PROCEEDINGS
Of The
FIFTH ANNUAL
FLORIDA DAIRY PRODUCTION CONFERENCE
UNIVERSITY OF FLORIDA
GAINESVILLE
MAY 7 and 8, 1968

Interested discussion at one table during the Dairy Conference Banquet.

SPONSORED BY
DEPARTMENT OF DAIRY SCIENCE
AGRICULTURAL EXTENSION SERVICE
AGRICULTURAL EXPERIMENT STATIONS
OF THE
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
WITH COOPERATION OF STATE DAIRY ORGANIZATIONS
To: Florida Dairymen And Those In Related Enterprises

Topics for the Fifth Annual Florida Dairy Production Conference Program were selected by representatives of the various dairy organizations and of the Institute of Food and Agricultural Sciences of the University of Florida. The subjects were those dealing with key problems in dairy production and marketing. They are of major current importance to the industry.

Resumes or complete copies of most of the talks are included herein. We think you will find them authoritative, providing accurate information and analysis of factors affecting different phases of your business. The subjects fall into three general divisions, namely, (1) dairy marketing, (2) milk quality, and (3) dairy production.

The Proceedings are provided to extend the usefulness and value of the Florida Dairy Production Conference.

C. W. REAVES
Extension Dairyman and Conference Chairman

The Cover

The Cover picture is a chance shot of one of the tables at the Dairy Banquet attended by 185. Engaged in interested conversation are a program speaker, a dairyman, a dairy regulatory representative, another dairyman and a dairy supply man.
SUBJECTS PRESENTED AT FIFTH ANNUAL FLORIDA DAIRY PRODUCTION CONFERENCE

(Listed In The Order Of Their Placement In The Proceedings)

DAIRY MARKETING:

THE PRESENT STATUS OF LEGISLATION CONCERNING IMITATION AND FILLED MILK
Jack Dodd, Director, Dairy Division, State Department of Agriculture

ROUTES OF ACTION FOR DAIKYMEN IN RELATION TO IMITATION AND FILLED MILK
Dr. Gerald Quackenbush, Director, Research and Development Division, American Dairy Association, Chicago.

EXPLORING ALTERNATE PRICING SYSTEMS FOR FARMERS' MILK IN FLORIDA
Dr. Ralph Eastwood, Economist, Marketing, Florida Agricultural Extension Service.

FEASIBILITY AND VALUE OF A STATEWIDE EQUALIZATION MILK PLANT
James E. C!ick, Manager, Maryland-Virginia Milk Producers' Assoc., Inc. Arlington, Virginia

MILK QUALITY:

STATUS AND OBJECTIVES OF THE FLORIDA QUALITY MILK COUNCIL
Dr. C. B. Browning, Chairman, Dairy Science Department, University of Florida, Gainesville.

SURVEY OF LEUCOCYTE COUNTS OF MILK IN FLORIDA - Hugh F. Butner, Director, Sanitary Bacteriology, State Board of Health.

LOUISIANA'S EXPERIENCE WITH A STATEWIDE ABNORMAL MILK PROGRAM
Dr. Buck Green, Dairy Specialist, LSU, Baton Rouge, Louisiana

DAIRY PRODUCTION:

SOME LABOR MANAGEMENT PRACTICES ON FLORIDA DAIRY FARMS
Charles Anderson, Assistant in Farm Management

WHAT THE ELECTRONIC MACHINE DHIA RECORDS PROVIDE - V. H. Lytton, Manager, Southern Regional Dairy Records Processing Center, Raleigh, N. C.

APPLICATION OF DHIA RECORDS TO HERD MANAGEMENT FOR INCREASING PROFITS
Dr. George Hyatt, Director, North Carolina Agricultural Extension Service

CHANGES IN FLORIDA FEED INDUSTRY TO MEET DAIRYMEN'S NEEDS - J. A. Riley, President, Hughes Feed and Grain Company, Boynton Beach, Fla.

GROUP FEEDING COWS FOR ECONOMIC MILK PRODUCTION - Dr. Barney Harris, Jr., Assistant Extension Dairyman

CITRUS PULP STUDIES WITH (A) DIAMONIUM PHOSPHATE (B) PHOSPHORIC ACID
"FILLED" SILAGE
Dr. S. P. Marshall, Nutritionist, Dairy Science Department

ALFALFA FELLETS AS ROUGHAGE SOURCE
LEVELS OF MOLASSES
Dr. G. W. Powell, Research Associate, Dairy Science Department

EXPERIENCES WITH EARLY FRESHENING OF FIRST CALF HEIFERS - Dr. C. J. Wilcox, Geneticist, Dairy Science Department
THE PRESENT STATUS OF LEGISLATION CONCERNING IMITATION AND FILLED MILK

BY

Jack Dodd, Director, Dairy Division, State Department of Agriculture

Florida becomes the third state in the southeast to be attacked on the basis of the constitutionality of their Filled Milk Law, Chapter 502.151.

The opportunity was given the opposition to be well prepared and to get more proficient as they gain experience with each battle. So far, in no State, has the Filled Milk Statute been upheld. (Washington, Georgia and Texas have fallen by the wayside). In all cases the States have appealed the decisions of the lower courts with some degree of optimism. I talked to Mr. Adams, Director of the Dairy Division, State of Washington, yesterday and he expressed some degree of optimism and the thought that they should have some decision by June 1, 1968.

We were sued in April by Quality Foods, Inc. of Atlanta -- earlier we were notified by them that they had franchised the State of Florida for Farmer's Daughter and a list of other drinks that they would offer. After considerable correspondence, some of which we have requested samples of the products and examples of labels to be used, we advised them that it appeared useless for our Department to try to communicate with them since we would have to deal with the manufacturer who would be their franchisee in the State of Florida.

Quality Foods, Inc. has requested a panel of three judges to hear arguments of the constitutionality of the Florida Filled Milk Statute.

In the Setzer vs. Mayo Case which was tried before Judge Taylor in Leon County in 1944, he ruled that the Law was constitutional, however, that if the filled milk product was proved to be as nutritious as milk that it could be sold in the State of Florida.

Their strategy in refusing to attack the Federal Filled Milk Statute, is that they create a great deal of publicity from attacking each individual State; and, I was told by one of their representatives that this resulting publicity pays more than pays for the court costs. In the instance of the Georgia case, the Farmer's Daughter representative estimated that approximately fifty (50) franchises would result, and he did in fact succeed in getting some coverage in SuperMarket News, and, no doubt must have sold some franchises.

The case that they have presented is very similar to the complaint filed in Alabama, where it was placed before a three judge Federal Court.

In view of the above, the Attorney General's Office (in Tallahassee) who will be handling the litigation, asked for a Stay of the Proceedings on May 1, 1968, pending the disposition of the Alabama case. I can only assume that whatever decision is made in the Alabama case, that it will have a great deal of bearing on the outcome of Florida's.

Our Department, sensing the importance of these cases to the dairy industry of Florida and to the people of this State has had representatives at all the recent Hearings. Recently, at the Texas Hearing it was felt that the most significant development was the fact that there were two expert witnesses who testified to their expert knowledge that coconut oil was deleterious to the health of the consumer. The National Dairy Council sent Dr. Marion Brink who did an outstanding job in our estimation in presenting testimony that showed that the filled milk was not as nutritious as the manufacturers have alleged it to be. It appears that Dr. Brink is well informed and up-to-date on research on this particular product. I was real pleased to learn that the dairy industry of the State of Texas and the Dairy Council both cooperated in supporting this legal action financially.
I am pleased to advise you that the Commissioner has received a letter from the Farm Bureau offering their support to help us in this matter. I want to express my appreciation to all of you who have kept us informed, both from the University and from the Industry. We would request from the Industry that they furnish our Division with all the available information which they might have which would enable us to be better informed in the event we had to defend our Statutes in the courts.

It looks like the filled milk interests will now make every attempt to substitute a combination of other vegetable oils with milk in order to eliminate the arguments against using coconut oil. One suggested combination has been soybean, coconut and cottonseed oils.

The opposition presented a pediatrician and a nutritionist (who was eminently qualified). He testified this product should be regulated and not prohibited; and further, he testified, that in any event the filled milk was a more nutritious product than a pure synthetic. The latter statement may have had a great deal to do with the judge's decision in the Texas case.

The Commissioner has charged this Staff with the responsibility to do everything in their power to be as well informed as is humanly possible, and that since we do have a Law on the books that our Division uphold this Law and enforce it until such a time as it would be declared unconstitutional.
ROUTES OF ACTION FOR DAIRYMEN IN RELATION TO IMITATION AND FILLED MILK

GERALD G. QUACKENBUSH
Director, Research and Development Division
American Dairy Association

Fifth Annual Florida Dairy Production Conference
May 7, 1968

There is no single simple solution to the problems brought on to the dairy farmer segment of the industry by the imitation milks, whether filled or synthetic. All of the following are involved: Legislation, regulation, pricing, marketing efficiency, production efficiency, promotion, and research and development. Mention will be made of all of these, but with emphasis on promotion and research and development, the areas of my employ.

One of the most disturbing things ever to hit the dairy farmer segment of the dairy industry has been the introduction of the two imitation milks, filled milk and the synthetic milk. It has hit all producer segments within the industry. Many fluid milk producers often expressed little concern over the problems butter, evap, and ice cream were having with substitutes. In fact, the imitation creams have hardly stirred up a rumble. Now the emergence of imitation milks has stirred up the fluid milk producers who fear they will lose their markets, and also the manufacturing milk element which fears the onslaught of surplus fluid milk as imitations gain and replace real milk.

What I say today assumes that imitation milk sales will grow. Otherwise there isn't much to talk about on the topic. This, however, is not a prediction of any particular rate of growth, fast or slow.

The producer element of this sleeping giant, the milk industry, is aroused to action. Perhaps I should say aroused to reaction in response to an action. There will be reactions by the processor segment to the reactions of the producers. It isn't just a producer problem now.

While American Dairy Association is not involved in any activity at the national level besides promotion and research, I assume from the topic assigned to me that other aspects of the problem are expected to be covered at least to some degree.

The legislative route has historically been a method wherein individuals with no market power as individuals, as farmers are, is put to use. The dairymen's role in the butter-oleo legislative battle has often been ridiculed as asinine. But I remind you that it worked for 2 generations and helped feed a lot of farm kids. It may have been relied upon a little too long and with a little too much security. Other competitive techniques could and should have been brought to bear on the problem as the power of the legislative technique diminished.
In the U. S. today filled milk is legal in only about a dozen states. Synthetic milk is not legal in about a dozen states. There is no reason for producers to go marching to their state legislatures and insisting on making them legal. To the contrary, there is some kind of a balance between efforts to keep the products illegal and the public relations losses in a fight over the issue. This is a matter of good judgement. I'm thinking of the producer point of view. So legislative activity is and will be involved.

Regulatory activity through definitions, grades, standards, and labels can be used to grease the skids or gum the skids for a product. My personal opinion is that the industry is not operating with as much intelligence as it should. For example, in California filled milk must be labeled imitation milk. In Arizona it can't be labeled imitation milk. In New York it must be labeled Melloream. In Pennsylvania it must be labeled a non-dairy product. In some states synthetic milk must be labeled imitation milk. Some argue that it shouldn't be labeled as such. Minimum standards for filled and synthetic milk may or may not exist, state by state. Some of the synthetic milks have been analyzed and shown that they have only 1/4 the calcium and 1/4 the protein of real whole milk. From a producer point of view, if the object is to gum the skids, it probably is best to have no minimum standards if there is plenty of promotion money behind real milk. Let the substitute be lousy; then try to kill it. If there is little promotion money, strict standards that enhance higher costs may be the best route.

Pricing has a role. But here the big game is not much different from roulette in Las Vegas. The game is: How long before technology can produce a synthetic milk that the market will tolerate and buy especially if it is encouraged by pricing? One year? Two years? Five years? Ten years? Another part of the game is that of satisfying, through government arbitration or industry compromise, the economic self-interests of geographic or product groups. A third part of the game is public relations, for every effort to gum the skids is subject to public scrutiny and reaction.

The pricing issue largely revolves about two things. First, the relative weights on the fats versus the nonfats portion, still giving the farmer as good a price for the two combined as now. Second, the distribution of income to producers geographically.

At the present time, quite generally around the nation, milk fat is priced at about 80 cents a pound, and it is this price whatever its use, fluid or manufactured. This is a direct function of the price support program and low shipping costs. In filled milk this 80-cent fat goes out and 20-cent vegetable fat comes in, a saving of nearly 10 cents a half gallon. How can producers discourage this? One way would be to cut milk fat prices, perhaps as low as 20 cents a pound through the butterfat pricing in fluid milk markets. But this boosts the nonfat price in order to get the same weighted average price for the two combined. Now you ask: What is the technological elasticity with respect to price of the vegetable protein people?

When milk fat is 80 cents a pound whatever its use, wherever it is, the nonfat portion has to carry the quality and distance differentials. Grade A milk carries a quality premium, but surplus Grade A milk sells for Grade B prices. Class 1 prices increase nationwide as distances from Wisconsin increase. If Class 1 prices were $7.00 in Florida the nonfat price would be about 50 cents a pound dry equivalent in fluid skim. But handlers in Florida could buy nonfat dry skim for 25 cents a pound for filled milk. This is nearly another 10 cents a half-gallon on top of the nearly 10 cents by substituting vegetable fat. At this stage if carried to the end through
substitution, Florida doesn't need the milk fat and they can get their nonfat dry milk from Wisconsin. Florida dairymen are liquidated. So are the ones in Texas, Alabama, Arizona, and maybe New England. How do you stop that? Some say: Don't stop it; let 'em go. The farmers themselves don't think so. The farmers in Wisconsin and Minnesota who produce nonfat dry milk might say to let the Florida guys go broke, except for the miserable prices that could exist all over while the Florida and other farmers liquidated, which may take so long that another problem arose before this was settled.

A solution, of course, is to raise the dry nonfat price to handlers in Florida by means of compensatory payment. The money is paid to local producers in Florida to keep them in business, unless, of course, the Wisconsin and Minnesota producers find a way to get the compensatory payment money back to them. Again, we liquidate the Florida producers. In the meantime, the Florida milk fat backs up and affects the manufacturing product, butter and cheese. The extent of the compensatory payment and its distribution is of utmost importance to all segments of the industry. It also bears on the technological elasticity of price for vegetable protein for synthetic milk as we mentioned before.

By extent of the compensatory payment I mean both its amount and its spread geographically. If it is zero (and it likely would be zero only if the compensatory payment were taken to court and thrown out), there would be essentially the same price for filled milk product cost all over the country. Three pounds of vegetable fat at 20 cents plus 9 pounds of nonfat dry milk at 25 cents equals $2.85 total. This would be tough competition in an area where Class I is $7.00. At the other extreme it would be possible to have a compensatory payment very high, such as the difference between Class I fluid skim and Class II fluid skim. Using Class I at $7.00, subtract $2.80 as the value of 3.5 pounds of fat, leaves $4.20 for skim in Class I. Using Class II at $4.28, subtract $2.80 as the value of 3.5 pounds of fat, leaves $1.48 for skim in Class II. $4.20 minus $1.48 equals $2.72 for a compensatory payment. In this manner local producers would hope to get the same for their milk if fluid skim or if nonfat dry milk were used in filled milk. Theoretically they could be getting $7.00 for their milk and not a drop of it go into the bottle. A slightly lower compensatory payment would result if it were computed as the difference between Class I skim and the value of nonfat dry milk actually used. Still lower compensatory payments would result from some arbitrary figure between the latter idea and none at all. On April 23 the hearing on these issues reconvened in Memphis.

