of the general and pertinent findings:

1. Effective control leading to local eradication of bovine brucellosis is biologically feasible. State and federal governments and industries affected should support a cooperative program.

2. Biological knowledge essential to accomplish control leading to local eradication is available. However, levels of understanding and current knowledge are low in many places and programs of education should be supported.

3. Investment of funds in sound modifications of the present program targeted to varying requirements of herds will produce a favorable return.

4. Administrative problems in disbursing indemnity payments engender antiprogram sentiment. A method of correlating claims with replacement values and prompt payments should be instituted.

5. Research funding should be adequate to assure adequate scientific knowledge as new problems arise.

6. There is additional need for knowledge on the dynamics of dairy and beef cattle industries and how these affect disease control including brucellosis. Various government agencies in cooperation with the Land Grant Universities should conduct research in this area.

7. There is inadequate data to provide evaluations of brucellosis program performance and priority should be given to an adequate data collection system.

8. A nonduplicative individual animal identification system should be developed so that all cattle changing ownership after 1981 can be traced to herd of origin.

9. Serious consideration should be given to the prospect that Occupational Safety and Health Standards may be imposed in the packing industry on slaughter of reactor cattle.

10a. That a warranty on all changes of ownership be considered.
b. That classification of herds, states or regions be based upon sound principles.

c. That systems of individualized herd management be adopted.

d. That information from research be used to permit increased resistance in herds (adult cattle or herd vaccination).

e. That the Market Cattle System should not be used as the sole or primary method of surveillance or classification of areas.

Adult Cattle Vaccination

The field studies which generated data which supported the adoption of this procedure began in late 1975 in selected Florida dairy herds. These studies had shown that:

1. A reduced dose of Strain 19 provided resistance at least equal to that of the calf dose regardless of method of administration;

2. Methods are available to, with a high degree of accuracy, differentiate vaccinal and field strain infection titers, especially where the reduced dose is used;

3. Adult cattle vaccination resulted in dramatic reductions of reactors removed from herds when compared to pre-vaccination levels using test and slaughter methods;

4. That vaccine-induced abortions were less than the 1% of the vaccinated population and constituted no serious problem in the program;

5. That Strain 19 udder infections were less than 1% of the vaccinated population but would result in condemnation of some cattle since bacteriologic methods are the only form of differentiation of these from other infected cattle.

In October, 1978, a report was made to the United States Animal Health Association which summarized results of adult vaccination in dairy herds in Florida and Puerto Rico up to August, 1978. Among 95 herds in Florida and 68 in Puerto Rico, there was an 87% and 86% reduction in reactors, respectively, by the third post-vaccinal test. Many of these herds are now free of brucellosis.

To date, there have been 180 herds (108 dairy and 72 beef) which have been adult vaccinated in Florida.

Research

During the past few years there has been a renewed interest in research on brucellosis. This is because of the increase of brucellosis during the early and mid-seventies and an increase in federal funds.

Some of the major areas of research and where conducted are:

1. Improved diagnosis - Minnesota, Wisconsin, Texas, Alabama, Florida, California, New Mexico

2. Vaccine Evaluation
   a. Dose - USDA (Ames, Iowa)
   b. H38 - California

3. Latent Infections - Alabama, Texas

4. Wildlife - Wyoming, Alaska, Texas

5. Responses of the fetus - Louisiana

6. Cell Fraction - Wisconsin, USDA (Ames), Virginia
Needed Areas of Research

1. Incubative Infections
2. Diagnostic Tests, especially for vaccinated cows and for high volume test procedures
3. Optimal Dose of Vaccine
4. Chemotherapy

In Florida we would like to continue work on the indirect hemolytic test and initiate studies on dermal antigens and chemotherapy.

Program Changes

In my opinion, there are major changes which should be made in the national and state program. (Some of these are receiving consideration)
1. County certification should be eliminated
2. Card test should only be a screening method
3. Individual herd plans
   a. Should include prerogative for temporary retention of reactors under certain circumstances
   b. Flexibility in test schedules; vaccination
4. Wider use of whole herd vaccination without the serious restrictions which now exist.
5. Prerogative to vaccinate imported dairy replacements into negative herds.
USDA STOP PROGRAM IN DAIRY COWS

by

Dr. Grace Clark, DVM
Residue Evaluation and Surveillance Division
USDA
Washington, DC

A new program to detect antibiotic residues in the meat of dairy animals going to slaughter at federally inspected packing houses was outlined by Dr. Grace Clark, senior staff officer in the Residue Evaluation and Surveillance Division of the U.S. Department of Agriculture.

Dr. Clark said the USDA has had a residue testing program since 1967, but the new program, labeled Swab Test on Premises (STOP), involves a simpler and faster test which will permit the screening of many more animals.

She said a 1976 survey found there were more antibiotic residue violations in dairy than beef animals going to packing plants. She cautioned that "dairymen must begin to use more precautionary measures in their use of antibiotics."

Dr. Clark said the STOP program will not determine the type or level of antibiotic residues in a carcass, but will serve as a means to screen those which need more exact testing.

If a carcass is then found to be in violation of permitted residue types or levels, it would be condemned. She said producers found in violation will "feel the effects in a variety of ways," with animal screened more carefully in the future and inspectors looking for injection sites in the carcass.

"We recognize this program can have serious effects on dairymen and we want them to be aware of this," Dr. Clark said. She noted also that work is being done to develop a screening test for on-farm use.

What You Should Know About...

ANTIBIOTIC RESIDUES IN CULL DAIRY COWS

(Taken from USDA, FSQS-22)

There is growing government and public concern over the presence of drugs in meat animals.

As a dairymen, you've known for years that you are responsible for the wholesomeness of your milk. But, have you considered that you are also responsible for the wholesomeness of meat?

If you haven't, you need to know that important changes are coming. A new test has been developed to detect drug residues in cull dairy cows before their carcasses leave the slaughterhouse.
What's the Problem?

Approximately 2.5 million dairy cows are slaughtered each year. Government surveys indicate that between 10 and 30 percent of the cows showing specific disease conditions at the time of slaughter contain illegal levels of antibiotic residues.

Under the Food, Drug and Cosmetic Act—administered by the Food and Drug Administration (FDA)—it is illegal to market animals if they contain drug residues above established tolerances.

Similarly, under the Federal Meat Inspection Act—administered by the U.S. Department of Agriculture's (USDA) Food Safety and Quality Service (FSQS)—meat cannot be sold for human consumption if it contains residues above the tolerances set by FDA.

What's Causing the Residues?

The use of drugs to treat or control animal diseases has long been a common practice. This is particularly true among dairymen. Intramuscular injections to control various infectious diseases and treatment for mastitis are the major source of antibiotic residues among dairy cattle. The most frequently detected drugs are penicillin and dihydrostreptomycin.

Failure to observe required drug withdrawal times—which are listed on the drug's labels—is a major cause of violative residues.

What's Ahead?

The major drawback to USDA residue testing has been the time required to observe laboratory results. Heretofore, Federal meat inspectors collected tissue samples at the slaughter plant and sent them to a FSQS laboratory for analysis. Because of the sophisticated testing required to identify and confirm the specific residue, it took up to 14 days before the inspector in the plant could be notified as to the results. While this testing was done, the carcass was retained in the packing plant. However, starting officially in Feb. 1979, USDA veterinarians will begin using a new "swab-test-on-premises" (STOP) program on dairy cows. This new screening program will detect antibiotic residues in animal kidneys in a matter of hours, before the carcass would normally leave the slaughterhouse.

If the swab test is negative, the carcass will be released. If positive, the carcass will be retained until tissue samples are analyzed in FSQS laboratories. If the muscle tissue contains residue above the FDA tolerance level, the carcass will be condemned.

How Will STOP Work?

Following antemortem and postmortem inspection, USDA veterinarians will swab test dairy cow carcasses showing injection lesions, as well as carcasses of animals they suspect received antibiotic therapy because of severe mastitis or some other disease condition.

In each screening test performed, the veterinarian will insert a swab into the kidney from the suspected carcass. This swab is placed on a test plate and incubated for 18 hours. If the sample is positive for the presence of antibiotics, the carcass will be retained at the plant. Kidney as well as
muscle and liver tissue samples will then be sent to an FSQS laboratory to determine the specific antibiotic residue present and its level of concentration.

After this testing -- which takes 7 to 14 days to obtain results -- those carcasses and parts thereof containing no residues will be released for consumption.

What Are the Consequences?

This new STOP program enables USDA veterinarians to test more suspect cows with faster results -- and do it right in the packing plant. It’s safe, simple, and accurate in detecting antimicrobial activity.

Dairymen who send cull cows to market with violative residues will run a high risk of being detected. Packers will learn quickly which producers or dealers are marketing violative cows. They may refuse to buy animals from people with a history of violations to minimize the chance of having carcasses condemned.

When a violation occurs, USDA's meat inspectors will increase surveillance and testing of a producer's dairy cows. This procedure will continue until the residue problem is solved.

All incidents of illegal drug residues are reported to FDA, which has the authority to investigate and take appropriate regulatory action. In addition, if problems persist, tighter restrictions could be imposed upon the use of antibiotics.

In short, everyone stands to lose unless antibiotic residues are brought under control.

Industry-Government Teamwork

The National Milk Producers Federation, National Mastitis Council, and American Association of Bovine Practitioners, along with the National Dairy Herd Improvement Association and United Dairy Industry Association, and with the support of the American Dairy Science Association and the Animal and Health Institute, have joined forces with the USDA, FDA, State Extension Services and State Departments of Agriculture in a united effort to help dairymen and the rest of the meat industry eliminate the problem of violative antibiotic residues in dairy cattle.

A comprehensive educational program is underway to help dairymen avoid marketing animals with violative residues. Your help is needed, too.

What You Should Do Now

Dairymen, everywhere, should immediately review their use of drugs for disease prevention and treatment.

First, consider whether antibiotics should be used at all. If you do decide to use drugs, know the proper procedure and insist that it be followed in treating you animals. Buy drugs from reputable suppliers and sell your cows only to reputable dealers.

Here are some tips to remember:
*Keep complete and accurate records on when and what dose was given to each animal by you, your employees, or your veterinarian. Know the withdrawal time and don't sell the animal before that date. Don't forget, the withdrawal time begins the last time the drug was administered.

*Remember, misuse of intramammary infusion drugs as well as injectable products will also cause tissue residues. When in doubt about how a drug should be used, consult your veterinarian or the dealer who sold you the antibiotic.

