AN EVALUATION OF FACTORS INFLUENCING PARTICIPATION IN THE DAIRY HERD IMPROVEMENT PROGRAM IN VERMONT

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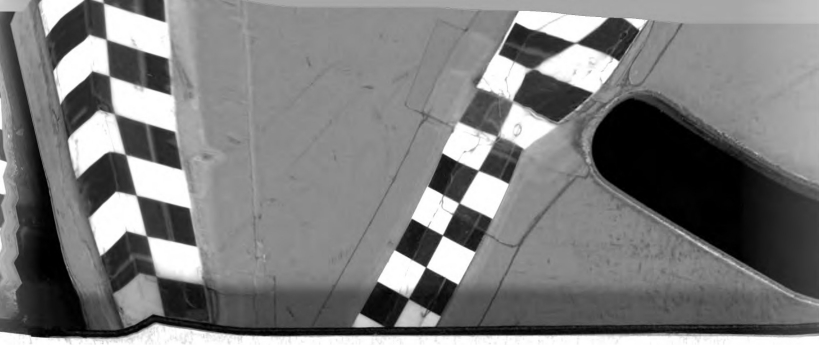

ABSTRACT

AN EVALUATION OF FACTORS INFLUENCING PARTICIPATION IN THE DAIRY HERD IMPROVEMENT PROGRAM IN VERMONT

by Verle R. Houghaboom

The dairy herd improvement program has been operating in Vermont for over fifty years. It was established to provide dairymen with records of the performance of individual animals in their herds. Such knowledge is essential to farmers interested in achieving economically sound adjustments in feeding and improving their herds. This information is also helpful to county agents and others in counseling dairymen.

As early as 1924 the Vermont Extension Service assumed official responsibility for supervising dairy herd improvement work. Extension's efforts to assist local associations and promote participation have been time-consuming and largely noneducational. Yet in spite of the potential value of test and record data and the wide publicity given to the program, participation is not great. Fewer than one dairyman in four has enrolled in any given year.

This study has investigated factors influencing participation. It is concerned with possible shortcomings in the program as they relate to: (a) organization and method of operation, (b) adequacy of information and services, and (c) ability of dairymen to utilize this information.

Verle R. Houghaboom

The study has two broad objectives. First, it investigates the historic development of the program and critically examines the rigid organizational framework to determine its influence on enrollment. Second, but most important, the research analyzes and evaluates information obtained in personal interviews with 250 dairymen. These data concern characteristics of farms and farmers; knowledge of feeding and management practices; and opinions as to why dairymen participate, drop out, or never join. The farmers interviewed include 147 participants, 53 ex-participants, and 50 nonparticipants. All were randomly selected from each of three participation categories in areas serviced by central testing associations.

The historic review indicates that the local association is an antiquated organization; that the sampling procedure embodied in the standard test is costly and limiting to enrollment. Further, it raises serious questions concerning the justification of extension's participation in the current program.

The analysis of survey data reveals that participation is associated with measurable characteristics of farmers and their farms. For example, compared with the other groups, participants: have more formal education; are more likely to be community leaders; are more aware of good production levels; keep essentially the same number of cows but produce more milk.

Yet participants' beliefs concerning grain feeding, coupled with inadequate knowledge of production response, seriously inhibit their use of test and record data. These dairymen appear to be more aware of participation costs than of monetary returns. They use test and record data mainly in culling although its usefulness for this purpose is extremely limited. The desire for recognition, status, or prestige appears to be a major reason why they participate.

Ex-participants are younger than dairymen of the other two groups. In most other measured characteristics, they rank below participants but considerably above non-participants. This is particularly true as it relates to knowledge of feeding and management. Primary reasons for dropping out include inability to use data; dissatisfaction with the supervisor or service; and costs in money, time, work, or bother.

Nonparticipants are aware of the program but have not been motivated to seek information. Their apathy is associated with ignorance of, or indifference to, good management practices. For most, more accurate knowledge of production data would have little value.

Specific recommendations, based on this study, relate to extension's activities and responsibilities as well as to the organization and operation of the program. Hopefully, future adjustments, as a result of this study, will enable more Vermont dairymen to obtain and use essential production data.

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By

Verle R. Houghaboom

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INTRODUCTION

Background

Information concerning the performance of individual animals in a dairy herd is essential to all dairymen interested in arriving at economically sound decisions in feeding, or in herd improvement through culling and breeding. It is valuable to county extension agents and other extension workers in counseling with dairymen concerning farm business problems. Participation in a dairy herd improvement association is one means of acquiring such information.

Since 1924 the Vermont Extension Service has been charged with the supervision of dairy herd improvement associations in the state. In 1941 the Extension Service received an increased appropriation from the state legislature for dairy extension work with special emphasis on supervision of DHIA. Yet in the fifty years that the program has been operative in Vermont, only a minority of dairymen have availed themselves of its service.

Purpose and Objectives

This study will investigate factors influencing participation in dairy herd improvement work. Primary emphasis will concern an evaluation of why dairymen participate in, drop out of, or never join associations operating with central laboratory and office facilities. The specific objectives of the study are as follows:

1. To determine the effect of the structure and method of operation of local associations on participation.

2. To discover any relationships existing between characteristics of farmers, farms, and participation.

3. To determine the use made of test and record data in day-to-day management decisions as determined by factors considered in feeding, breeding, and culling.

4. To investigate farmers' opinions on various aspects of a test and record program.

5. To suggest improvements in organization and method of operation of dairy herd improvement associations.

Information obtained in this study will be of value to the extension dairyman in charge of DHIA work, the directors of the state and local associations, county extension workers, and local dairy farmers. It will be useful in making corrective adjustments in the dairy herd improvement program; especially as these concern the structure of the local association, the method of operation, and the type of information and educational assistance provided.

Theoretical Background

Participation in a dairy herd improvement program involves both benefits and costs. These may be monetary or nonmonetary in nature. They may be realized or anticipated. Further, it can be argued that realized monetary benefits or costs may be actual or imagined.

Benefits are dependent upon the participant to the extent that he has the knowledge and ability to use information provided; to the extent that he is motivated to do so; and to the extent that he may realize nonmonetary satisfactions from participation. Benefits are dependent upon the program to the extent that it provides information or services useful in arriving at economically sound decisions; and to the extent that it offers nonmonetary satisfactions.

Costs are dependent upon the participant to the extent that he has alternative uses for the necessary expenditure of time and money; and to the extent that his subjective values cause him to realize dissatisfaction from participation. They are dependent upon the program to the extent that they are influenced by such factors as efficiency of operation and cost differentials by size of herd and type of test; and to the extent that such factors as method of operation or personalities involved lead to dissatisfactions.

Hypotheses

In any given year, fewer than one dairyman in four has participated in a dairy herd improvement program in Vermont. More than half of the dairymen of the state have never participated. In view of this situation and the fact that presumed advantages of participation have been promoted for more than fifty years, it would seem that serious shortcomings exist in: (a) the organizational setup for conducting the program, or (b) the adequacy of the information provided, or (c) the ability of dairymen to utilize this information, or a combination of factors in these areas. The specific hypotheses which guide this study are as follows:

1. The traditional local association is an antiquated organizational structure which places serious limitations on expansion of enrollment in dairy herd improvement work.

2. The traditional "standard test" is a generally unnecessary and costly procedure which seriously limits enrollment in dairy herd improvement work.

3. Participation is associated with age, education, community leadership activities, size of business, production levels, and other measurable characteristics of farmers and farms. Knowledge of these characteristics would be valuable in making corrective adjustments to enhance enrollment.

4. Dairymen who drop out of or never join the program consider different factors than participants in feeding, breeding, and culling.

5. Farmers hold beliefs concerning grain feeding practices which place serious limitations on the economic value of test and record data and thus on the value of participation.

6. Participation is associated with opinions concerning the adequacy of information and services provided.

7. Participation is associated with the amount of assistance received in utilizing test and record data in making day-to-day management decisions. Many dairymen who drop out do so because they are dissatisfied with the amount of assistance received from their supervisor or county agent.

8. Participation is limited by the awareness and interest of nonparticipants.

Method and Scope of Study

If dairy herd improvement work is to be expanded in Vermont it is necessary that there be a better understanding of factors influencing participation. It is recognized that an accurate identification of all the causal factors influencing dairymen to participate in, drop out of, or never join a test and record program is an important though all but impossible task. Innumerable variables associated with each farm operator, each farm business, each supervisor, and each association preclude a comprehensive determination. This study will investigate the influence of the rigid organizational and operational structure of the traditional association on enrollment. However, primary emphasis of the study will concern an evaluation of why dairymen participate in, drop out of,

or never join the program in areas serviced by associations operating with central laboratory and office facilities.

The influence of the organizational and operational structure of the local association on current enrollment can be most readily determined by reviewing its influence on enrollment in years past. An investigation of the growth and development of dairy herd improvement work in Vermont is therefore relevant to this study. This investigation will utilize reports prepared by persons directly or indirectly responsible for the program since its inception. It will study growth and development as associated with the rigid framework which largely governs the program to the present day. This will be done in sufficient detail to determine the influence of this framework on enrollment and to suggest corrective adjustments to enhance participation.

Participation in central testing associations was selected for primary emphasis because these associations appear to offer the greatest potential for future expansion of dairy herd improvement work. Enrollment in areas serviced by such associations is not restricted by possible limitations peculiar to the organization and method of operation of traditional units. Dairymen were selected as a source of information concerning participation since in the final analysis, in areas serviced by central associations, the decision to participate, to drop out, or to not join rests with the individual.

The questions asked of dairymen in the study are designed to provide information in three broad areas. These areas concern characteristics of farmers and farms; factors considered in decisions related to feeding, culling, and breeding; and opinions regarding such factors as the adequacy of information and service and why dairymen participate, drop out, or never join a test and record association.

The Sample.—The objectives of this study dictated that the sample be drawn from areas serviced by associations operating with central laboratory and office facilities. There were five such areas in the state. Three areas were serviced exclusively by central associations. Two of these were county oriented; the third was so defined geographically as to include only that portion of a county serviced by a central association. The two remaining areas were serviced by local as well as central associations. One of these two areas was within the geographic limits of a county; the other included portions of two counties.

The objectives of the study necessitated that the data be obtained from dairymen and, furthermore, that the dairymen contacted be representative of each of three participation categories. The three categories are broadly delineated by the farm operator's experience with dairy herd improvement work. The first includes all dairymen within the defined areas who had completed at least one

full year on test and were currently enrolled in a test and record program operated by a central testing association. The second includes operators of active dairy farm businesses who were known to have dropped out of the program. The third category includes dairymen who had never participated in a test and record program.

Dairymen representative of each participation category were randomly selected from lists of dairymen in each category in each area. The lists (fifteen) were developed in the following manner. Participants' names were obtained from association supervisors. These names were compiled and listed alphabetically for each association. Dairymen who had completed less than one year on test were eliminated.

Ex-participants' names were more difficult to obtain. Lists were developed from records kept at the state office, from association records, and from the recollections of association supervisors and county extension agents. Supervisors and agents were also helpful in adjusting the lists by identifying dairymen who no longer kept cows. These were dropped from the sample. The initial sample was supplemented during the field enumeration through contact with dairymen originally presumed to have been nonparticipants.

Nonparticipants' names were obtained by using town listers' reports as a point of departure. Town listers'

reports include names of all persons who keep livestock, together with the number of each important type of livestock kept as of April 1 of each year. Alphabetic lists of dairymen so obtained were first reduced by eliminating all who kept fewer than fifteen cows or heifers two years old or older. Names of all dairymen known to have participated in a dairy herd improvement program at one time or another were similarly eliminated. This was accomplished with the assistance of county extension agents, association supervisors, and state office and local association records. A number of dairymen incorrectly identified as nonparticipants were eliminated during the field enumeration.

