PROCEEDINGS
OF THE
NINTH ANNUAL

FLORIDA DAIRY
PRODUCTION CONFERENCE

Institute of Food and Agricultural Sciences

TEACHING
RESEARCH
EXTENSION

IFAS

University of Florida

"Effective Management"

University of Florida
Gainesville
May 10 and 11, 1972

SPONSORED BY
DEPARTMENT OF DAIRY SCIENCE
COOPERATIVE EXTENSION SERVICE
AGRICULTURAL EXPERIMENT STATION
OF THE
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
WITH COOPERATION OF STATE DAIRY ORGANIZATIONS
TO: Florida Dairymen and Those in Related Enterprises

SUBJECT: PROCEEDINGS
NINTH ANNUAL FLORIDA DAIRY PRODUCTION CONFERENCE
May 10-11, 1972

Dear Dairy Cooperator:

The Ninth Annual Florida Dairy Production Conference brought together authoritative speakers on topics of current major interest to the progressive minded dairymen and agri-business friends in attendance. Use of dairymen who have carried out specific practices successfully along with college men and other speakers assured a practical approach to the problems and information on their solution.

Appreciation is expressed to all who participated in making it a successful Conference. We think the Proceedings with resumes on the different topics will serve as a reminder and source of information for reference.

Special appreciation is expressed to the Independent Dairy Farmers Association, the Tampa IDFA, the Upper Florida Milk Producers Association, and Suncoast Milk Producers Cooperative for helping to finance and publicize the Dairy Conference.

Sincerely yours,

Barney Harris, Jr.
Extension Dairy Nutritionist
and Conference Chairman

BHjr:pl/mp
# TABLE OF CONTENTS

The New Veterinary College and Its Supporting Role to the Dairy Industry ........................................... 1

Merger and Consolidation of Florida Dairy Cooperatives Revisited .................................................. 2-10

Efficiency in Rotary Milking Parlors .................................................. 11-14

Milking Equipment and Mastitis .................................................. 15-16

Advantages of Co-ops Establishing and Enforcing Their Own Quality Standards .................................................. 17-21

Accuracy of Regulatory Tests in Maintaining Quality Milk .................................................. 22-23

Safe Use of Antibiotics and Drugs in Herd Health Programs .................................................. 24-26

Brucellosis and the Dairy Herd .................................................. 27-32

Estrus Synchronization of Dairy Heifers and Cows with MGA .................................................. 33-37

Inducing Lactation with Hormones .................................................. 38-40

A Program to Combat Virus Diseases in Dairy Herds .................................................. 41-42

Different Levels of Sugarcane Bagasse Pellets in Complete Rations with and without Bentonite or Supplemental Hay .................................................. 43

Input Data for Dairy Management Decisions .................................................. 44-47

A Review of Programs in Dairy Science .................................................. 48-51

ii
THE NEW VETERINARY COLLEGE AND ITS
SUPPORTING ROLE TO THE DAIRY INDUSTRY

Dr. Charles E. Cornelius
Dean
University of Florida
Gainesville, Florida

Present Status of Planning:
College of Veterinary Medicine

Planning funds for the College of Veterinary Medicine were included in the University Budget for this next year. The legislature gave the College a strong mandate to proceed. I want to personally thank all the officers and members of the Florida Dairy Industry who so diligently supported our program this year. By our presenting our state's many needs for a college at your local level, it was quite convincing to all that a college is a vital need in our growing state.

Preliminary construction plans should be complete by next spring and submitted to HEW in June 1973. By October of next year, a construction grant could be forthcoming. This would be followed by a matching state appropriation in the spring of 1974 with construction commencing soon thereafter.

The College of Veterinary Medicine can help the Dairy Industry in many ways. The numerous subtropical diseases affecting our industry in most cases are unique in Florida and research will be needed to find the answers. There is also a great need to learn more about and ultimately solve our "old enemies" of calf scour, calf pneumonia, pink eye, ketosis, milk fever and mastitis.

In addition, the study of many animal diseases such as leukemia, congenital porphyria, prolonged gestation, a multitude of tetanies, eye disorders and neonatal diseases in dairy cattle will in turn serve as animal models to inform us more about human diseases.

I feel we have made good progress this year. The support of agricultural and urban groups was overwhelming. I look forward to working closely with the Dairy Industry in future years.
MERGER AND CONSOLIDATION OF FLORIDA DAIRY COOPERATIVES REVISITED

Dr. Ralph Eastwood
Extension Economist
University of Florida
Gainesville, Florida

This is a report of impressions gathered in a number of personal interviews with knowledgeable people, and of my ideas concerning the involved factors. You should not consider it the product of careful research. Rather, it is a highly subjective, conscientious effort to put this topic into perspective for members of the dairy industry of Florida, researchers, and other interested persons.

Premises

The context for these remarks includes:

1. The number of Florida dairy farms is likely to continue at about the present level for five to ten years. They are likely to increase in size, at least in milk output, during that time period.

2. Producer-handlers are likely virtually to disappear from the business scene because of their price disadvantages when they function as producer-handlers and when they pool their surplus.

3. Florida's federal orders may be consolidated in the next few years, but they will continue performing approximately the same functions they do at this time.

4. There will be no critical changes in laws regulating farmer cooperatives in the next few years.

5. The market structure for farm labor will increasingly include group labor management, probably by labor unions and farmer cooperatives.

There still is time for farmer cooperatives to increase services to their members by expansion in group farm labor management.

Needs for Merged Cooperatives

Sound, substantial economic need is the only safe basis for the development of a commercial dairy marketing cooperative. Accordingly, it is well to review possible needs that Florida dairy farmers express or may

---

have which they could solve by merger, consolidation, or organization of cooperatives. One way to list these needs is to divide them into deferred and current needs. Major and minor needs seem useful subdivisions of the deferred group. None of the current needs ranks in importance with the major deferred needs, so perhaps it is well to subdivide the current group into larger and smaller current needs:

**Deferred Needs**

**Major**

1. The possible competition from out-of-state milk for Florida fluid milk markets.

2. National milk supply management as some visualize it would result in substantial business hardship to Florida dairy farmers.

3. Bargaining cooperatives may require handling facilities at some time to reinforce their bargaining and to provide handlers and consumers a larger number of services.

4. Consolidation of three or more federal orders into one in Florida seems likely. This should present no serious problem because the last two were planned to facilitate eventual consolidation without disruptive events.

5. Florida dairy farmers prefer that their federal order milk prices be sufficient that bargaining for premiums is not necessary. This policy might change. If so, it would be a major encouragement to consolidation of bargaining cooperatives.

6. Florida dairy farmers have paid little attention to the possibility of supplying some of their hired farm labor through cooperatives. A change in this policy could encourage stronger farmer cooperatives.

**Minor**

1. Florida dairy farmer cooperatives are concerned primarily with bargaining, federal milk marketing order service, and quality control of milk on the farms of their members. Some believe that additional farm supply or input services might be worth consideration, there does not appear to be enough need felt to make this a substantial project at this time.

2. Some of the present milk marketing alignments in Florida could encourage the movement northward within Florida of milk produced in the state. This could change conventional trade practices. It might suggest consolidation of one or more marketing services by two or more cooperatives.
3. There is some thought that centralized payroll accounting for the dairy farmers who are members of Florida milk marketing cooperatives may be of importance. There is not enough interest in this to warrant careful analysis at this time.

**Current Needs**

**Larger**

1. The legal structure under which certain joint activities are conducted should be reviewed.

2. A primary function of a bargaining cooperative in Florida is to service the federal order in its bargaining area. No attempt is made to bargain for premiums above the federal order prices. So long as this policy continues, there will be little reason to consolidate bargaining cooperatives to strengthen their milk bargaining power.

3. Labor management for members has been largely confined to experimental recruitment and training in the Tampa Bay Area.

4. Hauling of milk for members is one of the more costly bargaining activities.

5. Advertising and promotion are conducted by all dairy farmers in Florida.

6. Milk bases are valuable property rights in Florida. They constitute an intangible asset having an indeterminate useful life. Accordingly, the cost of the milk is not allowable as a business expense, and payments for bases are to be capitalized and are not subject to amortization or depreciation for purposes of federal income tax treatment. Furthermore, the cash liquidity of these base values is of substantial consequence to Florida dairy farmers.

7. A current procedure is for adjacent cooperatives to provide one or more cooperative services, rather than for all cooperatives to merge to perform all services.

8. There seems to be a substantial opportunity for collective insurance programs for farm workers and farm family members.

9. Upon occasion, the problem of collections from handlers and payments to producers has been remarkable. Fortunately, this does not occur often, or specifically inconvenience many dairy farmers. However, it is a continuing latent challenge to the cash flow structure of dairy farmer cooperatives and their members.
10. Cooperatives feel a continuing need for more political education.

11. Member service, including membership information concerning operation of cooperatives, is a continuing urgent need.

Smaller

1. The present cooperatives appear sufficiently efficient in most of their operations so that one would not expect great savings from merging their present services. On the other hand, there appear to be some possible savings from expanding some of the present services conducted by the individual cooperatives to all the dairy farmers presently served by cooperatives in Florida.

2. Opinions vary concerning the possible improvement in milk quality to be expected from a rigid centralized quality control program.

3. Pooling for price is a current need, being quite well served.

4. Information about supply management is a current need. This is being served.

Cooperative Experience

Florida dairy farmers have at least 50 years of experience in farm business cooperation. They have organized dozens of locals, have tried numerous mergers and consolidations, and have initiated implicit or explicit dissolutions of substantial numbers of farmer cooperatives.

A dairy farmer is in a dilemma between his natural inclination to analyze production and marketing situations with the intention of maximizing his own short-run benefits rather than from the point of view of group action to maximize his long-run benefits. This dilemma is as old as people deciding whether to perform services for themselves by individual or group action. It is especially depicted among dairy farmers in the classical question of individual handler versus marketwide pooling. The advent of Federal order marketing in Florida marked the end of most individual handler pooling in this state.

Organizational progress among Florida dairy farmers has taken the special problems of producer-distributors into account. These considerations continue, although on almost a vestigial basis at this time.

Florida dairy farmers have moved toward lasting merger and consolidation primarily by membership drives to combine services such as handling, financing, transfer and diversion, base plans, pooling, and advertising and promotion.
**Competition**

**Interstate.** There is a vast potential supply of northern milk qualified for fluid markets. Dairy farmers throughout the nation accord this its rightful amount of attention and planning. The potential threat seems enormous, but the large milk marketing cooperatives which seem most likely to move the milk into Florida also seem preoccupied with internal organizational and consolidation problems at this time.

Floridians ship some milk out-of-state. Data are not available in the public domain to determine whether this exceeds amounts shipped in. Certainly the quantities are not large in terms of the percent of total milk consumed in Florida or in absolute terms. The propensity of Floridians to produce milk far exceeds the interstate markets at this time, but the potential retaliation by out-of-state farm cooperatives is of sufficient presence to discourage Florida production for out-of-state markets.

Florida dairy farmers and others may desire to buy, or start, milk companies for possible protection. This does not appear to be necessary at this time, although one or more surplus handling plants always are under consideration.

**Intra-state.** Questions are ever present concerning the effects of dissolution of some cooperatives upon the levels of prices. Bargaining reinforcement probably is not a strong question so long as Florida dairy farm policy is to encourage minimum federal milk marketing order prices rather than bargain for premiums over federal order minima. The merger or consolidation of producer-handlers and others may be desirable from time to time if these outlets seem to reduce bargaining effectiveness. Likewise the buying or building of fluid facilities and the provision of a full line of plant services to handlers within the state are live questions. So far, farmers have limited themselves to ownership of a small number of handler cooperatives and the buying of at least one generic producer-handler.

**Membership Relations**

The fundamental question of the percentage of emphasis a dairy farmer should put upon individual and group action to solve his production and marketing problems is of continuing importance. It is especially important among highly specialized and technically sophisticated dairy farmers with large farm operations. Florida dairy farm members want, and can afford, close attention. They want access to the top decision maker. The business consequences of their decisions are of such magnitude that they desire all the information they can get as quickly as possible when they think it is time for a decision. This context increases their desires to deal directly with the top decision maker in any organization. This would have substantial implications in consolidating dairy farmer cooperatives in Florida because each level of organization would remove the dairy farmer (or, equally likely, the manager of the local department
supposedly serving the farmer) from the decision-making process between
the individual member and the top decision maker in the cooperative. They
appear to desire a great number of cooperative directorships for group
decision making, distribution of business information to the directors
concerned, and the social values of frequent peer-group conferences.

One would be hard-pressed to determine the cash value of the membership
relations services contributed by these many directors compared with the cash
cost a federated cooperative would incur in informing members, and the
changes in farm income which might result from less attendance by dairy farmers
of meetings off their farms. The costs of membership relations programs are
observed to rise (geometrically) as geographical and numerical sizes of a
cooperative increases. This cost estimate probably would be increased more
because of the reduction in membership relations expenses borne in kind by
the forty or fifty directors who now frequently attend meetings.

_Industrial Relations_

Location of the headquarters of a consolidated cooperative would be
important. Questions of centrality, transportation convenience, and
locations of important allied trades would control. The federal milk
marketing order probably would draw the general headquarters to its neighbor-
hood. Branch headquarters and local department headquarters probably
would be located in major milk marketing centers in Florida, much as now.

Relationships with full supply contractees probably would change little
as a result of merger or consolidation. Servicing the contracts likewise
would change little, if at all.

Milk handling might change to some extent if a consolidated milk
hauling program would save an appreciable amount of money.

