THE ECONOMICS OF BEEF COW HERDS IN MICHIGAN

Thesis for the Degree of M. S.
MICHIGAN STATE UNIVERSITY
Lynn J. Maish
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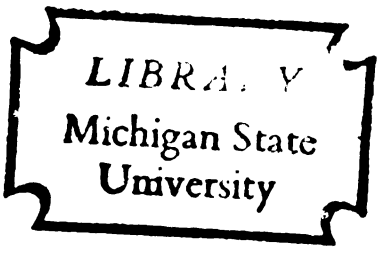

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By

Lynn J. Maish

AN ABSTRACT OF A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
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MASTER OF SCIENCE

Department of Agricultural Economics

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ABSTRACT

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The purpose of this study was to examine the profitability of the beef cow-calf program under various conditions likely to be found in Michigan. Questions to be answered included the following: What are the effects of various locations, land values and productivities; systems of management; levels of production efficiency; and sizes of herds upon profits? How do the income potentials of the beef cow enterprise compare with alternative enterprises? Under what conditions do beef cow herds best fit in Michigan? Tentative conclusions concerning the future role of the beef cow enterprise in Michigan may be made after these questions are answered.

This study involved the preparation of several budgets for beef cow enterprises under various hypothetical conditions, which were considered to be representative of the types of situations found in Michigan. Input-output

data for the budgets were largely synthesized from secondary sources.

The full time 200-cow enterprise in northern Michigan required from 880 to more than 1200 acres of land, and total investments of more than $120,000. With good or above average management these operations resulted in labor incomes of from $1,500 to $3,000, which seemed to be competitive with other alternatives in the northern areas of the State. Crop yields, weaning weights, and calving percentages had significant effects on incomes. Profits were highly correlated with changes in cattle prices.

Land values also had a strong effect on labor incomes. The large beef cow enterprise tended to be profitable only when land was moderate to low in price. Large capital requirements, a low rate of capital turnover, and vulnerability to price changes are major problems facing farmers considering the addition of a large beef cow enterprise.

The 200-cow enterprise on less productive soils in southern Michigan was less profitable than most of those for northern Michigan. A program using a corn silage ration resulted in a labor income of nearly zero.

Large beef cow herds are apparently less profitable than alternative enterprises under many southern Michigan situations.

Small herds of 25-cows on part time farms produced negative labor incomes in both northern and southern Michigan. However, returns were as high as likely alternatives in northern Michigan, when the operator's labor was valued at a very low level. The southern Michigan beef cow enterprises were not quite as profitable as possible alternatives, as for example, the income from renting the farm out.

The use of productive corn land to grow pasture and feed for the beef cow herd was highly unprofitable.

The replacement of a 22-cow dairy enterprise with a 50-cow beef herd reduced labor requirements by nearly 2000 hours. If the released labor had an earning power of $.67 to $1.15 per hour (depending on the ration fed the beef herd) in some alternative use the shift could be made with no loss in income.

The alternative of cornstalk silage appeared to be more profitable than regular corn silage as feed for beef cows. However, heavy labor requirements during the harvesting season may be a major drawback for cornstalk silage.

A 50-cow year-around drylot operation using cornstalk silage was unprofitable when all costs were charged to the beef enterprise. However, if adequate physical facilities and machinery for the operation are available for the enterprise with no opportunity cost and only the repairs on these items were charged to the beef herd, then a modest return ($.63 per hour) accrued to the labor of the operator.

The beef cow herd seems best adapted where an abundance of forage is available, alternative enterprises are limited, and land values are low. Such conditions are found in some areas of Michigan, particularly in northern areas where dairy markets are limited. A moderate increase in beef cow numbers is likely to occur in Michigan in the next few years. Price levels and production patterns on the national level will be important determinents of the role of beef cow herds in Michigan's future.

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CHAPTER I

INTRODUCTION

Forages and forage consuming livestock add significantly to Michigan's agricultural economy. A large percentage of the farm land in the state is adapted primarily to the production of forages. In 1959, about 33 percent of Michigan's cropland was used for hay and pasture, an additional 5 percent of the total farm land was in open permanent pasture and a sizable proportion of the farm woodlands, which constitute approximately 19 percent of the state's farm land, also provided pasture.[1] The northern areas of the state have a relatively larger percentage of farm land adapted primarily to forage production than do the southern parts.