The sample was drawn to include, from each area, thirty participants, four to sixteen ex-participants, and ten nonparticipants. All were randomly selected with this exception—in four areas having fewer than fifteen known ex-participants, records were obtained from all. One alternate was initially selected for each participant and two alternates for each nonparticipant. In this manner it was possible to obtain the desired number of records. However, three participants' records had to be eliminated from the study because of unusual circumstances. The completed sample, therefore, included records from 147 participants, 53 ex-participants, and 50 nonparticipants.

Collection of data.—Data for the study were gathered by personal interview. This was done during the

months of June and July 1958 by three specially trained enumerators. Methods used in the personal interviews included open-end questions, with the respondent being encouraged to express his personal viewpoints; and fact-seeking questions, where the respondent was required to give definite information. Indirect questions were also used in an effort to determine the respondent's feelings toward participation. The questions and the sequence in which they were asked were designed to delay the respondent's awareness of the fact that the survey was primarily concerned with dairy herd improvement work. Three questionnaires were used—one for each participation group. A major reason for using different schedules was to facilitate the exact wording of certain questions, and so assure that each enumerator stated the question in the same way to each respondent.

All dairymen in the sample were sent a letter prior to the survey. This informed each farm operator that he had been selected to represent dairymen of Vermont in a study of farm practices; that his assistance was essential; and that his replies to all questions asked would be treated as confidential. It was meant to assure each that many of the questions would have no right or wrong answer—that they were being asked to determine things farmers consider in reaching certain decisions. To keep the interview as objective as possible, the respondent was never voluntarily

informed that the study bore any particular relation to the dairy herd improvement program.

Method of analysis.—A combination of tabulations and the strip method of analysis was used in analyzing the data obtained in the field survey. Averages and frequencies as well as group relationships could be readily obtained when data were handled in this manner. Statistical tests of significance were used in all cases where applicable.[1]

Regardless of the methods of analysis, the interpretation of data in a study of this type must be largely subjective. This is true as it concerns the interpretation of reports related to the influence of the organization and method of operation of traditional associations on participation. It is particularly true when evaluating knowledge and opinions of dairymen. Since knowledge and opinions do not lend themselves to quantitative analysis, this study is a combination of quantitative description—reviewing factors such as age, education, and size of

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[1]Basic formula used to test significance of difference between sample means:

$$\hat{\sigma}_{\bar{X}_1 - \bar{X}_2} = \sqrt{(\hat{\sigma}_{\bar{X}_1})^2 + (\hat{\sigma}_{\bar{X}_2})^2}\ .$$

If the computed $t = \dfrac{\bar{X}_1 \quad \bar{X}_2}{\hat{\sigma}_{\bar{X}_1 - \bar{X}_2}} \geq t_{\alpha}$, the difference is significant at the 5 percent level. That is, only 5 times out of 100 could these differences have occurred by chance alone. For reference see Croxton and Cowden, Applied General Statistics (2d ed.; Englewood Cliffs: Prentice-Hall, Inc., 1960), pp. 651-54.

business associated with dairymen in three participation groups—and qualitative analysis of opinions of dairymen who participate in, drop out of, or never join a dairy herd improvement program.

Procedure for Reporting

The remaining parts of this study present results of the investigation. Chapter II will deal with the initiation and development of the dairy herd improvement program in Vermont. It will briefly describe the organizational and operational framework of the traditional association and will relate enrollment over the years to factors associated with this framework. Chapter III will present the findings of a survey designed to increase our understanding of why the dairymen who participate in a dairy herd improvement association do so; why the dairymen who drop out of a dairy herd improvement association do so; and why some dairymen never participate.

The implications of the research and possible adjustments to enhance participation will be discussed in Chapter IV.

CHAPTER II

DAIRY HERD IMPROVEMENT WORK IN VERMONT

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Initiation and Leadership

The first "cow testing association" in Vermont was organized in Morrisville in 1908. At that time there were but six associations in the nation, the first of which was established in Fremont, Michigan in 1905. Dairy herd improvement work in Vermont owes this early introduction to the untiring and unofficial persistence of one man, Joseph L. Hills, Dean of the College of Agriculture.

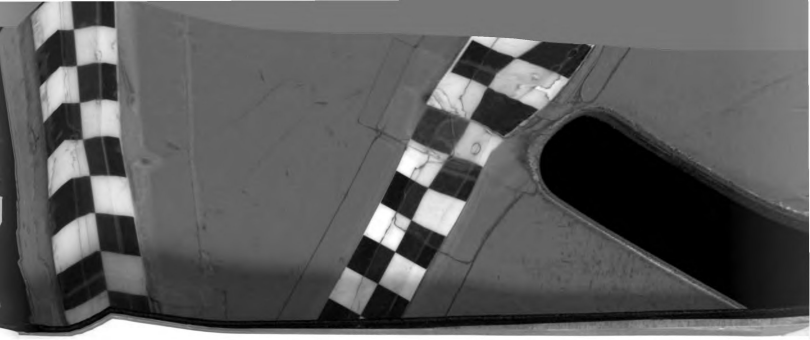
Responsibility for assistance in the organization of subsequent associations was first assumed by the State Board of Agriculture under the immediate direction of the Commissioner. As early as 1912, when it became evident that special assistance was needed for supervising associations to make their work effective, the State Experiment Station cooperated in hiring the part-time services of one man.

Later, in 1917, when financial assistance was received from the Dairy Division of the United States Department of Agriculture, an extension dairyman was appointed to take charge. However, the program remained

under the direct supervision of the State Department of Agriculture. Since that year (1917) the extension dairyman and county extension agents have had primary responsibility for locating and training supervisors, purchasing supplies, speaking at annual meetings, publicizing record information, and enforcing all the rules of the program.

In 1924 the Vermont Agricultural Extension Service assumed official responsibility for the supervision of the work in the state. An extensive system of monthly and annual reports was developed and, in 1932, to enable the dairy specialist to devote more time to educational and promotional work, a State Dairy Herd Improvement Association was formed. With the dues collected, an office secretary was hired to supervise the details of record work.

However, not until June 1941 were the general direction and supervision of DHIA in Vermont more than a part-time responsibility of any one person. In that year the State Legislature appropriated special funds for dairy extension work with emphasis on supervision of DHIA. This appropriation was made in response to repeated pleas for financial assistance on the grounds that: (a) the number of associations was too large to be handled by one part-time worker, and (b) it would be easily possible to enlarge association work with sufficient help for supervision and promotion. The increased funds were used to secure the services of an assistant extension dairyman to devote full time to the program.



The Local Association

A traditional association—the focus of dairy herd improvement work in the state—is a cooperative organization of dairy farmers united to employ a technician to keep feed, production, income, and breeding records on their cows. It is bound together by a constitution and bylaws.

The formal authority for handling all its business affairs and for directing its program of herd improvement rests with a board of directors consisting of five active members. The board of directors usually delegates this responsibility to its officers—a president and a secretary-treasurer. The latter rely heavily upon their county extension agent and the extension dairyman for counseling and assistance in all the affairs of the association.

Members of a local association are bound to it by an agreement which may be terminated by either party with one month's notice. A meeting of the general membership is held annually for the purpose of electing a board of directors and transacting other necessary business. A summary and analysis of the year's record work is presented for discussion and study at this meeting. Usually the program includes a discussion of some improved herd-management practices.

Two points in relation to the organization and operation of local associations are of particular interest. First, membership has, until recent years, been limited

by the number of herds which will provide a full month's work for one supervisor. A full membership in a traditional association—one whose members are all enrolled in standard testing—is generally limited to twenty-six dairymen.[2] This is necessary because the supervisor must be present at each farm enrolled in standard testing at two consecutive milkings each month.

The second point of interest in understanding the development of dairy herd improvement work is the dependence of an association upon one man. This one indispensable man—the tester, later named supervisor—is the sole employee of the association. The quality of work, the continuity of record data, and the association itself depend upon his capabilities and interest and upon the availability of his replacement in time of need.

The Supervisor and His Job

A supervisor's work with a traditional association requires that he visit each farm on two consecutive milkings. He must be present at night milkings as late as 9 p.m. or later and at morning milkings as early as 4 a.m. or earlier. In the evening he weighs the feed and milk of each cow and takes a sample of the milk for testing. He records all

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[2]The average number of herds on standard test per association in Vermont each year for the years 1919-1958 ranged from sixteen to twenty-four, the most common number being twenty.

figures in a barnbook from which he transfers them to a herd-record book. The barnbook is his record of the work and the herdbook the farmer's record. The following morning the supervisor again weighs the feed and milk and takes another sample for testing. He mixes the two samples thoroughly and tests the composite for butterfat.

The day the test is made is considered as the middle day of the testing period. The record of that day is multiplied by the number of days in the period to obtain monthly data. During the year, as each cow completes the first 305 days of her lactation, the supervisor is expected to report her production record, together with her breed, date of birth, date of freshening, identification number, and the identification numbers of her sire and dam, to the extension dairyman in charge of dairy herd improvement work. At the end of the testing year he is expected to summarize the herdbooks and prepare a complete report of the year's work, which includes feed and production data and returns above feed costs, both individually and collectively, for all of the cows in each herd on test.

The qualifications desired in a supervisor were first outlined as follows: "The ability accurately to make a Babcock test is but one of the many necessary attributes which this employee should possess. He must be neat, accurate, a rapid workman, must handle figures easily and accurately, write plainly; must be obliging,

tactful, pleasant in his bearing, and well informed concerning agricultural matters in general and dairy matters in particular."[3] "The number of men who are both mentally and temperamentally fitted to undertake it (the work) is small."[4]

A statement made in 1910 describing the job and the financial return accurately forecast one of the major problems which has confronted dairy herd improvement work to the present day. "The main difficulty, however, is and bids fair to be the lack of adequate test operators. The stipend does not attract the men who are best adapted to this line of work. . . . It is a confining and an irksome kind of work. It is sometimes difficult to keep men at it a second year, for the chance of advancement is not great and the routine becomes monotonous. It is not clear just how this difficulty may be met, and it may well prove to be the limiting factor in the increase in the number of these associations, both here and elsewhere."[5]

Participation and the Indispensable Man

The historic dependence of an association upon its sole employee coupled with the chronic difficulty of hiring

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[3]Joseph L. Hills, "A Year's Record of Three Vermont Cow Testing Associations," Cow Testing Association Number, Vermont Agriculture Bulletin No. 5 (Montpelier: Capital City Press, 1910), p. 7.

[4]Hills, 31.

[5]Hills, 31.

and retaining qualified workers has resulted in a continuous turnover in associations as well as violent fluctuations in association numbers. The latter plummeted from the growth peak of forty-two active units reached as early as 1916 to twelve in 1919; and from forty-three in 1941 to twenty-three in 1944 (Fig. 1). These two drastic declines were in each instance closely associated with war service demands for men, and with the prevalence of alternative job opportunities.

Less dramatic fluctuations, each tied closely to the availability of supervisory workers, have occurred throughout the history of the program. In 1924, when association numbers had dropped to fourteen (from twenty-one two years earlier), it was stated: "It is very difficult to secure supervisors for cow test associations, and due to this cause it has been necessary to discontinue some associations."[6] In 1926: "The shortage of testers of the right type has kept down association work and discouraged many from remaining with an association when a new untried tester was put in charge."[7] Incidentally, in 1926, 62 percent of the associations changed testers at least once;

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[6]Stanley G. Judd, "Annual Report of the Dairy Specialist, December 1, 1922 - December 1, 1923" (unpublished data, Vermont Agricultural Extension Service, The University of Vermont), p. 5.

[7]Edward H. Loveland, "Annual Report of the Dairy Specialist, December 1, 1925 - December 1, 1926" (unpublished data, Vermont Agricultural Extension Service, The University of Vermont), pp. 3-4.

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Less dramatic [illegible] closely to the availability of [illegible] resources throughout the [illegible]. In 1926, when association numbers [illegible] (from twenty-one two years earlier), it was stated: "It is very difficult to secure supervisors for our herd associations, and due to this cause it has been necessary to discontinue some associations."[6] In 1926: "The shortage of testers of the right type has kept down association work and discouraged many from remaining with an association when a new tester was put in charge."[7] Inadequacy, in 1926, 62 percent of the associations employed testers at least once;

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[6]Stanley G. Lund, "Annual Report of the Dairy Specialist, December 1, 1922 - December 1, 1923" (unpublished data, Vermont Agricultural Extension Service, The University of Vermont), p. 5.