_Employee Relations_

Any reorganization interjects uncertainties into the planning employees
do for their own welfare. Preliminary observations indicate that there
would be very few terminations initiated by employers or employees in a
merged milk marketing cooperative situation. All of the tasks now performed
by the cooperatives would continue to be performed. Probably some new
ones would be added. Headquarters would remain in approximately the positions
they are, with the possible exception that the general headquarters might be
in Ft. Lauderdale rather than in Orlando. There undoubtedly would be some
new job classifications. Wages and salaries would be greater in some and
smaller in others. Some employees might choose not to relocate if asked.
There would be some other attrition. On balance, there would appear to be
a requirement for new job classifications, newhirings and new structures of
salaries, wages and fringe benefits to employees.
Finance

No good estimates are available concerning the financing of a merged or consolidated cooperative. Of course, this should be one of the earliest detailed studies before a decision is made.

Perhaps no other group of Florida farmers is in as good a position to provide equity capital for a cooperative as are dairy farmers. They can finance whatever they believe to be in their best interests.

Pooling provisions always will be among the most critical questions in the organization of a cooperative. Present coordinated and consolidated pooling activities would be a model for a mature cooperative. Few changes would be expected from the present situation, although adjustment might be necessary between South Florida and the remainder of the state.

Base values accrue in markets in which farmers believe there is effective exercise of market power. The absence of uncertainty should increase the value of base in such a market. The presence of surplus milk would increase it even more if farmers produce milk in excess of Class I needs. My opinion is that base values would tend to increase in Florida so long as Florida dairy farmers continue to be virtually the only source of Class I milk supplies. These increases may be hard to estimate, and even harder to measure. Nevertheless, base values are likely for a long time. Milk base values in Florida now seem to approximate $12 per pound of daily production or, approximately $60 million of intangible property having an indeterminate useful life. Each increase of $1 per pound in the value of daily base equals about $5 million of intangible property values to dairy farmers. This is exceedingly difficult to measure, but everyone understands the direction of thrust of these numbers.

Assessment of desirability of merging or consolidating involves pricing the tradeoffs in costs and benefits which may result. The assessments indicated for membership relations would be the most difficult. Less difficult, but probably of much greater significance, are estimates of costs and savings from consolidating quality control, hauling, and bargaining.

Precise analysis is warranted of changes which might be expected in blend prices if consolidations or mergers came about. Assessment of these impacts will be relatively easy any time a change is evaluated, but are extremely difficult to project for more than one or two years. Conventional wisdom suggests that such changes might aggregate 20 cents per hundred weight. This testifies to the importance of analyzing this factor with great care before a decision is reached. The magnitude of this factor is apparent when one recalls that a change of 1 cent in the blend price for Florida will approximate $180,000 per year at production levels soon to be reached in the state.
Conclusions

In assessing possible trade-offs, we may list possible losses and gains from consolidation:

Possible losses

1. Employee morale would be disturbed to some extent because of the uncertainties of employment.

2. Membership relations would be disturbed because the localness of attention might be modified. Directorships probably would be reduced in number with loss of aggregate prestige and direct information sources. Cash costs of membership relations and leadership training probably would increase to make up for the costs now borne in kind by the directors.

3. Other costs undoubtedly would accrue because of a larger organization. However, these very well may be offset by additional efficiencies and additional services.

Possible gains

1. Effectiveness perhaps could be increased for a number of reasons. Authority would flow from one central board. Coordination of activities of the milk marketing organizations would be much more centralized, and presumably more effective.

2. Economy and efficiency appear possible in a number of service areas. Highly tentative estimates of the savings in advertising costs, at present levels of advertising intensity, range in the area of $50-60,000 per year. Informed preliminary estimates of the savings Florida dairy farmers might enjoy from consolidated insurance programs range to $250,000 per year. Present intangible property values of milk base are on the order of $12 per pound per day, or $60 million. These would change approximately $5 million for each $1 change in base values per pound per day. Consolidation hauling activities are thought to possibly save 2 cents per hundred weight per year, or $360,000 per year for present levels of production. Slight utilization improvements seem possible. Each cent improvements in the blend price will approximate $180,000 per year.

3. Bargaining strength would be increased, because of the additional authority and coordination from a central source. Quality control probably would be more effective throughout the state, although this is questionable in at least some areas.

4. The political presence of dairy farmers as a coordinated force probably would be somewhat greater than at present, although the present arrangements are highly visible and audible.
Suggestions

Suggestions which may be inferred include:

1. Substantial research appears indicated to determine the feasibility of important mergers and consolidations.

2. Director leadership training programs would seem appropriate considering the number of directors involved in Florida dairy farmer cooperatives.

3. Managerial audits of present dairy farmer cooperatives might be beneficial regardless of whether the cooperatives are consolidated or merged.

4. The phasing of consolidation now underway seems appropriate. It involves internal phasing among individual cooperatives. This takes the form of dissolutions, and the management of long term commitments which exist as a result of spinoffs from previous arrangements and services. Discussion by adjacent cooperatives is underway concerning handlers who operate in two markets and concerning producer-handlers. Other services such as federal order service and advertising and pooling are consolidated or coordinated in meaningful ways.

5. BE READY TO CONSOLIDATE FULLY AT ANY TIME.
EFFICIENCY IN ROTARY MILKING PARLORS

Dennis Armstrong
Farm Manager
Michigan State University
East Lansing, Michigan

Milking parlor efficiency is measured by construction cost, equipment cost, annual maintenance cost, performance or efficiency and owners' preference. Rotary parlor success will be subjected to the same measurements and standards as other milking systems. When a new idea or product is first used there is a tendency to forget to measure the new product or idea by the same measurement we have subjected the present product or idea to. Everyone likes to have something new and different, but we must not forget economic and performance. It will be very costly for the dairyman to forget to use the same measurements of performance and efficiency on the rotary as he has subjected other parlor configurations to in the past.

The dairyman of Australia, New Zealand and Europe are using more rotary milking parlors today than five years ago. The idea for the rotary parlor which will be built in the United States will come from those countries. Construction cost and annual maintenance will be higher in the United States than most other countries because of higher labor and material cost. There are only seven rotary parlors in operation (May 1972) in the United States. More rotary parlors will need to be built before an accurate construction and maintenance cost can be assessed.

Most of the rotary parlors which have been built in the United States have not been in operation over one year. All types of new milking parlors take approximately one year for the people and cows to adjust before maximum efficiency is obtained. The use of a cow pusher in the holding pen to assist the loading of the rotary has been necessary for the present rotary parlors in the United States. The use of the cow pusher was also found necessary in rotary parlors in Australia and New Zealand which had been in operation two and three years. New ideas and equipment will need to be developed before the cow pusher can be removed from the rotary parlor where the operator works on the inside of the platform. The rotary parlor from New Zealand (turn-style) where the operator works on the outside of the platform does not require a cow pusher.

Rotary milking parlors presently being used in New Zealand and Australia have not improved efficiency when compared to herringbone parlors. Data in Figure 1 collected by Mr. Ross, a dairy advisor officer from Scotland, compares the efficiency of the herringbone and the rotary parlor. Mr. S. A. Ross's
data would agree with data collected by Michigan State University in 1972 presented in Figures 2 and 3. The data from Figure 2 on the 28 stall rotary herringbone (Peterson parlor) was the most efficient rotary in New Zealand with 92 cows per man hour. The Peterson parlor is a 28 stall rotary herringbone usually operating at 17-21 seconds per cow entry time and seven to eight minutes rotation time with two operations. One operator is on the outside at the entrance gate washing and assisting the cow onto the platform. The second operator does all the attachment and detachment. The work load is very unevenly divided between the two operators. The efficiency in the Peterson parlor would greatly be reduced by longer milking cows with high milk production and larger cows. Difficulty in loading the parlor at the increased rotary speed without cow injury will be a problem.

The major problem with the rotary parlor presently being built in the United States will be stall number and rotation time. What is the proper stall number and rotation time for our cows? You don't have to spend very long in Europe, New Zealand or Australia to realize that our milking conditions are different than other countries. We need to be concerned that the operator work sequence and cow traffic is correct for maximum efficiency. In present rotary installations I see little evidence of this concern. Figure 4 is a comparison of a rotary herringbone where machine time is shorter and with 26 pounds of milk per cow compared to a herd milked in a herringbone with milking time recorded and a production of 46 pounds of milk. A rotation time of six minutes would allow all the rotary cows to milk, but a rotation time of eight or more is necessary for the 46 pound average herd to milk. Decreasing the speed of the rotary to correct the condition will make an inefficient use of the labor, because of excessive idle time.

Questions you as a dairyman must ask when considering a rotary might include the following:

1. Construction cost
2. Equipment cost
3. Maintenance cost
4. Labor requirements
5. Parlor size (number of stalls)
6. Milk production level of herd
7. Labor efficiency
8. Cow traffic
9. Is cow traffic on the rotary satisfactory, or is a pusher necessary
10. Will future mechanization add efficiency to the system
11. Compare all the above to existing milking installation
Figure 1

<table>
<thead>
<tr>
<th>New Zealand Herringbone</th>
<th>No. of Parlors</th>
<th>Cows Per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn-style</td>
<td>8</td>
<td>56</td>
</tr>
<tr>
<td>Alfa-Laval</td>
<td>2</td>
<td>47</td>
</tr>
</tbody>
</table>

*S. A. Ross, 1971, New Zealand

Figure 2

(Rotary Herringbone)

<table>
<thead>
<tr>
<th>Size</th>
<th>Average Production</th>
<th>No. of Operators</th>
<th>Cows Per Man-Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Stalls</td>
<td>26</td>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td>28 Stalls</td>
<td>19</td>
<td>2</td>
<td>92</td>
</tr>
<tr>
<td>64 Stalls</td>
<td>13-32 (5 herds)</td>
<td>6</td>
<td>55</td>
</tr>
</tbody>
</table>

*W. G. Bickert & D. V. Armstrong  
Michigan State University, 1972

Figure 3

(Turn-style Rotary Parlor)

<table>
<thead>
<tr>
<th>Size</th>
<th>Average Production</th>
<th>No. of Operators</th>
<th>Cows Per Man-Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Stalls</td>
<td>28</td>
<td>2</td>
<td>54</td>
</tr>
<tr>
<td>14 Stalls</td>
<td>35 (Holsteins)</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>16 Stalls</td>
<td>23</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>28 Stalls</td>
<td>23</td>
<td>3</td>
<td>67</td>
</tr>
</tbody>
</table>

(Double entry)

*W. G. Bickert & D. V. Armstrong  
Michigan State University, 1972
Figure 4

- 0.100 -
- 0.075 -
- 0.050 -
- 0.025 -

MACHINE TIMES
ROTARY HERRINGBONE
26 LB. COWS

MILKING TIMES
U.S. COWS
46 LB. AVE.

TIME - MIN.

W.G. Bickert & D. V. Armstrong
Michigan State University 1972
MILK EQUIPMENT AND MASTITIS

Fred Gore
Dairyman
Zephyrhills, Florida

The relationship of milking equipment to the incidence of mastitis or the leucocyte count has received increased attention in recent months. However, a suspected relationship has existed since milking machines were first used. To properly utilize milking equipment, the dairyman or manager needs to understand the cow, the milking process, and the man operating the milking machine. Regardless of how efficient the machine is mechanically, an inadequate stimulation of the cow prior to milking and too long a delay between stimulation and putting on the teat cups will result in faulty milking practices.

Misuse of the milking machine causes tissue damage. This includes placing the machine on too quickly or leaving the machine on too long after the flow of milk has ceased. Excessive machine stripping should be avoided and is not necessary if the machine is operating efficiently with the right type, condition, and design of inflation.

A properly functioning milking machine allows the cow to be milked and at the same time gives relief to the blood congested in the teat. This is accomplished by the alternate onset and release of vacuum. At the onset of vacuum between the teat cup shell and the inflation liner, the liner springs back to a normal position and vacuum from the milking machine causes the milk to flow from the teat. The same vacuum that sucks the milk out of the mammary gland cisterns also allows the rubber inflation to close long enough to massage the teat. The resulting massaging action on the teat allows the sphincter muscle to rest, thereby preventing congestion of blood and permanent damage to the teat.

An improper vacuum level or faulty inflations may prevent the teat cup liners from closing properly. This often occurs when there are milk blocks or restrictions in the milk hoses or inflations. Old or badly worn inflations lose their shape and resilience strength, resulting in teat cups creeping up the teat. Conditions of this nature will quickly lead to stresses and possible tissue damage. Narrow bore inflations are helpful in correcting this problem.

The milking machine is an important tool and is used more hours during the year than any other piece of equipment. For this reason, a good understanding of its function is necessary in order to maintain top efficiency.
The incidence of new intramammary infections has consistently been reduced by 30 to 50% or more over extended periods. Teat dipping with an antiseptic solution removes or dilutes any residual milk left on the end of the teat which is a favorable site and media for bacterial growth. In addition, the antiseptic solution kills bacteria on the end of the teat that could grow their way through the teat canal. Progress in reducing herd mastitis infection levels by teat dipping is a gradual process over a period of months, and visible improvements should not be expected "overnight".

Teat dipping and dry cow medication offers the dairyman an effective means to reduce the incidence of mastitis. However, these processes should only be a part of a mastitis control program which also includes good milking practices, proper maintenance of milking machines, effective sanitation practices, segregation of infected and non-infected cows and utilization of non-infected herd replacements.
ADVANTAGES OF CO-OPS ESTABLISHING AND ENFORCING
THEIR OWN QUALITY STANDARDS

Dave Greenawalt
Farnbest
Jacksonville, Florida

In order to properly discuss this topic, it is necessary to review the change in marketing patterns of milk and milk products in recent years.