*Mark treated animals and, if possible, isolate each animal that has been treated.

*Drug labeling instructions change frequently; always look closely for the correct dosage and withdrawal time each time you but and use an antibiotic.

*Use only the exact dose recommended for the species and size of animal being treated.

*Administer the drug correctly; select needle size and injection site carefully. Adverse reactions and ineffective treatment -- as well as violative residues--can result from incorrect use of drugs.

*Don't "double dose"--for example, don't use an injectable drug along with the same antibiotic orally. On the advice of your veterinarian, if you do exceed the label's dosage directions, you and/or the veterinarian must be responsible for a longer withdrawal time.

*Be sure your veterinarian advises you on the safe date to market animals he treats, and the composition of any drugs administered.

Remember, safe meat--like safe milk--is your legal responsibility, Protect your investment and maximize your returns from the sale of cull cows by ensuring that they are free of antibiotic residues.
PROBLEMS ASSOCIATED WITH PRODUCING QUALITY MILK

by

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As a newcomer to Florida dairying, it would be presumptuous of me to attempt to speak with authority about the quality problems of milk produced in Florida — particularly when most of Florida's milk satisfies the regulatory agencies, the processors, and most importantly the consumers. The large number of repeating quality awards presented at the banquet is evidence of the performance of typical Florida dairymen and a reflection of the basic high quality of Florida milk. Consequently, I prefer this to be a "get acquainted" session in which you learn something more about me; and as the result of contacts I make at this meeting, I get to put more names, faces, and voices together and also begin to understand about your production systems, ways of doing business and your problems. So, I will just review those problems that are currently of concern to dairymen whether located in Florida or almost anywhere else in the continental United States. However, in the few short months I have been getting around the state, several "tender spots" have become apparent and I'd like to say a word about them.

1. Composition

Because of the basic lack of roughage, Florida milk tends to be lower in fat and solids than milk from farther north where the cows get more silage and hay. The low acidity levels (0.14-0.15%) commonly encountered (and, thus, usually expected at delivery to the processing plant) are generally due to the low solids, at least in part. If the right set of circumstances occurs, the fat can increase and the solids not fat along with it; as a result, the acidity can go to 0.16-0.18% without there being cause for concern particularly if the fat is in the neighborhood of 4.0% or above. The amount and type of roughage will markedly influence composition as will certain other factors; and changes in composition can affect titratable acidity. The pH and bacterial count should indicate whether the increased acidity is the result of bacterial activity or some other controllable factor.

2. Freezing point as an indication of added water

The average freezing point of milk used as a regulatory standard is generally arrived at as the result of local testing experience; and based on the figures obtained by the Dairy Division, State of Florida, serious problems are infrequently encountered; but there are producers who do show borderline results from time to time.

There are good opportunities for added water to get into milk particularly with the size of milking equipment used in the larger Florida dairy herds. The dairyman has to be vigilant about adequately draining
the milking system, bulk tank, and associated piping after cleaning and sanitizing to get rid of not only the water which contributes to a higher freezing point, but also the detergent and sanitizer residuals which contribute to positive inhibitor tests and may interfere with good culture activity in the manufacture of cultured products. We will discuss more about these chemical inhibitors later.

3. Off-flavor problems in raw milk

As milk is received from the dairy farm, there can be a variety of flavors present: from the feed, from pasture or loafing areas (weeds), from the sanitizing and/or cleaning chemicals used if the equipment is not well rinsed and/or drained, and developed flavors such as rancidity. This latter can be related to late lactation and marginal nutrition in the dairy cow as well as to equipment factors (starved pumps and defective level controls, poorly maintained milking systems with air leaks: all of which permit entrance of large amounts of air into the milk and subsequent excessive foaming); and some milking management factors such as teat cups on too long and teat cups dropping off - these again adding to excessive air in the milk. It is interesting to note that several of the milking management practices which are recommended in mastitis control also are suggested to minimize lipase activation during milking.

4. Antibiotics and drug-inhibitors from disease treatment

Florida milk supplies are well monitored for the presence of antibiotics and other animal drug inhibitors. The percentage of positive tests obtained is very low among all of the samples tested from Florida dairymen which indicates a general awareness of the problem and conscientious control over milk from treated cows. The consequences of the very infrequent slip-up are so very serious here in Florida because of the size of the herds which results in few herds per pick up tanker; and in the smaller plants, a very few large producers constitute the entire processing supply for a given day.

We have just heard from Dr. Clarke of USDA on the STOP program for detecting antibiotics in meat carcasses. This rapid screening procedure will provide a similar quick screening for the presence of antibiotics in carcasses as is done in milk. This program is of current concern to the dairy farmer as it relates to his marketing of cull cows particularly those that he wants to move quickly.

But the dairymen has an even greater concern on a day to day basis about the presence of antibiotics in his milk. While the FDA looks on all residues in foods as contamination, the FDA does consider antibiotic residues in milk as particularly significant from a public health point of view. The presence of minute amounts of penicillin in milk can trigger serious allergy symptoms in those who are sensitized to the penicillin. Furthermore, the dairy processor who is manufacturing culture milk products will be seriously disadvantaged if cultures will not be active in milk containing antibiotics or other bacterial inhibitors.

The procedure generally used in the screening of farm milk samples for antibiotics is somewhat less sensitive than the methods used for detecting antibiotics in commingled milks and processed fluid products. In turn, the latter are less sensitive than those used for detecting antibiotics in dry milks. Thus, there is a greater burden on the dry milk
processor than on the fluid milk processor or the dairy farmer in providing products that show no detectable antibiotic residues.

The practices on the dairy farm which provide a hazard related to antibiotic residuals are those used principally in control of mastitis. Administration of antibiotics and other drugs to lactating dairy cows sets up the critical conditions. Strict adherence to the withholding times is absolutely necessary and that means not only on each quarter treated but for each cow treated regardless of the number of quarters treated per cow.

5. Bacteria standards

As regards bacteria, the average Florida dairymen does not seem to have much difficulty in meeting bacterial count standards; although there are occasionally situations in which a poor job of cleaning and sanitizing is done or there is an equipment or power failure so that cooling is delayed or not at all properly carried out. As is the case wherever cows are milked, the necessity to conscientiously do the little things and not just go through the motions is the secret of success in keeping those counts low. The consequences of a slip-up or an accident or some event occurring over which we have no control may be very serious and it's better to admit the problem rather than cover it up because at least in that way a whole tanker load of milk may avoid being spoiled.

Some of the consequences of a bad (high bacterial count) tank of milk may be off flavor and/or poor shelf life of the processed product. High bacterial counts and the development of off flavors can take place even in properly pasteurized milk that has been adequately stored in the cold as the result of post pasteurization contamination picked up from milk contact surfaces downstream from the pasteurizer. This is primarily a processing plant sanitation problem.

But, a high bacterial count raw milk off a farm where there has been a cleaning-sanitizing "boo-boo" or a power failure even though a very high percentage of the bacteria are killed by pasteurization can have a short shelf life and develop some off flavors relatively quickly due to the action of enzymes which are not destroyed by pasteurization even though the bacteria themselves have been killed. This kind of spoilage often results in characteristic bitter flavors and the "bitty" defect in high fat products - the latter an appearance defect in which the product looks lumpy or curdled.

Another kind of shelf life problem is related to the pasteurization survival of a particular group of bacteria known as spore formers and some of which are capable of growing at refrigerated product storage temperatures. These organisms are known in dairy research literature as psychrotrophic spore formers. The results of this slow growth are bitter flavors and sweet curdling. The latter is evidenced by plaques or "blisters" of coagulated milk adhering to the insides of milk containers toward the end of the designated shelf-life period. In the more advanced stages of sweet curdling the bottom portion of the container may be covered or filled with a very soft custard-like curd. Depending on the numbers of these organisms present originally and some factors not yet completely understood, the defect can be observed in as little as seven days but more often takes longer to develop. Consequently, because the organism may be present in the raw milk before pasteurization and does survive pasteurization, this could be a farm
quality problem. Modern dairy processing techniques which utilize higher product pasteurization temperatures may intensify rather than decrease the frequency of this problem.

6. Extraneous matter and chemical residuals

We have already mentioned something about residuals in milk as it is delivered from the farm. They may come from the feed of the cow, from the cow's environment, from drug treatments, from milking equipment and operations. Any chemicals or extraneous materials are in this category. The most common items are: sediment, added water, cleaning and sanitizing chemicals, antibiotics and other drugs, mycotoxins and iodine. FDA regulations consider extraneous matter and enough water to raise the freezing point above a certain standard as adulterants. Control of these, extraneous matter and added water, is relatively easily achieved by close control and monitoring of the cow side and milk house sanitation procedures. Sediment arises from dirty teats and udders and by being picked up in and by the inflations during milking. The control of residues from cleaning and sanitizing operations depends on close supervision of milking parlor and milkhouse clean up to insure that all equipment is adequately drained before the next milk contact period. Antibiotic and drug residues can be controlled by conscientious adherence to withholding times. It's like playing Russian roulette and practicing false economy to put milk from antibiotic treated cows into the bulk tank.

Mycotoxins are somewhat different. They find their way into milk via the feed. The growth of certain types of molds on grain and other feed ingredients can result in the production of these toxic substances which can cause lethal reactions in certain animals and be transmitted from dairy cows. The obvious control is, of course, elimination of feeds containing mycotoxins. Their detection in feedstuffs is not a simple short routine test; it is involved requiring sophisticated equipment, and it is relatively expensive. The southeastern states have had some problems with mycotoxins in dairy feeds; residuals beyond tolerable regulatory limits have been detected and FDA continues to be extremely concerned about the problem. The State of Florida Department of Agriculture, Dairy Division is to be commended for the quiet effective efforts which have dealt with the problem adequately.

The presence of high iodine intakes in today's "Market Basket" food survey by FDA is cause for continuing concern by that agency. Milk continues to be a very high occasional source of iodine in the diet. And, the extremely high levels detected in milk come from orally administered drugs and other compounds rather than teat dips or other sanitation chemicals. Further research is being undertaken to establish the predominant sources of iodine in bovine milk and some proposal(s) addressing the control of high iodine levels in milk should (or are scheduled to) appear in the near future. This type of proposal and the problem addressed will have some substantial impacts on dairymen in terms of limitations of iodine containing compounds or formulations used as drugs and/or feed supplements.