[7]Edward H. Loveland, "Annual Report of the Dairy Specialist, December 1, 1925 - December 1, 1926" (unpublished data, Vermont Agricultural Extension Service, The University of Vermont), pp. 3-4.

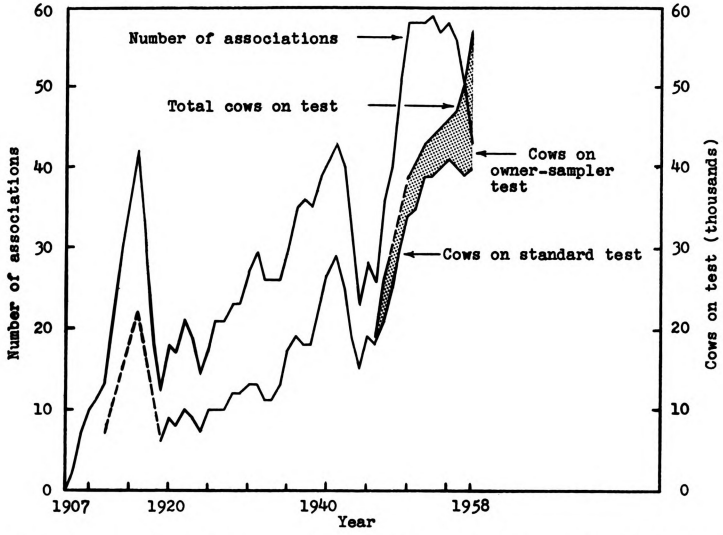

Fig. 1.—Comparison of number of dairy herd improvement associations and number of cows on standard test and owner-sampler test for given years 1907-1958.

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one changed five times in three months. In the following year, 90 percent changed at least once.

Only during the depression years of the early 1930's was there no problem in securing or retaining testers. In 1931: "There has been less shift in testers in the associations than usual, and also a larger number of applicants."[8] In 1932: "Many of the testers are better satisfied to remain now even at a lower price, than take the chance of finding a new job."[9] However, as economic conditions improved and as early as 1936, the old cry, "it is becoming harder each year to hold good testers on the job,"[10] was resumed. This statement has been repeated in one way or another to the present day.

Participation and Innovations in the Program

Two developments have had significant influence upon the expansion of participation in dairy herd improvement work. Each was designed to increase efficiency in the use of a supervisor's service. The influence of the first innovation—bimonthly testing—was of short duration. This procedure, sponsored by United Farmers Cooperative Creamery, was introduced in 1939, and discarded three years

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[8]Loveland, "Annual Report . . ., December 1, 1930 - December 1, 1931," 13.

[9]Loveland, "Annual Report . . ., December 1, 1931 - December 1, 1932," 12.

[10]Loveland, "Annual Report . . ., December 1, 1935 - December 1, 1936," 8.

later as a result of difficulties in securing capable supervisory help. During its brief existence, this program expanded to include eight associations, each of which serviced nearly twice the normal number of herds. The program accounted for 70 percent of the increase in cows on test in the entire state in 1939, and 73 percent of the increase in 1940. In just two years the share of cows on test in the two counties most affected jumped from less than 5 percent in each county to 10 percent in one, and 19 percent in the other.

The second innovation—owner-sampler testing—again sponsored by United Farmers, was introduced in 1945. This new program, as well as a similar one subsequently sponsored by the Whiting Milk Company, was of short duration.

In regard to innovations in testing procedures, it should be noted that cattle breeders have an incentive, whether or not recognized, to perpetuate the standard test. Why? It is required by breed associations and by common acceptance in authenticating production records. Thus, while the system provides unnecessary and costly objective production data for commercial milk producers, their participation shares or subsidizes the cost of this service to breeders.

Owner-sampler testing has, however, assumed an important place in dairy herd improvement work. In fact, owner-sampler testing, in conjunction with central testing

laboratories, has been responsible for most of the expansion in participation since 1953 (Fig. 1). Over the five years (1953-1958), the number of cows on standard test has leveled off at about 40,000, or 15 percent of the dairy cows in the state. During the same period, the number on owner-sampler test has increased from approximately 5,000, or 2 percent, to 20,000, or 8 percent of the cows in the state. In fifty years of dairy herd improvement work, the program has thus expanded to include approximately 23 percent of the dairy cows in Vermont.

Central Testing Associations

Five central testing associations are operative in Vermont. The first was organized in Orleans County in 1948. It replaced the one small local unit operating in the area. This central association was patterned after similar ones in Wisconsin. It was the first non-sponsored association in Vermont to offer owner-sampler testing and the first to provide test and record service to all interested dairymen within a county.

The second central association, organized five years later in Lamoille County, resulted from the merger of two locals. The locals—each of which was in need of a tester—united in an effort to create a single organization strong enough to finance the hiring of one capable supervisor.

Two more central associations were established three years later—one in Rutland County and the other in Windsor and Windham Counties. The Rutland association was organized from the membership of three geographically scattered locals. Although an attempt was made to establish this organization as a countywide unit, the three better associations in the county chose not to unite. The Windsor-Windham association was organized to serve dairymen in parts of both counties. Its membership also came from three scattered locals. It too failed in an attempt to unite three strong locals operating within the same area.

The fifth and last central association to be organized in Vermont was established in Franklin County in 1957. This association was initiated through the action of a local supervisor who, in 1956, took over the supervision of two local units. The following year this combined unit absorbed a third local and, with the assistance of the county extension agent, was organized as a central testing association. Again an attempt was made to expand the initial membership to include participants of all associations in the county. However, the five remaining units chose to maintain their local status.

These five central testing associations differ from traditional associations in several important ways. Differences can be most meaningfully defined by first listing their common characteristics and then their points of

departure. Each performs owner-sampler testing, employs more than a single worker, and practices some degree of job specialization—all of which enables each to operate more efficiently than a traditional association in terms of cows and herds tested per worker. At the same time, each central association differs from the other four as well as from traditional associations. Obvious dissimilarities concern size, share of members on standard and owner-sampler test, division and specialization of labor, growth, and physical facilities.

Observations

The expansion of dairy herd improvement work in Vermont has, historically, been faced with one major deterrent—the difficulty of hiring and retaining qualified workers. Until recent years, sampling procedure has limited membership in a local association to the number of herds one supervisor could visit on two consecutive milkings each month. Participation in dairy herd improvement work has, accordingly, varied directly with the number of associations functioning at any particular time. The number of active associations has, in turn, depended almost entirely upon the availability of men willing to work as supervisors at the wages offered. Dairymen in local associations have never demonstrated an interest in raising wages to a level sufficient to attract and keep good men. Thus, the number of associations and the number

of participants have fluctuated with the availability of alternative job opportunities. At the same time, a large share of the time and effort extension workers have devoted to dairy herd improvement work has been used in locating and training supervisors, and in other necessary organizational and promotional activities; a comparatively small share has been devoted to educational activities.

Owner-sampler testing—an alternative sampling procedure whereby each dairyman takes his own samples—provides substantially the same test and record data as the standard test. However, the data so obtained does not receive official recognition from the breed associations. Consequently, it is of no value to a purebred cattle breeder interested in establishing official records to enhance the sales value of his stock. Yet, this procedure, by eliminating the necessity for the supervisor's presence at two consecutive milkings each month, has increased the number of herds one man can handle.

The establishment of associations operating with central laboratory and office facilities, in conjunction with owner-sampler testing, has further enhanced the efficiency of supervisory help and has thus paved the way for increased participation among the commercial dairy herds within an area. Such associations have the potential to: (a) pay competitive wages without raising fees to participants through economies of scale, job specialization,

and wage differentials among employees; (b) remove possible physical limitations on participation within an area through increased flexibility of association size; (c) provide neighboring dairymen with substantially the same data at a differentiated cost through owner-sampler testing and standard testing; (d) relieve uncertainty as to continuity of service through the flexibility of a larger staff and the stabilizing influence of competitive wages; (e) improve the quality of service provided through the employment of qualified and superior-trained workers; (f) relieve extension of the unproportionate share of time and effort required in locating and training supervisors and in performing other necessary organizational work; and (g) enable the association to adopt a more businesslike accounting system.

Unfortunately, none of the five associations is so organized or operated as to realize all of the potential advantages of a central testing association.[11] However, they have been successful in removing any fixed limitation on the number of participants within the wide areas which they service.

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[11]This conclusion is supported by the author's unpublished time-cost analysis of associations operating with central office and laboratory facilities.

CHAPTER III

FACTORS ASSOCIATED WITH PARTICIPATION

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Characteristics of Farms and Farmers

Participation in a dairy herd improvement program, in areas serviced by central testing associations, is open to all dairymen. Yet in any given year, even in these areas, fewer than one dairyman in four is enrolled. Do dairymen who participate, drop out, or never join differ in recognizable ways? To test the hypothesis that participation is associated with certain personal and economic characteristics of farms and farmers, comparisons were made of nine selected variables. These were chosen because it was felt that they would give an informal cross section of the interests, knowledge, and managerial ability of each participation group. Knowledge of these characteristics should be valuable in planning adjustments in the program to better meet the needs of the one dairyman in four who participates, as well as those of the three out of four who have dropped out or have never joined.

Age.—Participation is associated with age to the extent that dairymen who dropped out of the program are

significantly[12] younger than dairymen who never joined. The average age of ex-participants was forty-three years. Nonparticipants were forty-eight years old. Ex-participants were also younger than participants—average age forty-six years—but not significantly so.

The age distribution of dairymen within groups emphasizes the comparative youth of dairymen who dropped out. Nearly three out of four were between thirty-one and fifty-two years of age. Only one of two dairymen in the other participation groups were of similar age; more than twice as many were older than fifty-two years.

The fact that the majority of dairymen who dropped out did so in their most productive years has implications as to the usefulness of test and record data to them. It would appear, for one reason or another, that they were not deriving potential benefits from information provided.

Education.—Participants completed a significantly higher level of formal education than nonparticipants. The average level attained by dairymen varied among groups as follows: participants, 11.2 years; ex-participants, 10.3 years; and nonparticipants, 9.1 years. Differences between participants and ex-participants, and ex-participants and nonparticipants were not significant.

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[12]The significance of difference between sample means was uniformily tested following the procedure outlined in footnote 1, p. 12.

The lower level of formal education attained by nonparticipants is most apparent from the following figures: 88 percent completed grade school as compared with 94 percent of the other participation groups; only 20 percent completed high school as compared with 68 percent and 43 percent respectively of participants and ex-participants; and but 2 percent completed a year or more of college as compared with 30 percent of the participants and 11 percent of the ex-participants.

Since level of education is associated with participation, it might be inferred that dairymen who dropped out or never joined lacked the formal education necessary to use test and record data. However, it seems more likely that level of education is only incidentally associated with participation and is not in itself a limiting factor. This conclusion is reached in view of their average level of formal education, the simple nature of the information provided, and the relatively low degree of knowledge required for practical application.

Social participation.—An understanding of the degree of leadership exercised by dairymen in each participation group is important to this study. It serves to identify dairymen of each group. Of greater importance, it has implications concerning possible limitations to enrollment in the program in Vermont. As discussed in Chapter II, the organization and method of operation of

traditional associations tend to limit enrollment within an area to the number of dairymen one supervisor can visit on two consecutive milkings each month. Thus, to the extent that a local association includes the leaders of an area, the formation of successive associations would be expected to become progressively more difficult. Each would be confronted with an increasingly greater leadership problem.