The Dairy Industry has changed from one of local nature to one of inter-state complexity. Refrigeration improvements on the farm, in bulk milk transportation, in processing, delivery, merchandising and the home, have resulted in broadening the geographic boundaries for milk and milk products. Research and development in the sanitation procedures, automation, and process equipment, have resulted in quality improvements at all levels in the Dairy Industry, which have significantly improved shelf-life characteristics of milk and milk products. This also has allowed the geographical movement of dairy products for greater distances than were previously possible. A third important change has been the continual, although gradual, adoption of uniform regulations from municipality to municipality, and from state to state, which has aided in allowing the free movement of milk and milk products in inter-state commerce.

Recent years have seen a consolidation of dairy farms. Production has changed over recent years from general purpose farms to farms specializing in dairy production. Also, these specialized farms are growing larger and are tending to be business rather than family enterprises. The economic requirements for automation result in high fixed capital cost which require larger farm units in order to be economically feasible.

During this period of time also a consolidation of processors has been going on. The industry has changed from one of many small local processors to a greatly reduced number of much larger regional plants. These larger regional plants have evolved for several reasons. The elimination of artificial trade barriers has made it possible to consolidate large volumes in a single location. The capital cost of automation and new processes requires larger production volumes in order to be economically feasible. A change in the type of dairy buyer from the small store concept to the chain store concept has increased competition and resulted in lower margins which have required greater production units in order to reduce processing costs. This competitive process has also reduced the number of processors through economic attrition as well as consolidation of facilities.

The fourth factor changing marketing patterns has been the rise of dairy co-operatives as marketing agents. The co-operatives are providing the milk supply and management of many individual producers and their control extends
over many processors. This has resulted in a destruction of the original relationship between individual producers and specific processors. This has also reduced the effectiveness of dairy field men provided by the processors and in most cases, the dairy field man on the processors' payroll has been eliminated.

I believe the need for co-operatives establishing and enforcing their own quality standards can be demonstrated better if we understand what the main purpose is of a dairy co-operative. The purpose is two fold. First, is marketing - the co-operative's primary purpose is to find sufficient outlet for all production generated by it's members. Secondly, after the first purpose has been satisfied, the co-operative must work on improving the utilization and the blend price of the product. The co-operative must attempt to maximize the percent of production into Class I products.

Since the co-operative's primary role is that of marketing, it is clear then, that they should establish and enforce their own quality standards. As mentioned previously, the field men of the processors no longer have control over individual producers and have therefore lost most of their effectiveness. In some areas, individual producers are still assigned to a certain plant or processor, but the long range trend is to have the producers in a pool with the co-operatives scheduling where co-mingled tank truck loads are to move. It is also important to remember that regulatory agencies, generally speaking, only audit performance. Their programs are not set up to provide quality control on a continuing basis. They are set up to audit performance and protect the public health. Therefore, the co-operative really is the only entity in position to control and effectively administrate a quality control program on the raw milk supply.

The co-op has several advantages in establishing these standards - raw milk quality determines it's marketability. This is important in all areas and is growing more important in Florida. At the current rate of growth, Florida in 5 to 10 years, may change from a deficit state to a surplus state. At this point, it will be imperative, that the quality of raw milk is sufficient to move freely in inter-state commerce and find markets. The quality of raw milk also determines it's usage. The high quality goes into Class I utilization - lower quality may end up in Class II and unfortunately, some milk may have to be discarded. Improved quality, which is the result of improved sanitation on the farm, has benefits in terms of improving herd health, developing longer and better production periods for the herd, both of which result in increased producer returns. Quality effects the cost of the co-operative's operation, which is borne by it's individual members. Poor quality milk, which is rejected or diverted, increases the co-operative's cost and reduces the net to individual co-operative members. Also, in this period of consumerism we must assess the impact on future sales which can be created by adverse publicity on low quality products. Poor quality also can result in restrictive legislation, such as dating ordinances which
reduce the allowable shelf-life. Several of these ordinances already enacted reduce allowable shelf-life significantly below the level of current technology. These shelf-life regulations effect the net return to the producer, since they cause products to be discarded rather than consumed, which has the effect of lowering the blend price in any given market. I believe that it is also important to point out that research has clearly indicated that the initial quality of raw milk determines the shelf-life potential of the finished product. The higher the initial raw milk quality, the longer the potential shelf-life of the products resulting from it's processing.

There are very distinct advantages in co-operatives having the power to enforce their own quality standards. Almost all milk is co-mingled in transport. This requires that every lot of milk contained on that co-mingled load is of the required quality. If not, the other lots are contaminated with this lower quality, which results in the whole tank truck load being downgraded. It only takes a few instances of this to significantly effect the blend utilization of an individual co-operative. Also, as with any program, compliance will never be totally effective as long as it is on a voluntary basis with no method of enforcement. We have many examples of this with relation to public law. Lack of enforcement results in lack of compliance. If dairy co-operatives have the power to enforce standards, more rapid correction of defects will result. The attainment and maintenance of quality standards aids marketing, product utilization, herd health, and reduces operating costs, all of which will improve the individual co-operative members' net return.

For those dairy co-operatives which do recognize and accept the need for developing and enforcing their own quality standards, I would recommend a three step program. The program should involve research and training, development of standards, and enforcement procedures.

In research and training, State Agricultural Schools should be utilized to research operating problems, to improve operating techniques and to develop procedures helpful in the operation of the individual farm. The State Agricultural Schools can also be called upon to aid in training members through such things as seminars, field presentations, etc. Use should also be made of the State Department of Agriculture to aid in research and help train individual members and employees of members in good operating techniques through their field services departments and through their testing capabilities. The dairy co-operatives themselves should develop standard operating procedures and instructional material which would be made available to individual members, to aid in producing high quality milk. The co-op should also provide an energetic field program, have representatives work directly with individual members, and their employees, on quality improvement, following up on quality problems, reviewing sanitation methods, and working on herd productivity. This on-site training is most effective when field visits coincide with milking times.

The standards established by the co-operative should, in most cases, be more stringent than State or Federal standards in order to guarantee compliance of co-mingled loads on every shipment of milk. As will be mentioned later, more enforcement programs are based on a three out of five compliance
program and the statistical law of probability is that a goodly number of co-mingled loads will have at least one producer with higher than standard results.

I would recommend that at least as a minimum the following standards be established in such a program:

**Bacteria:** Samples should be taken weekly and should have limits of 50,000 per ml on a standard plate count basis and 500 per ml on a laboratory pasteurized basis. Once a month a direct microscopic somatic cell count should be taken with a limitation of 1,000,000 per ml.

**Butterfat:** A sufficient number of samples should be taken for payment purposes.

**Temperature:** Each pickup should be checked and should have a standard not to exceed 40°F.

**Sediment:** A sample should be checked monthly and should have a result no greater than a number two pad on the USDA Sediment Chart - Series 1964.

**Antibiotics:** A Zero tolerance. The co-operatives should check co-mingled loads on a daily basis and check individual producers on a monthly basis.

**Pesticides:** Zero tolerance. The co-operative should check co-mingled loads on a semi-annual basis and if any positive results are obtained, conduct individual producer sampling.

**Added Water:** Each producer should be checked for added water at least monthly and a standard should be set not above minus 0.530 degrees centigrade.

**Acidity:** This should be checked weekly and have a standard not greater than .02 above normal for the area.

As mentioned earlier, the enforcement provisions are the key to effective program. The enforcement can take a variety of forms such as imposition of fines, downgrading of classification, reduction of base, or suspension of milk shipments. Whatever method is chosen, it will involve economic impact on a producer not meeting standards and create the "teeth" necessary to implement and make effective a quality control program.

Compliance to the standards should be similar to that of the United States Public Health Service. That is, based on an analysis of the most
recent five samples and enforcement action being taken when three out of the
most recent five samples fail to comply with standards. Each time an indi-
vidual producers' milk is checked he should be notified of the results of
this checking or testing. A special form should be used for results not
meeting standards, a warning letter should be issued when two out of the
last five samples in a given category do not meet standards, and a re-testing
procedure should be set up for those producers failing in compliance on a
three out of five basis.

It is important to point out that the enforcement of standards must be
accompanied by increased field help and testing in order to help the indi-
vidual producer solve his problem as rapidly as possible.

In summary, the current marketing patterns have determined that the dairy
co-operatives are the only entities in position to establish and enforce
quality control standards on a raw milk supply. Economics require that they
do so. Without enforcement the quality control program established will be
ineffective. If the program is ineffective, the net return on invested
capital and labor expended by the individual producer will not be maximized.
Also, without quality control, improvements in per capita consumption of
dairy products cannot be achieved.
THE ACCURACY OF REGULATORY TESTS IN MAINTAINING QUALITY MILK

K. L. Smith
Dairy Science Department
University of Florida
Gainesville, Florida

There are many tests used to maintain quality in raw milk. These tests might be broken down into two categories; those for determining gross composition of milk and those for measuring indicators in milk which are of either public health or sanitary significance.

Gross composition of milk tests include those for fat, total solids, solids-not-fat, specific gravity and freezing point. Two of the most common tests for fat are the Babcock test and the Gerber test. The accuracy of these two tests is about the same. The test bottles of both tests have 0.1% as their smallest graduation. Electronic fat testing is just being introduced and approved. The advantages of these tests are speed and increased accuracy if they are properly calibrated but they have the disadvantage of being expensive. There are several electronic fat testers on the market at the present time.

The lactometer is used as a test for measuring specific gravity and as a screening test for total solids and solids-not-fat. The lactometer reading of whole milk should be about 32. Using the lactometer reading and the fat test in special formulas it is possible to calculate the solids-not-fat and total solids in mixed large herd milk with an accuracy of about 0.2%. Majonnier test is used to confirm low solids tests and the determination is calculated to the nearest hundredth of a percent. The official solids test is very accurate but requires several hours to run and is not practical for routine testing.

The freezing point determination is used to test milk for added water. When the freezing point is higher than -0.525°C milk is suspected of containing added water. To confirm this an authentic sample must be taken from the herd and if the freezing point of this sample is more than 0.01°C lower than the previous test sample, the presence of water is confirmed. An authentic sample is obtained when the sampler is present during the entire milking operation and knows that the milk contains no added water. This test can detect 2% or less added water in milk. The equipment used to perform this test is called a cryoscope and the most common type in use today is an electronic machine using a thermistor for the actual temperature measurement.

The public health or sanitary indicators that are measured in milk include bacterial counts, somatic cell counts and the detection of microbial inhibitors. Two types of bacterial counts are run on raw milk samples; the coliform count and the standard plate count (SPC). The coliform count is used as an indicator of the sanitary precautions used in handling the milk and is not used in a regulatory way. There is a standard of 100,000 per ml on the SPC of individual producers of milk and a producer is degraded when three out of his last five samples exceed this standard. The distribution of bacteria in milk follows a distribution known as the
poisson and by the mathematical nature of this distribution bacterial counts have rather large errors associated with them. For this reason the counts are not averaged and the standard used is a three out of five standard.

The Wisconsin mastitis test (WMT) is used as a screening test for somatic cells in milk. The standard for these cells is not to exceed 1.5 million per ml. When this test indicates a high somatic cell count, the count is confirmed using the direct microscopic somatic cell count. Somatic cells like bacteria follow a poisson distribution in milk and again the three out of five standard is used in enforcement. Electronic counters are being developed for somatic cell counts and when perfected should increase the accuracy of this test because they can count a larger sample of milk than is used in the direct microscopic somatic cell count.

A paper disc method is used to detect the presence of bacterial inhibitors in milk. This test is designed to insure that the milk supply contains no antibiotics or similar material. A paper disc is dipped in a sample of milk and then placed on a petri dish containing bacteria which have not been allowed to grow. After the dish is incubated there will be no bacterial growth around the paper disc if the milk contained antibiotics. This is a very sensitive test and can detect less than 30 parts per billion of penicillin in milk. When a bacterial inhibitor is detected in milk, the producer's milk is withheld from the market until a negative test is obtained.
SAFE USE OF ANTIBIOTICS AND DRUGS IN
HERD HEALTH PROGRAMS

Dr. C. W. Meyerholz
Extension Veterinarian
Department of Veterinary Science
Gainesville, Florida

Public concern over adulterants in human food is increasing. This concern
is likely to involve milk if purity of the products is not maintained. Milk
found to contain adulterants such as antibiotics must be condemned as unfit
for human consumption. Although this results in economical loss to the producer
and processor, an even greater loss would be caused by undue public fear of
contaminated milk.

Rapid and more sensitive tests are now being used to detect antibiotics
and other residues in milk. One part of antibiotic in 100 million parts of
milk can now be detected. This is like finding one bad apple in one million
bushels. The well-intended dairymen can get into trouble if he does not pay
close attention to the proper use of drugs in the treatment of mastitis and
other diseases.

Concern over antibiotics in milk is based on allergy to drugs and develop-
ment of resistant bacterial organisms. Continued exposure to certain drugs,
particularly penicillin, produces allergy in a significant number of people.
For example, an estimated 5 to 6 percent of our population is sensitive to
penicillin. Another possible hazard is the resistance developed by disease-
producing germs when frequently exposed to small amounts of drugs.

Sources of Antibiotics

The cause of antibiotic residues in milk in probable order of importance
include: 1) persistance of antibiotics in milk for more than 72 hours after
intramammary infusion; 2) failure to identify treated cows properly and with-
hold milk for the required period; 3) persistance of antibiotics in milk
following intramuscular injections; and other routes of administration; and
4) possible absorption and transfer of antibiotics from treated to untreated
quarters and failure to withhold milk from all 4 quarters.