7. Control of mastitis

On several occasions earlier, reference has been made concerning certain issues relating to the problem of mastitis. Mastitis with its destructive effects on milk production is largely an economic problem to the dairyman but it also complicates the processor's life because mastitis milk is
low in solids, has poor stability in processing, provides lower yields in cultured product manufacture, and seems implicated in some rancidity incidents. By and large, the Florida dairyman seems quite knowledgable in the technology of mastitis control which is focused on close supervision and management. The areas where these efforts are focused in a mastitis control program include cow side hygiene (sanitizer solution for washing udders and preparing the cows for milk let-down and the use of post milking teat dips); milking management factors (proper installation and maintenance of milking equipment, good prepping of cows + fast milking) and finally dry cow therapy.

There is no quick and easy way to minimize mastitis. There are no magic drugs, vaccines, or other treatments to provide immediate and complete control. Maximum control is achieved by a constant application of preventive health practices involving two main principles: 1) minimizing the number of mastitis pathogens in the area of the teat end opening to prevent entrance of the organism into the udder, 2) as much as possible, avoiding exerting any stress on the mammary gland so that any organism gaining entrance to the mammary gland does not have the opportunity to grow and set up an infection. The cow’s environment does not lend itself readily to control of microorganisms but we must do the best we can with good sanitation practices both at cow side and directed at environmental contamination and the management factors including equipment maintenance and approved milking practices. These are exercises in conscientious adherence to detail and thus are people related and people dependent. To get these program details properly and consistently applied requires awareness, knowledge and dedication at the top management level which then must carry down into close supervision of the milking personnel who get these critical things done properly on a day to day basis.

The National Mastitis Council (NMC) is a non-profit scientific and educational organization founded to serve the dairy and related industries through improved control of the major disease problem of the dairy cow, mastitis. There are 650 individual members and 200 sustaining memberships held by various organizations and industry groups. The Council holds a regional summer meeting and an annual meeting in February at which educational papers are presented and Council business is transacted. Educational materials such as Current Concepts of Bovine Mastitis and Microbiological Procedures for Diagnosis of Mastitis are published by the Council. There are sixteen committees within the Council sponsoring educational and research activities relating to mastitis.

Florida dairymen and associated industry and regulatory people presently are not widely supporting the National Mastitis Council. There are this year only fourteen individual members and one sustaining member from the State of Florida. Greater contact with the National Mastitis and Council its programs would be of benefit to Florida dairymen. The summer meeting of the NMC will be held this year on August 16, 1979 at the Sheraton Twin Towers in Orlando, Florida. The program will last from 9:00 a.m. to about 4:00 p.m. and the afternoon program will include a panel of Florida dairy industry people who will discuss Florida programs, problems, and concerns related to mastitis control. I would urge that you take advantage of this opportunity to learn more about the activities of NMC.
In conclusion, some of my past experiences have included working with dairy farmers, producer group and dairy plant fieldmen, processors, and associated regulatory personnel on raw milk quality problems including control of mastitis and milking equipment sanitation. I will make every effort to become better informed on the Florida dairyman's individual problems and needs by attending as many producer meetings as possible and in one-on-one contacts in the field. And, accordingly, the opportunity to visit with each of you would be most welcome. Please get in touch with me if I can be of assistance in providing information or in helping out with any problem you may have.
USING DIFFERENT FIBER SOURCES, FEED ADDITIVES, AND MASONEX IN COMPLETE FEEDS

by

Barney Harris, Jr.
Extension Dairy Nutritionist
University of Florida

1. Fiber Sources

Several experiments have been conducted in recent months to test a variety of fiber sources as well as a number of feed additives. Already reported at past conferences is our studies with sugarcane bagasse pellets and ground corrugated boxes (GCB). Sugarcane bagasse pellets were reported to be equal to cottonseed hulls (CSH) in effective fiber while ground corrugated boxes contained 1.75 times more effective fiber than cottonseed hulls. The results of the two studies are as follows:

| Table 1. Bagasse Pellets vs CSH in Complete Feeds

<table>
<thead>
<tr>
<th>Component</th>
<th>DM Intake</th>
<th>Milk Intake (1b/day)</th>
<th>Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% Bagasse Pellets (BP)</td>
<td>3.9</td>
<td>47.7</td>
<td>4.1</td>
</tr>
<tr>
<td>25% CSH</td>
<td>4.1</td>
<td>50.2</td>
<td>3.8</td>
</tr>
<tr>
<td>12.5% CSH, 12.5% BP</td>
<td>4.0</td>
<td>47.7</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Marshall and Van Horn, JDS 58:896, 1975

| Table 2. Ground Corrugated Boxes vs CSH in Complete Feeds

<table>
<thead>
<tr>
<th>Component</th>
<th>FI (lbs)</th>
<th>MY (lbs)</th>
<th>FAT (%)</th>
<th>Feed:Milk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% GCB</td>
<td>47.1</td>
<td>51.3</td>
<td>3.1</td>
<td>.92</td>
</tr>
<tr>
<td>20% GCB</td>
<td>48.8</td>
<td>50.8</td>
<td>3.5</td>
<td>.96</td>
</tr>
<tr>
<td>30% GCB</td>
<td>45.3</td>
<td>46.2</td>
<td>3.6</td>
<td>.98</td>
</tr>
<tr>
<td>30% CSH</td>
<td>58.1</td>
<td>50.6</td>
<td>3.8</td>
<td>1.14</td>
</tr>
</tbody>
</table>

The bagasse pellets were crumbled prior to mixing with the other feed ingredients in order to avoid separation. Several dairymen have reported some separation in bulk tanks where pelleted ingredients are added to conventional feed mixes. Ingredients such as cottonseed hulls and masonex help prevent separation.

Ground corrugated boxes are bulky and when included in a ration forms a bulky feed. The addition of a liquid supplement or moisture at the time of feeding increases palatability. Feed intake on our experimental rations was exceptionally good even though the rations contained no liquid supplements. Rations were consumed more slowly than CSH rations.
Peanut hulls are occasionally used as a roughage extender when a shortage of CSH exists or when other fiber sources become expensive. Peanut hulls may contain pesticides and therefore caution must be used with their inclusion into dairy rations. The results of an experiment where fan-blown peanut hulls were used as a roughage extender are as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>FT (lbs)</th>
<th>MY (lbs)</th>
<th>Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% CSH</td>
<td>51.6</td>
<td>50.0</td>
<td>3.29</td>
</tr>
<tr>
<td>20% GCB</td>
<td>39.9</td>
<td>49.5</td>
<td>3.30</td>
</tr>
<tr>
<td>10% GCB, 10% PH</td>
<td>44.5</td>
<td>50.7</td>
<td>3.23</td>
</tr>
</tbody>
</table>

The results of our feeding trial with fan-blown peanut hulls indicated that peanut hulls contain about 35% effective fiber. Peanut hulls finely ground and/or pelleted would contain very little effective fiber.

In recent months, a shortage of boxcars has been reported to be a frequent problem in shipping loose cottonseed hulls. At the same time, hopper cars appear to be more available and are easier to unload. The problem that exists is that loose cottonseed hulls cannot be unloaded out of hopper cars. There appears to be two advantages in pelleting cottonseed hulls: 1) increases density, and 2) smoother flowing. The question is how does pelleting affect the effective fiber value of loose cottonseed hulls. Studies in Arizona showed that pelleted CSH were as effective as loose CSH in rations containing a combination of alfalfa hay cubes and pelleted CSH. Since the combination made up 50% of the ration, it is doubtful that a depressed fat test would have occurred anyway. The objectives of our studies with pelleted CSH were to determine the effective fiber and energy values of pelleted CSH as compared to loose hulls. The results of the studies are summarized in Table 4.

<table>
<thead>
<tr>
<th>Component</th>
<th>FT (lb)</th>
<th>MY (lb)</th>
<th>Fat (%)</th>
<th>FI/MY Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular CSH (30%)</td>
<td>52.9</td>
<td>44.6</td>
<td>3.38</td>
<td>1.18</td>
</tr>
<tr>
<td>Pelleted CSH (30%)</td>
<td>49.8</td>
<td>47.1</td>
<td>2.91</td>
<td>1.04</td>
</tr>
<tr>
<td>Pelleted UC (30%)</td>
<td>49.9</td>
<td>46.0</td>
<td>3.22</td>
<td>1.08</td>
</tr>
</tbody>
</table>

The results indicate that the pelleting of regular CSH increased their energy content and slightly reduced their effective fiber. The ratio of feed intake to milk yield narrowed from 1.18:1 to 1.04:1 when going from regular hulls to pelleted CSH. Pelleted undelinted CSH had a higher effective fiber value than regular pelleted hulls but a poorer feed conversion to milk than pelleted regular CSH.

Sunflowers are a relatively new crop in the south. Sunflower seed acreage in this country has been boosted by superior per acre return which is better than for wheat while the cost of production is similar to wheat. USDA reports that prospective plantings for 1979 are up by about 50% in several leading states such as Minnesota, Dakota's and Texas. Plantings in several southeastern states appears to be increasing even though insect problems were encountered during 1978.
Table 6. Average Feed Intake and Milk Yield the First 8 Week Postpartum

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>Control-Buffer</th>
<th>Buffer-Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Cows</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Dry Matter Intake, lb</td>
<td>40.04</td>
<td>44.88</td>
<td>42.02</td>
</tr>
<tr>
<td>% of B.W.</td>
<td>2.93</td>
<td>3.25</td>
<td>3.05</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>63.80</td>
<td>70.18</td>
<td>70.62</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.91</td>
<td>3.96</td>
<td>3.92</td>
</tr>
</tbody>
</table>

Muller et al. Penn State University, NC 119

The authors stated that cows receiving rations with buffers appeared to adapt to the rations more rapidly postpartum than controls.

Work conducted at Florida has been primarily with Holstein cows 1 to 3 months in lactation. In our first experiment, sodium bicarbonate was used in a 3x2x2 factorial arrangement where 36 Holstein cows receiving three fiber sources (20% GCB, 10% PH & 10% GCB, and 30% CSH) added fat (0 or 2%), and added sodium bicarbonate (0 or .75%). Only effect on milk yield was due to interaction of fat and NaHCO₃ in CSH diets but not in GCB and GCB-PH. The results are shown in Tables 7 and 8.