Participation in community activities is frequently an indication of community leadership. The Chapin Social Participation Scale[13] was used in an attempt to determine variations in leadership exercised by dairymen of each participation group. This scale measures the degree of a person's or family's participation in community groups and institutions. It repeatedly gives high degrees of correlation between scores and community leadership activities. Scores were developed from respondents' replies to questions concerning membership in formal organizations, regularity of attendance, whether or not they made financial contributions, and if they were currently holding an office or serving on committees. The same questions were asked regarding the spouse. In scoring, points were given for membership, extent of activity, and other factors. Scores were ranked as

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[13]F. Stuart Chapin, Experimental Designs in Sociological Research (New York: Harper and Brothers, 1955).

follows: 0-9, inactive to slightly active; 10-19, moderately active; 20-29, active; and 30 and up, very active.

Participants attained an average score of 12—significantly higher than ex-participants or nonparticipants who scored 6 and 4 respectively. This could be interpreted to indicate that the average participant in a dairy herd improvement association was moderately active, and possibly a leader, in his community. In contrast, the average ex-participant or nonparticipant was at best but slightly active in formally organized community groups.

The distribution of "leaders" within and among groups as illustrated in Fig. 2 offers a more effective means of comparison. This shows that 56 percent of the participants classified as inactive to slightly active, compared with 72 percent and 84 percent of ex-participants and nonparticipants respectively. At the other extreme, 13 percent of the participants were very active, compared with only 2 percent of the ex-participants and no nonparticipants. On a Social-Participation-Scale base, dairymen who do not participate appear to lack the leadership that is essential in organizing and operating a dairy herd improvement association.

Concept of a "good" rate of production.—Production per cow has long been recognized as an important factor influencing the profitability of a dairy farm business. Assuming economic rationality, dairymen can be expected to

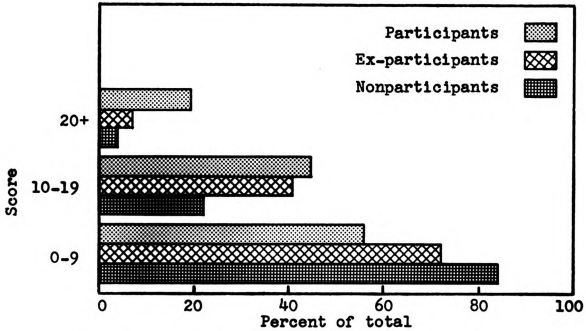

Fig. 2.—Scores of three participation groups denoting community leadership based on the Chapin Social Participation Scale.

be aware of the importance of attaining good production; and, therefore, to have some goal or standard which signifies a good production level.

To determine whether differences existed among participation groups in knowledge of or ability to recognize good production standards, each dairyman was asked: "What do you consider to be a good rate of production per cow as a herd average?" It was explained that the inquiry was directed towards no particular herd. This was done so that the level reported would not be limited by what the individual felt to be the productive potential of his own herd.

Opinions as to what constitutes a "good" rate of production on an annual basis were not significantly different among groups. The average "good" levels cited were as follows: participants, 10,049 pounds; ex-participants, 10,268 pounds; and nonparticipants, 9,279 pounds. However, dairymen who had never joined a test and record program differed from participants and ex-participants in at least three respects as related to their concept of a "good" level of production. First, 14 percent of the nonparticipants, as compared with no dairyman in the other participation groups, were unable or unwilling to state an amount of milk that would constitute a "good" level. Second, 26 percent of those nonparticipants who had some concept of a "good" level of production stated it in terms of a daily rate rather than an annual. Thirteen percent of the ex-participants

reported in this manner, and but 2 percent of the participants. Daily rates have considerably less value than annual rates as a standard of production. One reason is that daily rates are not likely to give sufficient recognition to differences among animals in persistency of production and in butterfat content of milk.

Nonparticipants also differed from the other two groups in that only about one-half (52 percent) of those who cited a "good" level of production stated amounts in excess of 8,500 pounds per cow. This compares with 84 percent and 83 percent of participants and ex-participants respectively. These differences indicate that nonparticipants are less aware than other groups of "good" production levels. This is undoubtedly an important factor influencing their interest in participating in dairy herd improvement work.

Knowledge of recommended feeding standards.—Knowledge of the nutritional requirements of dairy cows as influenced by differences in milk and butterfat production is essential in attaining maximum benefit from participation in a dairy herd improvement program and, incidentally, in the profitable operation of dairy herds.

To determine whether differences existed among participation groups in knowledge of recommended grain feeding standards, each dairyman was requested to indicate the amount of concentrates required under given circumstances. The question: "We would like to get your views

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as to how much grain (dairy ration) is necessary during the barn feeding season in order to maintain milk production. Assume these cows test the same as your herd and that they are getting all the good quality roughage they will eat. How much grain is required to maintain daily production (for stated quantities of milk)?" At this point, each respondent was given a card which listed eight levels of "daily milk production" and provided space for recording "grain required" at each level.[14] Suggested rates at five[15] levels of production were scored using Morrison's feeding standards as a base.[16] Recommended quantities allowed for a range in quantity and quality of roughage and for variations in butterfat content of milk.[17] Scores were

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[14]Generally, the respondent studied the card and gave verbal replies which were recorded by the enumerator on the field questionnaire. A very few dairymen volunteered that they would not normally determine grain feeding requirements without reference to a feeding chart or table.

[15]The lowest level (twelve pounds) and the highest levels (eighty-four and ninety-six pounds) were not scored; the former because recommended amounts are so largely dependent upon circumstances peculiar to each farm operation, and the latter because the highest levels were believed to be beyond the experience of most dairymen.

[16]F. B. Morrison, Feeds and Feeding (22d ed.; New York: The Morrison Publishing Company, 1956).

[17]Recommended requirements at each production level represent a range, the limits of which were determined by roughage quality (ranging from "two and a half pounds—very liberal feeding of good roughage—to two pounds—usual rate of feeding good hay or good hay and silage"), and butterfat content of milk (in categories of less than 3.8 percent butterfat; 3.8-4.2 percent; 4.3-4.7 percent; 4.8-5.2 percent; and 5.3 percent or more).

computed arbitrarily at each production level by subtracting five points from a possible score of 100 for each pound that the suggested amount of grain either exceeded or fell below the recommended range. Thus, the conformity of dairymen's views of feed requirements with recommended amounts is directly related to scores received.

The mean score received by participants for the five levels of production was 75. As indicated by scores received at each production level, participants were generally aware of recommended feeding standards at low levels of production,[18] but were very inadequately informed at high levels (Fig. 3). Of equal significance, participants who suggested amounts outside the recommended range more frequently overstated requirements at low production levels and understated requirements at high levels (Table 1).

The mean score received by ex-participants was only slightly lower than that of participants—73 as compared with 75. Furthermore, ex-participants' opinions as to grain requirements paralleled those of participants'—they too were better informed at low production levels than at high levels. A greater share overstated requirements at low levels and understated requirements at high levels. Yet in one respect ex-participants demonstrated

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[18]At least their opinions as to required amounts generally coincided with recommended amounts.

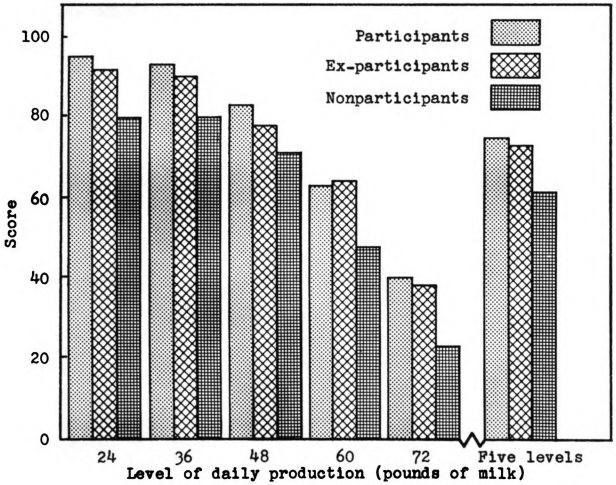

Fig. 3.—Scores of three participation groups denoting knowledge of recommended grain feeding rates at various production levels.

TABLE 1.—Comparison among participation groups of proportion of dairymen suggesting grain requirements within, above, or below recommendations at given levels of

TABLE 1.—Comparison among participation groups of proportion of dairymen suggesting grain requirements within, above, or below recommendations at given levels of production*

Level of daily production+	Participants			Ex-participants			Nonparticipants		
	Within	Above	Below	Within	Above	Below	Within	Above	Below
Pounds of milk	Percent								
24	68	22	10	65	21	14	48	34	18
36	55	8	37	51	8	41	44	16	40
48	24	1	75	23	4	73	28	8	64
60	12	4	84	10	4	86	14	2	84
72	5	1	94	2	-	98	4	2	94

*Feeds and Feeding (22d ed.), by F. B. Morrison, used as base in determining requirements. Recommended requirements represent a range, the limits of which were determined by roughage quality (ranging from "two and a half pounds—very liberal feeding of good roughage—to two pounds—usual rate of feeding good hay or good hay and silage"), and butterfat content of milk (in categories of less than 3.8 percent butterfat; 3.8-4.2 percent; 4.3-4.7 percent; 4.8-5.2 percent; and 5.3 percent or more).

+Butterfat test same as that of respondents' herds.

less knowledge of grain requirements than participants. They scored less at the twenty-four-, thirty-six-, and forty-eight-pound daily production levels. At the sixty-four- and seventy-two-pound levels, where both groups were inadequately informed, scores were more nearly equal.

Dairymen who had never joined a test and record program received a mean score of 61—significantly lower than the scores received by the other participation groups. Although their views as to grain requirements to maintain production at given levels generally paralleled those of dairymen in other groups, their scores were lower at every production level. A considerably larger share was unable or unwilling to estimate needs at each level.

The preceding data indicate that differences exist among groups in knowledge of nutritional requirements to maintain production at given levels. Participants' views coincide most closely with recommended nutritional standards. The apparent lack of understanding of feed requirements on the part of ex-participants and nonparticipants undoubtedly limits their awareness of the potential usefulness of test and record data to them. Beliefs which inhibit the application of good feeding practices may very well be an important factor limiting participation in the program.

Knowledge of own production and feeding practices.—Dairymen of each participation group were questioned to determine their knowledge of production factors important

to every dairy farm business. The question: "Without referring to your last year's records, what is your best estimate of: the amount of grain you fed per cow; your average production per cow—milk and butterfat; your average butterfat test; your average milk-grain ratio?"

Participants' replies were evaluated for accuracy by using test and record data as a base. Unfortunately, equally reliable data were not available for the other participation groups. For ex-participants and nonparticipants, it was necessary to determine milk and butterfat production per cow and grain fed per cow from total figures—some of which were themselves estimates. Total milk production and butterfat test of milk were obtained from sales receipts. Total grain fed was an estimate obtained with the assistance of an enumerator who asked: "How often do you buy grain?" "How much do you buy each time?"—and related questions to provide a calculated estimate of the quantity purchased for cows. To obtain per cow data, these totals (milk and grain) were divided by the average of the estimated number of cows milking and dry at the beginning and end of the year. Comparisons among groups as to accuracy of estimates on a per-cow basis are, therefore, open to criticism. However, the author is satisfied that the data are sufficiently comparable for indicating possible differences among participation groups in knowledge of these factors.

The evaluation of replies obtained indicates two possible areas of difference among groups. One concerns the proportion of dairymen able to recollect or willing to estimate these data; the other, the accuracy of the estimate. To facilitate comparisons among groups, replies were scored using a procedure which gave weight to the number of specified relationships estimated or recollected, and to the accuracy of the figures stated.[19] The mean scores received, according to this scoring procedure, were as follows: participants, 84; ex-participants, 68; and nonparticipants, 46. Differences among groups are statistically significant.

A brief review, by participation groups, of the proportion estimating and the accuracy of their estimates, provides a more easily recognized comparison of existing differences. It clearly demonstrates that participants were able to recollect, or willing to estimate, production factors to a greater extent than dairymen who dropped out or never joined the program. At the same time, it illustrates that certain production factors are more

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[19]Scores represent the reciprocal of the sum of the percentage difference in estimated and actual data (concerning grain fed per cow, milk production per cow, butterfat production per cow, and milk-grain ratio) divided by the number of estimates.