Before antibiotics are administered to lactating cattle, the period of
time antibiotics will persist in milk must be known. However, this varies
with different products depending on the particular antibiotics, the carrier
or vehicle, and the dosage. Generally, the withholding time is about 72
hours. Recently, the Food and Drug Administration (FDA) has initiated action
to extend the withholding period on some penicillin preparations to 96 hours
or 8 milkings to correspond with experimental evidence. Also, FDA is recommending
that certain preparations that resulted in milk residues more than 96 hours after treatment be discontinued. In any event, the label directions or advice of a veterinarian should be followed closely. Do not use any antibiotic that does not have clear, specific directions on the length of time milk from treated animals must be withheld from the market supply.

Antibiotics will persist in milk for 36 hours to 6 days following intramuscular, intravenous, or subcutaneous injections. Be sure to follow specific instructions for the product used.

In some mastitis cases antibiotic is apparently absorbed into the blood stream from treated quarters and finds its way to untreated quarters of the udder. Therefore, milk from all four quarters of a treated cow should be discarded.

Antibiotics or sulfonamides given by mouth for the treatment of disease may be excreted in milk. When antibiotics are fed to lactating cattle in sufficient amounts to produce a detectable blood concentration for treatment value, traces of the drug can be found in milk. However, chlortetracycline is approved for feeding at a dosage of 0.1 mg per pound of body weight and the antibiotic is not found in milk. The drug is sometimes used in treatment of respiratory infections, foot rot, anaplasmosis, and bacterial diarrhea. If chlortetracycline is fed at a level of 0.5 mg per pound of body weight, the antibiotic is found in milk. Care must be taken not to exceed recommended dosage levels.

Another possible source of drugs in milk is from intrauterine absorption. Research information is limited on this subject. There is evidence to indicate that when sulfamethazine, sulfamerazine sulfapyridine, sulfathiazole, sulfanilamide, sulfacetamide and possibly other sulfas are placed in the uterus, sufficient movement across the uterine membrane occurs to cause these drugs to be found in milk for up to 72 hours, depending on the length of action of the sulfas. Uterine absorption of the sulfonamides was greater during proestrus and estrus phases than in the diestrus phase. Nitrofurazone and nitrofurantoin have been found in milk in low concentrations for up to 24 hours after intrauterine administration. Information to date indicates that antibiotics such as penicillin, dyhydrostreptomycin, and oxytetracycline do not move from the uterus into the milk. This information suggests the use of antibiotics in the uterus and to avoid the use of sulfa drugs and the nitrofurans in lactating cows because of the possibility of drug residues in milk.

The best way to identify treated cows is to segregate them and milk them separately until the period of discarding milk is past. A good cattle dye or cattle marker may be used on the hip or thigh for identification. Also, close supervision of milkers is sometimes necessary to avoid carelessness and "convenient forgetting."
Summary

Millions of dollars have been saved by our livestock industry through the use of antibiotics. When properly used, these drugs are safe. However, to prevent residues of antibiotics in milk, the dairyman should carefully follow the directions on the label of the product, the directions of a veterinarian, and recommendations made by local regulatory agencies which pertain to the withholding of milk from treated cows. Let's maintain Florida's reputation for good quality milk.

Warning: Strict enforcement of Florida's milk quality laws will result in condemnation of any milk containing antibiotic or drug residues.
BRUCELLOSIS AND THE DAIRY HERD

Dr. N. E. Schultz
Animal and Plant Health Service
Veterinary Services
Jacksonville, Florida

Brucellosis of livestock in the United States has been a serious problem for half a century. Losses due to this disease in our farm animals have exceeded hundreds of millions of dollars. Let's review for just a moment, some of the history of our fight to eradicate this disease: Just what is brucellosis - how it spreads - and what you as a dairy owner can do to prevent this costly disease from entering your herd or eliminate it should it gain entry.

Although efforts to control brucellosis first began under independent state programs way back in 1922, little progress was made until 1934 when the problem was attacked on a national scale. In that year, the Cooperative State-Federal Bovine Brucellosis Eradication Program was launched, and initial testing indicated that approximately 10 percent of the adult cattle in the United States were infected. The initial work proved the disease could be eliminated from areas of the cattle population; and as it was found to be more economical to eradicate brucellosis than to live with it, in 1954 funds were made available by the Congress and the various states for an adequate program. The incidence of brucellosis in this country has been dramatically reduced in the past twenty years through the cooperative efforts of the cattle industry, practicing veterinarians, and disease eradication officials. Thus we have seen the percentage of infected animals drop from a high of 10 percent in the 30's to less than 1 percent in the late 60's and early 70's. You may be interested to know that Secretary Butz has committed the U.S. Department of Agriculture to stamp out the disease by the end of 1975 which is a little over three short years away and some five years ahead of the original timetable.

To meet this new goal, added pressure will need to be exerted on the Market Cattle Identification Program to see that all test eligible cattle are properly tagged with "shoulder identification tags" so that reactor animals blood tested at time of slaughter may be traced back to the originating infected herd. Another change will require that cattle from other than brucellosis-free herds or areas, must be tested and found free of brucellosis within 30 days of movement or at the first concentration point. In other words, tested on the farm before sale, or tested at the livestock market. Cattle sent direct to slaughter will not require a test since these animals are routinely tested at the time of slaughter.
Brucellosis, often known as contagious abortion or Bang's disease, is caused by a bacteria and affects cattle, swine, and goats. In the female animal, abortion may occur while the male may suffer inflammation of the testicles. Infertility can occur in either sex as a result of the disease. Brucellosis occasionally affects horses causing the condition known as fistula of the withers or poll evil. In the human, the disease is known as undulant fever, so called because of the rise and fall of the fever from day to day. When the disease spreads rapidly through a cattle herd, many abortions may occur. Once the disease is established, the rate of abortions is low and may occur only in the first calf heifer, or not at all. Oftentimes, only an occasional abortion is noted along with sterility problems evidenced by a good number of animals that are "hard to settle" and cows that retain their placenta after calving. Some infected animals, and even herds, show no signs of the disease; nevertheless, these cattle carry the germ, shedding organisms throughout their life that are highly infectious to other cattle, and, of course, to man.

The disease is generally spread by ingestion of the germ. Cattle may eat feed and grass or drink water that has been contaminated with the germ. They may also be exposed by licking the genitals of infected animals or licking a recently aborted calf or placenta which is literally teeming with the germ. Even a live calf from a reacting cow is covered with the germs when first born, just as is the placenta and uterine discharge from a reactor animal. Bulls shedding the germ in their semen will infect cows. The disease may be spread by mechanical means; by this, I mean dogs or wild animals may drag aborted calves or placentas to another farm. Likewise, these highly infectious tissues may float for miles down a creek or river, eventually coming to rest on a farm downstream.

"Doc, how long does the germ live on my farm?", is a question we are often asked. Like most organisms, the viability of Brucella is influenced by temperature and the protection of the surrounding medium. They are killed in a few hours by direct sunlight and even sooner if it is hot and dry. Lysol (1 percent), Formalin (2 percent), or Sodium Orthophenylphenate at the rate of 1 pound to 12 gallons of water at 60°F kill the organism in less than 15 minutes. They have been known to live for as long as seven months in infected exudate kept in an ice chest, up to six months in an aborted calf placed in cool shade, and for up to twelve months in feces kept in a cool, moist, shaded area. This then, certainly points out the need for proper cleaning and disinfecting after removal of reactor animals from the herd.

Several methods are used to locate the disease and probably the most familiar one to this audience is the milk ring test or BRT, which is run every three months on milk samples from each dairy herd in the state, or the nation for that matter. The milk ring test is an excellent surveillance test to detect infection in a herd. As I am sure you all know, the milk ring test is not suited to locating individual infected animals, so a blood test is used should the milk test be suspicious.

The Market Cattle Identification Program provides a means to identify reactor animals disclosed at the time of slaughter. Cattle destined for slaughter are tagged at the farm or livestock market with a special coded
tag. A blood sample is taken at the packing house from all breeding cattle over two years of age which is keyed to the coded tag. When reactor animals are disclosed, tracing to the originating farm may be accomplished through the coded tag and a blood test of the herd is made to locate any other infected animals.

Presently, blood samples are taken at time of slaughter from breeding cattle over two years of age at all slaughtering plants in Florida. Both backtagged cattle arriving at the plant by way of the markets, as well as direct shipments from the farm to the plant, are sampled.

In Florida, the card test, plate test, and tube test are all recognized as official tests; however, due to the card test's ability to rule out vaccine titer, the card test is used routinely in our laboratory. In addition, the card test is highly sensitive and detects infected animals that may be suspects or even negative on the plate test. By spotting the infected animal earlier and eliminating reactions due to vaccine titers, the card test has proven to be an effective tool in cleaning up infected herds that were formerly such a headache when the plate test was used.

There are other tests used which we refer to as supplemental tests. These supplemental tests are very specific and positive findings are almost as accurate as finding the living bacteria in exudates from the reactor. The supplemental tests are used as back-up tests at the laboratory on all newly infected herds to establish that true infection does exist. In other words, as a double check to be sure vaccine is not clouding the picture and that we are dealing with actual Brucella infection.

Now, what can a dairy farmer do to prevent his herd from becoming infected? Brucellosis, as with any disease organism, doesn't just happen or come out of the thin air! Earlier, we discussed the means of spread and we pointed out that infection originates from an animal that is harboring the germ. Generally, infection gets into our herds by introducing an infected cow! In other words, this is a disease that is usually "bought and paid for". I can hardly emphasize enough the following piece of advice - DON'T BUY UTESTED CATTLE - and even then, insist on a test record or a health certificate documenting the cattle listed were negative to test within the past few days. Check the animals to see that they are actually the same cattle listed on the certificate. Don't accept "lame excuses" that the cattle lost their tags or that the testing veterinarian put down the wrong numbers on the test papers. Keep these newly purchased cattle separate from your herd and have them tested again at least 30 days have gone by. The cattle you have purchased may have been exposed to a reactor animal prior to or during transit. If so, the disease may be incubating and even though the animal was negative at time of purchase, she may go ahead and develop the disease as a result of her exposure and be a reactor on the later test. I realize many of you find it difficult or even impossible to isolate newly purchased cattle, but any way to keep her separate or even in a small unit until she has calved and undergone a test after about 30 days.
will pay high dividends in protecting your herd. I am sure you realize a large portion of the nation is free of brucellosis but many areas and states still have a good deal of infection. As long as any area has infection, we have a good chance to import it since we bring in so many cattle to supply our needs. To re-emphasize - recently exposed animals may be clean on the test before purchase and the blood test won't show it until later when they have already infected your herd.

If your herd should become infected, there are certain basic steps you should take in order to clean up. This is extremely difficult in large herds where overcrowding is common. The major method of spread is direct contact with infected cows that either abort or have a normal calving. The calf, fetal membranes, and fluids, are highly contaminated and contain millions upon millions of the Brucella organisms or germs. Anything and everything you can do to reduce the exposure of your cattle to these materials is essential. Testing alone only locates the reactors after they become infected - so this is not enough! Large herds should be broken down into as many small separately pastured herds as possible. This is absolutely necessary in the dry herd. The dangerous animal is the one that has a calf or aborts. Heavy springers should be isolated from the rest of the dry herd. After they calve, they should be kept away from the rest of the herd until all uterine discharge has stopped. Should a cow abort, she should immediately be isolated from all other cattle. Dead calves and afterbirth should be burned or buried deeply so that other cattle do not have the opportunity to contact this material. Ponds and streams in the calving area should be fenced so that water is not contaminated, thus preventing spread to other cattle. The cows in the calving area should be watered in troughs which prevent wading and contamination of the water supply. Practice good sanitation throughout your operation by removing all litter from the cattle pens - especially discarded artificial breeding equipment such as pipettes, protective sleeves, gloves, and any other litter that may harbor disease organisms. Insofar as is possible, see that the lots are well drained to avoid standing water and mudholes in which disease germs can thrive for long periods of time.

I am sure many of you are wondering whether you should vaccinate your calves or not. Since there are both good and bad points about vaccination, let us take a moment to examine both sides.

By vaccinating calves at an early age - 3 to 4 months - and using the card test, the problem of retained vaccinal titer is practically eliminated. However, some animals actually become vaccine infected and, of course, when this occurs, they must be handled like field strain infected animals; that is, removed from the herd and sent to slaughter. As with all vaccines, those for animal or man, none are perfect. In some calves, the vaccine doesn't "take" or they just don't develop enough immunity, and when exposed to massive doses of bacteria, they become infected and, in turn, spread the disease. Vaccinated cattle also have a longer incubation period. Most non-vaccinated cattle will react to the tests within 30 days after becoming infected. Vaccinated cattle may take another month or even longer to show up on the test - meanwhile, they may be spreading the disease to other cattle.
On the other hand, Strain 19 vaccine has done a good job for us in the past by giving our cattle some immunity while the infection rate was high. But, as with all vaccines, once eradication of a disease is in sight, vaccines must be eliminated to assure the disease is not being masked and the last vestiges are stamped out.

In an area having little or no infection, vaccination and the problem it causes is not justified, so many states have stopped vaccination. In fact, vaccination is not allowed once an area becomes free of the disease.

Then, as individual herd owners, what should you do? If the area in which your herd is located is free of brucellosis or relatively free of the disease, we suggest vaccination be discontinued. If you have infection in your herd or if infection is prevalent in your area, it might be to your advantage to continue having your calves vaccinated. I would point out, however, that as the disease incidence is lowered, vaccine is to be phased out and will no longer be available.