Table 7. Using Sodium Bicarbonate and Stabilized Animal Fat for Feeding Lactating Cows During Summer

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>NaHCO₃</th>
<th>Added Fat</th>
<th>NaHCO₃ + Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Yield, lb</td>
<td>50.30</td>
<td>50.00</td>
<td>49.10</td>
<td>50.70</td>
</tr>
<tr>
<td>Feed Intake, lb</td>
<td>45.70</td>
<td>45.10</td>
<td>45.00</td>
<td>45.40</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.45</td>
<td>3.39</td>
<td>3.21</td>
<td>3.03</td>
</tr>
<tr>
<td>Ration TDN (DM)</td>
<td>74.10</td>
<td>73.70</td>
<td>77.80</td>
<td>77.00</td>
</tr>
</tbody>
</table>

Table 8. Using Sodium Bicarbonate and Stabilized Animal Fat in CSH Rations

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>NaHCO₃</th>
<th>Added Fat</th>
<th>NaHCO₃ + Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Yield, lb</td>
<td>48.80</td>
<td>50.20</td>
<td>46.40</td>
<td>53.20</td>
</tr>
<tr>
<td>Feed Intake, lb (DM)</td>
<td>51.70</td>
<td>51.80</td>
<td>50.80</td>
<td>52.40</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.62</td>
<td>3.55</td>
<td>3.20</td>
<td>2.83</td>
</tr>
</tbody>
</table>

The addition of stabilized animal fat under our conditions reduced slightly milk production and fat percent. Also, there was a further depressing effect on fat percent with the combination of fat and sodium bicarbonate.

In an experiment completed in March, 1979, sodium bicarbonate was used in a 3x2x2 factorial arrangement where 32 Holstein cows received three fiber sources (35% pelleted CSH, 35% pelleted undelinted CSH, and 35% sunflower hulls (SPH), added fat (0 or 2.5%), and added sodium bicarbonate (0 or 1%). The results with the addition of NaHCO₃ are given in Table 9.
Table 9. The Effect of Sodium Bicarbonate on Milk Yield, Feed Intake and Fat Percent

<table>
<thead>
<tr>
<th>Item</th>
<th>1% NaHCO₃</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Intake, lb</td>
<td>58.40</td>
<td>56.60</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>55.50</td>
<td>56.70</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.42</td>
<td>3.35</td>
</tr>
<tr>
<td>FCN</td>
<td>54.70</td>
<td>55.00</td>
</tr>
</tbody>
</table>

In recent years, poultry producers have consistently added up to as much as 8% fat to poultry rations to enhance the energy content of the chick’s diet. No such widespread use of added fat has been made in ruminant rations. Animal scientists have established a net energy value for fat used in lactating cow rations at 255 megacalories per 100 lb or 202% TDN. This would indicate that added fat contains about 2.5 times more energy than an equal amount of corn. This being true, it appears possible that cows needing large amounts of energy could more nearly meet their requirements on high energy rations or low energy rations could be improved with the addition of fat.

Early work at Cornell on the level of fat in dairy rations compared concentrate mixtures containing 2.7% fat with higher fat mixtures averaging 6.5% fat. There was a 4% increase in milk yield with the higher fat mixture. Also, it was demonstrated that fat in natural feeds was more useful that by adding corn or soybean oil to rations. Recent work by Palmquist at Ohio State is given in Table 10.

Table 10. Feed Intake and Production of 12 Holstein Cows Fed Isocaloric High Grain and High Fat Rations*

<table>
<thead>
<tr>
<th>Rations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ration fat, % of DM</td>
<td>3.7</td>
<td>3.5</td>
<td>7.3</td>
<td>6.8</td>
</tr>
<tr>
<td>CP, % of DM</td>
<td>14.3</td>
<td>16.8</td>
<td>14.0</td>
<td>16.5</td>
</tr>
<tr>
<td>Milk, lb/day</td>
<td>64.6</td>
<td>65.1</td>
<td>62.9</td>
<td>66.6</td>
</tr>
<tr>
<td>Fat, %</td>
<td>2.7</td>
<td>2.7</td>
<td>3.4</td>
<td>3.4</td>
</tr>
</tbody>
</table>

*Ohio State

Studies at Florida with animal stabilized fat are given in Table 11.

Table 11. The Effect of Added Animal Stabilized Fat on Milk Production, Feed Intake, and Fat Percent

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>Added Fat (2.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Cows (Holsteins)</td>
<td>18.00</td>
<td>18.00</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>48.80</td>
<td>46.40</td>
</tr>
<tr>
<td>Feed Intake, lb</td>
<td>51.70</td>
<td>50.80</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.62</td>
<td>3.20</td>
</tr>
</tbody>
</table>

*Complete Feeds with Roughage by-products.

In a more recent study, 32 Holsteins were used to test the value of added fat (HEP, Proctor and Gamble Co.) in rations containing two pelleted forms of cottonseed hulls and sunflower hulls. The results with the added fat are given in Table 12.
Table 12. The Effect of Added P&G Fat on Milk Yield, Feed Intake, and Milk Fat Percent

<table>
<thead>
<tr>
<th>Added Fat (2.5%)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Cows</td>
<td>16.00</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>56.10</td>
</tr>
<tr>
<td>FCM, lb</td>
<td>54.20</td>
</tr>
<tr>
<td>Feed Intake, lb</td>
<td>56.90</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Taylor and Harris, unpublished

Enzymes as feed additives in dairy rations and as silage preservatives are presently being used by a number of dairymen but have received limited studies as to their usefulness. Our studies have dealt only with the enzymes that are contained in a product called "Vita Ferm" (Biozyme Enterprises).

In an experiment just completed, the results obtained but not statistically analyzed are given in Table 13.

Table 13. The Effect of Vita Ferm on Milk Yield, Feed Intake, and Fat Percent*

<table>
<thead>
<tr>
<th>Added Enzyme (2 oz)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Intake, lb</td>
<td>58.40</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>57.90</td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.31</td>
</tr>
<tr>
<td>FCM, 3.5%</td>
<td>56.10</td>
</tr>
</tbody>
</table>

*Preliminary Results

An additional study with Vita Ferm is presently underway. The results of the present studies will be completed this summer.

3. Liquid Supplements - Masonex

Masonex is a free-flowing, dark brown liquid with 60% solids, a hemicellulose extract of hardwood production (Masonite Corporation) has been widely used in feedlot rations as a substitute for sugarcane molasses. Masonex contains primarily carbohydrate (not less than 55%), water, and a small noncarbohydrate fraction having a variety of phenolic compounds. Phenolic compounds are reported to be capable of protecting protein from microbial degradation in rumen. Studies by Satter at Wisconsin using fermentors in the laboratory concluded that Masonex can react with feed protein and afford some protection against degradation by rumen microbes. Their results, however, indicated that the active compounds in Masonex vary with loads and tend to be unstable in storage.

Several studies have indicated that Masonex is comparable to cane molasses in feeding of Masonex to molasses for feeder cattle. Their results are give in Table 14.
Table 14. A Comparison of Masonex and Molasses on Feedlot Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Masonex</th>
<th>Molasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed/Gain ratio</td>
<td>7.60</td>
<td>7.95</td>
</tr>
<tr>
<td>ADG</td>
<td>3.12</td>
<td>3.02</td>
</tr>
</tbody>
</table>

Crawford et al. at Auburn compared the feeding of Masonex to molasses for feedlot cattle in Table 15.

Table 15. A Comparison of Masonex with Molasses on Feedlot Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Masonex</th>
<th>Molasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Animals</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Days on Test</td>
<td>134.00</td>
<td>134.00</td>
</tr>
<tr>
<td>Gain, lb</td>
<td>383.00</td>
<td>403.00</td>
</tr>
<tr>
<td>ADG, lb</td>
<td>2.86</td>
<td>2.99</td>
</tr>
<tr>
<td>Feed/gain ratio</td>
<td>7.00</td>
<td>6.83</td>
</tr>
</tbody>
</table>

During 1979, studies were conducted at Florida comparing Masonex, molasses and no liquid supplement. The results are shown in Table 16.

Table 16. The Effect of Masonex, Molasses and No Liquid Supplement on Feed Intake, Milk Yield and Fat Percent

<table>
<thead>
<tr>
<th>Item</th>
<th>Molasses</th>
<th>Masonex</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Intake, lb</td>
<td>50.10</td>
<td>51.30</td>
<td>49.00</td>
</tr>
<tr>
<td>Milk Yield, lb</td>
<td>45.90</td>
<td>45.70</td>
<td>45.80</td>
</tr>
<tr>
<td>Fat, %</td>
<td>2.91</td>
<td>2.94</td>
<td>3.13</td>
</tr>
<tr>
<td>Fat Yield</td>
<td>1.27</td>
<td>1.36</td>
<td>1.39</td>
</tr>
</tbody>
</table>

A few dairies in the Gainesville area used Masonex during the summer of 1978. Two of these dairies were monitored for the purpose of gaining information on palatability and fly control. The dairies reported that the product was similar to molasses in palatability and helped maintain good fly control around the dairy. In each situation, it was quite apparent that Masonex tended to maintain fly control in corn silage complete feeds.
COMMON FLORIDA SHADE MANAGEMENT SYSTEMS
TO REDUCE HEAT STRESS

by R. J. Collier
Dairy Science Department
and D. E. Buffington
Agricultural Engineering Department
University of Florida

The radiant heat load that an unshaded cow receives during the day from the sun and surroundings is often greater than the cow's metabolic heat production. A simple shade structure can effectively reduce the radiant heat load on the cow by 30% or more by intercepting the direct solar radiation. As shown in Table 1, this reduction in solar radiation markedly reduces rectal temperatures and respiration rates of cows compared to unshaded control animals. This reduction in heat load improves lactation and reproductive performance of dairy cattle in a subtropical environment, Roman Ponce et al., 1977, J.D.S. 60:104.

Table 1. Responses of animals to environment.

<table>
<thead>
<tr>
<th>Black Globe Temperature (°C)</th>
<th>Shade 29.84</th>
<th>NS-S 8.11*</th>
<th>No Shade 37.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein</td>
<td>Jersey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectal Temp (°C)+</td>
<td>38.75</td>
<td>38.53</td>
<td>39.74</td>
</tr>
<tr>
<td>Respiration Rate (per min)</td>
<td>77.48</td>
<td>78.62</td>
<td>114.20</td>
</tr>
<tr>
<td>Rumen Contraction+ (per min)</td>
<td>2.20</td>
<td>2.63</td>
<td>1.44</td>
</tr>
<tr>
<td></td>
<td>-0.70*</td>
<td></td>
<td>1.96</td>
</tr>
<tr>
<td>n</td>
<td>188</td>
<td>130</td>
<td>243</td>
</tr>
<tr>
<td>n=number of observations.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant treatment difference P<.001.
+Significant breed within treatment difference P<.001.