The level of the compensatory payment will have repercussions on butter and cheese, but two big unknowns make prediction difficult. The first big unknown is the extent to which a high compensatory payment will speed technology for all synthetic milk. The second big unknown is the speed with which a low compensatory payment will cause liquidation of herds in markets distant from Wisconsin. If the producers hung on, even with lower prices, a lot of milk fat could pile up on the national market, and you know that butter and cheese are the tail end Charlies for surpluses. There are other unknowns, of course, and these include the many factors including price which affect consumers as they do or don't buy the imitations.

As you can see, the handling or price weights for the milk fat and nonfat portions can be a fluid milk phenomenon alone. On the other hand, there is the possibility of shifting these as a part of the total industry through the price support program. This too, is complicated. You can calculate that 40¢ fat and 40¢ nonfat will give producers about the same price as 80¢ fat.
and 23¢ nonfat. But the nonfat producers ask what you are going to do with 40¢ nonfat when the commercial market won't take it at 20¢.

Besides the imitation milk problem there is another trend in the industry that affects the manufacturing milk business. This is the trend toward lower fat fluid items—lower fat whole milk, more skim items, less cream, etc.

We hear a great deal in the Midwest about the large amounts of butter and cheese produced in the North Atlantic area. The data I have shows that they have provided about 5 to 6% of the nation's milk going into manufactured products except frozen desserts the last 10 to 15 years. Also, in 1966 about 13% of their milk production went into manufactured products other than frozen desserts. It is interesting that the weighted average fat test for all fluid items has dropped 4 or 5 points in the last 10 to 15 years, or about 13%. If I have this figured right, the milk they now put into manufacturing is about equal to that available because of lower fat fluid milk and cream items. We haven't made such a big issue of this trend. The point I'm trying to make is that some seemingly unimportant happenings have caused us great anxiety really. Now enter imitation milks, and we'll likely have greater anxieties from the North Atlantic as well as elsewhere.

To now we've touched on three areas of activity involved in gumming the skids for imitation milks, legislation, regulation, and pricing. Our ag economist friends would have us mention marketing efficiency. It seems to me, though, that if filled milk is handled in the same distribution pattern as real milk, a gain in marketing efficiency will help each about equally. The question of synthetic milk and its distribution methods is something else perhaps. We'll have to see when someone produces a satisfactory product. But if the present fluid milk trade also handles the synthetic product, marketing efficiency will affect both about the same.

Now let's look at another activity which is related to the dairy industry's ability to compete against the substitutes and imitations. This is the area of research and development—finding new products, improving present products, and finding new uses for dairy products. In this area the dairy industry is accused of being decadent, unimaginative, non-progressive. We hear it in the dairy trade press; we hear it in the farm press; we hear it in the food distribution press. I hear it whenever I rub shoulders with people in other industries. This may be the most important technique for competing in today's economy, and the inference is that the dairy industry just isn't competing effectively in this area.

Whatever the reason, it is apparent from the data that we aren't aggressive. The National Commission on Food Marketing reports that eight large dairy companies, from National Dairy Products on down in size, in 1964 were putting only 0.1% of dairy sales into dairy product research. Research and development is generally conceived of as applicable to large companies. If they aren't doing it, who is? If we aggregated the entire dairy industry would it be 0.05% at the processor level? I saw an estimate of 0.04% the other day.

It is said that in some food industries about 1% of sales is going into R & D. That would be 20 times as much. One percent in our $12 billion dairy industry would be $120 million. I saw a guess of $5 million actual the other day, and how much of this is on imitation dairy products I wouldn't know. In the total economy business is putting 3% of sales into R & D. That would be $360 million for dairy. Some entire industries are putting over 5% into R & D. One cannot help but conclude that R & D activity in the dairy industry is only
peanuts compared with what it ought to be to compete effectively.

I am asked continuously what the dairy farmers might do themselves to compete against imitations and substitutes. My personal response is that, among other things, they ought to invest 1% of their income in R & D. Their $5.8 billion portion of the industry would yield at 1% $58 million yearly.

This recommendation has not been accepted yet, but I'll bet it will be within 5 years. However, these steps have been made. A poll of some of the leading cooperative managers in the country shows almost unanimous agreement that a producer supported multi-million dollar R & D program should get underway and ADA should be the organization to do it. An R & D Division was created in ADA in January. In March the delegates to the Annual Meeting approved the goal of $1 million expenditure in 1968, with a goal of $5 million yearly within a few years.

While some may scoff at the idea of farmers carrying on such an activity I see no reason why it can't be successful. Farmers run half billion dollar businesses and compete. We would have at our disposal the same commercial research firms that General Foods, Pillsbury, P & G, or others use, whether the research be in idea generation, concept testing, laboratory product development, sensory evaluation, home or industrial placement, and test marketing. We can contract with firms in the various research stages without the intra-corporation persuasion and bickering that goes on in a company. It is inconceivable that a dairy company would not pick up and run with a product successfully test marketed and with proven profit potential. We could go outside the dairy processor industry if a product were of greater potential outside the industry.

Two items of our operating procedures may be of interest. This R & D Division can seek and accept funds from organizations which are not dairy farmer organizations—whether they be dairy companies, farmer supply organizations, dairy suppliers, foundations, or you name it. Secondly, we will patent, register, license, or franchise when they are feasible and practicable.

The immediate object is the survival of the dairy farmer segment of the industry. But there can be no doubt but what this will contribute to the survival and growth of dairy companies, dairy suppliers, dairy farmer suppliers, the insurance industry, and many others including Labor if you please. We think all should get involved in this as they would gain from it.

Another area in my discussion today is promotion. The ADA Board has set a goal of 1% of dairy farmers' income for promotion. Again the object is survival; the immediate concern is imitations. These funds would be used both in promoting for real dairy products and promoting against imitations with the proper balance and method as our research would indicate as feasible and practicable.

The basis for the 1% figure is the milk promotion test done by ADA and USDA a couple of years ago. I still think this was one of the most sophisticated and realistic tests of the effectiveness of advertising ever done by anyone. In this study, done in 6 markets over a 2-year period, promotion at the rate of 15 cents per capita per year above the then current levels of promotion increased milk sales by 4.5% within a 1-year period. Producers got back 4.56 for each dollar invested, a net return of 68%. The 15-cent rate for 200 million people is $30 million. Add to this the then current collections of about $7 million is $37 million for fluid milk. The balance of the $58 million should arise from manufactured milk.
There is no priori reason why manufactured milk products would not respond as well or better to promotion than fluid milk, yet our support from the fluid milk segment of the industry is much better than from the manufactured. This should be of concern to both segments of the industry.

When the manufacturing milk segment does not strongly support market building for their products the fluid milk segment is less anxious to support promotion of products made from surplus fluid milk. Instead they emphasize fluid milk promotion with the objective of shifting milk from Class II to Class I. Fluid milk people may carry a bias in the direction anyway, not recognizing as strongly as they should the importance of a strong manufacturing milk market as a basis for strong prices for fluid milk.

Here is some rather startling information. I was asked by one of our directors to compute how much milk would have to be shifted from Class II to Class I to get a 2% increase in blend price to cover the 1% for promotion plus 1% for R & D. Using Class I price of $6.45 and Class II price of $4.25 (which might be about the national level under the new support program) and 65% going into Class I, I computed that instead of 65% in Class I this would need to go to 70.5% in Class I. This is an increase of 8.5% in Class I sales to get a 2% increase in blend.

On the other hand, an 8.5% increase in sales of manufactured products might scare the hell out of the Secretary of Agriculture and his price support program and get much more than a 2% rise in all milk prices. Hindsight illustrates this. Between 1964 and 1967 the amount of milk available for factory production of products other than fluid items dropped by about 6%. This decline, as well as the current outlook, has resulted in present milk prices at the new support level 20 to 25% higher than in 1964, including blend prices in fluid markets. I assume that an increase in consumption would do as much for prices as a decrease in production. This illustrates the need for good markets for manufactured products, even for the fluid producer.

I come back to the point that producer support of the 1% level for promotion is in response to the growth of imitation and substitute products, and especially the introduction of imitation milk.

Your sessions today and tomorrow are heavily in the area of production at the farm level. You can rest assured that production efficiency at the farm level is an effective means for the animal industry to compete against the vegetable industry. It not only is vegetable fats against animal fats, but it may soon be vegetable proteins against animal proteins.

Thus I conclude that imitation milk, following on the footsteps of other substitutes, will cause actions and reactions in regard to legislation, regulation, pricing, research and development, promotion and production efficiency which will affect all of you in all segments of the industry. I repeat that what I have said is based on an assumption that imitation milk will move, and this is not a forecast on its rate of movement. If this all sounded like the farmers' point of view I think that's primarily where the action and reaction is, and therefore something to talk about.

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EXPLORING ALTERNATE PRICING SYSTEMS FOR FARMERS' MILK IN FLORIDA

This topic involves some of the implications of changing from present price relationships and price discovery functions between butterfat and solids-not-fat (SNF) in milk pricing in Florida. It is timely because the pricing of components of filled and imitation milk, and the continuing interest in attaching more importance to SNF, currently attract dairy farmers as perhaps nothing else has in 15 years.

Three types of new products are of concern today. Those anticipated in 1922 by the Federal Filled Milk Act because they contain fresh or reconstituted skim milk as the protein base generally are known as filled milk. Two others -- one using sodium caseinate and the other using purely vegetable sources of protein -- probably are not subject to the Act and are generally known as imitation milk.

Experimental determination of the economic relationships involved seems of overriding importance, yet I know of no one doing research on the topic.

These foods are expected to compete with conventional whole milk in several ways. Non-price competition is likely as regards advertising, taste, color, nutritive values and consumer habits. Price, however, is likely to be the critically relevant form taken by competition. If these competitions develop, and if these foods are close economic substitutes for each other, fluid milk well may be hard pressed to maintain even most of the present market position it enjoys. On the other hand, if these foods are economic complements, the increase in the use of one will bring about an increase in uses of the others. If they are economic supplements, the change in any one will have no effect upon the others.

The case seems clearer that these filled products will be complements or supplements to present markets for nonfat dry milk (NFDM). Presumably, more SNF will be used in foods essentially new to the markets using NFDM.

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1 Prepared and delivered by Dr. Ralph A. Eastwood, Economist, Marketing, Florida Agricultural Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida at the Fifth Annual Dairy Production Conference, 2:30 - 3:00 P.M., May 7, 1968.
In the absence of experimental evidence, dairy farmers tend to
draw upon their experience with margarine, mellorine, filled toppings
and coffee whiteners. Their innate wisdom and reflexive instincts
consider these new filled and imitation foods to be the newest acqui-
sitions in this rogue's gallery.

For purposes here, we shall accept the prevalent point of view
of farmers; even though the accuracy of this is in some doubt because
much of the admittedly fragmentary market data generally quoted suggest
that these foods are more complementary and supplementary to fluid
milk than substitutes for it.

Our discussion will treat questions of costs and class equalization
payments associated with filled and imitation milk; then, of component
pricing of producer milk in general and with respect to milk solids in
Florida milk, the present California pricing system for Class I, and
flat pricing.

FILLED AND IMITATION MILK

Filled milk is sold in about one-fourth of the states and one-half
of the federal order markets. The quantities generally are quite small
compared with fluid milk, but they seem to grow.

The data from Oregon, California and Arizona are not adequate to
support conclusions. They show parallel increases in sales of filled
and whole milk. They show little, if any, substitution. If these data
were dependable, this would be an excellent example of complementarity
or supplementation, rather than substitution.

Filled milk sales equal a greater percentage of whole milk sales
in Hawaii than in any other state. The opinions of at least some
knowledgeable people there are that filled milks appear to be perhaps
half substitutes and half complements or supplements to fluid whole
milk. Again, they do not report scientific studies.

Imitation milk has appeared in small amounts in several markets.
USDA reports that 15 handlers in 10 federal order markets sold an
unknown amount in March 1968. There are at least three firms selling
these products in Florida. The instinctive wisdom dairy farmers have
applied to the problem in the absence of research proof has resulted
in severe apprehension that in the long run these products may hold a
serious -- even mortal -- threat to their enterprises. History probabli
will prove them right if the accounting is deferred for a great number
of years.
### Costs

Price competition between the foods we are considering will reflect the costs of producing them if the threats of substitution develop. In-plant costs are not likely to be markedly different between the products. Raw material costs, in sharp contrast, may be expected to highly favor the competitors of whole milk. Present relationships per hundredweight synthesized for the Upper Florida Milk Marketing Area as of March 1968 would approximate:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Conventional Whole Milk</th>
<th>Filled Milk Made With</th>
<th>Imitation milk</th>
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<td>Class II Skimmilk</td>
<td>Grade A non-fat dry milk</td>
<td>Class I Skimmilk</td>
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<tr>
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</tbody>
</table>

**Class equalization.** If farmers were to choose, they probably would set class equalization payments at levels to bring the cost of filled milk to handlers at least up to that of fluid whole milk. Many observers say that the classified pricing system will be in jeopardy if skimmilk or SNF for use in filled milk ultimately are not priced to handlers at Class I prices.

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2 The classified pricing system in use prices the milk used in the least price-elastic foods as Class I; the next least, as Class II; and on down to Classes III and IV. Relatively inelastic products have few substitutes; elastic, many. Therefore, substitution would be expected to be most effective in the lower priced classes first; in Class I, last. This theory is confirmed. Vegetable oils devastated butter, then made highly visible strides in frozen desserts, and liquid cream. In effect, the demand curve for dairy foods may be said to have become a skirmish line, with enemy breakthroughs in the price-elastic portions.

3 This assumes 3.5% fat in all products. Obviously the fat content may be changed at will within legal limits.
A number of questions arise. Economics, law, equity, nutrition, and political sovereignty are not likely to yield the same answer to each.

Are class equalization payments lawful, especially as regards milk? Are these new products economic substitutes, complements or supplements? Should consumers be penalized by being prevented from benefits possible from the drying of milk in the Dairy Belt, transporting NFDM to a handler in the consumer market, and his reconstitute the fluid there? Should the class equalization payment be made to the market of origin of the skim milk or NFDM; or should it be made to the market where the filled milk is sold? Should producers ultimately receive the payments? If so, those in which market? If not, who should? Should the producers of manufacturing milk be qualified as regular suppliers of the market in which reconstituted filled milk is sold? What enforcement problems arise as a consequence of each answer?

Other questions are relevant. Should producer-handlers be regulated? If so, how? Will any new plan drive handlers away from filled milk, imitation milk? If so, how serious is this? How soon are these producers a threat serious in dollars and cents, rather than as a working hypothesis?

Our review of the costs of producing raw materials for these foods suggest that the following class equalization payments might be necessary to assure conventional whole milk price parity with filled and imitation milks in the Upper Florida Milk Marketing Area as of March, 1968:

<table>
<thead>
<tr>
<th>Product</th>
<th>Class Equalization Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filled milk made from:</td>
<td>$/cwt.</td>
</tr>
<tr>
<td>Class II skim milk</td>
<td>3.639</td>
</tr>
<tr>
<td>Reconstituted Grade A NFDM</td>
<td>3.615</td>
</tr>
<tr>
<td>Class I skim milk</td>
<td>1.775</td>
</tr>
<tr>
<td>Imitation Milk</td>
<td>3.300</td>
</tr>
</tbody>
</table>

**COMPONENT PRICING**

Dairy farmers and milk handlers often consider new relationships if possible use in the pricing of butterfat and SNF. This usually is in response to the traditional expressions by nutritionists that butterfat does not deserve the prominence it has in the present arrangements for milk price discovery. Protein is a glamour item in the dietary. Other components are less so.
Milk Solids. A Florida dairy farmer wishing to calculate the effects of various component pricing systems upon his milk check may be interested that members of the Department of Dairy Science at the University of Florida think the Jacobson Relation would be found generally valid for Florida.