Research is being done on some other experimental vaccines but the drawbacks are: They must be given once a year, they cause a good deal of tissue damage at the site of injection, they interfere with the test causing a positive reaction, and all thus far give rather poor immunity. Thus it becomes apparent the production of any "cure all" vaccine is quite unlikely.

To sum up some of the points that are essential in brucellosis eradication:

1. Purchase only test negative cattle.
2. Isolate purchased additions and retest 30 days after purchase and before adding them to your herd.
3. Keep heavy springers in a separate pasture or lot until after they calve and until all uterine discharge ceases.
4. Practice good sanitation and sound management procedures throughout your operation.
5. Insist on and do all you can to promote regulations and laws that will protect your herd. For example: Insist that all cattle be tested prior to sale, either tested on the farm, or tested at the market. Insist that cattle be identified before they move, so reacting animals may be traced to their herd of origin. We are in dire need of a dealer law in Florida which would require dealers to keep records of their purchases and individual identity of the cattle, so infected cattle can be traced to the infected herd. In addition, such a law or regulation would go a long way toward keeping the reactor and exposed animal out of the trade channels and from entering your herd. Equally important, is our failure to credit negatively tested animals to the proper county for recertification purposes. The existence of a dealer law would correct all these problems.
Let's hear from the dairy herd owners at the meetings of the Animal Industry Technical Council where proposed regulations are aired.

I observe many, many beef cattle owners in attendance at these meeting, but I have yet to see a dairy herd owner present (other than the dairy industry representative on the council), let alone hear his voice asking for legislation which would protect his herd and interests.

Gentlemen, we cannot become complacent about this disease. Should we decide to stop or even slow down, it wouldn't be long until the disease incidence would creep up to its former level where 10 percent of our cattle were infected, and all our gains would be lost.

Brucellosis, just like Glanders, Dourine, Foot & Mouth Disease, Screwworms, can be eradicated from this country.

Let's get on with this task and have a brucellosis-free nation by the end of 1975.
ESTRUS SYNCHRONIZATION OF DAIRY HEIFERS AND COWS WITH MGA

W. W. Thatcher and L. A. Chow
Department of Dairy Science
University of Florida
Gainesville, Florida

Introduction

Maintaining a high level of herd fertility is one of the biggest challenges faced by today's dairyman. Many dairymen have been unsuccessful in meeting this challenge as indicated by the fact that approximately $25 - $75 per cow is lost each year in the United States due to reproductive problems. This represents a financial loss in the form of decreased milk production, fewer calves, extra maintenance for the dry cow, higher replacement costs, forced culling and treatment of reproductive disorders. Each year 20-25 percent of the cows culled go out of the herd because of infertility. In the average high producing herd, four out of ten cows require at least two or more services per conception. Consequently, there is considerable potential for improvement of reproductive efficiency in dairy herd operations.

Inadequate estrus detection and insemination of cows at the improper time are major management problems that reduce breeding efficiency in cattle. When kept in stanchions, dairy cows usually exhibit signs of estrus soon after being released. However, cows managed under loose conditions, as in Florida, show overt signs of estrus less frequently. This requires longer periods of observation for estrus by the herd manager. The managerial problem of estrus detection increases with increases in herd size and with greater automation of dairy herd operations. Consequently, less time is spent on a per cow basis in checking for estrus. Also, high ambient temperatures alter reproductive behavior. Cow estrus periods average 13 hr duration in subtropical environments compared to 18-19 hr in temperate regions. A higher incidence of silent ovulation is associated with hot weather. All of these factors contribute to inefficient estrus detection resulting in a high incidence of missed heat periods that delay breeding.

Any system which truly improves estrus detection will improve a herd's breeding program. I am very optimistic about the possibilities of utilizing estrus and ovulation control in the future, through the treatment of dairy cows with synchronization compounds in a reproductive management system. Such a system would hopefully eliminate the failure to detect cows in estrus as a major source of infertility since the occurrence of estrus will be controlled. However, research to date indicates that fertility of the

---

synchronized estrus in cattle has been variable and generally lower than the fertility of control cattle.

Our laboratory has conducted a study to evaluate the effectiveness of a progestational synchronization compound, Melengestrol Acetate (MGA), to control estrus in dairy heifers, and to evaluate possible hormonal factors that may contribute to the poor fertility of the synchronized estrus. The specific objectives of this study are:

1. To determine the effect of MGA feeding on the control of estrus in dairy heifers.

2. To characterize the concentration of peripheral plasma progesterone and estradiol, during the period of MGA feeding and from the time of MGA withdrawal to the onset of estrus.

3. To compare these changes in plasma sex steroid hormones with the normal changes preceding the second estrus after MGA feeding, and with the normal changes in a separate group of control heifers.

Materials and Methods

Fifty-two normally cycling purebred heifers (Holstein, Jersey, Guernsey and Ayrshire) from the Florida Agricultural Experiment Station Dairy Herd were used. All heifers were 13 months of age or older and were judged free of anatomical abnormalities based on rectal palpations prior to initiation of the study. Heifers within each breed were randomly assigned to either the MGA treatment group or the control group. All heifers were checked for estrus using visual observation, Kamar heatmount detectors and a vasectomized bull wearing a marking harness. Heifers were observed for estrus for a period of 50 days prior to initiation of the experiment, during MGA feeding and for 50 days after MGA treatment. Twenty-six treated heifers received orally 1 mg of MGA by gelatin capsule daily for 14 days. MGA treatment was initiated without regard to the stage of the estrous cycle. Rectal palpation was used to evaluate ovarian status (follicular development, corpus luteum development and corpus luteum regression) at days 1, 7 and 14 of MGA feeding. Blood samples (100 ml) were drawn from the jugular vein during treatment (days 1, 7 and 14). After treatment samples were collected daily until first estrus, from day 15 of the first cycle to the day of second estrus and also from day 15 to day of estrus of control heifers. At the second estrus after MGA feeding treated heifers were artificially inseminated and fertility compared to control heifers. Plasma estradiol and progesterone were isolated on Sephadex LH-20 columns (solvent system - chloroform:ethanol (96:4)) and measured by radioimmunoassay and competitive protein binding procedures, respectively.
In this study the degree of synchronization was determined as the percentage of heifers in heat within a five day period from the day of first heat after MGA withdrawal.

**Results and Discussion**

Feeding of MGA caused a significant decrease (P < .01) in the occurrence of palpable corpora lutea (≤5mm) by day 14 of MGA feeding compared to day 1 (Table 1). At the last day of MGA feeding 88.5% of the heifers had a palpable follicle on one or both ovaries.

**Table 1** Ovarian status of dairy heifers receiving 1 mg Melengestrol Acetate (MGA) daily for 14 days.

<table>
<thead>
<tr>
<th>Days of treatment when palpated</th>
<th>1</th>
<th>7</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of heifers</td>
<td>26</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Number of heifers with a corpus luteum</td>
<td>20(76.9%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13(50.0%)</td>
<td>2(7.7%)</td>
</tr>
<tr>
<td>Number of heifers with a follicle</td>
<td>16(61.5%)</td>
<td>15(57.6%)</td>
<td>23(88.5%)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Percentage of total animals on treatment

After withdrawal of MGA, 25 of the 26 heifers came into heat within a five day period (Table 2). This is a 96% synchronization of estrus with the first detected heat occurring at day 4 after withdrawal of MGA. Due to the close grouping of synchronized heats or first heats, there was a high degree of estrus synchronization (92%) at the second estrus after MGA feeding. The excellent degree of synchronization observed in this study was partially due to the fact that all heifers definitely received the entire 1 mg of MGA due to the use of gelatin capsules administered by a bolus gun. Whereas, top dressing the feed with MGA may not have resulted in total consumption of the compound daily. Due to the synchronization of heat all MGA treated heifers exhibited two heats within a 28 day period. In contrast, heats occurred at random in the control group during a 23 day period. The conception rates of inseminations made at the second estrus after MGA feeding and that of control heifers were 40% and 44%, respectively.

Plasma hormone measurements were made in ten MGA treated heifers and in ten control heifers. Plasma levels of estradiol were elevated during MGA feeding, but not significantly so (.10 < P < .25). Daily estradiol levels approaching the first estrus after MGA feeding were higher (P < .01).
than estradiol levels approaching second estrus or approaching estrus of the control heifers. Average estradiol values for pre-estrus days -4, -3, -2, -1 and day 0 (estrus) of the first estrus after MGA feeding were 3.4±1 (n=6), 4.9±1(10), 8.2 ± 1.5 (10), 9.1 ± 1.2(9) and 7.7 ± 1.9(10) pg/ml plasma, respectively; control estradiol levels (second pre-estrus after MGA feeding plus pre-estrus of control heifers) were 1.4±0.2(17), 1.6±0.2(19), 3.2 ± 0.4(19), 5.9 ± 0.7(20) and 5.3 ± 1.1(20) pg/ml plasma, respectively. Plasma progesterone levels (days -4 to 0) of the first estrus after MGA feeding were lower than controls (p<.01). The characteristic precipitous decline of plasma progesterone in controls associated with corpus luteum regression was not observed during the first pre-estrus period after MGA feeding. Thus, ovarian secretory activity may be altered immediately following MGA treatment resulting in elevated estradiol levels and lowered progesterone levels as compared to controls. In the practical sense, this means that the sex steroid hormonal balance after MGA feeding is not normal. The cow is under a greater estrogenic influence, and the normal events occurring at the time of insemination (ova transport, sperm transport and nutrition of the fertilized egg) could possibly be influenced by this altered hormonal environment in such a way to reduce fertility. Additional studies are needed to determine the possible site of action of hyper-estrogenism on key physiological processes affecting fertility.

With the current development of knowledge in animal and human reproduction, it will soon be possible to develop practical systems of controlled artificial insemination. It has been suggested by Hansel (Hansel, W. 1970, Der Tierzüchter, In Press) that a practical system for estrous cycle control should meet the following criteria:

1. Synchronization of estrus and ovulation following treatment should be so precise that insemination can be performed at predetermined times, and without the necessity of checking animals for estrus.

2. The treatments should be simple and should require that the animals be treated individually no more than three times, including the insemination.

3. The conception rate of animals inseminated at the first estrus after treatment should be normal.

4. The additional costs involved in synchronization must be relatively small.

5. No potentially harmful drug residues must remain in the meat or milk of treated animals.

In summary, the present study substantiates that MGA effectively synchronizes the occurrence of estrus. In addition, hormone levels of estrogen and progesterone are altered by MGA feeding. Fertility at the second estrus after MGA feeding is comparable to the fertility of control animals.
<table>
<thead>
<tr>
<th>Percentage of total detected heats within a 5 day period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Heat Freq.</td>
</tr>
<tr>
<td>24 25 26 27 28 29 30 31 32</td>
</tr>
<tr>
<td>Days Post MGA Feeding: Second Estrus</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Heat Freq.</td>
</tr>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Days Post MGA Feeding: First Estrus</td>
</tr>
</tbody>
</table>

Table 2: Distribution of heats at the first and second estrus periods after feeding of melengestrol acetate (MGA)
INDUCTION OF LACTATION WITH HORMONES

Dr. H. H. Head
University of Florida
Gainesville, Florida

The development of complete mammary gland growth and induction of lactation by means of injected hormones on a practical basis would be of economic value to dairymen because sterile heifers and cows could be brought into production. Estimated figures suggest that one-half of the approximate 30% yearly cow turnover have the genetic merit to be considered as candidates for induced lactation. Thus, we have somewhere around 25-30,000 cow/year leaving Florida herds who could qualify for induced lactation. These represent a sizeable dollar value when salvage values and replacement costs are considered.

Mammary gland development in pre-pubertal heifers proceeds at a rate comparable to general body growth until puberty is reached. After puberty mammary gland growth is under hormonal control. Hormones are further involved in milk production since they are responsible for initiation and the maintenance of lactation once it has been established.

Much of the research on hormonal requirements of mammary growth has dealt with the role of estrogen and progesterone. Estrogen and progesterone secreted from the ovary during recurring estrus cycles, after puberty has been reached, stimulates mammary tissue growth. However, in attempting to induce lactation we must consider hormones other than those from the ovary. But we begin here because it is primarily estrogens and progesterone (progestins) which become available during pregnancy from both ovarian and placental origin that complete the complex of hormones necessary to stimulate complete mammary gland growth and subsequently initiate lactation at parturition.

Methods to induce lactation in cattle are not new inventions of the current crop of dairy scientists. Rather, they have long been of interest because this represented one way, a research tool, to gain an understanding of the factors bringing about normal growth of the mammary gland and resultant initiation of lactation.

The development and subsequent availability of a synthetic estrogen (diethylstilbestrol) during the 1930's opened up new means to study mammary growth and lactation. An early study at the Florida Experiment Station was published by Marshall, Becker and co-workers in 1948. They found, using 14 open heifers and 5 dry open cows, that injected animals often responded slowly to stilbesterol treatment. Udder tissue developed rapidly in heifers, udders filled and teats distended and milking was begun 14 to 17 days after beginning the injections. Cows responded more slowly and even adversely in a few instances. They concluded that the low level of production resulting from stilbesterol injections was insufficient to justify its use in commercial dairy herds.
Since the 1930's Dr. C. W. Turner and his colleagues at the University of Missouri have studied mammary gland growth and the means to induce lactation. I will present just a summary and conclusions of their findings from over the years. They induced lactation in a manner intended to mimic pregnancy, and thus took 180 days to do it by injecting estrogens or estrogen and progesterone in constant or changing quantities. For the most part, they used low doses of estrogen and progesterone (100 mg, 100 mg P). Milk secretion was stimulated after the long growth phase by the injection of 3 mg estrogen/day for an additional 14 days or more if necessary. On the basis of comparisons between treated and untreated animals they concluded that milk yield was 80-90% of that which would have been expected had cows calved normally. The mean daily yield, however, was only 22.7 pounds. Normal lactating and induced animals were fairly low producers and estimates of total expected production from induced animals seem optimistic.