Forage crops have little use other than as feed for livestock. Therefore, ruminants have been important to Michigan's agriculture as a means to market its abundance

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[1] Michigan Agriculture County Data and State Trends, Misc. Series Circular E-22, April 1962, Cooperative Extension Service, Michigan State University.

of forage. The major utilizer of forages in the state is the dairy enterprise. The nature of the dairy enterprise has been changing considerably in recent years. The total number of dairy cows in Michigan decreased from 889,000 in 1956 to 673,000 in 1965.[2] While the total number of dairy cows has decreased, the number per farm has increased due to a decline in the number of farms with small herds and to the expansion of other herds.[3] Dairy herds are not well adapted to many farms due to declining markets, insufficient capital for bulk tanks and other investments required for profitable milk production, and labor limitations. It has been estimated that by 1980 there will be only 9,200 dairy herds (as compared to 51,766 herds in 1959) and about 450,000 dairy cows in the state. It has also been estimated that 1.25 million fewer acres will be required to produce feed and pasture for Michigan's dairy herd by 1980.[4] Adjustments in the dairy enterprise have been more dramatic in some parts of the state than in others. During the period from 1959 to 1964 milk cow numbers decreased by 24 percent in the Upper Peninsula, 21 percent in the northern area of the Lower

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[2] Michigan Agricultural Statistics, Michigan Crop and Livestock Reporting Service.

[3] Hoglund, C. R., Michigan Dairy Farming, Special Bulletin 440, 1962, Agricultural Experiment Station, Michigan State University.

[4] Dairy--Phase II Report, Project '80, May 8, 1965, Michigan State University.

peninsula (crop reporting districts 2 and 3), and by 15 percent in the central and southern areas of the state (crop reporting districts 4 through 9).[5]

The declining importance of dairying and the changing nature of the dairy enterprise make it imperative to examine the potentialities of alternative forage consuming livestock enterprises which could replace the dairy herd on some farms. The need for such alternative enterprises may be the greatest in the Upper Peninsula and the northern parts of the state where the dairy enterprise is shrinking the most, but where the necessity to grow forage crops is the greatest. The beef cow-calf enterprise, being a utilizer of large amounts of forage, is thus of interest as a possible alternative to replace the dairy enterprise in some situations. The beef cow herd may also be a possible enterprise for many non-dairy farms as well.

Additional sources of interest in the feeder calf production enterprise may come from the growth and importance of part-time farming and the growth of the cattle feeding industry in Michigan. Beef cow herds with their very low and flexible labor requirements may be better adapted

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[5]Michigan Agricultural Statistics, op. cit.

to part-time farming than are most other livestock enterprises. Numbers of cattle on feed (on the first of January) have increased from 109,000 in 1957 to 160,000 in 1965.[6] Expansion in beef cow numbers in the state have not kept pace with the expansion in cattle on feed in the last 10 years. From 1956 to 1965 beef cow numbers increased from 96,000 to 125,000, a 30 percent increase, while numbers of cattle on feed rose by 50 percent from 107,000 to 160,000.[7] Approximately 96,730 head of feeder cattle were shipped into Michigan from other states in 1964.[8] The livestock committee of Michigan State University's Project '80 has predicted that 400,000 head of cattle will be on feed in the state by 1980 (on January 1) and that a total of about 600,000 head of cattle will be fed out per year at that time. The number of beef cows was predicted to rise to 350,000 by 1980. And in-shipments of feeder cattle were estimated to total about 290,000 head in 1980.[9] As Michigan cattle feeders rely

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[6] Ibid.

[7] Ibid.

[8] Shipments of Stocker and Feeder Cattle, January 27, 1965, SRS, U.S.D.A.

[9] Beef, Swine, Sheep and Horses--Phase II Report, Project '80, May 15, 1965, Michigan State University.

heavily on out-of-state sources of feeder cattle, they must compete with feeders from the Cornbelt states through which most of the cattle must travel on their way from the source of origin to Michigan feedlots.