It holds that SNF in the milk supply generally equals $7.07 + 0.40$ multiplied by the butterfat content. For example:

<table>
<thead>
<tr>
<th>Fat (%)</th>
<th>SNF</th>
<th>Fat (%)</th>
<th>SNF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.07</td>
<td>4.5</td>
<td>8.87</td>
</tr>
<tr>
<td>1.0</td>
<td>7.47</td>
<td>4.6</td>
<td>8.91</td>
</tr>
<tr>
<td>2.0</td>
<td>7.87</td>
<td>4.7</td>
<td>8.95</td>
</tr>
<tr>
<td>3.0</td>
<td>8.27</td>
<td>4.8</td>
<td>8.99</td>
</tr>
<tr>
<td>3.1</td>
<td>8.31</td>
<td>4.9</td>
<td>9.03</td>
</tr>
<tr>
<td>3.2</td>
<td>8.35</td>
<td>5.0</td>
<td>9.07</td>
</tr>
<tr>
<td>3.3</td>
<td>8.39</td>
<td>5.1</td>
<td>9.11</td>
</tr>
<tr>
<td>3.4</td>
<td>8.43</td>
<td>5.2</td>
<td>9.15</td>
</tr>
<tr>
<td>3.5</td>
<td>8.47</td>
<td>5.3</td>
<td>9.19</td>
</tr>
<tr>
<td>3.6</td>
<td>8.51</td>
<td>5.4</td>
<td>9.23</td>
</tr>
<tr>
<td>3.7</td>
<td>8.55</td>
<td>5.5</td>
<td>9.27</td>
</tr>
<tr>
<td>3.8</td>
<td>8.59</td>
<td>5.6</td>
<td>9.31</td>
</tr>
<tr>
<td>3.9</td>
<td>8.63</td>
<td>5.7</td>
<td>9.35</td>
</tr>
<tr>
<td>4.0</td>
<td>8.67</td>
<td>5.8</td>
<td>9.39</td>
</tr>
<tr>
<td>4.1</td>
<td>8.71</td>
<td>5.9</td>
<td>9.43</td>
</tr>
<tr>
<td>4.2</td>
<td>8.75</td>
<td>6.0</td>
<td>9.47</td>
</tr>
<tr>
<td>4.3</td>
<td>8.79</td>
<td>6.1</td>
<td>9.51</td>
</tr>
<tr>
<td>4.4</td>
<td>8.83</td>
<td>6.2</td>
<td>9.55</td>
</tr>
</tbody>
</table>

California system. California is thought to be the largest milk market in the world using prices of butterfat, SNF and fluid to discover Class I producer prices.  

The Jack Formula is used there for the average relationships of butterfat and SNF. It is $7.07$ plus $0.444$ multiplied by the butterfat content.

The California hearing procedure determines the value of each of the three components of Class I milk in each marketing area. SNF is priced at wholesale market value. Fluid components are priced at the approximate transportation cost. The residual of the necessary price is allocated to 3.5 pounds of butterfat per hundredweight of milk. For example, the computation for the Calaveras-Tuolumne market as of February 1, 1968 was:

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*Class I prices in California are subject to hearing testimony before they are changed. Prices of Class II and Class III there fluctuate with market values of butterfat and SNF.*
<table>
<thead>
<tr>
<th>Component</th>
<th>Base Test x</th>
<th>Price per pound</th>
<th>Milk Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$/cwt.</td>
</tr>
<tr>
<td>Milk fat</td>
<td>3.5</td>
<td>.91</td>
<td>3.185</td>
</tr>
<tr>
<td>SNF</td>
<td>8.622</td>
<td>.26</td>
<td>2.242</td>
</tr>
<tr>
<td>Fluid</td>
<td>87.878</td>
<td>.0046</td>
<td>0.400</td>
</tr>
<tr>
<td>Total</td>
<td>100.000</td>
<td>XXXX</td>
<td>5.827 or 5.83</td>
</tr>
</tbody>
</table>

Individual producers in that market received the Class I price of $5.83 if their milk tested 3.5% butterfat and 8.622% SNF. Otherwise, the producer received a price differing from this depending upon the tests his milk.

Things of special interest in such a pricing plan include:

1. Consumers prize a pound of butterfat much more highly than a pound of SNF and will pay accordingly, even though nutritionists may question the wisdom of the choice.

2. Prices of SNF may be used as a measure of protein values because tests for SNF are much quicker and cheaper than those for protein, and SNF and protein vary almost exactly directly with each other in milk at the time of its secretion.

3. Emphasis could be reduced on butterfat and increased on SNF. This is consistent with the philosophy that supplies of low butterfat will best serve the nutritional needs of consumers, and maximize the consumer satisfactions from a given amount of farm resources available for dairy production.

4. Use of constant pricing differentials for butterfat and SNF increases the net differentials for milk testing relatively high in butterfat. This may not be enough to offset relative dairy merit of cattle.

5. Pricing on total solids is equitable, but it does not inherently discriminate between the values of a pound of butterfat and a pound of SNF as do consumers.

6. Increasing the price of SNF almost surely will result in greater federal procurement of SNF if all are sold.

\(^5\)In the California case, butterfat is emphasized more than it is in other markets.
7. Reduction of butter prices may not reduce federal purchases of butter. Reductions on the order of 15 cents per pound may be necessary to clear the market without government price support purchases.

8. Reduction of butterfat prices almost certainly will lower aggregate dairy farm income unless subsidies are increased to offset the commercial sales losses.

9. This system as practiced in California is not expected to generate publicity favorable to increasing milk consumption.

10. Allowing butterfat (or SNF, or fluid) to carry the residual values results in unrealistically high values for it.

11. Price discovery may be too complicated for easy explanation or understanding.

12. This problem has two sides -- collection from handlers and payment to farmers. The California procedure deals only with payments to farmers.

13. Costs of testing, preparing payrolls, and other administration may surprise many who contemplate such a procedure.

14. There is a price incentive -- however slight as practiced -- for production of milk of higher SNF content. This incentive could be changed.

15. Extensive experience is accumulated concerning the testing for SNF and the relationships between the solids components in the California milk supply.

Flat pricing. There is tremendous interest in whether to go back to the flat pricing system used before the advent of classified pricing. Under this plan, handlers would be charged for the pounds of milk they buy regardless of content of butterfat, solids-not-fat and fluid. The corollary problem is how to pay farmers if handlers are charged a flat price. These are two significantly different goals and can be reconciled by repooling if farmers are to be paid according to tests, location differentials, and the like.

Such a plan might reduce butterfat surpluses if more fat is consumed as a beverage. This would tend to improve prices of manufacturing milk for butter and cheese because less fat from a given milk supply would go to those uses. If successful, it would thus change the trends toward lower-fat drinks and probably would meet protests from nutritionists.
The plan would price butterfat and SNF at the Class I price of milk. That is about 6.8 cents per pound. Such a new price structure would encourage standardization to produce exceedingly cheap solids in Class II and III uses. Classification enforcement under those circumstances would be an interesting procedure to observe.

Fluid skim sales would be hurt. In Florida federal order markets these totalled 10,081,406 pounds, or 8.1 percent of Class I sales, in March 1968.

It would reduce the competitive advantage of filled milk to the extent that a pound of butterfat would be worth only the value of a pound of milk, whereas vegetable oil would be worth perhaps 20 cents pound on a comparable present basis. This would not reduce the value of milk, however, because of the other component values presumably would be the total value of whole milk at present levels.

It would seem to encourage the pricing of all butterfat at lower prices than prevail now, because of the question as to whether butter in Class I should be priced differently than that in manufacturing category.

It pays nothing for the additional food energy in milk testing, some minimum. This would tend to encourage the lowering of minimum values. Depending upon the pooling system, this could be expected ultimate return more price advantage to milk testing below the basic fat test less to milk of high fat test.

CONCLUSIONS

There are things farmers can do as individuals; and many they can do as groups. Some of each type seem appropriate.

Individual Actions

1. Many dairy farm problems are more urgent and have greater magnitudes for Florida dairy farmers. Excellent economic health will pay off whether the present threat develops or not.

2. Expand support to organizations primarily concerned with milk marketing.

Group Actions

1. Research the question of the degree to which these new foods are substitutes, complements or supplements to conventional milk and dairy foods.

2. Guard against jeopardizing sales of Class I skim milk by pressure discovery methods intended to hamper emerging products which are hardly beyond the threat stage.
3. Reduced butterfat differentials for manufacturing milk will reduce total dairy farm income unless the government sector will increase the dairy subsidy an offsetting amount.

4. Study price experimentation in other markets. Schedule hearings when needs are clearly present.
FEASIBILITY AND VALUE OF A STATEWIDE EQUALIZATION MILK PLANT

by James E. Click, Manager, Maryland-Virginia Milk Producers' Association

From the program agenda of your 5th Annual Florida Dairy Production Conference I see that you are attacking a host of dairy production and marketing problems. These problems seem to be prevalent in many sections of the country and I might add that the fact that you are tucked away down here in the corner doesn't make them common to you alone.

We have them in the Middle Atlantic--the region with which I am more familiar. Like you, we are trying harder to study and evaluate data and trends that will lead us to sound decisions that accrue to the benefit of our producers. Needed information and data may require drawing on both formal and informal sources and we have been delighted when side trips from conventions have permitted us to observe "how the other fellow does it." In past years many of our directors and producers have visited some of your production and marketing facilities, and I'm sure they have gained much by their visits.

My presentation here today has a twofold purpose; one is simply to relate to you our experience in the operations of a large manufacturing or more recently an equalization plant that has been of considerable value to producers supplying two large metropolitan areas--Washington and Baltimore. The other purpose of my remarks is to give you the benefit of our analysis of the possibilities of a similar facility for the Florida area.

Our plant was purchased in 1955, is situated on 262 acres of land midway between Baltimore and Washington. The original land purchase was 20 acres, but since the original purchase we have added more land. We have our own water system, a power substation, and sewage treatment system. Raw milk storage capacity is 225,000 gallons, about one day's production of our 1130 members. Storage capacity was increased two years ago by the addition of three 40,000 gallon silo tanks. Powder drying capacity is about 7000 pounds per hour. Products sold from the plant are ice cream mix or blends, powder, butter, anhydrous fat and cream. In prior years, we were processing sterile milk; but recently we have discontinued this process.

During 1967, we handled 220 million pounds of milk through the plant which was week end and seasonal surplus milk from the Baltimore, Philadelphia and Washington markets. Within the past two years, it has also become a factor in handling the surplus of the Philadelphia market. At times in the past five years, it has been involved in handling New York surplus milk. You will note I referred to equalization and manufacturing earlier. This is simply my designation to differentiate between periods of short supply and periods of surplus.

During the past short season--October through March--when our Class I utilization in the Washington Market was in excess of 80 percent, we have been rolling milk over in the plant and shipping it into fluid milk plants on the high demand days of Thursday and Friday. Four major fluid milk plants handle about 80 percent of the milk in the Washington Market. They have varying degrees of raw milk storage. For instance, the largest plant which handles about 75 thousand gallons per day has only 40 thousand gallons of raw storage. The smallest of these four large plants has storage equal to one day's needs. This becomes an important factor in the procedure of equalization, particularly when the supply of milk is real tight. You have a tendency to favor those plants that have provided more storage yet the one with less storage in relation to sales may be your largest customer.
In assessing and evaluating the milk situation here in Florida looking toward the feasibility of a jointly owned manufacturing and balancing plant, I must admit that my limited knowledge of supply and demand conditions and other factors in Florida will to some degree fall short of some of the answers you are seeking. I do have the benefit of a study made by Jud Mason on the subject assigned to me by Professor Reaves. I have read and reread this study rather carefully and I understand its contents have been placed in the hands of dairy representatives in the area. I have also done some limited research in other publications and have talked with a few of the people familiar with trends in the area. A couple of weeks ago I was in Chicago and heard some reference made to the possibility that Florida milk may be shipped back to Wisconsin and Minnesota. This would be quite a switch, indeed.

A joint cooperative endeavor to construct and operate a manufacturing and balancing plant in Florida seems highly feasible and economically sound. The cooperatives involved, representing about 80 percent of the milk in Florida, could manage such a project at a time when it would be as a result of economic attraction rather than at some time in the future when circumstances may force the issue. This is the situation that we found ourselves in in 1955. We were dependent on one large manufacturing plant for handling all our surplus milk. The flush season was always a hectic period in negotiating prices for surplus milk under such an arrangement. At times, it cost us as much as $150,000 per month over a six month period. To change this situation after we had purchased our manufacturing plant we had to have some heated sessions on diverting our own surplus milk to our own plant because it was away from our largest Class I customer. This set of circumstances, I understand, does not exist in the Florida area. The cooperatives for the three Federal Order Markets have the burden of disposing of the surplus. It then becomes a matter of how best to accomplish this.

In addition to the aforementioned reason, a plant of this kind would serve the following purposes in the interest of dairy farmers and of the Florida milk market.

1. It would eliminate the need and cost of shipping reserve milk to distant plants for manufacturing.
2. It would eliminate the disposal of skim milk as a waste product which becomes necessary at times.
3. It would offer more flexibility in the production process.
4. The plant would provide a ready market for milk produced which is in excess of the requirements of the fluid milk market and would return a price commensurate with its value for manufacturing.
5. It would provide an opportunity to balance available supplies of milk to the day-by-day requirements of the fluid milk and processing plants served by the cooperative associations.
6. It would provide an opportunity to expand markets to Florida dairy farmers by making butterfat and solids-not-fat available to the local trade in the form of such products as cream, skim milk, condensed milk, frozen dessert mixes, butter and non-fat dry milk.

The annual statistical summary of Milk Production and Dairy Products for 1967 showed that Florida led all other states in the percentage of increase in production over 1966. Milk production per cow showed a healthy gain which pushed total annual milk production up 7 percent compared to a ½ of 1 percent drop for the U.S. as a whole. It is not unreasonable to assume that annual milk per cow in Florida at 8550 in 1967 could be pushed on toward the 10,000 pound level as shown for Connecticut, New Jersey, Arizona, Nevada and 11,000 pounds for California.

The population of Florida which now approximates 5.9 million persons should consume about 1.8 billion pounds of milk in 1968. The trend in the population growth rate shows a 2.5 percent increase in population per year.
Incidentally, this is the same growth rate in the Metropolitan Washington Area over the past 10 years. If fluid milk processing plants are to be assured of a sufficient supply from local sources at all times, considering seasonal and other variations in milk production and in sales, it is desirable that there be a reserve supply in an amount representing 10.5 to 12 percent of fluid milk requirements during that season of the year when sales are greatest in relation to production. Actually with the relationship of raw storage to sales in our fluid milk processing plants in Washington, we must have about 20 percent. Of course this 20 percent figure is also considering extra milk for separation for cottage cheese making. The reserve for the average month in Florida would thus be more than 10.5 percent of fluid milk sales.

If calculated on the basis of 1.8 billion pounds sales of fluid milk products per year, the reserve would amount to about 180 million or nearly 90,000 pounds of milk per day. A portion of this milk will be absorbed currently in the production of ice cream and cottage cheese, but it seems reasonable that in all probability a manufacturing plant could be expected to receive more than an average of 300,000 pounds of milk per day for a minimum of 7 months.

At the present time, there are no manufacturing plants in Florida, with the exception of plants manufacturing ice cream and cottage cheese. It would seem to me it would be an opportune time for cooperatives to give this very serious consideration—a time when it is economically attractive. There would be no division of volume with competing plants and a single plant could be located for greatest convenience, efficiency in procurement and processing. It could serve to reduce losses associated with transporting and marketing milk out of the state or drying-up cows before the end of the normal lactation period, as has been necessary in recent years. In the first 6 months of 1967 alone, dairy farmers in Florida lost in excess of $1.5 million in transporting milk to out-of-state markets or in disposing of milk within Florida at less than manufacturing value. This last statement, which was in Mr. Mason’s treatise on the subject, stands out to me. It is much the same as I related to you as our situation prior to 1955. I’m sure it would be most convincing in persuading our people to fashion some do-it-yourself facilities in quick order and get the job done. To me it seems highly feasible and the value will be revealed to you, as dairymen, once you have acted cooperatively to build versatility and usefulness into the venture.