Japanese workers induced lactation in umbred 16 month old Holstein heifers by treatment with stilbesterol during the course of a 10 year study. Their objective was to determine performance of the female at an early age...even before she became a dam. To do this they induced lactation in 30 Holstein heifers and compared induced lactation yield to subsequent normal lactation yield. Of the 30 original cows only 22 completed both lactations and the yields they obtained are shown in the following table.

<table>
<thead>
<tr>
<th>AGE</th>
<th>DURATION</th>
<th>DAYS TO MILK PEAK</th>
<th>AVE. DAILY MILK</th>
<th>100 DAY MILK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TO PEAK YIELD</td>
<td>PROD. YIELD</td>
<td>POUNDS</td>
</tr>
<tr>
<td>INUCED</td>
<td>16.6</td>
<td>241</td>
<td>116</td>
<td>2360</td>
</tr>
<tr>
<td>NORMAL</td>
<td>31.7</td>
<td>295</td>
<td>29</td>
<td>8757</td>
</tr>
</tbody>
</table>

\[
\text{Yield Induced} \times 100 = \frac{26.9}{27.5} = 30.8 = \% \text{ Normal}
\]

SUMMARIZING EARLY WORK

Although stilbesterol, estrogen or estrogen and progesterone combined injected into non-lactating cows or heifers brought about growth of the gland it most often resulted in unacceptably low milk production. Yields were generally only 50-80% of contemporaries undergoing normal lactation with peak production, duration and persistence less than normal and complete failure often observed. Generally, mammary tissue growth was not extensive nor entirely normal in appearance when observed histologically. Such treatment has question-
able effects on reproduction. Usually this treatment has been attempted with poor breeding cows so subsequent reproductive performance could not be evaluated critically, although both positive and negative reports on subsequent reproductive performance have been observed.

Interest in a practical yet effective means to induce lactation has been rekindled by the recent reports of Dr. K. L. Smith and co-workers at the Ohio State University Research Center at Wooster. They designed experiments to investigate effects of estrogen and progesterone on colostrum formation and also obtained results which suggested that the same hormone treatment they used would be effective in initiating lactation.

Dr. Smith has been somewhat successful with 7 day injection schedules with milk production initiated within another 14 days. Their treatment required a total elapsed time of only 21 days after treatment was initiated. Their hormone injection schedule was calculated to provide blood hormone levels comparable to levels found during the latter stage of pregnancy and thus may be mimicking conditions found then and at the time of parturition. Dr. Smith has brought cows into lactation in this manner and has described induced lactations which appear normal with yields up to 7,000-11,000 lbs./milk. Some of these cows were producing as high as 60 lbs/day with about 60% producing 30 lbs. or more. Of course not all treated cows came into lactation so we are only talking about those that did. An early evaluation suggests that cows brought into production will produce at a minimum of 80-85% of their previous production and that some will even produce as well or better than previous lactations.

Although this technique looks quite promising, many questions remain unanswered and I would like to emphasize that we are not yet to a point where this can be recommended to our commercial dairymen. Foremost among the reasons for this is that the injection of the exogenous hormones (estrogen and progesterone) in this quantity and for this purpose has not been approved by the Food and Drug Administration and should not be used because in their view, it renders milk and animals contaminated. But there are many other even more sound reasons. Success and failure occurs for unknown reasons, which pinpoints how little we understand about what we are really doing when we administer massive doses of these hormones. Subsequent breeding performance cannot be predicted and lactation persistency and yield are variable. Extensive estral behavior by the cows during treatment necessitates their isolation from other herd animals. Finally, inducing lactation will not improve production of cows whose genetic capability is low and it can only be used with non-lactating cattle free of mastitis.

Although recent research has done much to renew our interest in an effective and practical means to induce lactation it has also provided more questions than answers. It is expected that more extensive research efforts in this area will do much to provide the answers and perhaps result in a means for commercial dairymen to successfully induce lactation in selected cattle.
A PROGRAM TO COMBAT VIRUS DISEASES IN DAIRY HERD

Dr. E. C. Harland
Veterinary Science Department
Gainesville, Florida

Viral agents have been recognized as important disease producing agents in cattle since the discovery of Bovine Virus Diarrhea in 1946. Since then numerous viruses have been isolated from cattle, but only a few of this number are known to produce illness. The most widely studied and best described viral diseases are Bovine Virus Diarrhea (BVD), Infectious Bovine Rhinotracheitis (IBR), and the virus of shipping fever (PI-3). It is becoming apparent that we have only touched the surface in isolating and studying the bovine viruses. This is evidenced by the isolation of over 300 bovine enteroviruses some of which appear to be involved in calf diarrhea and infertility. Viruses are thought to be involved in some cases of pink eye and certain bovine cancers.

Diagnosing viral diseases with certainty requires laboratory tests which frequently consume several weeks. This, of course, requires that treatment of sick animals be based on clinical diagnosis on the farm. It is a wise practice to try to obtain a laboratory diagnosis, however, to aid in planning health programs as well as to increase confidence in diagnosing future cases.

We must realize that health planning for a herd involves more than a vaccination program. In fact, the health of the herd depends on the over all nutritional and management practices of the farm. Proper nutrition, housing, handling and isolation practices can do much more for the control of viral diseases than a vaccination program. When vaccination is combined with good management and used at the right time it can be a very valuable tool in preventing excessive losses due to viral disease.

Unfortunately too little is known about the proper and best way to utilize the available vaccines. Veterinarians and drug companies have lacked much of the needed information to make sound recommendations on when and how often cattle should be vaccinated against these diseases. Only now is information becoming available to base our recommendations other than clinical evaluation of different vaccination programs.

Strong evidence is now available to show that cattle properly vaccinated for IBR remain protected for at least 5 years. Protection from BVD vaccinations in general are stronger and longer lasting than IBR. Not all cattle, however, respond to the vaccine though apparently properly vaccinated. This represents a small percentage of a herd, but may explain an occasional break in vaccinated cattle. It is quite likely that most breaks in vaccinated animals are caused by viruses other than IBR or BVD and misdiagnosed as one of the more common viral diseases. This would also explain why annual vaccinations do not seem to be adequate in controlling the problems which are thought to result from IBR or BVD.
Another problem which has become evident is that frequently cattle which have been exposed to IBR or BVD during hauling and vaccinated on arrival at the farm have a more severe case of the disease than unvaccinated cattle. Until recently pregnant cows should not be vaccinated for IBR. Now there are two vaccines which can safely be used on pregnant cows. One is an intra-nasal vaccine and the other is an inactivated vaccine.

The vaccination program will depend on the management and methods of adding new animals to the herd. In herds where replacements are raised on the farm and it is evident that IBR, BVD or PI-3 is a problem on the farm, a series of 2 injections should be given 2 months apart after the calf is over 6 months and at least a month before breeding. The second injection is to insure that a good immunity is obtained in case the first injection does not take. No further vaccinations with virus vaccines are necessary since immunity should last the average productive life of the cow.

Where frequent additions are being made to the herd from outside sources as from sales and etc., vaccination should be delayed until after the cow has been in the herd for at least a month. This is because cows early in the disease tend to have a more severe case when vaccinated than if left alone.

Annual vaccination of open cows with the virus vaccines is probably not necessary although it is widely practiced and recommended. If annual vaccination is important, you feel, to your herd then the use of one of the vaccines which can be used on pregnant cows should be tried. This would represent a savings in labor and time since the whole herd could be treated at the same time.

The immunity to the virus of shipping fever is not apparently as long lived as IBR or BVD. Most of the commonly used IBR vaccines do contain this virus though it can be obtained by itself. The use of this product, if it can be given 2 weeks before stresses as shipping, is highly recommended for controlling shipping fever especially in young cattle. Annual vaccinations in the herd have been suggested to reduce respiratory infections in the herd during the colder months.

Better recommendations should be made available as we learn more about the immunity and its duration in vaccinated cattle. The recommendations we have made now seem reasonable based on today's information and availability of new vaccines.
DIFFERENT LEVELS OF SUGARCANE BAGASSE PELLETS
IN COMPLETE RATIONS WITH AND WITHOUT BENTONITE OR SUPPLEMENTAL HAY

Dr. S. P. Marshall
Dairy Nutritionist
University of Florida
Gainesville, Florida

The objectives were to study the effect of feeding 20, 25, and 30 percent of pelleted sugarcane bagasse in complete rations with and without 3.7% of sodium bentonite or 3 pounds of supplemental hay daily upon feed intake fat test milk production and animal health. The experimental design employed is shown below.

<table>
<thead>
<tr>
<th>Periods</th>
<th>Ration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardization (14d)</td>
<td>36 cows on complete ration with 25 percent bagasse and 3 lbs. hay/day</td>
</tr>
<tr>
<td>Experimental</td>
<td>12 cows, 20% bagasse</td>
</tr>
<tr>
<td></td>
<td>4 cows</td>
</tr>
<tr>
<td>Period 1 (35d)</td>
<td>Bent. Hay</td>
</tr>
<tr>
<td>Period 2 (35d)</td>
<td>Hay Control Bent. Hay</td>
</tr>
<tr>
<td>Period 3 (35d)</td>
<td>Control Bent. Hay</td>
</tr>
</tbody>
</table>

Complete rations containing 20, 25 or 30 percent sugarcane bagasse pellets were fed to groups of 12 cows each continuously throughout the 105-day experiment. During three successive sub-periods (35 days each) of the experiment either sodium bentonite, supplemental hay or no supplement (control) was incorporated into the basal bagasse ration (20, 25 or 30%) of each cow.

The results will be reported in the Newsletter and other media after all cows have completed the experiment.
INPUT DATA FOR DAIRY MANAGEMENT DECISIONS

Dan W. Webb
Dairy Science Department
University of Florida
Gainesville, Florida

Dairying is big business in Florida. Our state had the highest production per cow of any state in the southeast during 1971 (9,201 pounds). Milk produced in Florida during January, February and March of 1972 was valued at over 38 million dollars.

Florida's dairy situation is unique in several ways. With 420 cows per herd, Florida's average dairy herd size is among the largest in the nation. Herds characteristically are highly automated with group feeding and handling commonly practiced. Managers seek maximum utilization of labor and machinery. We often hear of operations where cow-man ratios exceed 50-60 cows per man per hour in the milking parlor. Feed supplies are characterized by shortage of high quality forage and widespread use of by-product feeds. Concentrates provide over 70% of the total energy intake of Florida's dairy herd.

Artificial insemination is widely practiced, with 75% of the state's cows inseminated through A.I. in 1970. More herd replacements are purchased than are raised on the farm. Over 65% of the dairy replacements entering a Florida milking barn for the first time during 1970 were purchased from outside the state.

The dairy situation in Florida may be unique but dairymen here share many of the same concerns as do dairymen everywhere. They have breeding problems, mastitis and leucocytes. They constantly strive to keep milk free of pesticides and antibiotics. Feed supply and demand for milk are recurring concerns. Of paramount importance is maximization of returns for effort and investment -- making a profit.

Of course profit refers to the desired balance of monetary input and output. The main factors that determine profit in a milking herd operation are:

- Milk Production Per Cow
- Price of Milk
- Production Costs
  - feed
  - labor
  - cow replacements
- Miscellaneous Income
  - calf sales, etc.

Increase the average production of your cows and your profit is likely to go up.
An area where effective management can pay high dividends is in the pursuit of high reproductive efficiency. Generally the objective is to have cows conceive as soon as feasible after calving. While this may be a worthwhile goal, evaluation of the reproductive status and identification of specific problems from an analytical viewpoint has merit. To properly evaluate the situation, historical information is needed -- complete accurate records. When did the cow calve? When was the first heat period? Is the reproductive tract normal? When should she have first service? When is she expected in heat again if not pregnant? etc.

There are several measures of reproductive efficiency that may be used to evaluate herd reproductive efficiency.

**Per cent Cows in Milk**
- indicates the proportion of total cows milking and dry

**Average Calving Interval**
- measures the length of time from one calving to the next

**Days Open**
- refers to the interval of time between calving and subsequent conception

**Days from Parturition to First Breeding**
- is self-explanatory

**Days from First Breeding to Conception**
- measures the days elapsed from first service after calving until conception. If conception occurs on first service, its value is zero.

**Services Per Conception**
- The number of breedings required for conception. On a herd basis, this figure would include only services of cows that eventually conceived.

**Services Per Cow**
- a similar figure indicating services per cow in the herd whether conceived or not. This figure would include services to cows that never conceived or that were eventually sold.

This kind of data is necessary to identify reasons for poor reproductive efficiency. Reproductive records are important not only for active management but for evaluation of past performance. If the desired results have not been
obtained, then it is necessary to discover the problem and correct it.

Goals should be set for reproductive performance as well as for milk production. In considering reproductive goals, we know that a twelve-month calving interval results in maximum production. When cows do not settle on time, income is reduced by decreased milk production, prolonged feeding of dry cows and fewer calves born.