In addition to lowering fertility heat stress also reduces uterine blood flow, Roman Ponce et al., 1978, J. Anim. Sci., 46:175. This reduction of uterine blood flow during pregnancy is of importance to the dairy farmer. Chronic reduction in uterine blood flow may retard growth of the fetus. The fetal placenta produces hormones stimulating mammary growth during pregnancy. The degree of mammary development establishes the potential of the cow to produce milk.
In order to determine if heat stress during pregnancy reduces calf birth weight and/or milk yield in the next lactation we ran the following experiment. Thirty-one pregnant cows were placed in either the shade (n=16) or no shade (n=15) areas in June 1978. At four day intervals from day 190 of pregnancy to term we measured environmental temperatures, cow rectal temperature, heart rate, and respiration rate and took a blood sample for analysis of hormones. At parturition all cows were removed from treatment and placed in the milking herd. Calf birth weights and milk yield of the dam were also recorded.

As shown in Table 2, pregnant cows in the no shade area were exposed to higher environmental temperatures and had higher rectal temperatures, respiration rates and heart rates.

Table 2. Effect of shade during pregnancy on maternal physiological parameters.

<table>
<thead>
<tr>
<th></th>
<th>Shade</th>
<th>No Shade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Globe Temperature (°C)</td>
<td>29.5**</td>
<td>36.9</td>
</tr>
<tr>
<td>Rectal Temp (°C)</td>
<td>39.2**</td>
<td>39.8</td>
</tr>
<tr>
<td>Respiration Rate/min</td>
<td>61 **</td>
<td>89</td>
</tr>
<tr>
<td>Heart Rate/min</td>
<td>78 **</td>
<td>83</td>
</tr>
</tbody>
</table>

n>700  
*P<.05  
**P<.001

As shown in Table 3 the cows which calved in the shade area gave birth to larger calves (ave, 3 kg) and produced more milk in the subsequent lactation, (ave 407, 168, projected 305 day ME).

Table 3. Effect of shade during pregnancy on calf birth weight and dam’s milk yield.

<table>
<thead>
<tr>
<th></th>
<th>Shade</th>
<th>No Shade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (kg)</td>
<td>39.68</td>
<td>36.64</td>
</tr>
<tr>
<td>1st 100-Day Milk Yield (kg)</td>
<td>2672.4*</td>
<td>2556.1</td>
</tr>
<tr>
<td>Projected 305-Day Milk Yield (kg)</td>
<td>6518.0*</td>
<td>6051.0</td>
</tr>
</tbody>
</table>

*Corrected for age, body weight, sire and real producing ability of dam.
Shade management during the dry period appears to be much more important than previously suspected. Benefits gained from shade management during the dry period are in addition to benefits of shade during lactation and shade effects on reproductive efficiency.

Since many large dairies do not have adequate natural shade available, artificial shades need to be provided in order to increase the productive and reproductive performances of dairy cows. The man-made shades, however, must be well-designed and engineered in order to obtain the maximum benefits that can be realized from shade structures.

The major design parameters for shade structures are: 1) orientation, 2) floor space, 3) height, 4) ventilation, 5) roof construction, 6) feeding and water facilities, and 7) waste management system.

The orientation of a shade structure is very crucial. The preferred orientation is east-west. This means the long axis of the building runs in an east-west direction. Figure 1 shows the shading patterns under shade structures for three different times during the day of June 21. It is important to notice that a larger percent of the shadow from the shade structure lies under the shade structure itself with the east-west orientation. The same relationship is true in September 21 as seen in Figure 2.

In Figure 2, it is also important to point out that there is no place where a feed and watering facility could be placed under the shade structure that would not be in the sun during a portion of the day. Having feed and water available under the shade is extremely important so that the cows are able to keep cool and have access to feed and water simultaneously.

Figure 3 shows the shading patterns under the shade structures for December 21. During the winter, a larger percentage of the floor under the shade will be sunlit when the structure is oriented east-west. This means that the floor will be drier.

Because cows position themselves in the shadow rather than under the shade itself, the area around some shade structures becomes a "mud-hole." Such conditions pose serious problems, especially in low lying areas with high rainfall. Under such conditions, it is advisable to fence the cows under the shade on a concrete pad. However, the area fenced needs to be larger than the floor area of the shade structure because the shadow will not always be under the structure. For a 12 ft high shade structure with an east-west orientation in central Florida, the fenced area should extend at least 8 ft on the north, east, and west sides of the shade. No extension is needed on the south side. This entire extended floor area should be concreted.
The size of a shade structure should allow at least 50 ft\(^2\) of floor space per cow. A more preferable floor area per cow is 65 ft\(^2\). Facilities for feed and water for the cows should be provided under each shade structure to maximize the benefits that can be realized. Feed and water should be supplied under the shade so that animals can take advantage of the comfortable conditions under the shade and still consume feed and water. If feed and water are supplied in an unshaded area, animals will reduce feed consumption and take an increased heat load during feeding resulting in lowered milk production.

Shade structures tend to have length to width ratios ranging from about 2:1 up to over 10:1. When the width of a shade structure exceeds about 40 ft the air movement under the shade structure is sharply reduced, especially in the center of the shade. For flat-roofed structures with a width of 100 to 125 ft, the environmental conditions under the center of the shade are most undesirable because of high temperature, high humidity and high concentrations of ammonia and respiratory gases. If a wide structure is desired, it is recommended to have several continuous openings in the roof to allow better circulation of air. To enhance natural ventilation in shade structures, the site should be selected so that there will be no obstructions, trees or other buildings, within at least 50 ft of all sides of the structure. Also, any gable-roofed structure should have a continuous open ridge to enhance natural ventilation, as shown in Figure 4.

The height of a shade structure needs to be selected with two opposing criteria in mind: 1) the higher the shade, the greater the air movement under the shade and 2) the lower the shade, the smaller the diffuse and reflected radiation loads on the cows. For Florida conditions, a minimum height of 12 ft from ground level to lowest point of the roof is recommended.

Various types of roofing materials can be used for shade structures. The most effective in terms of reducing heat load on the animals under the shade is an aluminum or white galvanized metal roof with about 1 in. of insulation directly beneath the metal roofing. No air space should exist between the roofing material and insulation, otherwise the insulation becomes very vulnerable to damage by birds and rodents. The insulation serves the purpose of practically eliminating the infrared heat load on the animals. The infrared heat load from the underside of a bare metal roof can be as high as 1000 BTU/hr to a cow.

The top of the roof should always be painted white if aluminum is not used. The white color serves to reflect a significant portion of direct solar radiation that would otherwise be absorbed and eventually place a greater heat load on the cows. Aluminum is more reflective than white paint; therefore, no paint should be applied to an aluminum roof.
Modifications of the shade structures with metal-clad roofs are the galvanized metal-cable roofing systems for flat-roofed shades, Figure 5. The metal-cable system consists of sheets of galvanized roofing sandwiched between cables under high tension. The sheets are spaced with a gap of 4-8 in. between them. The advantage of such a system is a lower initial investment; however, it is not known how well such a roof would withstand strong winds.

Shade cloth fabrics with various weave openings providing actual shade from 30% up to 90% are available for use as animal shades. Most commonly used are fabrics with about 80% actual shade. The shade cloth used as a roofing material is definitely cheaper than any other roofing system commonly used. However, the shade cloth does not provide as much protection from solar radiation for the cows. Shade cloth is quite durable if it is installed properly under tension so that the wind cannot freely whip it. It is necessary to maintain the tension in the fabric in order to realize many years of service from the material. Research is currently being conducted at the University of Florida to assess how significant the differences might be between a well-designed shade structure and a structure utilizing the shade cloth in the roof.

The floor of a shade structure in Florida needs to be made of at least 4 in. or reinforced concrete on a 1/4 - 2% slope. An earthen floor cannot be used under Florida's hot and humid conditions, because such a floor would soon evolve into a "mud-hole."

A waste management system must be planned as an integral part of any shade structure. The concrete floor of a shade can be cleaned by flushing with dump tanks, hosing manually with high pressure water, or scraping manually or with a small tractor. An efficient system used in Florida involves flushing a 30 ft. by 80 ft. shade with three 300 gal. dump tanks. The flush water, along with water from holding pens and milking parlor, is then channelled into a lagoon system. The lagoon system consists of two lagoons with gravity flow from the first to the second. The first lagoon is anaerobic, while the second one is aerobic. Water from the second lagoon can then be used as irrigation water on crop lands. The plants will utilize the nutrients in the water and the soil will filter the water as it percolates into the ground water supply.

A promising new type of shade structure is a quonset shaped structure, using vinyl coated dacron with polyester fiber as the covering, Figure 6. This covering material is reflective on the exterior and appears to be very durable. The only disadvantage with this type shade structure is the high capital investment required. The high cost is attributed not only to the materials but also high erection costs involving a crane.

During August 1977, dairy producers in California experienced critical heat stress for a period of about a week after a tropical storm
hit their area. During this period of critical heat stress, the daily maximum temperature was 88-96°F and daily minimum temperature was about 70°F. Relative humidity during the afternoon averaged 40-50% and during the late evening and early morning hours was 90-95%. During this period, approximately 700 dairy cows died because of the heat stress and the milk production of all the dairy cows was substantially reduced.

It is interesting to note that the climatic conditions of the critical heat stress in California are very similar to what is frequently experienced through the period of May 15 to September 15 in Florida. In fact, many Florida summer days are even more heat stressing. In California, the cooling systems evaluated for their performance in terms of reducing death losses and milk production losses were shades, foggers, several different barn types, and washing systems. The main conclusion reached by the researchers was "shades were much more effective than any other method for reducing production and death losses."