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familiar than others. Of greater significance, it reveals that even participants were generally not well informed of data obtained from their test and record program.

Participants are generally unaware of the amount of grain fed per cow and of their milk-grain ratio. Only 53 percent were willing to estimate, or able to recollect, the amount of grain fed per cow; a third of these—18 percent of the entire group—estimated within ± 10 percent of the actual quantity fed (Table 2). Eighty-eight percent estimated their milk-grain ratio; however, only a third of those estimating—29 percent of the entire group—estimated within ± 10 percent.

Participants were better informed as to milk and butterfat production per cow than grain fed or milk-feed ratio. They were best informed as to butterfat test of milk. Eighty-two percent estimated production per cow; 72 percent of these—59 percent of the entire group—estimated within ± 10 percent. Seventy-two percent estimated butterfat production per cow; 74 percent of these—53 percent of the entire group—estimated within ± 10 percent. Nearly nine out of ten estimated butterfat test of milk, and 94 percent of those estimating—81 percent of the entire group—estimated within the 10 percent range.

Ex-participants differed from participants in that proportionately fewer were willing or able to estimate production relationships; and with one exception,

TABLE 2.—Comparison among participation groups of knowledge of own production

TABLE 2.—Comparison among participation groups of knowledge of own production and feeding practices

Relationship	Participants			Ex-participants			Nonparticipants		
	Share estimating	Share estimating within ± 10 percent		Share estimating	Share estimating within ± 10 percent		Share estimating	Share estimating within ± 10 percent	
		Of those estimating	Of entire group		Of those estimating	Of entire group		Of those estimating	Of entire group
	Percent								
Grain fed per cow	53	33	18	45	33	18	34	18	12
Milk produced per cow	82	72	59	79	29	24	52	8	4
Butterfat produced per cow	72	74	53	51	19	10	18	0	0
Butterfat test of milk	86	94	81	83	86	74	92	93	86
Milk-grain ratio	88	33	29	74	18	14	60	17	10

proportionately fewer of those estimating (and fewer of the entire group) estimated within the 10 percent range (Table 2). Differences between participants and ex-participants were greatest in ability to estimate milk and butterfat production. Only 24 percent of the ex-participants, as compared with 59 percent of the participants, estimated milk production within the 10 percent range; only 10 percent, as compared with 53 percent, estimated butterfat production within this range.

Nonparticipants had little or no knowledge of the production relationships cited other than the butterfat content of their milk (Table 2). With this one exception, the proportion estimating, and the proportion estimating within the 10 percent range, was considerably smaller than either of the other groups. Actually, no dairymen in this group estimated butterfat production per cow within ± 10 percent of the actual figure. Only 4 percent estimated milk production within the 10 percent range; 10 percent estimated milk-grain ratio within the 10 percent range; and 12 percent estimated grain fed per cow within the 10 percent range. However, 86 percent—more than either other group—estimated butterfat content of milk within ± 10 percent of the actual figure. One explanation for their ability to correctly estimate butterfat test is the fact that this figure appears on biweekly milk receipt stubs and is a factor influencing the price received per hundredweight of milk sold.

Size of herd.—The mean size of herds by participation groups was as follows: participants, thirty-six cows; ex-participants, thirty-six cows; and nonparticipants, thirty-one cows.[20] Differences among groups are not statistically significant.

It would appear that herd size is not a factor influencing dairymen to drop out of the program. At the same time, it appears that owners of small herds are less likely to be enrolled in the program. This fact would certainly have been more pronounced had nonparticipants keeping fewer than fifteen cows been included in the sample.

In the areas surveyed, the availability of service was not limited. Thus, the tendency for nonparticipants to include a disproportionate share of small farms is undoubtedly associated with their interest in participating. However, in other areas of the state where the opportunity may be more restricted, institutional factors are likely to contribute to this tendency. Consider these facts. In such areas, the number of herds a supervisor can service is generally limited; yet his wages are directly related to the number of cows tested. Thus, the system provides

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[20]The number of cows kept by participants was determined from DHIA (standard or owner-sampler) records and represents the average number of cows on test for the record year ending in 1958. The number of cows kept by ex-participants and nonparticipants was determined by asking the number of cows milking and the number dry on January 1 and December 31, 1957, and computing a simple average.

a built-in incentive for enrolling large herd owners, even to the extent of discouraging small ones.

Production per cow.—Participation and production per cow are closely associated.[21] The mean level of production per cow in herds on test was 8,700 pounds. Production in herds which were at one time on test was 6,800 pounds per cow—nearly 2,000 pounds less than in participants' herds. Production in nonmembers' herds was 5,700 per cow—3,000 pounds less than in herds on test, and 1,000 pounds less than in herds formerly enrolled in the program. Differences between sample means among groups are statistically significant.

Production per farm.—The quantity of milk produced or sold is the most adequate measure of the size of a Vermont dairy farm business. It is especially meaningful as a measure of size when drawing comparisons among groups arbitrarily segregated into categories having widely differing levels of production per cow. According to this criterion, participation is closely associated with size of business.[22]

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[21]Production in participants' herds represents annual average production per cow on test for the record year ending in 1958. Production per cow in ex-participants' and nonparticipants' herds was determined from actual sales for the calendar year 1957. All production figures were converted to a 4.0 percent fat corrected basis.

[22]Refers to total production on participants' farms; total sales on ex-participants' and nonparticipants' farms.

The mean level of production attained by participants amounted to 309,000 pounds of 4.0 percent milk per farm. Ex-participants' sales amounted to 243,000 pounds per farm—about 20 percent less than participants'. Non-participants' sales amounted to 173,000 pounds—about 40 percent less than participants' and 30 percent less than ex-participants'. Differences between sample means among groups are statistically significant.

Participation as a Source of Useful Information

The primary purpose of a dairy herd improvement association is to provide its members with useful information. This information presumably has value to dairymen in making decisions leading to profitable adjustments in their operations. These adjustments commonly fall in the areas of feeding and herd improvement through culling and breeding.

Two approaches were taken in an attempt to evaluate the usefulness of test and record services. First, dairymen were questioned to determine factors influencing their decisions in each of four herd management areas. It was felt that knowledge of the factors considered by each group would demonstrate the usefulness of the data; and further, that differences among groups would provide an insight as to why some dairymen drop out and others never join.

Secondly, an attempt was made to determine dairymen's opinions as to the adequacy of test and record services. Questions dealt with: (a) felt needs for supplemental information and for changes in information or services currently provided; (b) opinions concerning the amount and quality of assistance received from supervisors and county agents; and (c) opinions as to how well the local association was functioning. It was felt that dairymen's opinions, as these suggest changes, adjustments, or educational opportunities, must ultimately be of concern to persons interested in expanding participation.

Factors considered in feeding concentrates.—Test and record data could have their most general application in determining the quantity of dairy ration to feed each animal. Dairy nutrition specialists, production economists, and other experts stress the importance of relating the amount of concentrates fed to the amount of milk and butterfat produced. Response to questions asked in the survey indicates that nearly all dairymen of each group (99 percent) also felt that the amount of grain fed should be related to production.

At the same time, dairymen of each group reported numerous other factors which weighed in their grain-feeding decisions. They said that they considered prices, price ratios, and the quantity and quality of roughage available in determining total concentrates for the herd. In

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determining the ration for each animal, they considered the obvious physical characteristics, such as condition, stage of lactation, and age, as well as production. Unfortunately, the response to questions asked was not adequate to measure the influence of knowledge (or lack of knowledge) of individual production on the amount of concentrates fed. However, dairymen of each participation group revealed certain beliefs, as well as a lack of knowledge of production response to grain feeding, which seriously inhibit their use of production data in feeding.

Sixty-nine percent of the participants felt that, regardless of production, a cow should never be fed above a certain quantity of dairy ration, commonly twelve to sixteen pounds per day. This belief was volunteered in response to a question concerning the amount of concentrates required to maintain various levels of production under given circumstances.[23] Frequent replies were: "None of our cows ever get more than twelve pounds of grain no matter how much they are producing." "Fourteen pounds is about all you can feed them." "Wouldn't feed over sixteen pounds." It is inferred that at least two of every three participants were therefore unaware of the potential use of individual production data in grain feeding. Knowledge

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[23]Barn feeding season; unlimited roughage of good quality; breed of cows and butterfat test similar to operator's herd.

of individual production could not, by any standard, receive an adequate weight in their grain-feeding decisions. A common lack of understanding of production response to grain feeding supports this inference.

Knowledge of production response was investigated as follows: Participants were asked to estimate the daily ration of concentrates that should be fed under certain assumed conditions[24] to maintain daily production of thirty-six pounds of milk. They were then asked to estimate current production assuming (a) a four-pound increase in daily concentrate feeding and (b) a four-pound decrease in daily concentrate feeding. Further, they were requested to assume that these four-pound differentials from their normal graining schedule had been maintained since freshening.

The accepted theory that milk production increases at a decreasing rate as additional quantities of grain are fed was used as a basis for evaluating replies. Knowledge of production response was assumed for all dairymen whose production estimates met this criterion, that is, those whose estimated production curve was consistent with the theoretical response curve. Two conditions were thus necessary for a dairyman to be considered knowledgeable of production response to grain feeding. First, he must

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[24]Barn feeding season, unlimited roughage of good quality, breed of cows, and butterfat test similar to operator's herd.

have estimated an increase in production for the higher grain-feeding level and a decrease in production for the lower grain-feeding level. Secondly, the added output at the higher grain-feeding level must have been less than the reduced output at the lower feeding level.

Fifty percent of the participants offered estimates which met these conditions—they, optimistically, have some knowledge of milk response to grain feeding. Forty percent failed to meet the criteria. Their replies illustrate a definite lack of knowledge. Ten percent were unwilling or unable to estimate changes in production in response to changes in the amount of grain fed.

Ex-participants and nonparticipants faced an even greater handicap than participants in feeding grain according to production. First of all, many of these dairymen had no accurate measure of production. One in five ex-participants and one in three nonparticipants felt that they could determine production adequately by observation—"I look in the pail." Although the remainder stated that they kept their own records, it is highly doubtful that they did so. In addition to inadequate production data, 63 percent of the ex-participants and 78 percent of the nonparticipants were inhibited by beliefs concerning the maximum amount to feed. Further, less than half of either group (30 percent of the ex-participants and 44 percent of the nonparticipants) met the conditions believed to

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demonstrate some understanding of production response to grain feeding. Fifteen percent and 22 percent respectively were unwilling or unable to estimate changes in production in response to the amount of grain fed.

Factors considered in culling.—Test and record data have limited application in culling the herd. A major reason for this is the fact that the majority of animals removed from herds are disposed of for reasons other than their inherent production ability. Furthermore, many dairymen choose not to remove their poor producers even when they are recognized as such. Possible reasons include the lack of sufficient financial resources to purchase replacements and the feeling that the risk of obtaining an unsatisfactory replacement is too great. Under these circumstances, dairymen prefer to minimize their losses by keeping a poor producer. Simple budgeting supports the old adage that a poor cow is likely to be more profitable than an empty stall.

The usefulness of test and record data in culling was determined by asking farmers to classify their reasons for selling all cows that were sold. They were first questioned to establish the number of cows sold during the year. Then, they were asked the number sold for each category of reasons as listed in Table 3.

Seven out of ten participants reported that they sold cows because they were low producers; yet only 32

TABLE 3.—Reasons for selling cows sold

Reason for selling*	Share of farmers selling cows for reason stated			Share of cows sold for reason stated		
	Partici-pant	Ex-par-ticipant	Nonpar-ticipant	Partici-pant	Ex-par-ticipant	Nonpar-ticipant
Disease or breeding trouble	83	77	74	43	33	39
They were low producers	70	70	42	32	33	21
They were old	39	23	38	9	9	18
They were slow or hard milkers	11	17	6	2	3	1
They were the buyer's choice	10	8	4	5	19	1
Other reasons	11	6	12	9	3	21

*Refers to primary reasons for selling a particular animal.