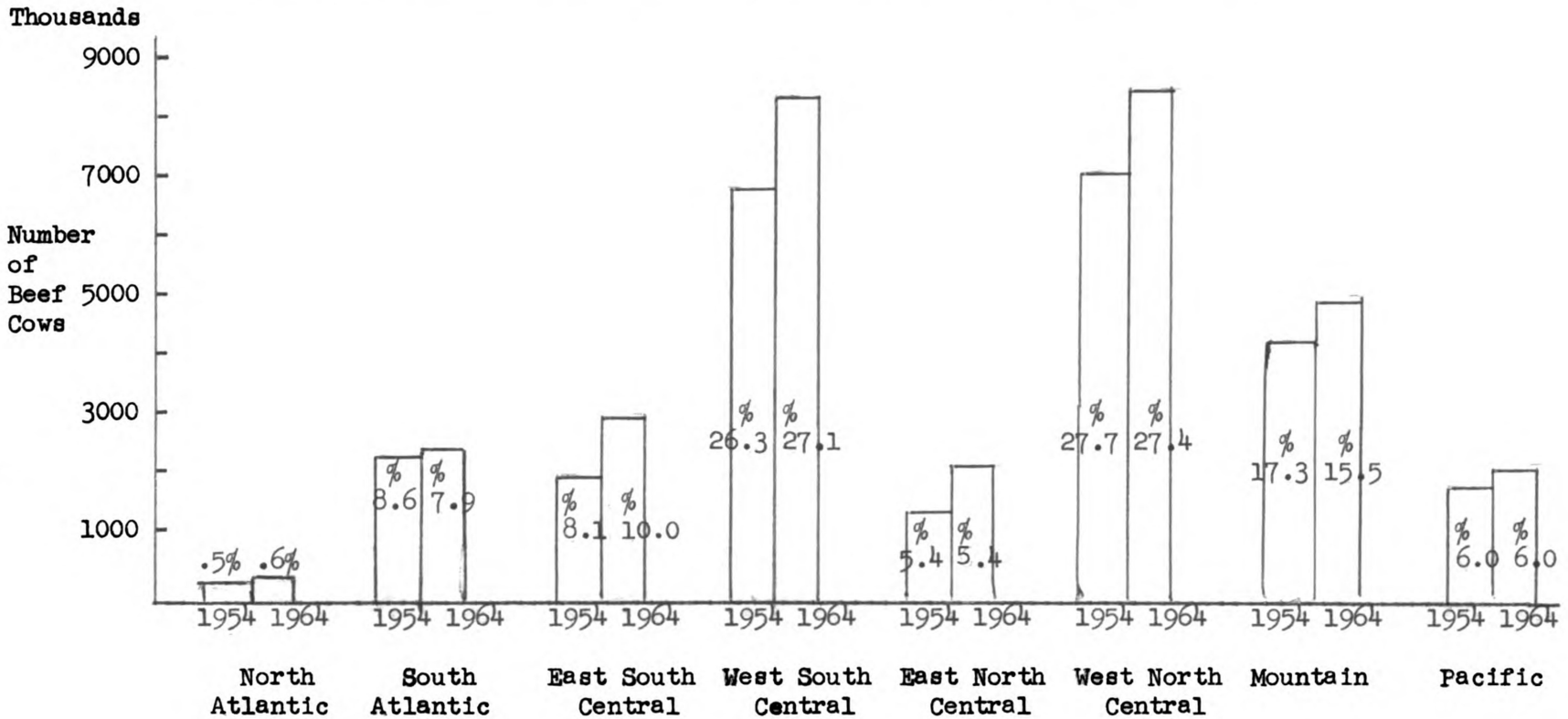
Developments in the beef industry on a national basis and in other areas of the country will have important effects on the potential for beef cow herds in Michigan. The beef industry is a growing one. Beef cow numbers have increased more rapidly in the east south central areas of the country than in any other area. The proportion of the nation's cow herd in the mountain range states has declined (see Chart No. 1). An increasing proportion of the cattle raised in the traditional range states is being fed in the western states. If present trends continue, cattle feeders in the Cornbelt and surrounding areas may obtain more and more of their cattle from the South and/or from local areas. Given these conditions, if the beef feeding enterprise continues to grow in Michigan, it may require more locally produced feeder calves in the future. But feeder calf production in Michigan will increase only if they can be profitably produced in this state in comparison with alternative enterprises and if the costs of producing calves in Michigan are competitive with the costs of producing feeders in other areas.

Beef cow numbers have grown substantially in Michigan since 1950, with the biggest increase occurring in the early 1950's (see Chart No. 2). The probable effect of the release of resources suitable for feeder calf production from dairying on certain types of farms and in certain areas such as the U.P. and northern Michigan, and of the probable increase in demand for feeder calves from a growing cattle feeding industry in the state on beef cow numbers in the future can be more intelligently assessed once the nature and profitability of the beef cow enterprise, as it exists in Michigan, is better understood.

The purpose of this study is to examine the profitability of the beef cow-calf program under various conditions likely to be found in Michigan. Questions to be answered include the following: What are the effects of various locations, land values, and productivities; systems of management; levels of production efficiency; and sizes of herds upon profits? How does the beef cow enterprise compare with alternative enterprises? Under what conditions do beef cow herds best fit in Michigan? Tentative conclusions concerning the future role of the beef cow enterprise in Michigan may be made after these questions are answered.