To summarize, the major factors that need to be considered in the design of a shade structure are: 1) east-west orientation, 2) minimum of 50 sq. ft. of floor space for a cow, 3) minimum height of 12 ft., 4) roof ventilation openings, 5) a white insulated roof or aluminum roof to reflect incoming solar radiation, 6) feed and water available under the shade structure, and 7) a waste management system.
Figure 1. Shading patterns on June 21 under shade structures oriented north-south and east-west.
Figure 2. Shading patterns on September 21 under shade structures oriented north-south and east-west.
Figure 3. Shading patterns on December 21 under shade structures oriented north-south and east-west.
Figure 4. Gable-roofed shade structure with continuous open ridge

Figure 5. Shade structure with galvanized metal-cable roofing system

Figure 6. Quonset shade structure with vinyl coated dacron surface
PREVENTIVE MEDICINE PROGRAM FOR DAIRY CALVES

by

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Department of Preventive Medicine
College of Veterinary Medicine
University of Florida
Gainesville, Florida

The foundation for any successful calf raising program is a calf which is born healthy and has absorbed adequate amounts of a high quality colostrum. To accomplish this goal under dairy conditions, the following management factors require strict supervision:

1. Nutrition of the dry cow
2. Clean supervised calving areas
3. Strict management of colostrum
4. Nutrition of the calf
5. Vaccination programs, dry cows, young stock
6. Early detection of disease with prompt judicious antimicrobial therapy
7. SANITATION!

The single most important factor in the success of any calf raising program is the calf manager and feeder.

Calving Area

Clean supervised calving areas are a requirement for a successful calf raising program and should be designed to:

1. Minimize infection of calf via mouth and nose prior to colostrum absorption
2. Minimize navel contamination which can manifest itself 2 to 3 weeks later
3. Promptly assist in any calving problems
4. Insure calf receives clean wholesome colostrum within the first 2 hours of life

Colostrum Management

A survey of calves on a dairy farm where cows were left with their calves for 24 hours in a suitable calving area revealed 23% of calves did not absorb adequate levels of colostrum. A system that will enhance the number of calves absorbing colostrum includes:

1. Collection of low bacterial count non-mastitic colostrum
2. Pooling colostrum from several cows
3. Maintaining low bacteria count in colostrum until fed to calf
4. Getting 2 quarts of colostrum into the calf prior to bacterial invasion. Preferably, the colostrum should be warm and fed from a clean nipple bottle. Force feeding should be implemented only if necessary.

Management Schedule

I. Calving Pens

1. Check close springers for calving difficulties every 2 hours, 24 hours per day.
2. First calf heifers should not be in labor for more than 3 hours prior to offering assistance in delivery.
3. Dip navel in 2% iodine at birth and repeat at 12 and 24 hours following birth.
4. Herds experiencing greater than 10% calf mortality during first 2 weeks of life should institute a rigid colostrum feeding program.
   a. Remove calf from cow within 12 hours of birth.

II. Calf Pens

1. Feed colostrum 2 times daily for first 3 days of life using a nurse bottle. Holstein calves should be fed 1 1/2 quarts of colostrum or milk in a pail 2 times daily until weaned at 6 to 7 weeks of age.
2. To reduce incidence of calves nursing themselves, do not feed milk via a nipple following 3 to 6 days of life. House calves in individual stall from birth to 2 weeks following weaning.
3. Provide fresh grain daily (commercial calf-starter) beginning 3 to 5 days of age and continue until 3 months of age. Grain should be fed free choice.
4. Fresh water should be fed twice daily. When calves are being fed milk, wait for 10 to 15 minutes prior to rinsing milk pail and refilling with water.

III. Calf Diarrhea

1. Determine cause!
2. Is it bacterial, viral, parasitic or nutritional?
3. Bacterial diarrhea can be best controlled via sanitary procedures. Diarrheic calves that have received adequate amounts of colostrum at birth and 12 hours later, should be fed electrolytes in place of milk 2 to 3 times daily for next 48 hours. Kapectate fed at the dosage level of 4 ounces 3 times daily until diarrhea subsides (not to exceed 5 to 6 days) is recommended.
   Antimicrobial therapy (antibiotics) can be used in persistent cases of diarrhea. However, antibiotics usually become ineffective as resistant bacteria quickly develop.
4. Nutritional diarrhea is often caused by irregular feeding times or varying amounts of milk offered from one feeding to the next. Milk transfer pails must be marked so that the exact amount is
offered at each feeding. Do not feed mastitic milk to calves. This milk is best fed to hogs.

5. Viral diarrhea cannot be treated successfully with antibiotics. ScourVax II (Nordens) is a viral vaccine which must be given to calves during the first 2 to 4 hours of life. If these two viruses (Corona and Reo) are causing diarrhea in baby calves, then this vaccine is recommended and will be of benefit in controlling diarrhea. If you decide to use this vaccine, you must vaccinate all calves for adequate protection.

6. Parasitic diarrhea in unweaned calves is usually caused by lack of sanitary procedures. Route of infection is oral – fecal. Therefore, control procedures must incorporate a method of preventing fecal contamination of feedstuffs and areas likely to be licked by calves. Cause of parasitic diarrhea must be determined prior to treatment with an anthelmintic.

IV. Respiratory Diseases

1. Pasteurella pneumonia is the single most important cause of death in calves due to respiratory disease.

2. Respiratory Disease Complex (RDC) in calves is probably triggered by viral agents followed by severe stress and bacterial organisms such as Pasteurella.

3. Rational therapy instituted early is usually effective.

4. Antibiotic therapy, if ineffective, should be chosen following culture and sensitivity.

5. Prevention of pneumonia is easier and more rewarding than treatment. Stress must be kept at a minimum from birth until 6 to 8 months of age.

6. Good nutrition, housing, clean drinking water and a sound vaccination program are important in reducing the stress package.

V. Dehorning

Dehorning with an electric dehorner between 4 and 6 weeks of age is recommended. Dehorning is stressful. Therefore, calves should not be dehorned during the first 2 weeks of life or within 2 weeks prior to or subsequent to weaning.

VI. Castration

If bull calves are being reared, castration should be performed at the time of dehorning.

VIII. Housing

Calves should be individually housed until weaned. There are various types of individual housing, and if your method is successful, don't change. However, if you are having problems raising calves and land is available, you may want to consider calf hutch. Hutches need care and must be moved when sanitation is being compromised. Hutches should be completely relocated every 6 months so that the area can be tilled and the sun allowed to kill pathogenic organisms. The calf hutches must be designed so that the calf has protection from rain, sun and cold winds.
IX. Following Weaning

1. Do not move calves until 2 weeks following weaning.
2. Group calves by size and do not put more than 15 calves per pen. Ten calves per pen is ideal.
3. Provide enough manger space such that all calves can eat grain at the same time. Calves should be fed twice daily and mangers cleaned as needed. Self-feeders are not recommended.
4. Automatic waterers should be small enough so that water turnover is at least 10 times daily. Waterers should have a drain hole so that they can be drained and cleaned frequently.
5. Provide protection from rain and sun.
6. Size calves as needed to prevent bully calves from developing.
7. Provide free-choice hay.

X. External Parasites

1. Fly control is important. Use dust bags and sanitation.
2. Lice and grubs - use "pour-on" as indicated.
3. Ringworm - spray with "captan", a rose fungicide as indicated.

XI. Regrouping

When calves reach 6 to 9 months of age, they can be grouped 40 per pen. Sizing is important and small calves should be regrouped when indicated.

XII. Deworming

A deworming program for young stock is important. Young stock should be dewormed every 2 to 3 months or sooner if indicated. Choice of anthelmintics should be determined following fecal surveillance.

XIII. Vaccination Programs

Vaccination programs for cattle will vary under different systems of management and localities. Vaccination programs are time consuming and expensive, therefore, injudicious use of vaccines are unwarranted. A sound vaccination program augments, but will never take the place of, good management practices.

<table>
<thead>
<tr>
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<th>Etiology</th>
<th>Vaccines</th>
<th>Vaccination programs</th>
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</thead>
<tbody>
<tr>
<td>1. Viral</td>
<td>Reo-like viruses</td>
<td>Scourvax II (Norden)</td>
<td>Within first 4 hours of birth</td>
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<td></td>
<td>Corona viruses</td>
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<td></td>
<td>Bovine Virus</td>
<td>Modified live virus (MLV)</td>
<td>6-10 months of age</td>
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<td>Diarrhea (BVD)</td>
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<td></td>
<td>Rotoviruses</td>
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<td>Parvoviruses</td>
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<td>Enteric Diseases</td>
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<tr>
<td>2. Bacterial</td>
<td>Salmonella</td>
<td>Paratyphol (Cutter)</td>
<td>Dry cows; at drying off &amp; 2-3 weeks later</td>
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<tr>
<td></td>
<td>E. coli Salmonella</td>
<td>Antiserum</td>
<td>at birth</td>
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<td>3. Sporozoa</td>
<td>Cryptosporidiosis</td>
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<tr>
<td>1. Viral</td>
<td>Infectious Bovine Rhinotracheitis (IBR)</td>
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<td>Parainfluenza type 3</td>
<td>Intramuscular* (MLV)</td>
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<td>Rhinoviruses Adenoviruses Reoviruses Syncytial viruses</td>
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<td>Intramuscular (MLV)</td>
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<tr>
<td>2. Bacterial</td>
<td>Pasteurella</td>
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<tr>
<td></td>
<td>P. multocida</td>
<td>Bacterin</td>
<td>2-4 weeks of age repeat in 2 weeks</td>
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<td></td>
<td>P. haemolytica Corynebacterium pyogenes</td>
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<td>at birth</td>
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<td>Bacterin</td>
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<td>500,000 I.U. at birth</td>
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<td>75,000 I.U. at birth</td>
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<td>100 mg at birth</td>
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<td>Selenium</td>
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<td>Brucella abortus</td>
<td>Strain 19</td>
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<td>60-210 days of age (beef)</td>
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<tr>
<td>Leptospirosis*</td>
<td>5 serotypes</td>
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<td>30-60 days prior to breeding</td>
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<td>Vibriosis</td>
<td><em>Campylobacter fetus</em></td>
<td>Vibrio</td>
<td>6 weeks and booster 10-20 days prior to breeding</td>
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Vaccination of unhealthy cattle is not advised. Vaccines may cause "stress" in cattle which could result in a compromised immune response and clinical disease form any one of numerous infectious organisms.

Research and development of new vaccines may change present day recommendations.