Financing, plant site, type and size of equipment requirements can be arrived at after a more thorough study and I have not discussed these factors here. I believe it would require a closer look at other factors such as the demands for products for the ice cream industry, bakery trade, soft drink bottlers and other possible outlets. Further study could be made of the day to day volumes of milk that might be available to a manufacturing plant. It might be possible that the initial outlay could be smaller if it were decided to go to just a condensing operation for cream and condensed. This would be dependent on the amount of surplus that the ice cream industry would absorb. The plant could be designed to go in steps, dependent on the need to go all the way to butter and powder.

All of these matters should be thoroughly pursued and meaningful data should be provided to the final decision makers in order that they may choose the best solution. I confess that what I have said here does not represent expertise or precise guidelines that would make it possible to break ground tomorrow. From what little I have observed as to the functions and operations of the cooperatives in the Florida markets I am convinced that the principle of your own manufacturing and balancing plant is sound. Cooperative participation on such a joint endeavor would provide a high degree of stability in performance of your task of supplying milk to your Class I buyers and its resulting value would be measured in added income to dairymen.

JEC:ch
5/23/68
STATUS AND OBJECTIVES OF THE FLORIDA QUALITY MILK COUNCIL

C. B. Browning
Department of Dairy Science
University of Florida

During the past year several individuals representing various segments of the dairy industry here in Florida have discussed with interest some of the recent programs and developments in the areas of quality milk production, abnormal milk screening programs, and mastitis programs. Those of us here at the University are vitally interested in these programs since they are of major importance to the industry that we hopefully represent with effective teaching, extension, and research programs.

Quality milk programs are receiving increased emphasis and consideration nationwide. A great deal of this increased interest has been brought about by activities of the National Mastitis Council, as well as the Conference on Interstate Milk Shipment During an April, 1967, meeting of the Conference on Interstate Milk Shipment a three-phase program was adopted to add some definite requirements concerning milk quality for milk to be moved interstate. Abbreviated points of this three-phase program are as follows:

Phase I--Effective July 1, 1967

This first phase consists of regular routine laboratory inspection and screening procedures for the presence of unwholesome, altered mammary secretions, whether of an inflammatory, infectious, physiological or environmental origin in bulk raw milk at the farm level.

Phase II--Effective July 1, 1968

After this date only those interstate milk shippers that are certified to be following an indicating test program shall be listed in the quarterly publication, "Sanitary Compliance and Enforcement Ratings of Interstate Milk Shippers." When a herd milk sample tested by an approved laboratory indicates the presence of 1.5 million or more leucocytes per milliliter the dairymen shall be notified and suggestions made for improving this condition. If subsequent counts remain at this level or higher inspections by an official sanitary, as well as other helpful suggestions, will be made.

Phase III--Effective July 1, 1970

After this date a penalty clause shall be added for non-compliance with leucocyte standards. Milk supplies having 1.5 million or more leucocytes per milliliter on three out of five of the last tests and continued violations of applicable items of sanitation shall have their permits suspended and/or court action shall be taken in accordance with the Grade "A" Pasteurized Milk Ordinance.

Presented at the Fifth Annual Florida Dairy Production Conference, May 7-8, 1968, Gainesville, Florida
On November 20, 1967, a group of approximately 25 people representing dairy farmers of the state, the Veterinary Medical Association, dairy equipment companies, the State Department of Agriculture, the State Board of Health, and the Institute of Food and Agricultural Sciences met and recommended that a Milk Quality Council be formed. The major objective of this Council would be to give leadership and coordination to the various groups, individuals, and programs throughout the state concerned with quality milk production. In addition, the Council should be responsible for drawing up guidelines, recommendations for various quality milk programs and helping to outline the dairy industry an effective program of information and education regarding quality milk production. The Council will operate strictly on an advisory basis primarily as an educational organization.

We are pleased that the important dairy organizations in the state, as well as the State Board of Health, the State Department of Agriculture--Division of Milk, and others concerned with the dairy industry have indicated their belief in the importance of this activity and their willingness to participate in the Council activities. Representatives from the Department of Veterinary Science and Department of Dairy Science from the University of Florida, of course, will participate in the program.

At a Council meeting May 8, 1968, C. B. Browning, Chairman of the Department of Dairy Science, University of Florida, was elected to serve as Chairman of the Council, with Mr. Bud Ward, dairyman from Astatula, elected as Secretary.

We are hopeful and optimistic this Council can be an effective means helping coordinate various activities concerned with quality milk production and a meaningful program for the dairy industry of our state.
A SURVEY OF LEUCOCYTE COUNTS OF MILK IN FLORIDA

Hugh F. Butner, Sanitary Microbiologist
Florida State Board of Health

Fifth Annual Florida Dairy Production Conference
Gainesville, Florida
May 7, 1968

In 1950 the first National Conference on Interstate Milk Shipment was held in St. Louis, Missouri. This group was composed of industry and regulatory people. One of the problems they recognized was that it would be necessary to eliminate abnormal milk from the market supply, and started proceeding towards this objective. Late in the 50's through the combined efforts of the National Conference on Interstate Milk Shipments and the International Association of Milk, Food, and Environmental Sanitarians, the National Mastitis Council was formed. They started working for a national uniform approach for combating abnormal milk in the market supply.

In the 1963 meeting of the N.C.I.M.S. in Memphis, the first report and recommendation was given for a comprehensive plan for abnormal milk control. Continued work of this group resulted in an agreement that all states participating in the N.C.I.M.S. program would develop a method for screening the milk supplies for the presence of abnormalities by July 1, 1966, and be fully operative by July 1, 1967.

The National Mastitis Council had described abnormal milk as milk with a leucocyte count in excess of 500,000 per millilitre. The question then is asked: What are leucocytes? They are a normal constituent of the blood and are commonly called white blood cells. Certain types of the white blood cells are one of the body's important defenses against infection. When an infection occurs in the body these cells migrate to the infected area in large numbers, in an attempt to combat and limit infection.
Should this infection occur in the udder, it is known as mastitis. By making a count of the leucocytes, one is able to determine if mastitis or abnormal milk is present. The U.S.P.H.S. in their publication, No. 1306 "Screening Tests for the Detection of Abnormal Milk" has described five tests or procedures that can be used for screening milk. The Wisconsin Mastitis Test is the test of choice, since it is most strongly recommended by the Public Health Service; also many of the States have selected this procedure.

Of the five screening tests described in the above mentioned publication comparisons were made between the Catalase, Wisconsin Mastitis Test, and Direct Microscopic Leucocyte Count. The Modified Whiteside and California Mastitis Tests are more adaptable for cow side testing and were not considered for laboratory use. It was found that results of the WMT and the DMLC compared much more closely than those of the catalase test. The WMT was then chosen because (1) it is much more rapid and (2) one can obtain reproducible results.

The Florida State Board of Health Laboratories started making WMT tests on all raw milk samples submitted, beginning with July 1, 1967. The laboratory results are sent to the person or agency submitting the samples, who in turn, informs the individual dairyman of the results on his milk. The reports are compiled by the Division of Veterinary Public Health, Florida State Board of Health, beginning in the month of August, 1967. The results are totaled on a county basis under four headings: (1) Numbers of samples showing a leucocyte count of less than 500,000. (2) Those between 500,000 and 999,999. (3) Those between 1 million and 2 million. (4) Those over 2 million. The following table including results of August 1967 - February 1968, shows the percentage of the samples tested falling under each heading:

<table>
<thead>
<tr>
<th></th>
<th>&lt;500</th>
<th>500-999</th>
<th>1mil.-2mil.</th>
<th>&gt;2mil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug.</td>
<td>30.40</td>
<td>44.42</td>
<td>24.47</td>
<td>0.71</td>
</tr>
<tr>
<td>Sept.</td>
<td>21.97</td>
<td>46.62</td>
<td>30.92</td>
<td>1.49</td>
</tr>
<tr>
<td>Oct.</td>
<td>34.98</td>
<td>41.85</td>
<td>22.19</td>
<td>1.98</td>
</tr>
<tr>
<td>Nov.</td>
<td>30.36</td>
<td>42.08</td>
<td>26.68</td>
<td>1.87</td>
</tr>
<tr>
<td>Dec.</td>
<td>31.69</td>
<td>42.90</td>
<td>25.14</td>
<td>1.27</td>
</tr>
<tr>
<td>Jan.</td>
<td>51.13</td>
<td>40.60</td>
<td>8.27</td>
<td>0.00</td>
</tr>
<tr>
<td>Feb.</td>
<td>38.18</td>
<td>44.09</td>
<td>17.73</td>
<td>0.00</td>
</tr>
</tbody>
</table>
You will note by this limited data that there is no definite trend
toward general improvement. It appears that those over the two million may
be lessening; however, those under the other headings are up and down. As
the study continues, we are hopeful that the counts will improve.

I was interested to see if there were any differences in different areas
of the State, so I computed the percentages for the various areas, and found
that a similar picture existed throughout the State. I then took a look at
different size dairies and found no significant difference between the
large, medium, or small dairies.

I believe this points out that there is still a lot to be done in order
to get the leucocyte counts down to an acceptable level. Certainly the
work of the University personnel and the Quality Milk Council can aid materially
in the accomplishment of this objective.
At the beginning, I should point out that we certainly do not have all the answers on mastitis control in Louisiana. We do feel that we have a sound and workable program and progress has been made in the area of mastitis control. We believe this because the plant personnel tell us they are getting a cleaner and better quality raw product. Many dairymen have told us that for the first time they have a systematic way of working at mastitis control. They say the program is working for them and it's putting more money in their pocket.

Perhaps I should tell you something of the dairy industry in Louisiana so you can compare it with your own. We have 2,022 dairy farms in the state of Louisiana with a milking cow population - 2 years and older - of approximately 150,000. About 400 Mississippi producers are also shipping into the state. Our average size dairy farm has about 72 milking cows which is considerably smaller than the average size farm in Florida. We do have several herds with 200 cows and some with up to 500, but most of them are smaller than this. Our investment per cow in the milking herd runs between $1,600 and $1,800. Last year, Louisiana dairymen sold slightly over one billion pounds of milk.

More than half the dairies in the state are located in six or seven parishes or counties in the southeastern part of the state known as the Florida Parishes. These are relatively small farms, located on hilly cut over pine land. Another major dairy area is located in the southwest part of the state which is primarily a cane and rice growing area. Land prices are extremely high in this area and most of the dairymen are concentrating large numbers of animals on limited acreage. The land in this area is very low and swampy. Consequently, mud is a real problem there.

Our larger dairy herds are found in the northern part of the state bordering on the Mississippi Delta area. Many of these dairies have dry-lot free-stall housing operations.

The Extension dairy staff, realizing the economic importance of mastitis as a herd health problem, began work on a state-wide control program in 1962. We were interested in a mastitis control program for two reasons: 1) We considered mastitis to be one of our more costly herd health problems, and 2) We felt we could improve the quality of the product sold to the consumer. Research information such as presented in Tables 1, 2, and 3 below convinced us the dairyman must control mastitis to make the most profit from his investment.

Table I

Average Decrease in Milk Production
Associated With CMT Reactions
Washington Data

<table>
<thead>
<tr>
<th>CMT Reading</th>
<th>Production Decrease in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Quarter Per Day</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Trace</td>
<td>0.96</td>
</tr>
<tr>
<td>1</td>
<td>2.18</td>
</tr>
<tr>
<td>2</td>
<td>3.88</td>
</tr>
<tr>
<td>3</td>
<td>5.74</td>
</tr>
</tbody>
</table>
**Table II**

Average Decrease in Milk Production Associated With CMT Reactions
Louisiana Data

<table>
<thead>
<tr>
<th>CMT Reading</th>
<th>Percent Production Decrease Per Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Trace</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
</tr>
</tbody>
</table>

**Table III**

Estimated Losses Resulting From Subclinical Mastitis
Louisiana Data

<table>
<thead>
<tr>
<th>CMT Score</th>
<th>Loss Per Cow Per Year in Dollars*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>$1.80</td>
</tr>
<tr>
<td>Trace</td>
<td>$7.56</td>
</tr>
<tr>
<td>1</td>
<td>$14.64</td>
</tr>
<tr>
<td>2</td>
<td>$31.73</td>
</tr>
</tbody>
</table>

*Milk Valued at $6.00 per cwt.

Our first job was to create an awareness among dairymen of the importance of controlling clinical and subclinical mastitis. Most dairymen thought of mastitis only as that which could be seen as lumpy or flaky milk or an animal with a swollen or inflamed quarter. Dairymen would tell us that mastitis was not a real problem with them. In 1962, a complete portable milking unit was borrowed from one of the equipment companies. In addition to this, vacuum recorders and air flow meters were purchased so the performance of milking equipment could be measured. Using this equipment, approximately 90 demonstrations were given throughout the state to dairymen, dairy labor, county agents, plant fieldmen, Board of Health personnel, veterinarians, and all persons interested in the dairy business. We attempted to show that good equipment and good milking procedures are most important in controlling mastitis and that this was a logical starting place for a control program. It was thought that 70 to 80% of mastitis could be prevented by having equipment that is operating properly and being run by a competent operator.

The entire program in Louisiana is built around prevention rather than cure of mastitis. We know that we can't prevent all mastitis, but we also have experienced the frustrations of trying to treat it.

In 1963, a bulletin entitled, "You Can Control Mastitis," was published. The bulletin contained the same information that was given in the demonstrations around the state. Good equipment and good milking procedures were emphasized.

By early 1964, sufficient interest was built up in mastitis control that the Louisiana Mastitis Council was organized, composed of representatives of the following groups.
MEMBERS OF MASTITIS COUNCIL

Louisiana Department of Agriculture
Louisiana Veterinary Medical Association
Louisiana State Board of Health
Louisiana Dairy Products Association
Louisiana Farm Bureau, Dairy Section
Louisiana Animal Breeding Cooperative
North Louisiana Pure Milk Producers Association, Inc.
Southwest Louisiana Pure Milk Producers Association, Inc.
Easton Rouge Area Milk Producers Association
Gulf Milk Association, Inc.
L.S.U. Agricultural Experiment Station
L.S.U. Dairy Science Department
L.S.U. Veterinary Science Department
Louisiana Cooperative Extension Service

After several meetings, this group published, in mimeograph form, its recommendations for mastitis control. These include the seven step program listed below.

RECOMMENDED STEPS OF MASTITIS CONTROL

Steps

I. Animal Identification
II. Equipment Checks
III. Follow Correct Milking Procedures
IV. Laboratory Screening Test on Bulk Tank Milk
V. CMT, or Similar Paddle Test on Individual Cows at Monthly Intervals
VI. Laboratory Examination of Milk Samples from CMT Positive Quarters as Shown by Step 5
VII. Follow a Complete Herd Health Program Under the Guidance of a Veterinarian.

Later these recommendations were published in pocket size bulletin form and paid for by the dairy industry of Louisiana. The Council's biggest contribution in the mastitis program probably has been in its efforts to have everybody telling the same story on mastitis control. The group has sponsored several meetings on mastitis control. For a time, the Council published a monthly newsletter which was distributed by milk plants and co-ops to all dairymen.

In 1965, a series of 80 slides was developed which again told the story of good equipment and milking procedures. In addition, we went into the anatomy of the udder to show how it was built. This helped explain the reasons for some of the recommendations being made for good milking procedures.