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percent of the cows sold were disposed of for this reason. The share of ex-participants selling low producers and the share of animals sold for this reason was essentially the same.

Nonparticipants were less concerned with production levels in culling. A smaller share (four out of ten) sold animals because they were low producers; furthermore, only 20 percent of the cows they sold were disposed of because of low production. Nearly the same share (18 percent) and twice as many as the other groups (9 percent) were sold because they were old.

Factors considered in herd improvement.—Participation in a test and record program is not of itself recognized as an important factor in improving the productive capacity of the herd. However, participants do recognize the importance of practices which directly or indirectly depend upon the availability of data and services provided by the program.

When asked specifically, "What are you doing to improve the productive capacity of your herd?" only 15 percent mentioned that they were participating in a dairy herd improvement program. The largest share (63 percent) mentioned artificial breeding. Thirty-one percent gave replies classified as "better feeding and management." Other frequently mentioned practices were culling, 28 percent; use of good bulls, 24 percent; and selection of

calves, 22 percent. The question was not pursued to determine the extent that participants use their records in breeding or in selecting replacements.

Ex-participants emphasized the same practices as participants with the exception of "participating in a test and record program." Nonparticipants mentioned artificial breeding less frequently and the use of good bulls more frequently than other groups.

Adequacy of information.—Dairymen enrolled in the program and those who had dropped out[25] were questioned to determine whether they had ever felt a need for more information in order to make better use of test and record figures in each of the four herd management areas. Those who reported having felt such a need were asked what sort of information[26] would have been of most help.

Response to these questions indicates that dairymen were generally satisfied that the information provided them was adequate for their needs. There are a number of possible explanations for this—the information received fulfilled the needs of most dairymen; dairymen failed to realize

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[25]The specific questions asked of ex-participants were worded to refer to the time when they participated in the program.

[26]Respondents were free to interpret information to mean basic data concerning herd performance; or in a broader sense, to mean knowledge concerning production response, prices, farm practices, and the like.

what basic data would be useful; or they were unable to recall felt needs. At any rate, a relatively small share of either group reported having felt the need for more information. Furthermore, the proportion of dairymen reporting felt needs for supplemental information differed very little between groups—in feeding, 25 percent of the participants and 19 percent of the ex-participants; in deciding which cows to sell, 14 percent and 11 percent respectively; in improving the productive capacity of the herd, 18 percent and 11 percent; and in other herd management problems, 14 percent and 15 percent.

Dairymen reporting felt needs were asked: "What sort of information would be (would have been) of most help to you?" Replies did not differ greatly between participation groups. A relatively small share of the reported needs of either group (participants, 13 percent; ex-participants, 14 percent) actually concerned "additional data or service" (something new). Common needs in this area concerned the desire for feed analyses (both concentrates and roughage) and more assistance in culling. A larger share of needs (participants, 22 percent; ex-participants, 34 percent) were for "better data or service." Typical needs in this category included "closer observation by tester of cows, of the grain or hay fed, and so on, in determining how much to feed the cow." The largest share of replies (participants, 41 percent; ex-participants, 35

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percent) indicated a desire for general production information on subjects ranging from disease control through hay harvesting.

Association members and those who had dropped out were asked a second and closely related question: "Have you ever felt a need for changes or improvements in services in order to provide figures that would help (or would have helped) you do a better job in the four herd management areas?" Those reporting such needs were asked what changes or improvements would have been of most help. Their replies again indicate general satisfaction with the information provided. However, the replies of dairymen expressing a need for change reveal two significant facts. These dairymen were primarily concerned with the quality of service received rather than with the comprehensiveness of the data. Further, ex-participants expressed greater dissatisfaction than participants.

Fifty-three percent of the needs reported by participants and 69 percent of those reported by ex-participants reflected a desire for "better data or service." The majority of replies in this category—particularly those of ex-participants—were critical of the timeliness and quality of the supervisors' work. Only 21 percent of the replies of participants and 12 percent of those of ex-participants concerned "additional data or service" (something new). These were generally repetitious of those offered in

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response to the previous question concerning the need for supplemental information.

Assistance received and desired.—Dairymen received relatively little assistance from their supervisors or county agents in interpreting and using test and record data. Replies to specific questions in this area indicate that supervisors spent little time with dairymen of either group when returning "barnsheets" or "herdbooks." They also indicate that if supervisors made a practice of calling an operator's attention to particular points on his barnsheet or herdbook, this fact was recognized by few (Table 4). If supervisors discussed subjects having to do with the farm business, this was also recognized by few. Eighty percent of the participants and 81 percent of the ex-participants were unable to name any specific subject, such as farm machinery or milk prices, that their supervisor had discussed with them in the month prior to the survey.

County agents also spent little time in reviewing participants' barnsheets or herdbooks (Table 5). Only 4 percent of each group reported that their county agent provided this assistance as often as twice a year. Sixty-four of the participants and 80 percent of the ex-participants reported that their county agent never looked over their barnsheets or herdbook. By far the greatest share of an agent's time and effort in the dairy herd improvement

TABLE 4.—Assistance received from supervisor

TABLE 4.—Assistance received from supervisor

Frequency	Farmers reporting supervisor called their attention to a particular point			
	On barnsheet		In herdbook	
	Participants	Ex-participants	Participants	Ex-participants
	Percent			
Always	7	6	5	8
Generally	13	11	13	8
Sometimes	28	30	27	28
Never	52	53	55	56

TABLE 5.—Assistance received from county extension agent

Frequency	County extension agent looked over barnsheets or herdbook	
	Participants	Ex-participants
	Percent	
At least twice a year	4	4
Once a year	14	8
Almost never	18	8
Never	64	80

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program is spent in locating supervisors and in organizing and servicing local units.

Were dairymen satisfied with the amount of assistance received? Thirty-seven percent of the participants and 38 percent of the ex-participants stated that they would like more assistance from their supervisor. Forty-seven percent and 49 percent respectively stated that they would appreciate more assistance from their county agent. The fact that the share desiring additional assistance did not differ between participation groups is an indication that those who dropped out did not feel discriminated against. At the same time, it points out the need for greater educational effort in teaching dairymen how to use test and record data.

Dairymen's appraisals of the supervisors' or agents' qualifications for assisting appear to be associated with their desire for assistance.

More than 90 percent of each participation group felt that their county agent was qualified to point out important facts revealed by their test and record data. More than 90 percent felt that he was qualified to advise them concerning herd management problems. A smaller share of both groups, and fewer ex-participants than participants, felt that their supervisor was so qualified.

Sixty-eight percent of the ex-participants and 80 percent of the participants felt their supervisor was

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qualified to point out important facts from their records—30 percent and 10 percent respectively stated that he was not so qualified. Furthermore, only 47 percent of the ex-participants and 65 percent of the participants felt that their supervisor was qualified to advise them concerning herd management problems—45 percent and 26 percent respectively reported that their supervisor was not qualified to do this.

The foregoing data indicate that assistance from a supervisor, or from a county agent, in whose abilities the participant has confidence would be effective in reducing the number of dairymen who drop out of the program. Further evidence of the importance of a qualified supervisor was revealed by response to questions concerning how well the local association was functioning. Opinions did not differ greatly between participation groups. However, most dairymen who expressed satisfaction gave credit directly or indirectly to the supervisor. The majority who expressed dissatisfaction were critical of the supervisor. The caliber and continuity of supervisory work, then, is basic to the success of any DHIA program.

Why Dairymen Participate

Dairymen participate primarily to identify the relative level of production of individual animals in their herds. Why is this knowledge of interest? They seek to identify poorest and best producers as a means of increasing

the productive level of the entire herd. The major recognized use of test and record data is in culling poor producers. The identification of animals from which to raise replacements is of lesser importance. Knowledge of individual production as a factor in feeding concentrates is of least importance. These are the opinions of participants and ex-participants alike. They are inferred from response to questions asked throughout the interview. Opinions as to why most dairymen continue testing and why dairymen who make no progress participate support this view.

Eighty-five percent of the ex-participants felt that most dairymen test to "maintain or improve production" (Table 6). Only 6 percent felt that they do so for reasons classified as "it's the thing to do." A minority of dairymen of each group expressed opinions indicating that farmers who make no progress participate for reasons other than to maintain or increase production (Table 7). Of greater significance, nearly all dairymen who felt that farmers participate to maintain or improve production gave replies indicating that this could or should be accomplished through culling. A few mentioned record uses in connection with a breeding program. Almost none volunteered that records might be used as a means of determining the nutritional requirements of individual animals, or the economic level of concentrates to feed.

TABLE 6.—Opinions on why most dairymen who test do so

Response	Percent of ex-participants
Maintain or improve production	85
Good way to keep records	15
Publicity	12
It's the thing to do	6
Other reasons	8
Don't know	2

TABLE 7.—Opinions on why dairymen who make no progress continue testing

Response	Percent of respondents	
	Participants	Ex-participants
Maintain or improve production	38	40
Habit	12	13
It's the thing to do	11	4
Just to find out what the cows are doing	7	11
Check on creamery	1	8
Other reasons	14	13
Don't know	28	28

What motivates dairymen to strive for an increase in the productive level of their herds? Profit is undoubtedly a major incentive. However, profit is surely not the only incentive, and perhaps not the primary one for many farmers. Dairymen generally appear to be much more aware of the costs of participation than they are of monetary returns. Less than 3 percent of either participants or ex-participants mentioned profit or income when expressing their views as to why dairymen participate. On the other hand, a large proportion—as will be discussed later—reported that cost was a major factor influencing dairymen to drop out or never join.

Could the failure to associate participation with profit be related to the fact that DHIA has traditionally represented "returns above feed costs" as profit? The connection is conceded to be weak but the author feels compelled to explore this possibility. Returns above feed costs admittedly have value in making intraherd comparisons. To a certain extent, this calculation measures the profitability of one animal within a given herd in relation to another. Yet it is grossly inadequate—and frequently misleading—as a basis for making farm to farm comparisons and as a means by which a dairyman might evaluate the influence of certain business adjustments on his net farm earnings.

Some of the more glaring shortcomings of returns above feed costs as a profit measure have their basis in the inadequacies and inaccuracies of measuring and evaluating feed consumed—both roughage and pasture. The physical quantity of feed charged against an individual animal's production based on estimates is likely to bear little relationship to the amount actually consumed. Furthermore, the value placed on home-grown feed is even less likely to reflect quality differences among farms. Of greatest significance, the value placed on a given quantity of a specified but really unknown quality may bear no relation to its production cost.

To the extent that total costs of producing, harvesting, and storing home-grown feeds differ from assigned values, so will a farmer's net earnings from dairying differ from returns above feed costs. On any given farm, annual returns above feed costs and annual net earnings could be far out of line, and, over time, could even move in opposite directions. Interfarm comparisons could be similarly erroneous and misleading.

To the extent that dairymen are aware that DHIA "profit"—as indicated by returns above feed costs—fails to reflect actual net earnings, so could they be expected to lack confidence in these figures. In the author's opinion, many dairymen question the validity of DHIA "profit" figures. This may, to an unknown but

limited extent, help account for the fact that participation was not associated with profit.

Other common incentives for participation include the desire for achievement, recognition, and status. There is a commonly accepted belief that "good farmers belong to DHIA." Participation thus offers a degree of status in the agricultural community. At the same time, it places the participant in a competitive position with friends and neighbors including, or in addition to, the best dairymen of the state. Production data are publicized to association members through monthly reports, news columns, and other mass media. Outstanding achievement is awarded special recognition. It is likely that this publicity coercively motivates some dairymen to strive for increased production; perhaps even to the extent of making adjustments which reduce net earnings—such as prematurely disposing of a poor producer. However, it appears that a majority of both participants and ex-participants value the opportunity to measure their accomplishment in relation to friends and neighbors.