Here are some goals for optimum reproductive efficiency:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Cent Cows in Milk</td>
<td>85-87</td>
</tr>
<tr>
<td>Average Calving Interval (months)</td>
<td>12½-13</td>
</tr>
<tr>
<td>Average Days Open</td>
<td>100</td>
</tr>
<tr>
<td>Days from Parturition to First Breeding</td>
<td>50-60</td>
</tr>
<tr>
<td>Days from First Breeding to Conception (less than)</td>
<td>21</td>
</tr>
<tr>
<td>Services per Conception</td>
<td>2.0</td>
</tr>
<tr>
<td>Services per Cow</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Although good management is an essential input in the dairy business for which there must be adequate compensation, this compensation can be earned by higher profits resulting from its use. If the operator's management was good, profit is earned; if not, costs may not be recovered. With the current situation of large herds, management is a more important input than labor, capital and other tangibles.

Management consists of three major phases: planning, implementation and evaluation.

To achieve excellence in any endeavor, one must start out with a clear objective. The dairyman should utilize the planning phase to set objectives and goals. The next step is to consider the methods of achieving those goals or implementation. What steps will be taken to accomplish the desired result? Thirdly, one must evaluate his results. If the desired results did not occur, it is important to discover why. Are the goals realistic? Is the implementation procedure adequate?

As we look at the evaluation phase we see the need for a record system. Records are needed in the management system -- to discover changes that can be made and to furnish valid information for the many administrative decisions.
A REVIEW OF PROGRAMS IN DAIRY SCIENCE

H. H. Van Horn
Chairman
Dairy Science Department
University of Florida
Gainesville, Florida

Since the 1971 production conference, two of the faculty changes that were announced at that time have taken place. Dr. Dan Webb joined our Dairy Extension faculty on July 1, 1971 replacing Clarence Reaves. Dr. Kermit Bachman joined the faculty on September 1, 1971 in a Dairy Foods Research position. In another change, Dr. Ron Richter has been hired to fill the Extension Dairy Technologist position vacated by the resignation of Dr. C. Bronson Lane who entered the ministry in March of 1972. Also, Mr. Jake White, who has been the faculty member in charge of the West Florida Dairy Unit at Chipley, Florida, relocated at the Dairy Research Unit at Hague, Florida following the merger of the dairy cattle from Chipley with the Dairy Research Unit herd at Hague.

It's been a good year for the Extension, research and teaching programs of the Dairy Science Department. Extension programs thrived this past year with the active work of three specialists -- Drs. Barney Harris, Dan Webb and Bronson Lane. These specialists are responsible for the total Dairy Extension program in the state and are the people you see most often from the Dairy Science Department giving leadership to educational programs. We look for Dr. Richter to continue in the fine tradition set by Bronson Lane in Dairy Foods Extension.

Research continued in many of the same areas that have been emphasized in recent years. Some areas, however, have been expanded to a larger extent than others. The main areas of emphasis in research are as follows:

1. Genetics -- Dr. Charles Wilcox

   A. Environmental-genetic relationships for milk yield -- This research has measured, where possible, the amount of yearly change that can be attributed to genetic and environmental effects, and to interactions between the two.

   B. Reproduction-genetic relationships -- Although past work here and elsewhere has shown practically no relationship between heredity and reproductive efficiency, some new approaches will be used to analyze our long-term reproduction data to see if non-additive genetic variance exists.
C. Jersey selection project -- One-third of the Jersey herd is being bred to a random selection of unproven bulls saved from our own herd while the remaining two-thirds is being bred to the highest proven AI Jersey sires in the United States. This is part of a regional research effort to quantify the progress in milk yield that can be made through breeding.

D. Tenure and reasons for disposal of AI sires.

E. Interaction of sire, farm, area, and country -- Data from Ecuador, Venezuela and Columbia are utilized in these studies, since they represent unusual environments for dairy cattle.

2. Physiology -- Dr. Herb Head and Dr. Bill Thatcher

A. Evaluation of the general hormonal status of the cow.

B. Influence of the adrenal gland on reproduction and lactation -- It is felt that secretions from this gland may be involved in the lowering of reproduction performance during periods of heat stress. The possibility that persistency of lactation may be limited by insufficient adrenal secretions is also being studied.

C. Estrus synchronization -- Basic and applied research in this area is directed towards developing systems to control occurrence of heat, ovulation and to allow preplanned inseminations without reductions in fertility.

D. Cystic ovaries -- This is a reproductive-endocrine study to determine hormonal factors causing cystic ovaries. Close cooperation by Gustafson's Dairy has greatly facilitated this project.

E. Factors affecting glucose utilization.

F. Mastitis control -- The combined effectiveness of teat dipping and dry cow therapy to reduce mammary gland infections is being studied.

3. Nutrition and Management -- Dr. Sidney Marshall and Dr. James Wing

A. Citrus pulp for dairy cattle -- Recent research evaluated pelleted citrus pulp in dairy rations and we have found it to be essentially equal with regular citrus pulp in various performance measurements.

B. Complete rations -- Sugarcane bagasse is being evaluated as a fiber source in complete rations.
C. Forage evaluation -- New and old forages have been evaluated in various ways for their silage producing ability.

D. Dairy waste disposal -- The sprinkler irrigation method of disposing of dairy waste from the holding pens of the milking parlor is being continued. The current emphasis of this research is mainly on the effect of various levels of waste on groundwater nutrients.

E. Milk feeding programs for dairy calves.

4. Microbiology -- Dr. Ken Smith and Dr. Leon Mull.

A. Controlling growth rate of lactic acid streptococci -- Efforts here are aimed at shortening the fermentation time needed in the production of fermented foods.

B. Extending shelf-life of dairy foods.

5. Chemistry (Foods) -- Dr. Kermit Bachman and Mr. Walter Krienke.

A. Interaction of proteins and lipids in dairy foods -- This is a new project that is just now beginning.

Training undergraduate and graduate students to perform well in the dairy industry and in the agribusinesses associated with dairying is one of the most important missions of the College of Agriculture. The Dairy Science Department has not had the opportunity to work with as many students as are needed in the dairy industry and the related industries. Last year at this time I indicated that we had 10 undergraduate students majoring, or showing intent to major in Dairy Science as of January 1, 1971. A similar count on January 1, 1972 would have shown our growth to 14 dairy students but since that time I have dropped out of school to manage a Florida dairy and another graduated. Thus, currently we have 12 undergraduate dairy students. Although the increase from a year ago is small, I think it is significant and I think the spirit of our undergraduate majors and students that are participating in the Dairy Science Club is quite good. We have had higher average attendance at Dairy Science Club meetings this year with a usual attendance of about 10 students. This includes 2-4 students interested in dairying but not majoring in Dairy Science.

We feel that we could place at least 15 students per year in the dairy industry, agribusinesses related to dairying and the educational institutions such as extension and vo-ag in addition to those that might continue in graduate work or veterinary medicine. To obtain this number of graduates per year we need at least 50 students majoring in Dairy Science. We think we have a good program to offer the students although we expect it to get even better. We certainly appreciate any help that you can give to bring the opportunities in Dairy Science to the attention of prospective students.
Acree, James  Meadowmilk, Inc., President, 8601 Acree Road, Jacksonville, Florida
Alvarez, Robin M.  Holly Hill Dairy, Vice President
13967 Duval Road, Jacksonville, Florida
Alvarez, W. T.  Holly Hill Dairy, Owner
13911 Alvarez Road, Jacksonville, Florida
Armstrong, Dennis V.  Michigan State University, Farm Manager
Dairy Department, Michigan State University
TUCO, Division of the Upjohn Company, Sales
Route 2, Lawrenceville, Georgia
Ash, Joel  DHIA Supervisor
1819 Bluebell Drive, Holiday, Florida
Atkinson, Paul R.  Aukema Dairy, Owner
Route 1, Chipley, Florida
Aukema, Arthur  Florida Department of Agriculture, Dairy Farm
Specialist, Route 6, Box 271, Jacksonville, Florida
Baker, J. B.  Baker Farms Inc., Owner
Route 2, Box 416, Sanford, Florida
Bartolotti, Gene  East Side Dairy, Owner
Route 1, Box 145, Seffner, Florida
Bass, Clint  Emerald Farms, Foreman
Route 2, Box 438A, Vero Beach, Florida
Becker, R. B.  Dairy Science, Professor,
University of Florida, Gainesville, Florida
Bergman, Arthur  1403 N. E. 20th Place
Gainesville, Florida
Bispham, Cy  Sun Coast Co-op, Secretary
Route 1, Box 85A
Bispham, Jack  Student
Route 1, Box 85A
Bissett, Glenn  Florida Cattleman, Field Representative
Box 1030, Kissimmee, Florida
Black, John A.  U. S. Sugar Corp., Salesman
Clewiston, Florida
Blanco, Octavio  Student
Route 2, Box 655, Odessa, Florida
Blocker, Mike  Rhodes Dairy, Owner
Star Route, Box 611, Buisis, Florida
Bowman, Bill  Bowman & Son's, President
Route 1, Box 295, Delray, Florida
Bowen, Kent  Charles McArthur Dairies, Executive Vice President
Box 1205, Okeechobee, Florida
Braddock, Thomas  Cooperative Extension Service, Extension Agent
409 Courthouse, Jacksonville, Florida
We currently have 18 graduate students in Dairy Science. Expansion of the graduate research program is expected in certain areas such as our new research area of protein chemistry, but numbers will not be expected to expand greatly in other areas unless students come to us with their own financial support.

We look forward to another good year.
Brooks, Marvin R. Sunny Hill South, Inc., Foreman
P. O. Box 111, Weirsdale, Florida
Butler, Robert K. Butlers Dairy, Inc., President
Eagle Bay Drive, P. O. Box 477, Okeechobee, Florida
Cammack, Elbert Florida Department of Agriculture, Supervisor of
Dairy Farms Inspection, 280 John Knox Road, Tallahassee, Florida
Carey, Bill Russell Dairy Inc., President
2517 Brandon Boulevard, Brandon, Florida
Cherne, Bill Sales
1908 Heather Avenue, Tampa, Florida
Chesnut, Gene Bayside Farms Dairy, Inc., Herdsman
5715 Bronx Avenue, Sarasota, Florida
Christian, Tom Hood’s Farm, Inc., Manager
1706 Woodhaven Drive, Brandon, Florida
Copeland, Allan Copeland Dairy, Owner
Route 3, Box 272, Arcadia, Florida
Daly, Micheal L. Heitfield Dairy, Inc., Farm Guest
1400 E. Tarpon Avenue, Tarpon Springs, Florida
Dawson, Robert C. Babson Brothers Company, Product Manager
Oak Brook, Illinois
Decker, Elroy L., Jr. Miller Machinery & Supply Company
5526 - C Auburn Road, Jacksonville, Florida
Denham, Frank T., Jr. D. & S. Dairy, Owner-Manager
4700 N. W. 16th Place, Gainesville, Florida
DeWitt, Gene NOBA, District Manager
1123 E. Lime Street, Tarpon Springs, Florida
Dodd, Jack P. Florida Department of Agriculture, Director, Dairy
Division, Suite 26, Collins Building, Tallahassee, Florida
Dressel, Dick Dressel Dairy Inc., Secretary
P. O. Box 398, Avon Park, Florida
Dumford, Howard Dairy Specialist
907 Flood Road, Fort Peirce, Florida
Evans, L. E. Florida A&M University, Professor of Animal Science
208 Osceola Street, Tallahassee, Florida
Ferrell, Sam L. E. Ferrell & Son Dairy, Manager
P. O. Box 430, Quincy, Florida
Field, J. Walker, Mr. & Mrs. Field Dairy Inc., President
1301 N. W. 9 Avenue, Ft. Lauderdale, Florida
Fledderjohn, Myron National Brown Swiss Cattle Association, Eastern
Representative, Route 1, New Knoxville, Ohio
Francisco, Carl Wells Dairy, Inc., Manager
5694 Morse Avenue, Jacksonville, Florida
Frazier, Helen DHIA Supervisor
208 Russell Drive, Palm Springs, Florida
Frazier, Walter
Lab Technician
208 Russell Drive, Palm Springs, Florida
University of Florida, Herd Manager
Route 2, Box 21, Alachua, Florida
Futch, Merrill C.
Sunshine State Dairymen's Co-op, Quality Control
3203 Jim Lee Road, Tallahassee, Florida
Galbraith, F. A.
Emerald Farms, Proprietor
3472 N. Havenhill Road, W. Palm Beach, Florida
Gay, Jack
Gay's Dairy, Owner-Manager,
Route 2, Box 85, Palmetto, Florida
Glasscock, Paul
Extension Service, Extension Agent
Room 107, Courthouse, Tampa, Florida
Graham, Austin
Florida Development of Health, Consultant
N. Pearl, Jacksonville, Florida
Grant, Larry
Dairy, Part Owner
P. O. Box 291, Trenton, Florida
Griner, Jim
Wil-Win Farms, Inc.
Orangedale Route, Box 70, Green Cove Springs,
Guerard, M. B., Mrs.
Cuerard Dairy
Route 1, Box 355, Thonotosassa, Florida
Gulledge, Ellis P
Miller Machinery & Supply Company, Salesman
760 N. E. 145th Street, N. Miami, Florida
Gwazdaukas, F. C.
Graduate Research Assistant, Dairy Science Department
University of Florida, Gainesville, Florida
Hanson, Donald G.
Basset's Dairy Farm, Manager
P. O. Box 110, Monticello, Florida
Hall, Bob
Venus, Florida
Hammack, Kenneth
The Graham Company, Herdsman
Route 1, Box 660
Hammond, A. S. Mr. & Mrs.
Oak Lawn Dairy, Owners
Route 1, Box 351, Sorrento, Florida
Harper, R. N.
Banking - Okeechobee County Bank, President
813 East 6th Street, Okeechobee, Florida
Harris, Barney Jr.
Extension Dairy Science, Associate Dairy Nutritionist,
University of Florida, Gainesville, Florida
Harris, Charles M.
Ministry of Agriculture
Harrison, Blair
Ministry of Agriculture, Kingston, Jamaica
Rylander Farm, Owner
Route 1, Lake Butler, Florida
Haskins, Harry F.
Glades Correctional Institute, Dairy Instructor
905 South "K" Street, Lake Worth, Florida
Healy, Dr. John
APHIS - USDA, Veterinarian in Charge
1671 Westminster Avenue, Jacksonville, Florida
Hughes Feed Company, Vice President of Sales
Box 1285, Okeechobee, Florida
Hefner, Dick
Heitfield Dairy Inc., Owners
1400 Tarpon Avenue, Tarpon Springs, Florida
Heitfield Jean &
Heitfield Vinton
Hindery, Dr. George A.
Florida Department of Agriculture, Division of Dairy Industry, Dairy Specialist, Route 2, Box 373, Tallahassee, Florida