Now, for some of the results: The State Board of Health in Louisiana is responsible for administering the program on a state-wide basis, insofar as regulations are concerned. The Extension Service and Mastitis Council are responsible for the educational phase of the program. The Board of Health started running catalase tests in the southwest area of the state in 1966 to determine the level of infection in the dairy herds. Results from these tests showed 38% of all samples to be positive. After running catalase tests for about six months, it was decided that the Wisconsin Mastitis Test (WMT) would be a better test, so the Board of Health changed to it as the official test. A 1,250,000 leukocyte or white blood cell count was used to indicate a positive sample. The compulsory phase of the program started in July, 1967. Three consecutive positive samples are required for a grade and all positive WMT samples are confirmed by a direct microscopic count. Two clean tests are required for a grade.
A dairyman in trouble with suspicious or positive test can get help in locating his trouble from county agents, Extension dairymen, equipment dealers, health sanitarians, and veterinarians. Four state diagnostic labs located throughout the state run quarter samples to determine type of bacteria and also determine which medicine will kill the infection.

Table IV gives the results from January, 1967 to March, 1968.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January, 1967</td>
<td>27.8</td>
<td>23.1</td>
<td>23.3</td>
<td>16.9</td>
<td>13.3</td>
<td>18.2</td>
<td>21.6</td>
<td>22.0</td>
<td>21.1</td>
<td>13.4</td>
<td>16.7</td>
<td>20.8</td>
<td>16.2</td>
<td>14.3</td>
<td>19.1</td>
</tr>
</tbody>
</table>

You will note that there is considerable fluctuation between various months. Much of this variation is coming from one area of the state that is characterized by small dairymen who have been slow to update equipment and change milking procedures. Also, this is an area plagued with mud during most of the year.

On a state-wide basis, progress has been made and it would appear that the positive samples are dropping about 5 to 6 per cent a year.

There are some observations which can be made from our experience in the program.

1. It is absolutely necessary to get the leadership of the dairy industry in the state to understand and agree upon a program of this nature and then everyone will tell the same story.

2. One of the bigger problems of a program of this nature is to decide upon the best test to use and decide on what will be a cut off point. Changing to different tests after the program is started causes some confusion. It is hoped that research can develop a more accurate and repeatable test for determining leukocyte count.

3. By studying data over a two year period, we seem to get a buildup of positive samples in July, August, and September or at a time when we have a number of late lactation cows in the barn. We think late lactation animals are giving more trouble than fresh cows.

4. Many of our positive samples are repeats and these generally are small dairymen, usually with older equipment and less sanitary conditions of the farm. Some of these are side-line dairymen with someone else doing the milking.
5. By following the recommendations of the Council, a dairyman can reduce his leucocyte count to a degree where there is no danger of degrade and his income can be improved.

Presented at the Fifth Annual Florida Dairy Production Conference
University of Florida, Gainesville
May 7 - 8, 1968
SOME LABOR MANAGEMENT PRACTICES ON FLORIDA DAIRY FARMS

By
Charles L. Anderson
Interim Assistant in Farm Management
Florida Agricultural Extension Service

Dairy products produced in Florida during 1965 had a value of $86,338,000 (The Farm Income Situation, United States Department of Agriculture, Economic Research Service, August 1965). This, coupled with the fact that there were 586 dairies in the State with an estimated annual payroll of $16,012,560., indicates that the dairy industry is of substantial importance to the economy of the State. With the increase in farm wage rates and the decrease in supply of farm labor, labor has become an important problem to most dairymen. A survey of the labor situation on Florida Dairy Farms was made in the spring of 1967, and the management practices covered in this report are from data collected.

Dairies covered in this survey were all located south of the Suwannee River. To draw the sample, the dairies were listed on cards according to size of operation and area of the State. The four areas were Northeast Florida, Central Florida, Tampa Bay, and Southeast Florida. These are referred to throughout this report as Areas 1, 2, 3, and 4 respectively.

By eliminating dairies with less than 125 cows, those dairies with only one hired man were not considered. A dairymen working with one hired man would likely not have the same labor problems encountered by larger dairies, and would not contribute greatly to a study of management problems.

In the spring of 1967, there were 62 dairies in Area 1 with 125 or more cows, 45 dairies in Area 2, 117 in Area 3, and 96 in Area 4.

The material presented here is from unpublished data from a forthcoming Thesis by the author.
The first item many think of when discussing management practices is weekly wage scale (Table 1).

**Table 1. Existing wage paid by dairymen per week, by areas, Florida 1967**

<table>
<thead>
<tr>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

*Minimum* 35 25 38 30

*Maximum* 130 150 172 170

*Average* 77 86 96 39

*Includes wages paid for some part-time help.*

The data in Table 1 reflects only cash wages paid. They do not take into account fringe benefits; such as milk furnished, utilities paid, housing furnished, etc. These are all additions to labor revenue and will be considered when the final report is made on the survey.

The wage scales (Table 1) are more meaningful when considered together with hours worked per week (Table 2).

**TABLE 2. Hours worked per week by labor hired on dairy farms by areas, Florida 1967.**

<table>
<thead>
<tr>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

*Minimum* 24 28 36 18

*Maximum* 77 84 77 84

*Average* 55 53 55 48

*Includes part-time help.*
The data in Tables 1 and 2 must be combined to get the picture of hourly wage scales in the four areas. Dividing the average weekly pay scale by the average number of hours worked gives the hourly scale by areas: Area 1, $1.40/hour; Area 2, $1.48/hour; Area 3, $1.75/hour; and Area 4, $1.85/hour.

Some dairymen in all areas paid bonuses to their employees (Table 3).

<table>
<thead>
<tr>
<th>Area</th>
<th>Bonus paid to employees by dairymen by area, Florida 1967.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area 1</td>
</tr>
<tr>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
</tr>
<tr>
<td>Maximum</td>
<td>757</td>
</tr>
<tr>
<td>Average</td>
<td>135</td>
</tr>
</tbody>
</table>

Here again, no fringe benefits were taken into consideration. Table 3 reports only cash bonuses paid. Some of these are paid weekly, some annually; but in order to compare bonuses paid, all bonuses were computed to an annual value per worker. The higher figures reported as maximum bonuses paid in Table 3 were bonuses paid to hired management. All bonuses paid on all dairies were calculated, including dairies that paid no bonus to arrive at the average bonus paid per hired worker by areas.

Nothing has been said about efficiency of labor or the basis for paying bonuses as yet. One measure of efficiency on dairy farms is the number of cows maintained per worker (Table 4).
Table 4. Number of cows on dairy farms, per worker, by area, Florida 1967*

<table>
<thead>
<tr>
<th></th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>37.6</td>
<td>29.8</td>
<td>26.0</td>
<td>38.0</td>
</tr>
<tr>
<td>Maximum</td>
<td>71.0</td>
<td>73.0</td>
<td>93.8</td>
<td>38.1</td>
</tr>
<tr>
<td>Average</td>
<td>47.2</td>
<td>43.1</td>
<td>56.6</td>
<td>60.9</td>
</tr>
</tbody>
</table>

* These data include management also.

No consideration was given in preparing Table 4 of the number of acres of forage maintained on the various dairies. This influenced the number of cows per worker, and will be considered in the final analysis of labor practices.

Rate of pay is certainly not the only factor influencing labor efficiency, for if the size of dairies in the four areas were considered, it may be that economies of size are just as important as pay scale in affecting labor efficiency. The size of dairies, as measured by the number of cows maintained, varied considerably over the four areas (Table 5).

Table 5. Number of cows per dairy, by area, Florida, 1967.

<table>
<thead>
<tr>
<th></th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>138</td>
<td>162</td>
<td>137</td>
<td>211</td>
</tr>
<tr>
<td>Maximum</td>
<td>1,151</td>
<td>1,331</td>
<td>1,345</td>
<td>1,750</td>
</tr>
<tr>
<td>Average</td>
<td>420</td>
<td>503</td>
<td>450</td>
<td>763</td>
</tr>
</tbody>
</table>

It might be well at this point to give more consideration to size of dairy and labor efficiency before going into more detail on labor practices (Table 6). The dairies were divided into groups as follows: Small 125 but less than 500 cows, medium 500 but less than 750 cows and large 750 and more cows.
Table 6. Distribution of small, medium and large dairies, average number of cows, and cows per worker, by area, Florida, 1967

<table>
<thead>
<tr>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq.</td>
<td>Ave.# Cows/ Cows Worker</td>
<td>Freq.</td>
<td>Ave.# Cows/ Cows Worker</td>
</tr>
<tr>
<td>Small 8</td>
<td>274 50</td>
<td>6</td>
<td>232 48</td>
</tr>
<tr>
<td>Med. 3</td>
<td>568 52</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Large 1</td>
<td>*</td>
<td>3</td>
<td>1,045 41</td>
</tr>
</tbody>
</table>

*Since there was only one large dairy surveyed in Area 1, the data was deleted in this table. This was done to avoid divulging information from an individual, for the survey was of a confidential nature. All that can be said is that there were over 750 cows on this dairy and that cows per worker were less than the other data shown for the area.

These data indicate that there is a difference in the effect of size on labor efficiency. Generally in both Area 1 and 2, after a dairy became larger than "medium sized" labor efficiency suffered. In Areas 3 and 4, the larger the dairy the greater the labor efficiency. There was a valid reason for this, not attributable as much to labor management, pay scale or skill of worker as to efficiency of plant. On the average, in both Areas 3 and 4, dairy barns are newer. There has been quite a large out migration of dairy farmers from the urbanized areas in both Area 3 and 4. Here the owners had operated older dairy barns at one location, over time had seen changes which could increase milking efficiency. When high land prices forced the sale of the older locations, they moved and were able to incorporate these changes in barns built at new locations.
On the other hand, many barns in the other two areas were designed for a specific number of cows, and are being used for a much larger herd. In other words, dairymen in Areas 1 and 2 were milking in older barns for the most part, which were designed to efficiently handle fewer cows than were being milked in them at the time of the survey.

One important measure of satisfaction in employer-employee relations is the length of service of employees (Table 7).

<table>
<thead>
<tr>
<th></th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>.02</td>
<td>.02</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>Maximum</td>
<td>15</td>
<td>20</td>
<td>40</td>
<td>29</td>
</tr>
<tr>
<td>Average</td>
<td>2.8</td>
<td>4.9</td>
<td>5.0</td>
<td>4.1</td>
</tr>
</tbody>
</table>

In no area did the average length of employment exceed 5 years. There were few exceptions to the case where there had not been a new employee hired during the week the farm was visited. Generally, the worker hired had been employed on another in the same area -- sometimes next door.

A study of labor management practices necessitates going to individual dairy records. Even then, the complete story is often difficult to reveal. An effort will be made to explain the circumstances without divulging enough data to single out any particular operation.

For instance, there was a dairy operating in a dairy barn which was quite an old building. This facility, however, was renovated as late as 1965, with an effort made to increase efficiency. Over the past five years this herd was increased by 75 cows with no additional labor. This operator was still only handling 43 cows per man, but this represented an increase from
30 cows per man. The average salary on this dairy was $111.50 per week and
the week constituted 5½ days with an average of 10.4 hours per day. The
average length of employment was 4 years, with a range of from 1 week to
15 years.

This operator had no set procedure for raises; however, he gave one
week vacations with pay after one year of employment. He furnished housing,
part of the utilities, milk, and did, on occasion, make personal loans. He
had two men who did not live on the farm, and he gave them a housing allowance.

The bonus was paid on production. He paid 8 cents per gallon for all
milk over 600 gallons per day. This was divided equally among the crew and
was paid weekly. He felt that this had helped increase production, and said
that since he fed cows individually according to production that there was less
risk of over feeding than would normally be expected from paying a bonus based
on production.

This operator had no formal management training, but thought that people
were more efficient if they were totally aware of what was expected of them;
consequently, he had an on the job training program for new men. A new employee
stayed "in training" until both he and the operator felt he was ready to per-
form the job on his own.

This operator stressed that the most important factor in increasing
efficiency was selecting the "right" man to begin with. He stated that at times
he had turned down new applicants when he was carrying the load himself, because
in his opinion they would not have fit into his operation. One point really
stood out when this dairy's operation was studied. The operator, in judging
the general attitude of his employees, placed their ratings as excellent, out
of a choice of excellent, good, fair, and poor. He also made an observation
that merits passing along -- dairy work isn't the most pleasant work available, and with mounting competition from other industries it will behoove the dairyman to make his job as pleasant as possible -- within reason of course.

Another dairyman in the study had increased his herd by 100% over the past 5 years, while increasing his crew by 20%. His crew was handling 50 cows per man at the time of the survey. This operator based salary increases on length of employment as well as efficiency. His supervisors were promoted from the ranks. In other words a new employee who came to work on the clean-up crew could expect to have the opportunity to become a supervisor if he applied himself. This operator felt that morale and efficiency of his crew had improved since he had begun to promote supervisors from the ranks instead of hiring outside supervisors.

Actually, when the schedules of the individual dairies were studied it was evident that there were almost as many different labor practices as there were dairies. Many of these were similar, but all varied in one way or another.

In summary it could be said that labor practices varied from dairy to dairy. Salaries ranged from one dollar per hour to slightly over two dollars per hour. Bonuses varied from none to one thousand dollars per man per year. In most cases the higher bonuses were correlated with hired management, who shared in the profits of the dairy. In other instances, there were dairymen who paid high bonuses to the entire crew based on production, bacteria count, etc. Some dairymen based salaries and bonuses not only on efficiency, but also on length of employment. Some of the dairymen surveyed felt that this had had some effect on lowering rate of turn-over in crews. Most dairies furnished housing -- either on or off the farm; and the trend appeared to be toward better housing. Better housing was being contemplated, for most operators felt that it paid to put a little more into housing in order that the workers' family
would be more satisfied. Vacations with pay were increasing and length of
vacations were normally tied to length of employment.

Most dairymen interviewed felt that labor is going to become more of a
problem in the future, and most were consciously trying to do something about
it. While automation is not solving all of the problems, capital invested in
efficient machinery which makes the job easier, tends to make labor more
productive. This is not the answer to all labor problems and most dairymen
felt that labor management training for operators and supervisors would be of
great assistance. They also felt that labor should be trained to do a more
effective job. Some had built parlors in order to extend the useful life of
milkers who had been with them for a long time, and who had become too old to
milk in a stanchion barn. They figured that the investment would pay off if
it allowed them to utilize the older employee in a parlor vs a new employee
in the old barn.

These were just some of the adjustments and practices in the use and
management of labor on dairy farms in Florida. This summary has of necessity
been brief, however, it may give an insight to the problems -- past, present,
and future -- of the dairy operators in the state; and at least give them an
opportunity to look for better ways in which to secure, train, and maintain
adequate help on their farms.

Presented: Fifth Annual Florida Dairy Production Conference
University of Florida
May 7-8, 1963
WHAT THE ELECTRONIC MACHINE DHIA
RECORDS PROVIDE

V. H. Lytton*

Starting in the fall of this year the Southern Regional Dairy Records Pro-
cessing Center will change to a new DHIA computing program. This program and
related changes were developed over a period of three years by Extension
agents working in the 11 cooperating states and Puerto Rico. The program has
been designed to provide (1) additional management information, (2) more accurate
information and (3) more complete identification on each cow. In addition, the
electronic computer will do much of the recording of data previously required of
DHIA supervisors.

The Dairy Herd Improvement Record, DHIA-200, with only one line per cow, pro-
vides information on 22 cows per page. Sold and dead cows are no longer listed
this report. The last calving date will be printed each month for milking
m. An optional mastitis test is a part of the report. Cows will be rated
ording to production and placed in one of five groups. A persistency index
given for cows milking more than 50 days. The due date is computed from the
recent breeding date. Number of days open is given for cows in milk.