Seventy-four percent of the participants and 79 percent of the ex-participants stated that they were interested in seeing their neighbors' production figures. Fifty percent of each group expressed an interest in having their neighbors see their own production data. Only 8 percent of the participants, but twice as many

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ex-participants (17 percent) stated that they would prefer not to reveal their own figures.

Nonparticipants expressed considerably less interest than the other groups in seeing their neighbors' production figures and in revealing their own. This is not surprising, in view of their limited knowledge of "good levels of production" and of their own production. Their lack of interest lends support to the author's opinion that some nonparticipants are not presently motivated to increase the production level of their herds.

The opinions expressed by the three participation groups suggest that nonmonetary appeals might be effective in encouraging participation. At the same time, they suggest a need for greater effort in measuring the effect of participation on income and in educating dairymen to use production data.

Why Dairymen Drop Out

Participants and ex-participants gave very different kinds of reasons as to why dairymen drop out of a test and record program. Participants' replies—justifiably or otherwise—imply their own superiority in knowledge or managerial ability. Ex-participants' stated reasons for dropping out tend to justify their decision for doing so.

The most common opinion expressed by participants—they "don't know how to use data"—was not mentioned by those who had dropped out. Neither was the opinion that

they are "ashamed of (their) own production." On the other hand, "dissatisfied with supervisor or service"—a reason frequently offered by ex-participants—was mentioned by relatively few association members.

Do these conflicts and probable biases invalidate the response of either group, or perhaps of both groups? In the author's opinion, the response of each group is revealing and, furthermore, is necessary in identifying major reasons for dropping out. The following rationale is offered in support of this contention.

Participants were called upon to express their opinions as to why others act as they do. Ex-participants were asked to reveal their personal reasons for dropping out. To the extent that those who dropped out suffered experiences foreign to participants, their replies would be expected to differ. Of greater significance, participants—as more or less objective observers—could be expected to express thoughts which those who had dropped out might hesitate to mention. This seems most likely as it concerns reasons which tend to reflect on the character or ability of the "dropout." To the extent that participants projected their own dissatisfactions, these also warrant consideration even though they might differ from those of ex-participants'.

Another primary reason for conflicting opinions between groups springs from the fact that participants differ from ex-participants in education, leadership, and in other recognizable ways. To this extent, the validity of the replies expressed by each group is strengthened by their difference.

Four major and interrelated reasons for dropout concern the ability of dairymen to use test and record data; the cost of the service; dissatisfaction with the supervisor or service; and the time, work, or bother involved. Forty-four percent of the participants expressed opinions indicating a belief that dairymen who drop out do so because they "don't know how to use data" obtained (Table 8). Typical replies were: "They don't seem to know what the testing is all about." "They don't realize how to use their records." No ex-participants admitted dropping out for such reasons. However, 19 percent expressed the opinion that dairymen who never join fail to do so because they wouldn't know how to use the data. Reasons concerning the ability to use the data are, therefore, believed to be legitimate. Furthermore, they very likely project the personal feelings of some participants. It will be recalled that a large number of dairymen in each group stated that they would like more assistance in using their records. Furthermore, 62 percent of the participants and 40 percent of the ex-participants stated that they would

TABLE 8.—Opinions and reasons concerning why dairymen drop out of a test and record program*

Response	Percent of respondents	
	Participants	Ex-participants
Don't know how to use data	44	0
Costs too much money	32	31
Periodic check sufficient	18	8
Too much time, work, or bother	16	23
Ashamed of production	14	0
Dissatisfied with supervisor or service	11	29
Lack of money	5	10
Dissatisfied with own progress	0	8
Other reasons	8	8

*Participants were asked to express their opinions on why some dairymen drop out. Ex-participants were asked why they dropped out.

like to attend a training school to learn how to use test and record data.

Another major category of reasons for dropout concern the cost of the service. Thirty-three percent of the participants and 31 percent of the ex-participants reported that testing "costs too much money." Most replies in this category stated simply that the service was too expensive. However, a few participants (5 percent) and twice as many nonparticipants (10 percent) expressed a drastically different point of view. They stated or implied that any price would be too high. Undoubtedly, these dairymen were able—for one reason or another—to make very limited use of test and record data.

Ex-participants were frequently critical of the quality of work performed by their supervisor. Twenty-nine percent stated that they had dropped out for the reason classified as "dissatisfied with supervisor or service." Typical replies were: "Their errors get under my skin." "Tester is not qualified." "Supervisors change too often." Only 11 percent of the participants expressed similar opinions. However, later in the survey, 60 percent of the participants and 40 percent of the ex-participants stated that they would be willing to pay more if additional or better service were available. In the author's opinion, this response indicates a general belief that the service could be improved. It is less likely to be a true

indication of the proportion of dairymen who would willingly pay more for additional or better service.

A substantial number of dairymen in each group were concerned that testing involves "too much time, work, or bother." Twenty-three percent of the ex-participants and 16 percent of the participants gave replies such as: "Didn't want to take the time to bother with it." "Took too much time." "Too busy." This is undoubtedly an important reason for dropout, particularly by dairymen enrolled in the owner-sampler program and also by those least able to apply the information in their operations.

In addition to the four major categories listed above, two reasons for dropout warrant special consideration. One reason—the belief that a "periodic check is sufficient"—was mentioned by 18 percent of the participants and 8 percent of the ex-participants. It tends to explain the high rate of membership turnover, particularly among dairymen who have little use for official records. By testing one year in three or four, they are able to identify the relative level of milk and butterfat production among the animals of their herds. As opportunity arises, the poorest producers may be eliminated. Since in many herds—according to the author's observation—grain feeding tends to be limited and not closely related to productive ability, many dairymen have good reason to believe that a "periodic check is sufficient." Knowledge of economic feeding

practices would greatly enhance the value of test and record data for them. Participation would be expected to assume greater value.

The opinion that dairymen drop out because they are "ashamed of (their) own production" was expressed by 14 percent of the participants. This raises a serious question as to the desirability of disclosing production figures. While no ex-participants admitted this as a reason for dropping out, they did express a feeling that good records may influence participation. Nine percent stated that some farmers never join because they are "ashamed of their production." At the same time, 8 percent of the ex-participants stated that they had dropped out because they were "dissatisfied with (their) own progress." This implies, among other things, that they might prefer not to disclose their production records.

A certain conflict exists, then, between the wishes of those who desire recognition for their herds and those who prefer confidential reports.[27] At first glance, it would seem that this could be easily resolved by giving each participant an option on whether or not his figures should be disclosed. However, this could easily be

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[27]Farms are identified by code number except when special recognition is offered for outstanding production records. However, it is seldom difficult for neighbors to decode farm numbers since facts pertinent to the production data, such as breed and number of cows in the herd, are revealed.

interpreted as an admission that there was something to be ashamed of and thus might have little appeal. A more appealing possibility would be to publicize only top records and group averages. The author believes that this procedure would satisfy the desires of the three out of four participants and ex-participants interested in seeing their neighbors' figures; also of the one out of two interested in revealing their own figures. Hopefully, it would place greater emphasis on economic production without detracting from the recognition which appears so important to participants. For example, it could remove a possible pressure to dispose prematurely of a relatively poor producer as a means of maintaining the herd average.

Why Dairymen Never Join

Awareness and interest of nonparticipants.—Nonparticipants were aware of the existence of DHIA test and record programs. In response to direct questions, forty-eight out of fifty stated that they had heard of DHIA; forty-five out of fifty stated that they had heard of owner-sampler testing. However, awareness of the program is but a first step in the process of adoption.[28] Were nonparticipants sufficiently interested in the program to

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[28]George M. Beal, Everett M. Rogers, and Joe M. Bohlen, "Validity of the Concept of States in the Adoption Process," Rural Sociology, Vol. 22, No. 2 (June 1957).

seek general information about it? Evidence of interest, or lack of interest, was demonstrated by inquiries concerning participation and by knowledge of the cost of the service.

Nearly six out of ten nonparticipants had sufficient contact with the program to name three dairymen whom they believed had herds on test. Less than two out of every ten said they were unable to name any farmers on test. Thus, most dairymen were not only aware of the program but also knew of a neighbor or neighbors whom they might contact for further information. Yet fewer than two out of ten nonparticipants (14 percent) reported that they had ever made inquiries about joining. Furthermore, over one-half (54 percent) remembered specifically being asked to join and refusing the invitation.

The fact that nonparticipants were generally poorly informed as to the cost of the service further supports their apparent lack of interest. Only one dairyman in twenty-five was able to estimate the cost of either standard or owner-sampler testing within ± 10 percent of the actual costs. The majority (over 80 percent) would not attempt to estimate cost. Yet when asked earlier why more dairymen have not joined, the most frequently expressed reason—mentioned by two out of five nonparticipants—was that testing "costs too much money" (Table 9). Lack of interest is, therefore, inferred to be the primary factor limiting participation by dairymen who have never joined.

TABLE 9.—Opinions on why dairymen have not joined a test and record program

Response	Percent of nonparticipants
Costs too much	40
Not interested (oldtimers, ignorant, indifferent)	30
Too much time, work, or bother	20
Haven't been asked	8
Wouldn't know how to use data	4
Other reasons*	14
Don't know	18

*None suggested that nonparticipants might be "ashamed of their production."

Reasons for apathy.—Why are dairymen apathetic toward a program designed to provide them with information essential to economically efficient production? Can it be that the profit-motive has no appeal for them? This seems most unlikely, at least for more than a small minority. Consider the high level of adoption of artificial breeding.[29]

Do dairymen who are apathetic to the program fail to recognize the potential value of the information provided? Probably a majority either fail to recognize that the information is essential to economically efficient production; or they fail to understand how to use the data. To the extent that either of these possibilities explains their lack of interest, extension has failed in its efforts to promote enrollment and education related to feeding and management.

Promotional efforts have not ignored the profit-motive as an appeal for enrollment. But, promotion has been derelict in the particular recommendations offered for achieving profits, and perhaps in the measure used to indicate profits.

In DHIA promotional activities, profits are traditionally recognized in terms of "returns above feed costs." In the author's opinion, dairymen are most

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[29]Eighty percent of the dairy herds in the state are bred artificially.

concerned about the amount of money available to pay their bills and provide for their family needs. "Returns above feed costs" may lack both meaning and appeal to nonparticipants.[30]

An informal survey of press, magazine, and radio releases—in addition to a review of historical records—reveals that for years dairymen have been urged to join the program as a means of increasing their income. An overwhelming majority of promotional pieces, past and present, advise that increased profits can be attained through the use of test and record data in (a) culling poor producers, generally all animals below a given level of production; (b) raising replacements from best producers only; and (c) feeding concentrates according to production. Let's briefly examine these recommendations.

Consider the usefulness of production data, given the reality that (a) culling practices—for reasons readily apparent to dairymen—are usually dictated by factors other than inherent productive ability; (b) heifer selection based on knowledge of the dam's production—though not generally recognized so—is relatively ineffective as a means of improving the production level of the herd,[31]

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[30]See page 69 for discussion of "returns above feed costs" as a profit measure.

[31]M. H. Fohrman, Breeding Experiments With Holstein-Friesian Cattle, Technical Bulletin No. 1220 (Washington: U. S. Government Printing Office, 1960).

and, furthermore, herd sires, on the few farms keeping such, are commonly selected from outside the herd. Thus, it would appear that the value of test and record data in culling and breeding is severely limited on commercial dairy farms. Moreover, it seems likely that practical dairymen, recognizing this fact, might tend to discount DHIA promotional efforts directed toward the use of production data in feeding.

The use of production data in feeding has emphasized that cows should be fed the amount of concentrates required to meet nutritional requirements at given production levels. Until recently, few dairymen recognized that milk output is a function of feed input, given other production factors. Recent educational efforts of extension, commercial fieldmen, and the like, on the subject of "lead feeding" have increased the usefulness and value of production data to many dairymen.

This is not meant to imply that test and record data have had no economic value to dairymen whose primary interest was milk production. However, many dairymen have not been made aware of the value of production data in feeding. Their failure to recognize this value is a major reason for their lack of interest in the program. For these dairymen, test and record data have no meaning. But there are other reasons for apathy.