*Vaccines recommended for all cattlemen.
COMPUTERIZED COST ACCOUNTING FARM RECORDS

by

Ron Muraro
President, FACTS Ag.
Lakeland, Florida

The FACTS program which you have before you is the Farm Accounting and Financial Management program specifically designed for dairy and other agribusinesses. Monthly and year to date, FACTS provides the big eight:

1. Budget Analysis
2. Cash Flow Analysis
3. Profit Analysis
4. Labor Analysis
5. Comparative Analysis
6. Enterprise Analysis
7. Balance Sheet Report
8. Financial Statement Report

FACTS-AG is proud to serve you and the dairy industry of Florida!
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**PAY TO THE ORDER OF**

PROGRESSIVE BANK  
PROGRESSIVE, AMERICA  
MR. JOHN Q. PUBLIC  
201 E. MAIN ST.  
ANYTOWN, U.S.A. 12345

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**Comments**

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### Production Budget Report

#### Gross Revenues

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**Total** 92200.00 97151.70 4951.70 5.37%

Actual Revenues are 105.37% of projected Revenues

### Family Revenues

| Category | Item     | Projected | Actual  | Difference | Percentage |

---

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ACTUAL EXPENDITURES ARE 102.91 PERCENT OF PROJECTED EXPENDITURES

PROJECTED GROSS PROFITS FOR YEAR 26379.16

ACTUAL GROSS PROFITS YEAR TO DATE 29410.45
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**WITHDRAWALS***

** FAMILY **

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**WITHDRAWALS***

** INVEST **

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**WITHDRAWALS***

** LOANS **

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</table>
USING THE DHI HERD SUMMARY TO
ANALYZE HERD PROGRESS

by

Dan W. Webb, Ph.D
Extension Dairyman
University of Florida
Gainesville, Florida

Dairying is big business in Florida. The average Florida dairyman milks over 400 cows, employs 10-12 people, manages an investment of over 1.5 million dollars and handles a yearly cash flow of about $750,000. Businessmen cannot afford mistakes. They need an accurate, up-to-date appraisal of every facet of their operation.

Successful management of any business demands an operational strategy. One we have found useful is the DHI Management Profit Route. This strategy consists of three main activities: 1) planning, 2) implementation, and 3) evaluation (See figure 1). Evaluation is the key — that is knowing what is going on — regarding production, feed cost, reproductive performance, cow turnover, performance of first-calf heifers, udder health and other areas.

The Dairy Herd Improvement (DHI) program offers a system of information which can be a big help in evaluating herd performance. One important advantage is that the information is organized and ready-made so that the manager can spend his valuable time using the information rather than calculating it. Also the information is comprehensive.

The DHI record program offers dairymen the opportunity to share the services of a big computer system and its technical staff at only a portion of the cost necessary to own and run a computer and the computer makes the comprehensive summary and handling of data feasible.

The DHI monthly HERD SUMMARY provides a wealth of information as seen in the example (figure 2). The information is divided into four basic areas: 1) production, income, and feed cost, 2) reproductive efficiency, 3) general management information and 4) yearly production and mastitis summary.

Production information is summarized for the last test-day and for the year, expressed on a per cow basis. Test day production information is presented both the total herd and the milking herd.

The Reproductive Efficiency Summary expresses an analysis or profile of the current situation. Generally cows are grouped into one of two categories — pregnant and others. The approach is that pregnant cows are no longer a problem. They may have been in the past but not now. The other cows are then divided further into serviced and non-serviced groups. A profile of cows with no breeding dates profiles three groups by stage of lactation. Some key indicators in this section include: 1) number of cows
in milk over 100 days at last service and their number of breedings per
cow, 2) number bred 3 or more times, 3) number cows open over 80 days at
first breeding, and 4) percent problem cows (open over 100 days). Also
presented in the reproductive efficiency summary are the average days open
for the herd, the conception rate for the last year and for a recent 30-
day period.

The General Management section gives 305-day, mature equivalent com-
parison of first calf heifers to the rest of the herd. Also indicated
are somatic cell count profile and a summary of cows entering and leaving
the herd. This section contains a projection of cows to be milking, dry
and calving in future months. The average dry period represents the last
complete dry period for all cows. Test period persistency index compares
this month's production with the projected production for this month based
on each cow's stage of lactation. A figure of 100 is normal. If less than
95, close examination should be made to discover why.

The Yearly Production and Mastitis summary presents the trends for
the last 12 months. Each test-day is given and the test period daily average
for that month along with the rolling herd average that month. For herds
on the somatic cell screening program, a profile of udder health is presented.
The percentages of the herd in each of the cell count categories, 0 to 200
thousand, 200 to 400 thousand, 400 to 600 thousand and greater than 800 thou-
sand are given.

Summary

The DHI monthly HERD SUMMARY provides a wealth of information for herd
owners and managers to evaluate herd progress (or lack of it). Production
is central to the information but there is much more. Information on repro-
ductive performance reveals the current situation and why. The summary
identifies the number of cows in certain categories and other reports even
list those cows. Dairymen can use this summary to evaluate their replacement
program -- whether bought or home-raised. The summary contains projections
for future months and trends for the last year. The information on the DHI
monthly HERD SUMMARY provides a key tool for use in dairy herd management.
If read, digested and used on a regular basis, it can provide the means for
considerable improvement in performance and profit.
FIGURE 1: DHI MANAGEMENT PROFIT ROUTE

PLAN OBJECTIVE GOAL
What do you want to happen?

IMPLEMENTATION PROCEDURE ACTION
What do you do to make it happen?

EVALUATION PERFORMANCE RESULT
Did it happen?

CONTINUE WHAT YOU ARE DOING
Take the money to the bank

Reconsider and revise your goal

Change what you are doing to reach your goal

Is your goal realistic?

No

Yes

No

Yes

From Bliss Crandall, DHI Computing Service, Provo, Utah.
### HERD SUMMARY

**NAME AND ADDRESS**

- **BASSETT IS DAIRY**
- **ROUTE 2 BOX 17A**
- **MONTECILLO, FL 32344**

**STRING NO. 1**

### PRODUCTION, INCOME, AND FEED COST SUMMARY

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DAILY AVERAGE FOR COW ON TEST DAY</th>
<th>YEARLY HERD TOTALS</th>
<th>ROLLING YEARLY HERD AVERAGES</th>
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</thead>
<tbody>
<tr>
<td>TOTAL COWS</td>
<td>941</td>
<td>388,409</td>
<td>928.5</td>
</tr>
<tr>
<td>% IN MILK</td>
<td>66</td>
<td></td>
<td></td>
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<tr>
<td>MILK LBS. (ALL DOVWS)</td>
<td>461</td>
<td>14,711</td>
<td>15,846</td>
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<tr>
<td>FAT LBS. (ALL DOVWS)</td>
<td>1.57</td>
<td>452</td>
<td>607</td>
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<tr>
<td>FAT LBS. MILKING COWS</td>
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<td></td>
<td></td>
</tr>
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<td>48.7</td>
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<td>MILK LBS. MILKING COWS</td>
<td>48.7</td>
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<tr>
<td>SILAGE</td>
<td>23.11</td>
<td>7,157,083</td>
<td>7,708.16</td>
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<tr>
<td>OTHER SUCCULENCS</td>
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<td>DRY FORAGE</td>
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<td>OTHER FEEDS</td>
<td>29.83</td>
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<td>PASTURE</td>
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<td>CONCENTRATES</td>
<td>35.7</td>
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<td>8,016.67</td>
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<td>VALUE OF PRODUCT 8</td>
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<td>1,989</td>
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<td>COST OF CONCENTRATES</td>
<td>3.00</td>
<td>588,192</td>
<td>633</td>
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<tr>
<td>TOTAL FEED COST 8</td>
<td>3.51</td>
<td>755,762</td>
<td>814</td>
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<tr>
<td>INCOME OVER FEED COST</td>
<td>2.76</td>
<td>1,051,076</td>
<td>1,175</td>
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<td>FEED COST PER COW. MILK 6</td>
<td>7.60</td>
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<td>9.14</td>
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<tr>
<td>MILK BLEND PRICE</td>
<td>14.10</td>
<td>3.8</td>
<td>12.55 3.5</td>
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</table>

### REPRODUCTIVE EFFICIENCY SUMMARY

- **CURRENT BREEDING HERD SUMMARY**
- **TOTAL HERD SUMMARY**
- **GENERAL MANAGEMENT INFORMATION**

### YEARLY PRODUCTION AND MASTITIS SUMMARY

<table>
<thead>
<tr>
<th>DATE</th>
<th>DAYS TESTED</th>
<th>FEEDS TESTED</th>
<th>TIMES COW Tested</th>
<th>TIMES COW Tested</th>
<th>TIMES COW Tested</th>
<th>HOGS DEATH</th>
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<td>17496</td>
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<td>37</td>
<td>877</td>
<td>32433</td>
<td>86</td>
<td>136181</td>
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<td>896</td>
<td>17496</td>
<td>75</td>
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<td>897</td>
<td>25116</td>
<td>74</td>
<td>826414</td>
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<td>3.2</td>
<td>1.19</td>
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<td>26181</td>
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<td>930</td>
<td>26057</td>
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<td>1141256</td>
<td>43.8</td>
<td>1.8</td>
<td>1.21</td>
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<td>955</td>
<td>26728</td>
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<td>1647299</td>
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<td>31739</td>
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<td>45.5</td>
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<td>1.60</td>
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<td>958</td>
<td>26833</td>
<td>95</td>
<td>1375125</td>
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<td>1.67</td>
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<tr>
<td>4-07-79</td>
<td>28</td>
<td>947</td>
<td>26521</td>
<td>95</td>
<td>1284071</td>
<td>48.4</td>
<td>3.3</td>
<td>1.62</td>
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**TOTAL MILLER**

- 356.929
- 320579.8
- 14355125.7
- 158486.3

**CUMULATIVE INDEX**

- 4.047
- 4.12
- 3.08
- 4.047
DAIRY SCIENCE UPDATE

by H. H. (Jack) Van Horn, Chairman
Dairy Science Department
University of Florida, Gainesville 32611

In 1976, I presented a fairly extensive departmental review report at this conference which gave an outline of the various faculty developed programs in our department and a report of an extensive evaluation of these programs by our own faculty and by an outside team of reviewers from other parts of the United States. This report is intended to bring you up to date on some of the changes since that time. The outline I am using centers on topics that were previously pointed out as needing improvement.

Teaching Programs Need Further Growth.

Through our annually rotating Dairy Science Club Banquet and Field Trip, many of you have very recent information on the status of our undergraduate teaching program. It had grown a great deal at the time of our 1976 report compared to what it had been 10 years previously, but more growth was still needed from that point if we are going to supply trained people to fill the great job opportunities for dairy trained students in a very large commercial dairy industry. The following three graphs show rather dramatically that progress is being made.