Herd averages are given on a separate form, the Herd Summary and Management
port, DHIA-202. Basic data on the monthly averages, herd totals and rolling
ly herd averages are still given. In addition, average calving interval,
ry, days open and number of breedings per conception are given. A break-
of reasons cows leave the herd is provided. The percent of cows with sire
stity, HRS (herd reproductive status index), number of cows open more than
less than 100 days and herd persistency of lactation is reported.

A machine produced cow page, the Individual Cow Record, DHIA-203, is pro-
d each time a cow completes a record. An interim page is printed for cows
king over 350 days. Much of the information given on the old cow page is
n. In addition, the rating in the herd, actual 305-days production, 305-
-2X-HE production and lifetime totals for available lactation records are
n. Each time a new page is provided, the old report can be discarded.

To help in identification, an Individual Heifer Calf Page, DHIA-204, is pro-
ed each time the identification is reported for a new heifer calf. Calf,
dam information is provided. The heifer's sketch may be made on the
. When a heifer calves, her basic identification is given on this page.

The DHIA supervisor has less recording to do as the computer does most of
work. For each test only one form must be completed by the supervisor,
Barn Sheet, DHIA-201. Stress is placed on increased accuracy. The pro-
ing center has increased the amount of checking of data as well as the
umber of reports and the information provided.

*Extension Dairy Husbandry Specialist (Dairy Records), Agricultural Extension
ervice, North Carolina State University, Raleigh, North Carolina 27607.
APPLICATION OF DHIA RECORDS TO
HERD MANAGEMENT FOR INCREASING
PROFITS

George Hyatt, Jr.*

Until recently, an individual might operate his dairy farm with little planning and few records. Today, however, the professional dairymen must use the skills, techniques, and management principles that other industrialists use. With narrowing profit margins more exact information is required. The computer processed DHIA report of today provides much of the needed information.

DHIA testing has passed the test of time. Since 1905 DHIA records, when used, have proven to be an investment with a high rate of return for each dollar spent. Higher production is indicative of higher profits. The average DHIA cow in the nation produces 4,500 pounds more milk than the non-DHIA cow. At $4.00 per hundred this yields $180.00 per cow.

Some of the areas of DHIA record use are given below. The list is by no means complete.

1. Culling - If the lowest producers are removed from the herd and replaced with better cows, the level of production rises. Low producing cows can be spotted because there is full information on production. Cows differ. It is not possible to spot the low producers especially in large operations without records. Increased production obtained by culling can more than pay the testing costs.

2. Feeding - Records indicate how to feed according to production needs. Feeding according to production, either on an individual or group basis, can save money. Also, as production increases the higher producers convert feed into milk more profitably than low producers.

3. Selection - The heifer of today is the cow of tomorrow. Herd replacements should come from the higher producing cows. Records identify the higher producers. Selection is the major genetic tool for use in herd improvement. Every 4 to 5 years on the average the herd is a new group of animals as usually 20 to 25 percent of the cows are removed each year.

4. Reproductive Performance - A 12½ months calving interval is desirable. High reproductive rate is necessary for maximum milk flow. It has been estimated that from 50c to over $1.00 is lost for each day open after 100 days. In a herd averaging 130 days open (13½ months calving interval) at 60c per day this represents a loss of $18.00 per cow. Present records provide an indication of problem cows. However, this fall the revised reports will provide even greater help.

Director, Agricultural Extension Service, North Carolina State University, Raleigh, North Carolina 27607.
5. **Sire Evaluation** - Young sires must be evaluated. DHIA testing now provides the only evaluation data. The present sire evaluation program, started in 1935 by the USDA, is the best ever. The wise use of great sires, evaluated through DHIA testing, increased the genetic base. Florida dairymen with the largest percentage of cows bred by AI in the nation, have much to be gained in helping with the sire evaluation program.

6. **Management** - The central idea of management is to make every decision or action help achieve a desired goal. Increasing profits is a desired goal. Dairymen have a heavy investment. By using records and sound judgment the manager can put emphasis where most likely to obtain positive results. Management involves pulling the right string at the right time. Records help indicate the string and the time.

The DHIA record is not an end in itself but a means to an end. Records to be of value must be understood and used. They are used mainly for making on-the-farm decisions with greater knowledge of the situation. Lastly, record keeping adds greater interest in the work.
I am not going to speak on nutrition today as there are several specialist in the program more qualified than I to discuss this subject. I am going to speak as a feed manufacturer and discuss what we are doing and plan to do to meet the needs of the dairymen of Florida.

Let me review the dairy feed industry in South Florida. Unfortunately, some of the needs of the dairymen were not recognized 15 years ago by the feed industry. I am not speaking of the nutritional needs of the dairy cow. The feed industry, through the co-operation of the universities, its own research staff, commercial laboratories, its feed associations and other sources has always kept up to date with the nutritional needs of the cow and has always tried to keep you current on these needs. My subject today is not the needs of the cow but the needs of the dairymen.

Trends were developing 15 years ago that were ignored by the feed industry because it was easier and required less investment to supply a dairy with concentrates and sell sacked ingredients. If proof of this statement is needed, look around at the amount of mixing equipment in some barns. If we, as feed manufacturers, had recognized the trends and had been willing to invest in the solutions of your problems at that time, a lot of this mixing equipment would not be in the barns today.

Fifteen years ago, most dairymen bought sacked ingredients from his feed supplier and dumped these in layers in one section of his barn. Some still do it today. These were balanced with a dairy concentrate purchased usually from the same feed supplier. Why didn’t the feed manufacturer equip himself to receive these ingredients in bulk and manufacture and deliver a roughage mix to you that was mixed and balanced nutritionally and save all this labor in the barn and do it at a price that was economically sound? We didn’t recognize a trend and hesitated to make the necessary investment. The next step, particularly in the larger herds, was perfectly logical. Mixers were put in barns to mix roughage ingredients which were purchased on the basis as previously stated and we continued to supply the concentrates. This did not cut labor in most instances but it did increase investment. However, it gave a more uniform mix and made the work easier for dairy employees. We, as feed manufacturers, let this trend continue and in some cases we actually helped it along content to sell concentrates and furnish advice and formulation services.

The next step was also logical. The larger dairymen wanted his concentrate delivered in bulk. This the feed manufacturers equipped themselves to do at a substantial investment as they felt there was enough labor saving on their end to warrant the investment. At about the same time the dairyman was caught in a price squeeze and economics seemed to justify buying the roughage ingredients on a carload basis and have the manufacturer serve as a buyer or broker agent for a small fee which was supposed to be his profit, return on investment, sales cost and if a car or truck was late, fill in with stock from his warehouse. The feed industry accepted this role as long as the customer was buying concentrates. Next, and again in perfectly logical order, came the buying, storage and delivery of bulk, free flowing ingredients to the farm. Then, with the help of machinery companies, some of the larger dairymen decided to manufacture so called complete feeds on the farm or the combination of purchased concentrates were mixed with hay and citrus pulp and the ingredients supplying fiber were purchased from a broker or feed manufacturer.
We are not saying on the farm mixing is wrong. When ever a new concept in feeding is suggested and is found to have merit, its acceptance must be based primarily on economics.

Therefore, when considering on the farm mixing other factors must be considered rather than just the cost of ingredients. The only way a dairymen can realistically decide if he should manufacture feed is to enumerate all the costs incurred. Then a comparison of the quality and cost of the feed produced should be made with the quality and cost of the product purchased from a feed manufacturer. It is not easy to make quality comparisons but this is a vital consideration.

Some of the costs which must be considered are as follows:

A. **Original Capital Investment**
   - This includes your equipment such as hammermill, conveyors, electric motors, elevators, storage bins, scales, mixers, molasses tanks, and in some cases, bulk trucks, not needed if commercial feed is used. All of this is needed equipment to manufacture properly plus the fact that very few dairies are located on a railroad siding so still must purchase their fiber sources such as hulls, snap corn, beet pulp, cob & shuck and chopped alfalfa from outside suppliers and have them delivered in sacks.
   - Also, the smaller items that their capacity does not justify purchasing in quantity such as salt, urea, defluorinated phosphate, trace minerals and vitamins must be bought from a feed manufacturer who does buy in carload quantity.

   Remember in order to produce a high quality ration the feed manufacturing equipment must have the ability to accurately weigh and thoroughly mix. The equipment should contain magnets at several locations to trap metal and have cleanout sources to reduce contamination. All this requires considerable investment on the part of the dairymen.

B. The next consideration must be Operating Costs: Operating the equipment must be divided into several categories:

1. **Depreciation**
   - This is the original cost, including installation; divided by the length of time the equipment will be worn out or obsolete.

2. **Interest on Investment**
   - Original cost, including installation, less depreciation, multiplied by the interest you pay for borrowed funds.

3. **Repairs**
   - Include time required as well as parts required.

4. **Maintenance**
   - Include labor plus such items as grease, oil, etc.

5. **Insurance**
   - Or risk of loss from fire or storm if no commercial insurance is carried.

6. **Additional Taxes**

7. **Fuel or Power**
Now, the next cost would be labor. This is the actual cost of hired labor plus the value of management time for supervision. In this capacity the time required to keep up to date with the latest nutritional research should be considered. Several days per year should be used for this purpose and this is a cost that is often overlooked in the cost of farm mixing.

C. Next there is the ingredient cost which actually consists of more categories than most people realize:

1. **Purchase Cost of Actual Ingredients**
   This is relatively high due to the necessity of purchasing some ingredients in small quantities, often in bags instead of bulk, requiring higher handling costs and deliveries of small quantities.

2. **Transportation Costs:**
   Unfortunately, we have found that ingredient prices used for comparison to commercial feeds are not always quoted on a delivered to the farm basis. Also, a commercial feed in volume usually has the same transportation cost to your farm as a major ingredient without the disadvantages of higher costs for small deliveries of the smaller quantity items.

3. **Shrink or Drift**
   This is a cost that is almost always ignored in on the farm mixing and includes moisture loss, rodent and insect damage, waste and lost in dust.

4. **Interest**
   Average value of inventory multiplied by interest rate.

We have tried to realistically evaluate a dairyman's costs and problems as we feel that if we are to grow and justify our position as a dairy feed manufacturer, we must be in a position to deliver feeds of higher quality, better formulation and at lower prices than can be done by the dairyman. In order to do this we faced the fact that our incoming ingredients must be received almost 100% in bulk, including the hard to handle ingredients such as cottonseed hulls, snap corn, cob and shuck, etc. We have recently made a tremendous investment in our Boynton Beach Mill to manufacture, at costs competitive to on the farm mixing, such things as complete feeds, roughage mixes and dairy concentrates with the flexibility to adjust the formula to the particular farm. This remodeling is now completed at Boynton and our new mill for the Okeechobee area is being designed for next year construction. This mill will manufacture only complete feeds or roughage mixes, will receive incoming ingredients in bulk only and will deliver in bulk only. We sincerely believe that the local dairy feed manufacturers have now recognized the trends in the dairy industry and would like to suggest that before you make any substantial investments in mixing or bulk storage equipment that you sit down with the feed manufacturer of your choice and the machinery representative with whom you are dealing to make sure that the equipment purchased is economically sound and practical for the feeds you expect that equipment to handle.

We stated a moment ago that whenever a new concept in feeding is suggested and is found to have merit, its acceptance must be based primarily on economics. Many good ideas in terms of nutrition have proved to be impractical in terms of cost as of a given time of place or herd but entirely practical and profitable at other times or under other conditions. The idea of a complete dairy ration, mixed accurately, formulated and balanced scientifically, computed for least cost
and highest value, and delivered in bulk, falls in this category, in our opinion. We are in a position to make complete feeds economically but want to emphasize that there is no nutritional advantage in feeding a complete feed over what you can obtain from a conventional feeding program.

The trend in feeding dairy cattle will continue toward heavier concentrate feeding. The higher the production potential of a herd, the lower the percentage of roughage to be included in the ration. This is because energy intake must be sufficient to maintain the cow in good health and condition and produce milk in ever increasing amounts per cow.

We have found that the dairy men who operate on high priced and high taxed land, or limited acreage and where labor is scarce and very often inefficient are the dairymen most interested in complete rations. A large portion of the dairymen we serve in South Florida fall into this group. On the other hand, where good pastures are plentiful and roughage can be grown economically, and labor is available, hay and silage will continue to be fed separately.

However, the percentage of roughage to concentrate will still be reduced due to the increased production per cow. The decision of what feeding program is correct for a particular herd must be based on economics relative to that particular dairy and its conditions and then must be adjusted as the conditions change. Actually, a feed manufacturer today, to serve the dairymen properly, must be flexible enough to manufacture a feed for each dairy and its particular feeding problem.

We have found that the greatest problem in feeding a complete ration is the overfeeding of the low producing cows and the underfeeding of the high producing cows. With the real high producing cows the problem of roughage is most difficult. We have learned that when roughage—hay, ground corn cobs, cottonseed hulls, cob and shuck, snap corn, or some similar ingredient forms less than 20% of the complete ration, the percentage of fat in the milk is depressed. We have also learned that buffers such as bicarbonate of soda and magnesium oxide may be a partial answer to the fat test problem but we need much more information before practical recommendations applying to very high producing cows can be made.

We have learned in the use of complete feeds that the fiber shown on the tags of rations can be very misleading as fibers differ in their fat depressant effect according not only to their source, but also as to their physical properties, texture, and so forth. Experience seems to indicate that the type and texture of the roughage used in complete feeds may be of even greater importance than the amount used.

Also, the texture of a complete feed varies considerably depending mainly on the changes in texture of citrus pulp and cottonseed hulls, depending on the source or manufacturer of these by-products.

As stated previously, we have also learned that there is little if any nutritional advantage in complete dairy feed over the concentrate-roughage feeding program. The big advantages lie in the direction of management and increased efficiency in the use of capital, labor, and equipment.

The university, the experiment stations and our commercial nutritionists have a real challenge in the development of sound, practical, complete dairy rations for the high producing dairy cows of the future. We feel that the Florida feed manufacturers have now recognized the trends of the Florida dairy
industry and are equipping themselves with the type of machinery and personnel necessary to do the job for you economically and efficiently.

There is one other observation I would like to make regarding the comparison of feed tags. Florida State Law applying to feed manufacturers require the feed tag to show the guaranteed analysis and the list of ingredients used in the composition of the feed. The analysis is limited to minimum percentage of crude protein and crude fat, the maximum amount of crude fiber and the maximum percentage of total mineral ingredients. Certain additives must also be declared and the amounts stated on the tag. With in these limits the law requires only that the ingredients claimed on the tag are in fact present in the feed in detectable amounts. The actual quantity of any given feed ingredient is not required. This is a very wise provision because, in modern complex formulas, there is no practical or accurate way of determining how much of a given claimed ingredient is actually present in the feed after it has been mixed. To require "Open Formula" quantitative statements of individual ingredients, would open the door much wider than it is to any unscrupulous manufacturer who could flout such a law without detection by the state regulatory agencies.

The feed tag does NOT reveal and CANNOT reveal the comparative nutritional and economic efficiency of the blend of ingredients. Two feeds can carry identical guarantees and list of ingredients on the tag and still be miles apart in terms of results in the dairy barn.

Claims for superiority, based alone on minor differences showing on feed tags can not be supported in fact. A point or two, more or less of fat or fiber and frequently of protein reveals nothing as to the relative feeding value of the feeds. Neither is the simplicity or the complexity of the list of ingredients a basis for appraising the feeding value. We feel that it is essential for our company's representatives to know the reason for the guarantee behind each feed and the purpose of each ingredient or additive used in its composition. But, in the final analysis the dairyman's interest is in the product as a whole and what it does or will do when fed according to the manufacturers' program.