When asked whether they would be more interested in testing if they had a better herd, 62 percent said "yes"; 34 percent said "no"; 2 percent said they were already

interested; and 2 percent stated "it depends on the cost." Probably some of the dairymen who said they would participate if they had a better herd were rationalizing their failure to do so, particularly since many were inadequately informed both as to their own production and as to good standards of production. Yet it also seems likely that this group included dairymen who were ashamed to reveal or to confirm their present situation, as well as dairymen who felt that testing was for farmers with "good" herds.

For an indeterminate but hopefully small share of nonparticipants who most likely are not aware of good feeding and management practices, test and record data have no meaning because self improvement has no appeal. For these few, the motivation to seek information, not only about the program but about improved management practices, has yet to be discovered.

CHAPTER IV

SUMMARY AND CONCLUSIONS

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Hypotheses Reexamined

This study has examined the dairy herd improvement program in Vermont and found it wanting. The findings indicate that if participation is to be expanded, then substantial adjustments are required. Careful evaluation of the current program raises serious questions as to its justification. The author will first discuss the study as a whole in terms of the stated hypotheses and objectives, then make some recommendations for future action. Obviously, many of the hypotheses cannot be empirically tested. Therefore, any acceptance or rejection must be based on the author's subjective interpretation of the research results.

As the first two hypotheses are closely related they will be discussed together. They concern the influence of the traditional local association and the "standard test" on enrollment in the program.

The local association was developed to meet the conditions of a bygone era—horse and buggy travel, localized interests and communication, and limited nonfarm job opportunities. Initially, the area serviced by a local was

defined by the distance participants were willing and able to transport the tester. The significance of this area limitation is hinged to the fact that participants tend to be local leaders. To the extent that the leaders of a limited area were able to motivate a sufficient number of neighbors, an association could be organized. Later, as transportation improved, the area over which one association could function was expanded. To the extent that a successful association skimmed the leaders from the wider area, the formation of successive associations logically has become progressively more difficult.

Now consider the rigidities imposed by the "standard test." The sampling procedure—an integral part of this test—requires that a licensed supervisor be present at two consecutive milkings of each herd, each month. This limitation effectively dictates both the minimum and the maximum number of participants in an association. The minimum is established by the highest fee farmers are willing to pay, and the lowest wage for which a qualified person will perform the service. The maximum number of participants, as many as twenty-six under most favorable circumstances but commonly twenty, results in a shared cost which at least approaches the prohibitive level. At the same time, it provides a grossly inadequate wage to supervisors and circumvents the possibility of achieving economies of scale.

The required sampling procedure does provide authenticity to production data. For this reason it has particular value in proving bulls and in establishing widely accepted production records. But this costly objectivity is of questionable economic value to dairymen whose primary interest is the production of milk.

For these reasons, and because the historic fluctuations in association numbers are directly related to the limitations imposed by the traditional association and the standard test, the first two hypotheses are accepted. It is the author's judgment that the local association is an antiquated organizational structure; that the sampling procedure embodied in the standard test is a generally unnecessary and costly requirement for dairymen whose primary interest is economically efficient production; and that future expansion of the program, if justified, must involve corrective adjustments in these areas.

The third hypothesis relates to the possibility that participation is associated with measurable characteristics of farmers and their farms; that knowledge of these characteristics would be valuable in making corrective adjustments to enhance participation. The data of the survey reveal that, at least in areas where the opportunity to participate is presumed to be unlimited, such differences do exist.

Participants are older than dairymen who dropped out; younger than those who never joined. Comparatively, they have the highest level of formal education. They are much more likely to be leaders in their communities.

Participants are more aware of good production standards. Their opinions as to the quantity of dairy ration required under assumed conditions most closely coincide with recommended feeding standards. Yet even participants were very inadequately informed at high levels of production. However, their knowledge of their own production and feeding practices, although surprisingly sketchy, is much superior to that of the other two groups.

Participants keep essentially the same number of cows as the other groups. However, their production levels are substantially higher; thus, they operate by far the largest farms in terms of total milk output.

The difficulty of separating cause and effect—the practical impossibility of doing so with any degree of certainty—makes questionable the validity of any interpretation of differences among groups. Nevertheless, conclusions suggested by knowledge of certain characteristics of each group are offered for consideration. These concern both the dairymen and the program.

In the author's judgment, participants exhibit superior managerial ability, but this is largely incidental to the fact of participation. The demonstrated uses of DHIA

data underscore this conclusion. Perhaps of more importance is the recognition factor.

Ex-participants exhibit knowledge sufficient to use test and record data, at least to the extent that participants do. Nonparticipants apparently have enough natural ability to use the data but they fail to demonstrate an interest in good management practices.

Some rather obvious but none the less debatable conclusions concerning the program follow. It has greatest appeal to "joiners." It has failed to meet the needs of many dairymen in their years of greatest financial need—it seems likely that for them the cost of participation exceeds the monetary returns.

The program has made dairymen more aware of continually increasing standards of production, and of their own feeding and management practices. At the same time, it has fostered the common belief that concentrates should be fed in response to production. It has failed noticeably in aiding dairymen to recognize output as a function of input.

The fourth hypothesis concerns the influence on participation of factors considered in reaching certain decisions. More specifically, it states that dairymen who drop out or never join consider different factors than participants in reaching decisions leading to adjustments in grain feeding, or herd improvement through culling and breeding. Thus test and record data are presumed

to be less useful to them. This hypothesis must be conditionally accepted.

Although dairymen of each group consider essentially the same factors in reaching decisions in given areas, the depth or accuracy of their knowledge of these factors must often vary widely. Contrast a participant's knowledge or possible knowledge of production to that of an average nonparticipant who at most "looks in the pail." This suggests that the relative weight given similar factors may also vary widely among groups. Thus, it seems logical to conclude that level of production, while universally recognized by ex-participants and nonparticipants as an adjustment factor, actually has considerably less influence on their decisions.

Because ex-participants and nonparticipants have less knowledge of good management practices, an increase in the accuracy of knowledge of a given factor can logically be assumed to be less valuable to them. Therefore, it is concluded that even though ex-participants and nonparticipants consider essentially the same factors in certain decision areas, the practical usefulness of more accurate knowledge (provided by test and record data) is so limited as to be a primary reason for dropping out or never joining.

The fifth hypothesis states that dairymen hold beliefs concerning grain-feeding practices which place serious limitations on the economic value of test and record data and thus on the value of participation.

The data of the survey reveal that more than two out of three participants (69 percent), regardless of production, never feed above a given quantity of concentrates—commonly twelve to sixteen pounds per day. Moreover, one of every three of those willing or able to estimate production response to grain feeding demonstrates a definite lack of knowledge in this area. Thus there can be little doubt that participants are handicapped in using production data. Ex-participants and nonparticipants demonstrated similar beliefs and lack of knowledge.

On this basis, the hypothesis is accepted and it is concluded that many dairymen who participate do so for reasons only incidentally associated with the usefulness of production data in feeding. This in no way infers that the participation status of those who drop out or never join is not influenced by an inability, for whatever reason, to use production data. On the contrary—and to the extent that these dairymen recognize different goals or values—it is quite possible that beliefs limiting the usefulness of production data in feeding keep them out of the program.

Hypotheses six and seven will be discussed together. The former states that participation is associated with opinions as to the adequacy of information and services provided. It is accepted in part. Both groups, and ex-participants more frequently than participants, expressed criticism of the supervisors' services, particularly of

the timeliness and quality of his work. The seventh hypothesis states that participation is associated with the amount of assistance received in utilizing test and record data in making day-to-day management decisions. It is conditionally accepted. The amount of assistance apparently differs little between groups. But the findings indicate that assistance from a supervisor in whose abilities the participant has confidence (or from a county agent) would be effective in reducing the number of dropouts.

Participants and ex-participants alike are satisfied that the kinds of information provided are adequate to meet their needs. Very few were willing or able to recall felt needs for additional data, or to suggest changes in information or data provided.

There was no apparent discrimination between groups in assistance received from supervisors or county extension agents. The fact is, if dairymen of either group received assistance in interpreting and using test and record data, most failed to recognize it. About half expressed a desire for additional assistance, showing partiality to the county agents' services. Yet, none directly expressed the feeling that "lack of assistance" was a reason for dropping out.

Dairymen who participate, according to the data of the survey, do so primarily as a means of attaining recognition. They are more aware of costs than of possible monetary returns. They use test and record data mainly

in culling, although its usefulness for this purpose is extremely limited.

Dairymen who drop out do so for several apparent and interrelated reasons. Inability to use data—which stems from beliefs, knowledge, and experience of the operator, as well as the potential usefulness of the data—is one major reason for dropping out. Dissatisfaction with the supervisor or service—generally related to the continuity of service and to the quality of job done, but also associated with personality clashes—is another. Costs, in money, time, work, and bother, rank very high as a reason for dropping out.

The eighth hypothesis states that participation is limited by awareness and interest of nonparticipants. This hypothesis is unconditionally accepted as it applies to nonparticipants in the areas surveyed. These dairymen demonstrated an awareness of dairy herd improvement work. However, their interest was generally not sufficient to stimulate the most cursory investigation of the program. Their lack of interest was rationalized with the attitude that testing costs too much money; that it involves too much time, work, or bother; or that they are too old to learn or to care.

Nonparticipants' apathy is associated with ignorance of, and indifference to, good management practices. To a lesser extent, it may be fostered by an operator's feeling

that his cows are not good enough. For a majority of nonparticipants, test and record data have no meaning because they lack knowledge, not only of good feeding and management practices, but also of good production standards.

The limits of the sample preclude acceptance of this hypothesis for nonparticipants of other areas of the state. However, the author believes that an overwhelming majority of dairymen from the rest of the state are aware of the program. Further, that they fail to participate primarily because they are unaware or unconvinced of the possible economic benefits.

Recommendations

After thoughtfully analyzing and reviewing both the data of the study and the implications thereof, the author recommends that:

I. The Vermont Extension Service:

   A. Give serious consideration to the establishment of a date at which time to absolve itself of support, direct and indirect, of the current DHIA program.

   B. Accept responsibility of leadership in a concerted effort to replace the current hit-or-miss, outmoded, and inefficient program with one better designed to bring essential production data to the attention of the dairymen of the state—a program which does not exploit its employees.

C. Absolve county extension personnel of all responsibility in organizing and servicing local units and encourage them to devote the time currently so allocated to a program of educational assistance in utilizing production data.

D. Intensify educational activities in the areas of production economics and management, particularly as it applies to dairy cattle feeding—this to involve the concerted efforts of production and management specialists.

E. Consider the feasibility of reintroducing the "weigh-a-day-a-month" program in conjunction with an intensive educational program for using production data in feeding.

II. A revised program be developed which would:

A. Replace the current hegemony of independent units with county and larger district associations (operating with central testing laboratories) as units of a single statewide cooperative association.

B. Be so organized as to:

1. Assure its operation and continuity as the responsibility of commercial dairymen.

2. Provide wages, benefits, and working conditions adequate to attract and hold competent employees.

3. Provide dairymen with necessary production data at minimum cost in money, time, and effort.

4. Provide a differentiated service in accordance with differing needs among dairymen at prices which equitably reflect cost differentials.
5. Facilitate the usefulness of data by:
   a) Instructing each new participant in the use of production data, particularly in feeding.
   b) Providing for more adequate evaluation of quantity and quality of forage consumed.
   c) Eliminating relatively meaningless and unnecessary detail, such as roughage data, when adequate evaluation is impossible.
   d) Deemphasizing "returns above feed costs" as a factor for interfarm comparisons.
   e) Providing for essential health records.
   f) Providing for adequate summarization of test and record data.
6. Promote participation as a means of increasing net farm earnings, with emphasis on the use of production data in feeding concentrates.
7. Increase the appeal of participation by recognizing dairymen who have increased production but who have not yet reached high levels.
8. Circumvent the fee collection problem by adopting a procedure such as requirement of advance payment or consignment from milk check.

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