Hite, James & Gladys
Summerfields Jerseys, Owners
Route 1, Box 492, Summerfield, Florida

Hobbs, Bill
AGPRO Inc., S. E. Manager
P. O. Box 2508, Montgomery

Hobbs, John
Hobbs Dairy, Owner
1610 Alder Way, Brandon, Florida

Hogan, Riley, Jr.
Tampa Independant Dairy Farmers Association, General Manager, P. O. Box 5011, Tampa, Florida

Holley, Bert F.
Miller Machinery & Supply, Sales
Jacksonville, Florida

Hudson, Bert
Florida Department of Agriculture, Dairy Division, Dairy Specialist, Route 6, Box 127, Tallahassee, Florida

Jarvis, Ray N.
Gold Kist Inc., Assistant Director of Nutrition
Gold Kist, P. O. Box 2210, Atlanta, Georgia

Johnson, Dave
Gold Kist Inc., Area Director - Feed
Box 438, Douglas, Georgia

Johnson, Doug
Doug Johnson Industries, P. O. Box 895, Brandon, Florida

Johnson, H.
U. S. Sugar Corporation, Salesman
Route 3, Box 94 #18, Gainesville, Florida

Jones, Chal
Florida Department of Agriculture, Dairy Division, Dairy Specialist, 4250 S. E. 38 Street, Ocala, Florida

Kelly, Richard
Florida Department of Agriculture and Consumer Services, Executive Assistant
The Capitol, Tallahassee, Florida

Kejela, Gelana
Student
1231 S. W. 3 Avenue, Gainesville, Florida

Kondo, Francis N.
Hughes Feed & Grain Company, Inc., Salesman
716 Westwind Drive, N. Palm Beach, Florida

Krieg, Ingo
Mecklenburg Farm, Worker
Box 701, Baldwin, Florida

Krienke, Walter, Professor
Professor, Dairy Science Department
University of Florida, Gainesville, Florida

Laidig, Art
Moorman Manufacturing Company
Route 2, Box 107M, Palmetto, Florida

Laney, William A.
Plantation Dairy, Owner
Tampa, Florida

Lawhorne, Edward
Moorman Manufacturing Company
Route 3, Box 2105, Lakeland, Florida

Lekander, Paul H.
L & M Dairy, Owner
P. O. Box 814, St. Cloud, Florida

Leslie, M. C.
Gold Kist Inc., Director of Feed Distribution
5795 Brookgreen Road, N. E., Atlanta, Georgia

Long, C. H.
Con Agra, Nutritionist
P. O. Box 2207, Decatur, Alabama
Larson, Louis E. Larsons Dairy, Inc., Owner P. O. Box 1242, Okeechobee, Florida
Milky Way Farm, Inc., Owner-Manager Route 2, Box 287, Bradenton, Florida
Sales Representative 1913 Hart Road, Lexington, Kentucky
Gores Dairy, Manager

Mann, Gordon E. Route 6, Box 1128, Lakeland, Florida
ABS, District Sales Manager 4138 Piper Drive, Jacksonville, Florida
Dairy Science Department, Nutritionist
Dairy Science Building, University of Florida, Gainesville, Florida

Marshall, Sidney P. Beverly Hills Dairy Inc., P. O. Box 111, Riverview, Florida
Masesys Dairy, Owner Route 2, Box 90, Palmetto, Florida
Ranch Fertilizer Company P. O. Box 1203

McAmis, Tom J. DeLaval Separator Company, Sales Representative 3464 O’Hara Drive, Macon, Georgia
Dairy Division, Dairy Specialist P. O. Box 3041, Orlando, Florida

McGown, Ray McMillan Dairy Farm, Assistant Manager Route 3, Box 94, Live Oak, Florida
McMillan Dairy Farm, Manager Route 3, Box 94, Live Oak, Florida

McMullen, John L. McMillen Dairy, Owner 505 N. Glenwood Avenue, Clearwater, Florida
Sunny Hill South, Inc., Breeder Tech. Route 1, Box 543, Umatilla, Florida
Melear Dairy, Owner 3088 Hyapluxo Road, Lake Worth, Florida
Bluefield Dairy Inc., Owner Route 1, Box 1890, Okeechobee, Florida

McMullen, James B. Miller Dairy, Owner P. O. Box 297, Whitehouse, Florida
Upper Florida Milk Producers Association, Quality Control Supervisor 753 Warner Lane, Orlando, Florida

Melear, C. R. Pennwood Farm, Manager Box 362, Palm City, Florida
Melear, Raymond C. Veterinarian Mayo, Florida

Miller, F. B. Sr. Exchange National Bank of Tampa, Vice President Box 1809, Tampa, Florida
Upper Florida Milk Producers Association, Quality Control Supervisor 6304 David Drive, Jacksonville, Florida

Miller, John L.
Newcomer, Jerry  
Newcomer Dairy, Owner  
9971 S. W. 16th Street

Noles, Sam O.  
State Division of Health, State Milk Consultant  
P. O. Box 210, Jacksonville, Florida

Oelfke, Walter  
NOBA, Inc., Assistant Sales Manager  
3369 10th Avenue 10th N., Palm Springs, Florida

O'Quinn, J. T. (Tom)  
Ralston Purina, District Salesman  
P. O. Box 2122, Deland, Florida

Owens, Harry R.  
Security Mills, Salesman  
1551 River Lane, Tampa, Florida

Pace, Marshall  
The Graham Co.  
14420 N.W. 60th Ave, Miami Lakes, Florida

Palmer, Clyde  
Palmer's Dairy, Owner  
Okeechobee

Parks, Claude  
Wil-Win Farms, Herdsman  
Orange Dale Rt., Green Cove Springs, Florida

Peachey, John A.  
Peachey Dairy, Owner  
Rt. 3, Box 102, Sarasota, Florida

Peacock, Doris  
Core's Dairy Supply, Supervisor  
Zephyrhills, Florida

Peeples, Rod  
Hughes Feed & Grain Co., Mgr. Liquid Division  
P. O. Box 835, Okeechobee, Florida

Pipkin, Curtis B.  
Pipkin Dairy, Owner  
Route 4, Box 2252, Lakeland, Florida

Platt, Don  
Platt Dairy, Co-Owner  
Box 2263, Orlando, Florida

Platt, Kenley  
Platt Dairy, Manager  
1222 Egan Drive, Orlando, Florida

Pinzon, Francisco  
Post-Graduate Student  
1216-110 SW, 2nd Avenue, Gainesville, Florida

Potier, W. D.  
Rt. 4 Box 152

Putman, Paul  
Dairy Supply  
P. O. Box 1168, Okeechobee, Florida

Price, Kent  
Extension DHIA.  
Box 365, Okeechobee, Florida

Reagan, C. L.  
Milky Way Farm,  
Rt. 2, Box 289, Bradenton, Florida

Reagan, Lawrence  
Manatee Dairies Inc., President  
Route 2, Box 327, Bradenton, Florida

Register, Floyd  
Hank Register & Son Dairy, Co-owner  
Sanderson, Florida

Robinson, D. D.  
T. G. Lee Farms, Manager  
5705 Bearhead Road, Orlando, Florida

Roberts, Grant  
Florida Dept. of Agriculture, Dairy Specialist  
Rt. 2, Box 219, Ft. Meade, Florida
Rodriguez, Juan J. 
Hi Grade Farms, Inc., Herdsman
Box 426, Crystal Springs, Florida

Rodriguez, Wilfred, Jr. 
Hi Grade Farms, Inc., President
Box 426, Crystal Springs, Florida

Russell, Willard 
Hughes Feed & Grain, Sales
5718 Souchak Drive, West Palm Beach, Florida
Sunnyhill South
P. O. Box 1840, Eustis, Florida

Saffen, E. E. (DVM) 
Hilldale Dairy, Owner
P. O. Box 186, Mango, Florida

Sampson, Hugh, Jr. 
Syfutt Feed Co., Salesman
310 Clark St., Okeechobee, Florida

Sanchez, Al 
Sargeant Farms, Inc.,
P. O. Box 17, Lakeland, Florida
Hughes Feed & Grain, Sales
200-3 Emerald Ave., Lake Wales, Florida
Schmid, Walter, Jr. 
Schmid Guernsey Dairy
P. O. Box 182, Tallevast, Florida
Shirey, Bill 
Sunnyhill South, Breeding Tech.
Rt. 1, Box 482-A, Umatilla, Florida

Schubert, Jerry E. 
Ass't Veterinarian in Charge
331 Laurina St. #639, Jacksonville, Florida
Farm Bureau, marketing
P. O. Box 730, Gainesville, Florida
Shreve, Dale M. 
Farm - L&M Dairy, Foreman
Box 321, Brown Chapel Rd., St. Cloud, Florida

Simmons, Steve 
Wil-Win Farms - Owner
Orangedale Rt., Green Cove Springs, Florida

Smithwick, Dan 
Hughes Feed & Grain Company, Administrative Asst.
P. O. Box 10, Boynton Beach, Florida
Sunnyhill South, Inc.
6161 Silver Lake Drive, Leesburg, Florida

Snyder, P. L. 
County Extension Agent
Route 9, Box 905

Solger, David M. 
Security Mills, Inc., Manager
P. O. Box 11497 E. Henry St., Tampa, Florida

Spencer, Eugene 
Palm River Dairy, Inc., Owner
P. O. Box 168, Crystal Springs, Florida

Spoto, Joseph T. 
Carnation Co., Area supervisor
Tallahassee, Florida

Steinmetz, H. O. 
Florida Dept. of Agriculture, Dairy
3760 S.W. Archer Road, Gainesville, Florida

Strickland, James B. 
Carnation-Albers Co., Salesman - Florida area
2107 E. Lumsden Rd., Valrico, Florida

Strong, Kenneth 
Fla. Dept. of Agriculture, Dairy specialist
8232 Merivale Rd., Jacksonville, Florida

Summer, Arlie 
Univ. of Florida, Asst. Professor
University of Florida, Gainesville, Florida

Thatcher, William W. 
Bassett Dairy Farm, Herdsman
P. O. Box 69, Monticello, Florida

Toohey, Larry L.
Tucker, Cecil A.  Baker Farms, General Manager  
Rt. 2, Box 536A, Sanford, Florida  

Van Horn, H. H.  University of Florida, Chairman of Dairy Science Dept.  
University of Florida, Gainesville, Florida  

Walker, Jesse L.  Oak Acres Dairy, Herdsman  
Rt. 1 Box 660, Hialeah, Florida  

Walpole, Ed  Walpole Inc., President  
Box 344  

Walsh, Tom  Polk Co. Health Dept., Supervisor Sanitarian  
1855 15 ct. N.W., Winter Haven, Florida  

Ward, Bud  Lay Laine Guernsey Farm, Owner  
Astatula, Florida  

Webb, Dan W.  University of Florida, Asst. Ext. Dairyman  
University of Florida, 203 Dairy Science Bldg.  
Gainesville, Florida  

Wiederkehr, Hans, Jr.  Hansdale Dairy Farm, Owner  
3011 57th St. E., Bradenton, Florida  

Wiggins, A.  1722 N.W. 10th St., Gainesville, Florida  

Wilcox, C. J.  University of Florida, Geneticist  
University of Florida, Gainesville, Florida  

Williams, Charles  Williams Dairy, Owner-Manager  
Rt. 2, Box 650, Avon Park, Florida  

William, Larry  Hughes Feed & Grain Co., Salesman  
P. O. Box 671, Okeechobee, Florida  

Williams, Stamie, D.  Pine Grove Dairy, Owner  
1668 Whitman St.  

Wing, J. M.  University of Florida, Professor  
University of Florida, Gainesville, Florida  

Wisdom, A. M.  Ross-Holm  
3254 Hollywood, Medford, Oregon  

Wright, Herbert  West Coast DHIA, Supervisor  
Rt. 2, Box W40, Palmetto, Florida  

Yancey, Clyde  Clyde Yancey & Sons Dairy Inc., President  
Rt. 1, Box 26, Nyakka City, Florida  

Yancey, Clyde, Jr.  Clyde Yancey & Sons Dairy Inc., Manager  
Rt. 1, Nyakka City, Florida  

Yancey, Lester  Clyde Yancey & Sons Dairy Inc., Owner  
Myakka Star Route, Bradenton, Florida  

Yant, Danny  NOBA, Inc., Dist. sales manager  
Hibernia Rt. Box 143, Green Cove Springs, Florida  

Zinner, Charles  Florida Department of Agriculture  
P. O. Box 604, Plant City, Florida