The most important ingredients in any formula feed are intangibles and cannot be shown on the tag. These are: the integrity of the feed manufacturer, his know how and all that it implies, his efficiency in filling the feed and feed service needs of his customers. For long pull success as a feed manufacturer, I feel that we must provide the dairymen of Florida with sound profit making feeds and services which are constantly adjusted to changes and improvements as they are developed through nationwide research.
GROUP FEEDING DAIRY COWS FOR ECONOMIC PRODUCTION

The trend toward the concentration of more dairy cattle on fewer and more specialized dairy farms has been quite pronounced in Florida in recent years. At the present time, Florida has approximately 500 dairies with an average of about 350 cows per dairy. Production in 1967 increased in 20 states, Florida was up 7 percent, the largest percentage gain, followed by Texas with a 5 percent gain. Florida dairy cows led all southern states in 1967 with an average of 8,660 lbs. of milk, an increase of 460 lbs. of milk per cow, as compared with 1966 production.

Today's dairyman must not let himself become complacent in a fast changing world. He must continue to read, study, and evaluate new ideas and practices that may be incorporated into his dairy operation to help reduce overall production cost. Long range plans must be developed that are flexible enough to include the adoption of new approaches in solving current and future problems.

The movement toward larger herds and different milking systems has had a significant influence on feeding programs. One new approach that is presently receiving some study and attention is "Group Feeding". Although group feeding is not new to many dairymen, its application where cows are placed in three or more groups according to level of production is a relatively recent innovation. Group feeding is not being advocated in herds where individual feeding is practiced. However, few dairymen with large or small herds now practice individual feeding and many have adopted the practice of giving all cows an equal chance at the feed bunk. This scheme results in underfeeding the high producers and over-feeding the low producers. Dairymen shifting from this scheme to group feeding have been able to reduce their over all feed cost and increase the level of production.

Auburn researchers have recently reported the results of a trial comparing individual and group feeding. The cows were paired according to level of production and randomly assigned to concentrate feeding groups. Results of the trial are given in Table I.

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Method of Feeding</th>
<th>Individually</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCM/cow/day, lb.</td>
<td></td>
<td>32.0</td>
<td>31.0</td>
</tr>
<tr>
<td>Milk Fat, %</td>
<td></td>
<td>4.7</td>
<td>4.9</td>
</tr>
<tr>
<td>Gain in body weight/28 days, lb.</td>
<td></td>
<td>48.0</td>
<td>13.0</td>
</tr>
</tbody>
</table>

Prepared by Dr. Barney Harris, Jr. for presentation at the Fifth Annual Florida Dairy Production Conference, May 7 & 8, 1968.
In recent Illinois studies, a group feeding trial was conducted over a period of 18 weeks comparing free choice feeding of corn silage mixed with 1) 100%, 2) 50%, and 3) 0% of the concentrate mixture. The remaining portion of the concentrate mixture for groups 2 and 3 was fed individually in the parlor. The results of this experiment are summarized in Table II.

Table II A Group Feeding System Comparing A Complete Feed Mixture of Corn Silage and Concentrates for 18 weeks.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FCM/cow/day, lbs.</td>
<td>34.0</td>
<td>39.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Milk Fat test, %</td>
<td>3.9</td>
<td>3.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Silage TDN consumption, lbs.</td>
<td>16.5</td>
<td>16.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Grain TDN consumption, lbs.</td>
<td>9.5</td>
<td>11.2</td>
<td>8.4</td>
</tr>
<tr>
<td>Body weight gain, lbs.</td>
<td>167.2</td>
<td>154.0</td>
<td>127.6</td>
</tr>
</tbody>
</table>

The researchers concluded that lactating dairy cows can utilize a group-fed complete ration mixture of corn silage and concentrates as efficiently as an individually fed ration. Feeding concentrates in the milking parlor did not apparently stimulate greater milk production. All cows averaged 11 minutes per cow in the Herring-bone parlor with a consumption of 0.66 lbs. of concentrate per minute.

Recently Georgia researchers reported results comparing various group feeding schemes. The cows were assigned to four treatment groups as follows:

(A) ad lib. corn silage, ad lib. concentrate.
(B) ad lib. complete feed (60% concentrate, 40% cottonseed hulls and Coastal Bermudagrass pellets).
(C) ad lib. complete feed (70% concentrate, 30% cottonseed hulls and Coastal Bermudagrass pellets).
(D) ad lib. corn silage and 25 lbs. of concentrate.

The results are summarized in Table III.

Table III Ad Libitum and Controlled Group Feeding Of Lactating Dairy Cows for 150 Days.

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk/Day, lbs.</td>
<td>49.0</td>
<td>48.0</td>
<td>48.0</td>
<td>48.0</td>
</tr>
<tr>
<td>Milk Fat test, %</td>
<td>3.4</td>
<td>3.5</td>
<td>3.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Silage consumption, lbs/day</td>
<td>20.0</td>
<td>----</td>
<td>----</td>
<td>60.0</td>
</tr>
<tr>
<td>Grain consumption, lbs/day</td>
<td>41.0</td>
<td>56.0</td>
<td>56.0</td>
<td>24.0</td>
</tr>
<tr>
<td>Total TDN consumption, lbs/day</td>
<td>34.0</td>
<td>34.8</td>
<td>37.1</td>
<td>32.0</td>
</tr>
</tbody>
</table>

Corn silage = 38% DM; 24% TDN
Concentrate = 70% TDN
Complete feed = 62% TDN

Under pasture conditions, it is usually not practical to separate the cows into more than three production groups because of the amount of labor involved in moving the cows to and from the pasture. Generally, an effective job of group feeding according to level of production can be done when the cows are separated into three groups. Many dairymen prefer to use group feeding under dry lot conditions.
dairying rather than pasture separation. Drylot dairying offers the advantage of having as many lots and production groups as needed and a better chance to eliminate the problem of wet, muddy lots, pastures and lanes.

There are several methods that might be adopted in the feeding of cows according to production groups. Fence line or outside feeding appears to be more popular in new dairies with parlor operations. In some cases, the grain is mixed with the silage and/or green chop or other roughage prior to feeding. A few dairymen are using the mixer wagon (with scales) for distributing the feed and in other cases the self-unloading wagon is used. For group feeding to be effective the feed should be evenly distributed in the bunks so that all cows in each production group will have ample space and the same length of time to eat. In some cases, individual stanchions may be desired in order to fasten timid cows in the production group.

Another method of group feeding is the use of the stanchion barn. In some cases the cows are fed by hand whereas in other cases the barns are equipped with automatic feeding systems. Mechanized feeding equipment can be used in group feeding providing it will deliver measured amounts of feed to the production groups.

Group feeding appears to be the best solution to many of the problems associated with trying to adequately and economically feed large numbers of dairy animals found on many of our Florida farms. One method employed for grouping cows according to production and for feeding animals within each group is shown in Table IV.

<table>
<thead>
<tr>
<th>Table IV</th>
<th>A Group Feeding System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>I</td>
</tr>
<tr>
<td>Level of Production (lbs)</td>
<td>15-30</td>
</tr>
<tr>
<td>Fed for (lbs, milk)</td>
<td>25</td>
</tr>
<tr>
<td>Feed required (lbs) Av. 1400 lb. cows</td>
<td>25</td>
</tr>
<tr>
<td>Pasture (fair) (lbs)</td>
<td>25</td>
</tr>
<tr>
<td>Hay, pangola (lbs)</td>
<td>6</td>
</tr>
<tr>
<td>Concentrate mix (10.5% D.P.) (lbs)</td>
<td>20</td>
</tr>
</tbody>
</table>

As more pasture becomes available the grain feeding can be reduced accordingly. Generally, good producing cows can consume from 60 to 80 lbs. of good pasture per day. About 7 or 8 lbs of pasture is equivalent to 1 lb. of grain.

Following a 2-3 week period of challenge feeding, fresh cows are usually placed in one of the high production groups. Most cows will remain in this group for a period of at least 2 or 3 months. Then, production records must be checked at monthly intervals to determine which animals should be shifted to lower production groups. Some cows will remain in the high group during the greater part of their lactation while others will need 2 or 3 changes during the course of the lactation. Dairymen have not reported any real problems due to "boss cows" or adjustments needed by cows coming into a new group. Most cows will require 1 or 2 days to establish her place in the new group.
In order to remain competitive, today's dairymen are rapidly being forced to become larger and more automated. Increasing the size of the dairy as well as increased automation requires some changes in the existing practices. Two noticeable changes have been a trend toward parlor milking and group feeding. Parlors allow less time for eating than stanchion barns. Also, individual feeding of dairy cattle in large operations becomes burdensome to many dairymen and alternative methods of feeding cattle are sought. Therefore, at the present time, it appears that the adoption of a group feeding program offers the best approach to feeding large numbers of cows according to production.

BHjetbp

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Citrus Pulp Treated with Diammonium Phosphate

S. P. Marshall and C. E. Browning

Diammonium phosphate containing 20% phosphorous and 17% nitrogen was added to batches of citrus pulp prior to drying in amounts equivalent to 2.5 and 4.2% of the dried pulp.

The effect on acceptability of rations containing citrus pulp to which 0, 2.5 and 4.2% diammonium phosphate had been added were tested using dairy heifers. Ration ingredients expressed as pounds were: citrus pulp, 45; soybean meal, 10; ground corn, 23; cottonseed hulls, 20; trace mineral salt, 1; and defluorinated phosphate, 1. Vitamin A was added at the rate of 3,000 I.U. per pound of feed. Three rations of this composition but containing citrus pulp with the different treatments were fed ad libitum to different groups of heifers (six per group) for a 14-day preliminary period followed by a 42-day experimental period.

The heifers averaged 766 pounds body weight at the beginning of the experimental period. Feed intakes for the 42-day period averaged 28.0, 27.5 and 26.8 pounds on the rations containing citrus pulp with 0, 2.5 and 4.2% added diammonium phosphate. Average daily feed intakes per 100 pounds of body weight were 3.34, 3.32 and 3.24 pounds, respectively. Body weight gains averaged 3.25, 3.20 and 3.01 pounds daily on the respective rations. These data indicate that the addition of 1.1% or 1.9% diammonium phosphate to rations via treated citrus pulp does not affect significantly acceptability or rate of gain.

* * * * * * *

Citrus Pulp with Added Phosphoric Acid

S. P. Marshall and C. E. Browning

Phosphoric acid was added to citrus pulp prior to drying at the rate of 40 pounds per ton of dried pulp. Phosphorous content of the resulting product was increased from 0.19 to 0.63%.

The effect on acceptability of a ration containing the phosphoric acid treated citrus pulp is being tested using lactating cows. Ingredients in the basal ration, expressed as pounds, are: citrus pulp, 44.7; soybean meal, 11; ground corn, 18; alfalfa pellets, 5; cottonseed hulls, 20; trace mineral salt, 1; urea, 0.5, and dicalcium phosphate, 0.8. Two thousand I.U. of vitamin A are added per pound of feed. The phosphoric acid treated citrus pulp ration is the same except that dicalcium phosphate is omitted and citrus pulp increased to 45 pounds.

Two groups of 6 lactating cows each are being used in a single reversal trial to compare the two rations when fed ad libitum. One-half of the experiment has been completed. Feed intake has averaged 47.8 pounds per day on the control ration and 49.8 pounds on the ration containing the treated citrus pulp. Expressed as daily feed intake per 100 pounds body weight, the values are 4.0 and 4.1 pounds, respectively. Daily milk production has averaged 50.5 pounds on the control and 51.1 pounds on the phosphoric acid treated citrus pulp ration. There is no evidence to date of any effect on feed intake or milk production caused by adding, prior to drying, 40 pounds of phosphoric acid per ton of citrus pulp.

1. Citrus pulp furnished through courtesy of International Minerals and Chemicals Corp.
"Filled" Silage

S. P. Marshall and C. B. Browning

Shortage of roughage on the dairy farm along with the possibilities for reducing labor costs and simplifying the feeding program has stimulated interest in studying "all-in-one" or "complete" feeds for lactating cows. Where inadequate amounts of forage are being obtained from pasture or other sources, a modification of the "complete feed" concept has been adapted by mixing some supplemental roughage with the concentrate.

Although a significant amount of research has been done on the development of complete feeds utilizing dry roughages such as chopped hay, cottonseed hulls and corn cobs, little consideration has been given to the use of silages in these formulations. Since corn and grain-type sorghum silages are a mixture of grain and forage, they provide an excellent base on which to build a complete ration. Therefore, this investigation was initiated to study the ensilability, fermentation dry matter losses and the feeding value of a complete ration built on corn silage.

Alternate strips of corn were ensiled as a part of complete rations and as plain silage. In 1966, the chopped corn contained, on the dry matter basis, 48.6% of grain, 39.7% of stalks, leaves and husks, and 11.7% of cobs. The respective values in 1967 were 59.9, 26.2 and 14.9%. A concentrate mixture comprised of citrus pulp, cottonseed meal, salt and defluorinated phosphate was moistened with water and added to chopped corn prior to ensiling. In 1968, urea was added to both the chopped corn and to the concentrate at the rate of 1% of the dry matter.

When one pound of moistened concentrate containing 61% dry matter was blended with 2.57 pounds of chopped corn containing 36.5% of dry matter in 1966, and this mixture ensiled, the resulting ration was well preserved. Last summer (1967) when chopped corn containing 38.2% of dry matter was used to formulate the complete ration containing unground citrus pulp, some small mold spots were found in the top 10-foot layer. Mold spots did not occur in top layers of plain silage. These small mold spots were caused by miniature pockets of trapped air resulting from inadequate compression in the top 10-foot layer of the ensiled complete ration. Where high dry matter chopped corn with a low specific weight is ensiled as a part of an ensiled complete ration or alone, water should be added or some heavier material used to increase weight and compression in the top layer.

In 1966, fermentation dry matter loss values averaged 8.4% for the ensiled complete ration and 6.9% for the plain silage. When the ensiled complete ration was compared using lactating cows with one formulated by blending the silage and grain at feeding time, daily dry matter intake per 100 pounds of body weight averaged 2.9 pounds on the ensiled ration and 2.7 pounds on the blended ration. Milk production averaged 38.8 and 38.9 pounds daily on the respective rations. These differences between treatments were not significant.

An ensiled complete ration, one prepared by blending concentrate and silage at feeding time and another where the silage and dry concentrate were fed separately, were compared in 1967. Milk production on these rations averaged 41.4, 41.6 and 42.8 pounds, respectively. These differences were not significant.

Density calculations based on the weight of material ensiled and the space occupied at time of removal indicated 49.6 pounds per cubic foot for the plain silage and 62.3 pounds per cubic foot for the ensiled ration in 1966. On the dry matter basis, these values were 18.1 and 26.7 pounds per cubic foot, respectively. In 1967, the density calculations were 46.4 pounds per cubic foot for the plain silage, and 49.2 pounds per cubic foot for the ensiled complete ration. On the dry matter basis these values were 17.9 and 22.0 pounds per cubic foot. In 1966, when the 49% of citrus pulp in the concentrate was ground and the chopped corn contained 36.5% dry matter, only 5.2% more space was required to store the 26.7 pounds of concentrate (air dry basis) per 100 pounds chopped corn. In 1967, when the 59% of citrus pulp in the concentrate was unground and the chopped corn contained 38.2% dry matter, 31.6% more space was required to store 26.7 pounds of concentrate per 100 pounds chopped corn.

The ensiled complete rations were equally satisfactory for lactating cows when compared with comparable rations blended at feeding time or where the silage and dry concentrate were fed separately. In "filled" silages the dry matter content should be high enough to eliminate nutrient losses from seepage. The ensiled material should be sufficiently heavy and compressed to remove air pockets which allow mold formation.
ALFALFA CHIPS AS ROUGHAGE SOURCE\textsuperscript{1}.