Table 1. Undergraduate Students (Fall) 52

12
4
8
15
30
41
48

Table 2. B. S. Degrees*

10 10
8 8
4 4
8 3

1 1 1 1 0
65 66 67 68 69 70 71 72 73 74 75 76 77 78

*Years are school years starting Fall Quarter of year listed and ending the following Summer Quarter, e.g. '78 will end in Summer '79.

Undergraduate majors have increased steadily as shown by the number of B. S. degrees that are being awarded and undergraduate Dairy Science majors in the department. In the 1978-79 school year (ending at the end of Summer Quarter) over 30 B. S. degrees are anticipated. This is the largest number
Table 3. Graduate Degrees

<table>
<thead>
<tr>
<th>Year</th>
<th>65</th>
<th>66</th>
<th>67</th>
<th>68</th>
<th>69</th>
<th>70</th>
<th>71</th>
<th>72</th>
<th>73</th>
<th>74</th>
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<td>6</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>8</td>
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ever achieved. Our undergraduate student enrollment is now over 50. We probably will not attain 30 B. S. degrees again for a few years but the trend line of the B. S. degree graph shows steady growth. We think the program is strong enough that it is now sustaining itself from its reputation which was developed through good students creating a good image for the program. Dr. Sidney Marshall is the major leader of this growth and development with many other faculty contributing to teaching individual courses and/or helping counsel with activities.

Development of the graduate student program is almost as dramatic as the undergraduate. The third graph above shows the number of graduate degrees awarded. Three kinds of graduate degrees are offered; a Master of Agriculture (course work only), Master of Science, and Ph. D. Most of the degrees awarded are Master of Science and Ph. D.'s which are research oriented degrees. We are currently increasing the number of Ph. D. students in our program to some extent. Like the undergraduate program, 1979 is a big year and we do not expect this many degrees next year. But a total of more than 45 degrees (30 B. S. and 15 graduate degrees) being awarded from Dairy Science Department in 1979 does establish records for our teaching program. We are starting to see people from graduate training in Dairy Science continuing to serve agriculture-related industries in Florida and around the country. Extension agents, feed company nutritionists, faculty members with other universities, researchers with commercial companies' private research programs, leaders in Latin American countries, etc. These people, along with workers coming from B. S. degree programs are the biggest factor that builds the image that we need to sustain continued growth. In spite of good gains in the past, our undergraduate program still needs to grow to where we can produce 30 graduates or more each year rather than only on an occasional year. Our graduate program needs to maintain a production of 10 or more graduate degrees per year in order to supply Dairy's share of the demand for students with these kinds of degrees.

Perhaps the greatest credit to our teaching program is that we are supporting these kinds of degree programs plus contributing to the Food
Science teaching program with only 2.8 fulltime faculty equivalents (FTE's). Table 4 shows an approximate distribution of the teaching load for undergraduate and graduate classes in dairy production and dairy foods, along with assignments for research, Extension and an approximate amount of my time spent in administration. We certainly continue to have needs for further improvement in our teaching program but this has been an area that has shown at least as much improvement as we expected at the time we projected needed growth three years ago.

Table 4. Dairy Science Department Faculty

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>FTE Assignment*</th>
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<td>UGT</td>
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<tr>
<td><strong>Dairy Production Faculty</strong></td>
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<tr>
<td>Collier, Robert</td>
<td>Assistant Professor</td>
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<tr>
<td>Harris, Barney</td>
<td>Professor and Extension Leader</td>
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<td>Head, H. Herbert</td>
<td>Associate Professor</td>
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<tr>
<td>Marshall, Sidney P.</td>
<td>Professor</td>
<td>.9</td>
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<tr>
<td>Thatcher, William W.</td>
<td>Professor</td>
<td>.2</td>
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<tr>
<td>Van Horn, H. Jack</td>
<td>Professor and Chairman</td>
<td>.1</td>
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<tr>
<td>Webb, Daniel W.</td>
<td>Associate Professor</td>
<td>.3</td>
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<tr>
<td>Wilcox, Charles J.</td>
<td>Professor</td>
<td>.1</td>
</tr>
<tr>
<td>Wing, James M.</td>
<td>Assistant Professor</td>
<td>.1</td>
</tr>
<tr>
<td>Vacancy</td>
<td>Production Total</td>
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<td><strong>Dairy Foods Faculty</strong></td>
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<tr>
<td>Bachman, Kermit C.</td>
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<tr>
<td>Jezeski, James J.</td>
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<td>.2</td>
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<tr>
<td>Smith, Kenneth L.</td>
<td>Professor and Chairman</td>
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<tr>
<td>Van Horn, H. Jack</td>
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<td></td>
<td>Department</td>
<td>1.7</td>
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<tr>
<td><strong>Total Faculty</strong></td>
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<td></td>
</tr>
</tbody>
</table>

*FTE = fulltime equivalent, UGT = undergraduate teaching, GT = graduate teaching, R = research, E = Extension, A = administration.

Since dairy manufacturing teaching programs were merged with Food Science a number of years ago, the review team in 1976 recommended that we make a real effort to expand enrollment in a Master of Ag program in Dairy Manufacturing to help supply more trained students to the industry through this avenue. We have not yet made progress in this area.

Extension Program Needs Additional Manpower.

With only two production specialists serving a large commercial industry, youth programs relating to Dairy Science, a developing goat industry through small farm projects, and many other pressures, it is difficult to project much additional leadership to production efficiency-related programs without some additional manpower to give it or giving up something we now do to make room for it.
Hiring of a State DHIA Manager.

Dr. Dan Webb has much of his time committed to leadership of the State Dairy Herd Improvement program. The committee endorsed Florida's plan for the State DHIA organization to hire a manager to free Dan of much of the directly service-related work, such as hiring and training DHIA supervisors. March 1, 1978 the State DHIA Board hired a fieldman which had some managerial responsibilities and also improved the quality of the service given through starting new herds and substituting for supervisors that are ill or for vacant positions. Dan has continued with as much time devoted to DHIA as before but now does more educational work on using data for better management and more emphasis on expansion of the programs to herds that need this kind of information. Further growth of the program will generate additional income which may soon support a fulltime State DHIA manager. Probably due to these efforts more than any other reason, Florida dairymen have opted to expand their use of this program and the growth during 1978-79 has been the most dramatic ever (from 36,780 cows participating in the program on January 1, 1978 to 44,618 in April of 1979).

Additional Specialists Needed.

Prospects for an additional Extension Specialist in Dairy are not bright at this time. Consequently, some important production programs are not covered adequately by these two specialists. For example, mastitis control is an area usually given leadership by Dairy Specialists. Given the manpower that we have, we have directed our Specialist efforts toward their current work areas knowing that we were not serving the mastitis area as completely as possible. Our mastitis programs have consisted largely of a few milking management meetings and bringing mastitis experts into the state for special programs, such as the Dairy Production Conference, to bring dairymen up to date on latest research and recommendations. Thus, information is available for mastitis control but the leadership to help dairymen implement these recommendations has not been available from our Extension program. We hope dairymen understand and appreciate our dilemma in this matter and why we have set the priorities we have.

Opportunity for More Research in Extension Dairy Technology Position.

Dr. James J. Jezeski joined us December 15, 1978 as our new Extension Specialist for the Dairy Foods area. He has an outstanding professional career in research and teaching at the University of Minnesota and in industry. His coming to our Foods Group brings much experience and leadership talent and we hope will develop several applied research areas to help solve some of the problems facing dairy processors and milk quality control laboratories. His interaction with Kermit Bachman and Ken Smith in Foods Research should be
a great asset to us. His background in mastitis work, particularly teat dips and milk quality, will be a resource available to producers as well.

**Nutrition Program Lacks "In Depth" Approach.**

Over the years our nutrition program has changed greatly. Dr. Marshall was formerly in nutrition research heavily but has been shifted to nearly fulltime teaching. Jim Wing continues in nutrition research but has not had an adequate laboratory and technician staff to develop the chemistry programs needed in a fundamental nutrition research program. Because of the need of dairy producers to have more fiber sources, and having several research grant opportunities if he did some research, Dr. Harris has spent considerable time in applied research areas during the last few years. With some of the Extension needs as previously outlined still with us, we will be planning to reduce Dr. Harris's nutrition research commitment somewhat, however, in the future. I have also helped in applied nutrition research areas. The conclusion was drawn, however, at the time of our 1976 departmental review, and it was shared by our own faculty, that we needed to develop a better nutritional physiology program to study nutritional relationships with heat stress and other environmental research we are pursuing and to give a better laboratory research base to the applied nutrition input that we are currently getting from other faculty. Therefore, when Dr. Leon Mull retired from a dairy foods microbiology position in October, 1978, the departmental decision was that strengthening our nutrition program was the top priority need within the department even though it meant, at least temporarily, reducing our foods research manpower. We expect approval will be forthcoming to recruit a new faculty member with these responsibilities. We have already made some improvements in our nutrition research laboratories and increased laboratory technician manpower available to nutrition research. A new faculty member will find good resources available to develop this research. Hopefully, that position will be filled by fall, 1979.

**Continue and Further Develop Areas of Strength.**

Research programs in other areas have continued excellent development and productivity. Reproduction and lactation physiology research and genetics interaction with these areas has been outstanding in terms of students trained, research papers presented, and potential application through new efficiency producing practices in the industry. Further development of research on environmental effects on the physiology of producing animals has given great promise of efficiency gains. Interaction with Agricultural Engineering on types of structures that might be used to develop these gains is starting and we are hopeful that we can give leadership to integrated systems that will give benefits of shade, efficient waste management, avoid water pollution, and still have the benefit of improved net production efficiency overall.
Facilities Improvement Needed.

A plan for remodelling the current Dairy Science Building to make room for four faculty currently officing at the Dairy Research Unit was scuttled by IFAS Administration in favor of including us in a new Animal Science-Dairy Science Building. Approval has been given by the Legislature to proceed with Architects' Plans but the Dairy Section will be built after the Animal Science Section. In any case, in three to four years, the Department is likely to be in a new building to be located near the Animal Nutrition Laboratory and across the street from the Veterinary Clinic.

Need for Dairy Science Departmental Advisory Committee.

Although significant gains in research, teaching and Extension programs have taken place within the department over the years, opportunities exist for many more. Our departmental faculty feel that some avenue for discussion of program priorities with people that have an opportunity to use the output of these programs should be created. Therefore, we are expecting to talk with producer-cooperatives, dairy processors, feed industry representatives, former students, and others about how we can effectively communicate with an advisory group or groups to improve our decision-making process on important priority programs in the future.
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