George W. Powell
Department of Dairy Science, University of Florida

At the present time, we have a feeding trial in progress designed to compare alfalfa hay chips to cottonseed hulls as a source of fiber in a complete ration. Four weeks of the 10 week study have been completed. Eighteen lactating dairy cows have been divided into three groups and are being individually self-fed one of the following three rations. No additional forages nor supplements are being fed.

<table>
<thead>
<tr>
<th>Ration 1 (lbs)</th>
<th>Ration 2 (lbs)</th>
<th>Ration 3 (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus pulp 800</td>
<td>Citrus pulp 800</td>
<td>Citrus pulp 800</td>
</tr>
<tr>
<td>Corn meal 467</td>
<td>Corn meal 358</td>
<td>Corn meal 431</td>
</tr>
<tr>
<td>Wheat bran 100</td>
<td>Wheat bran 100</td>
<td>Wheat bran 100</td>
</tr>
<tr>
<td>Soybean meal,44% 200</td>
<td>Soybean meal,44% 100</td>
<td>Soybean meal,44% 125</td>
</tr>
<tr>
<td>Cottonseed hulls 375</td>
<td>Alfalfa chips 590</td>
<td>Cottonseed hulls 186</td>
</tr>
<tr>
<td>Biophos 18</td>
<td>Biophos 18</td>
<td>Biophos 18</td>
</tr>
<tr>
<td>Urea (281%) 20</td>
<td>Urea (281%) 14</td>
<td>Urea (281%) 18</td>
</tr>
<tr>
<td>Salt 20</td>
<td>Salt 20</td>
<td>Salt 18</td>
</tr>
<tr>
<td>Vitamin A*</td>
<td>Vitamin A*</td>
<td>Vitamin A*</td>
</tr>
</tbody>
</table>

\*4 million USP units per ton

Ration 1 contains cottonseed hulls as the fiber source, ration 2 contains alfalfa chips in place of hulls, and ration 3 contains a combination of hulls and alfalfa. All three rations have been formulated to contain equal percentages of the following: crude protein, 13.4%; digestible protein, 9.5%; TDN, 67%; calcium, 1.02-1.34%; phosphorus, 0.47%; and fiber, 15.3%.

When completed, this study should give a good indication as to the nutritive value of alfalfa chips and, in addition, establish whether a complete ration containing this alfalfa product will maintain normal butterfat production as compared to cottonseed hulls. Examination of

\textsuperscript{1} Presented at the Fifth Annual Florida Dairy Production Conference, Gainesville, Florida, May 7-8, 1968.
the data accumulated to date indicates that none of the rations are producing an abnormally low butterfat. Table 1 gives the average percent butterfat for each group of cows for each week of the experiment that has been completed.

Table 1

Average weekly butterfat percentages for each group of cows receiving the experimental rations

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Standardization period</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ration 1 (hulls)</td>
<td>4.4</td>
<td>4.3</td>
<td>4.2</td>
<td>4.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Ration 2 (alfalfa)</td>
<td>4.9</td>
<td>4.7</td>
<td>4.8</td>
<td>4.5</td>
<td>4.8</td>
</tr>
<tr>
<td>Ration 3 (hulls and alfalfa)</td>
<td>4.9</td>
<td>4.7</td>
<td>5.0</td>
<td>4.7</td>
<td>5.2</td>
</tr>
</tbody>
</table>

The data to date do not show any large differences in average daily milk production between the cows receiving the three rations.
LEVELS OF MOLASSES

George W. Powell
Department of Dairy Science, University of Florida

High concentrate complete rations containing 0, 6, or 18% blackstrap molasses in the concentrate portion (0, 4.2, or 12.6% of the entire complete ration) were fed free-choice as the only feed to lactating dairy cows to determine the effect of various levels of molasses on milk production and milk composition. The 0% molasses ration contained the following ingredients: ground shelled corn, 35%; brewers grains, 10%; cottonseed meal, 20%; wheat bran, 5%; and dairy-cut alfalfa hay, 30%. The molasses containing rations were the same as the above with the exception that molasses was added in place of corn while cottonseed meal was added to adjust for the difference in protein content between corn and molasses. Therefore, the rations were as near the same in energy and protein as possible. The calculated analysis of the rations was as follows: fiber, 13.8%; digestible protein, 14%; total digestible nutrients, 65%.

Results shown in Table 1 are average values taken from two trials, one in 1967 and one in 1968. Each trial utilized 18 cows. As can be seen from the following table, both 4.2% and 12.6% molasses in the ration resulted in a slight decrease in all measurements taken.

Table 1

Effects of two levels of molasses on milk production and composition

<table>
<thead>
<tr>
<th>% molasses</th>
<th>Average daily yield (lbs.)</th>
<th>4% FCM</th>
<th>Fat</th>
<th>SNF</th>
<th>% Fat</th>
<th>% SNF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>51.6</td>
<td>2.06</td>
<td>4.65</td>
<td>4.17</td>
<td>9.06</td>
</tr>
<tr>
<td>4.2</td>
<td></td>
<td>50.1</td>
<td>1.99</td>
<td>4.52</td>
<td>4.10</td>
<td>8.98</td>
</tr>
<tr>
<td>12.6</td>
<td></td>
<td>49.0</td>
<td>1.94</td>
<td>4.46</td>
<td>4.02</td>
<td>8.94</td>
</tr>
</tbody>
</table>

No significant differences were found between the 4.2% and the 0% molasses rations nor the 4.2% and the 12.6% molasses rations in any of the measurements taken. However, the decreases in 4% FCM yield, total fat yield, SNF yield, and percent fat which resulted from the feeding of 12.6% molasses were statistically significant when compared to the 0% level of molasses.

The average daily feed consumptions were as follows: 0% molasses, 49.6 lbs; 4.2% molasses, 51.1 lbs; and 12.6% molasses, 50.6 lbs. The average daily gains in body weight for the cows fed the 0%, 4.2%, and 12.6% rations were 0.47, 0.45, and 0.42 lbs, respectively.

The current recommendations for molasses feeding are 6-10% of the total ration with the higher percent being added to rations containing more than 30% roughage. The data accumulated in this experiment tend to substantiate these recommendations. However, the final decision as to what level of molasses to feed to lactating dairy cows should be based on the cost of energy in molasses when compared to other readily available sources of energy. It is possible that a slight decrease in production as seen with the highest level of molasses in the present study would be justifiable under certain economic conditions.
Experiences with Early Freshening of First Calf Heifers 1.
Charles J. Wilcox
Department of Dairy Science, University of Florida

A number of factors influence the decision one makes as to when first to breed dairy heifers. Perhaps of major importance is having the heifer freshen when milk prices are the highest, recognizing that the season of freshening also influences total milk yield. In the case of the University herd and many Florida herds, animals freshening in the fall produce more milk and this is also the time when prices are highest.

Yet a daughter of a fall-freshening cow freshens in the winter or spring if she does not conceive until 18 months of age or older. Our program since 1959 has been to breed our heifers so that they freshen only in late summer or fall, corresponding to a breeding season of October to March, breeding them as soon as they become 13 months old regardless of body weight or condition.

Productive and reproductive performance of 371 first calf heifers is shown in Table 1. Average age at first service was 14.9 months, at conception 16.5 months, at freshening 25.6 months. Frequencies of calving problems were: retained placenta, 2.4%; uterine prolapse, 1.1%; dystocia, 4.9%; metritis, 10.5%; dead calves, 10.2%; one or more of these problems, 21.6%. These values are normal and agree with research from other experiment stations. Holsteins had a higher frequency of problems than the other breeds. Frequencies of problems were not affected by age of calving, even though many animals freshened at 22 or 23 months. Table 2 shows the change in other measures of performance for each additional month of age at freshening.

Dairymen should expect no increase in problems at freshening if animals are managed according to standard recommendations and are bred at 13 months of age, and should consider the merits of a limited-season early-freshening management system.

Table 1. Performance of first-calf heifers

<table>
<thead>
<tr>
<th>Trait</th>
<th>Guernsey</th>
<th>Holstein</th>
<th>Jersey</th>
<th>Ayrshire</th>
<th>Brown Swiss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>63</td>
<td>97</td>
<td>171</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Age fresh (months)</td>
<td>25.6</td>
<td>24.6</td>
<td>25.7</td>
<td>26.9</td>
<td>27.3</td>
</tr>
<tr>
<td>Body weight after calving (lb)</td>
<td>955</td>
<td>1177</td>
<td>783</td>
<td>1023</td>
<td>1195</td>
</tr>
<tr>
<td>Milk yield (lb)(^a)</td>
<td>7396</td>
<td>11636</td>
<td>6700</td>
<td>7348</td>
<td>9160</td>
</tr>
<tr>
<td>Fat yield (lb)</td>
<td>377</td>
<td>425</td>
<td>344</td>
<td>313</td>
<td>368</td>
</tr>
<tr>
<td>Gestation length (days)</td>
<td>283.8</td>
<td>276.5</td>
<td>276.5</td>
<td>276.5</td>
<td>285.4</td>
</tr>
<tr>
<td>Alfa birth weight (lb)</td>
<td>68</td>
<td>79</td>
<td>49</td>
<td>64</td>
<td>78</td>
</tr>
<tr>
<td>Days open(^b)</td>
<td>126</td>
<td>146</td>
<td>132</td>
<td>184</td>
<td>187</td>
</tr>
<tr>
<td>Second lactation (%)</td>
<td>75</td>
<td>76</td>
<td>71</td>
<td>65</td>
<td>85</td>
</tr>
<tr>
<td>Calving problems (no.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retained placenta</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Uterine prolapse</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dystocia</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Metritis</td>
<td>7</td>
<td>22</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dead calf</td>
<td>6</td>
<td>14</td>
<td>17</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>One or more(^c)</td>
<td>12 (19%)</td>
<td>36 (37%)</td>
<td>26 (15%)</td>
<td>3 (15%)</td>
<td>3 (15%)</td>
</tr>
</tbody>
</table>

\(^a\) Actual 305 day yield.
\(^b\) Days open during first lactation.
\(^c\) One or more of the five calving problems listed.

Table 2. Change in performance for each additional month in age at freshening

<table>
<thead>
<tr>
<th>Trait</th>
<th>Guernsey</th>
<th>Holstein</th>
<th>Jersey</th>
<th>Ayrshire</th>
<th>Brown Swiss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (lb)</td>
<td>+7</td>
<td>+18</td>
<td>+14</td>
<td>+10</td>
<td>+12</td>
</tr>
<tr>
<td>Milk yield (lb)</td>
<td>+60</td>
<td>+152</td>
<td>+82</td>
<td>+214</td>
<td>+260</td>
</tr>
<tr>
<td>Fat yield (lb)</td>
<td>+7</td>
<td>+6</td>
<td>+4</td>
<td>+8</td>
<td>0</td>
</tr>
<tr>
<td>Gestation length (days)</td>
<td>+.2</td>
<td>+.4</td>
<td>+.4</td>
<td>+.2</td>
<td>+.7</td>
</tr>
<tr>
<td>Calf birth weight (lb)</td>
<td>+.6</td>
<td>+.8</td>
<td>+.2</td>
<td>+1.1</td>
<td>+.6</td>
</tr>
<tr>
<td>Days open</td>
<td></td>
<td></td>
<td></td>
<td>+2.3</td>
<td></td>
</tr>
</tbody>
</table>
Aikens, Wilbur B.
Ainsworth, David
Alvarez, Ray
Alvarez, Warren
Arpen, John H., Mr. & Mrs.
Bassett, Wilmer W., Jr.
Baumeister, George
Becker, R. B.
Berry, Don
Blackwell, James A.
Boardman, Bill
Boosinger, Jay B.
Bouchard, Donald E.
Bowman, Bill
Boyd, Clay
Boyles, C. R.
Braddock, Tom
Bradley, Porter
Broome, J. Frank
Brown, Harvey B.
Burdsall, Tom
Burton, Gene
Butler, Bob
Cain, Robert L.
Camrack, Catherine
Camrack, Elbert
Carey, William O.
Clark, Ken
Click, James E.
Click, Paul
Click, Wendell, Mr. & Mrs.
Cochran, John M.
Collins, Hanson E., Mr. & Mrs.
Collins, Sue
Combee, LeRoy
Cowles, Frank
Curley, Robert W.
Danson, J. W.
Dawson, Franklin L.
Dickerson, Bill
Dodd, Jack P.

Doke, Kent

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409 Courthouse, Jacksonville, Florida 32202
P. O. Box 3384, Tampa, Florida 33601
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Route 2, Box 114, Hawthorne, Florida 32640
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Route 2, Moore Haven, Florida 33471
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4431 Harmony Lane, Orlando, Florida 32806
P. O. Box 7854, Orlando, Florida 32804
Route 5, Box 1101, Lakeland, Florida 33803
Route 3, Box 364, Ft. Pierce, Florida 33450
P. O. Box 15165, W. Palm Beach, Florida 33401
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Dressel, Dick  
Eastwood, Ralph  
Ellis, Gordon  
Elrod, Ronnie, Jr.  
Farrell, Wilburn  
Fedder, Ronald  

Field, J. Walker  
Fledellerjohnn, Myron  
Futch, M. C.  
Galbraith, F. A.  
Gassaway, H. B.  
Gephart, W. A.  
Gerber, Clarence O.  
Gerber, Daniel S.  
Geyer, Harry  
Glass, James T.  
Glasscock, Paul  
Glisson, James M.  
Goolsby, David E.  
Goolsby, Wade  
Goolsby, Z. B.  
Gulledge, Ellis P.  
Hall, Bob  

Hammond, A. S., Mr. & Mrs.  
Hanson, Don  
Hargrove, C. D.  
Harris, Barney, Jr.  
Heitfield, Vinton, Mr. & Mrs.  
Head, H. H.  
Hebert, Jay  
Henry, W. L.  
Higginbotham, Neal, Mr. & Mrs.  
Hite, James E., Mr. & Mrs.  
Hodge, Robert, Mr. & Mrs.  
Hogan, Riley, Jr.  

Hooper, Larry  
Jackson, R. A.  
Jessie, R. W.  
Johnston, Arthur L.  
Jones, Mack  
Jones, Owen H.  
Kelly, Paul H.  
Kennedy, W. Harper, Mr. & Mrs.  
Kidwell, Jack  
Kipp, Bill  
Kondo, Francis  
Krueger, Walter  
Laney, William A.  
Larson, Louis E.  
Lasher, Richard K., Mr. & Mrs.  

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Rt. 1, Box 332, Riverview, Florida 33569  
Route 1, Umatilla, Florida 32784  
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McCulgan, Jerry
McMillan, Darycee
McNish, Donald R.
McNutt, Rollin
Manter, George M.
Marshall, S. P.
Martin, Gerald G.
Martin, H. B.
Massey, Val
Melvin, Chester
Minear, Judson
Moore, Harvey
Moore, Mike
Moore, Tommy
Morgan, Edward
Maul, Leon
Melsen, R. A.
Nolan, Wallace
Oelke, Walt
O’Keefe, Jerry
Palmer, Clyde
Parks, Claude
Peachey, John A.
Peeples, Rod L.
Pipkin, Curtis B.
Platt, Donald D.
Platt, Kenley
Poppe, Arnold
Popham, John E.
Pownall, George
Pownall, H. A.
Pownall, H. B.
Price, Betty
Price, R. K.
Quackenbush, G. G.
Race, Marshall
Raulerson, James L.
Reagan, C. L., Mr. & Mrs.
Reaves, C. W., Mr. & Mrs.
Riley, J. A.
Roberts, Mallory
Rodriguez, Wilfredo
Robinson, D. D.
Ross, Gilbert
Rucks, Don
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Route 1, Box 2252, Lakeland, Florida 33803
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Route 6, Box 951-B, Orlando, Florida 32807
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Myakka Star Route, Bradenton, Florida 33505
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