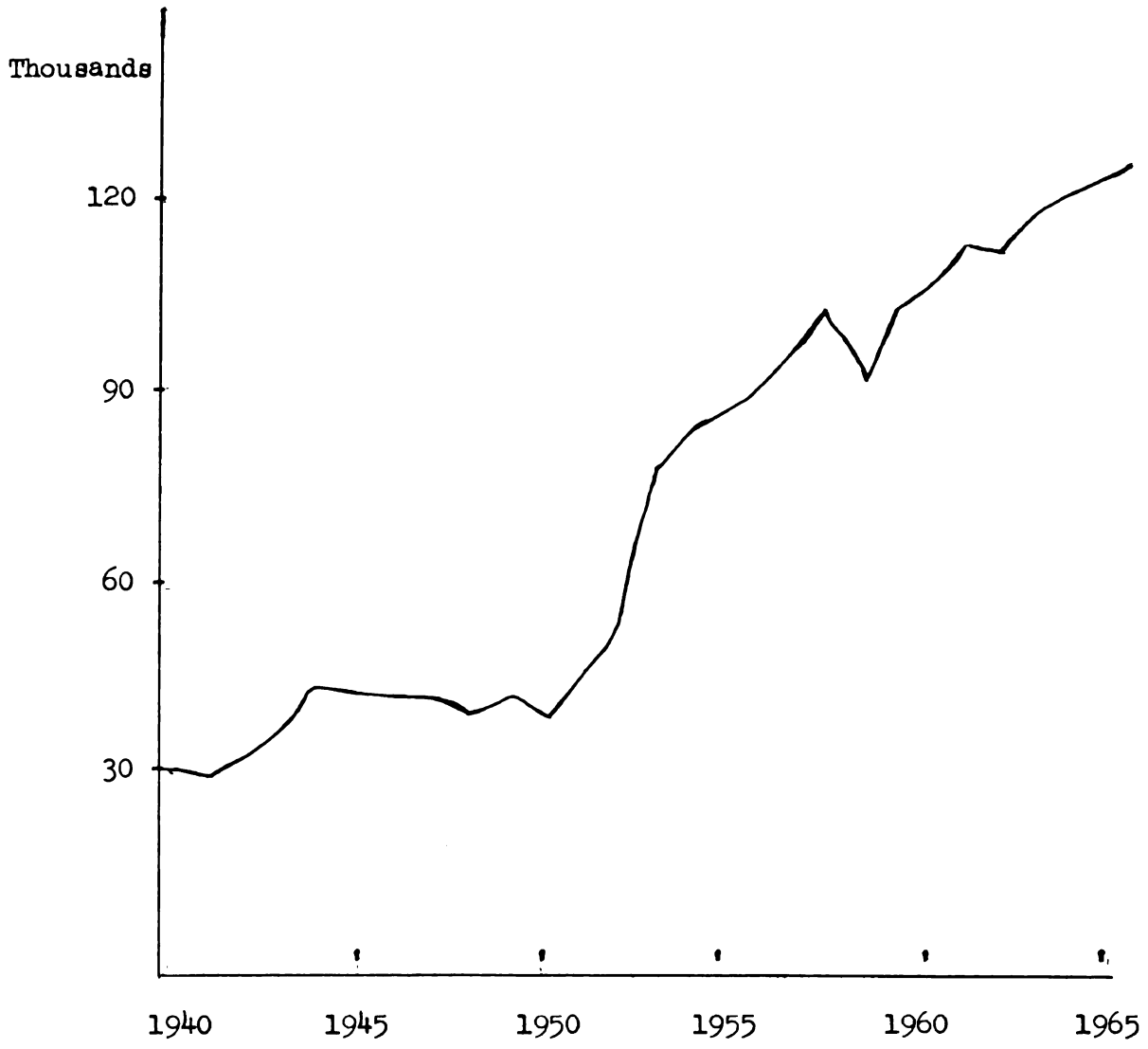
A series of budgets representing various types of beef cow enterprises in different parts of the state under varying levels of management have been prepared and analyzed in an effort to answer these questions. The next chapter outlines some of the important characteristics of the beef cow enterprise as extracted from a review of literature.

Chart 1.-- Number of Beef Cows and Percentage of U. S. Total per Region, 1954 and 1964



Source: Livestock and Poultry Inventory, January 1, S.R.S., Crop Reporting Board, U.S.D.A.

Chart 2.--Beef Cows and Heifers, 2 years old and over in Michigan.



Source: Livestock and Poultry Inventory, January 1, S.R.S., U.S.D.A.

CHAPTER II

REVIEW OF LITERATURE

The data and assumptions used in the construction of the budgets for this study were largely derived from the results of other research. A careful review of animal husbandry studies of beef cow nutrition and management practices, and economic studies of beef cow herd costs and returns under various conditions furnished guidelines for budgeting and evaluating beef cow-calf programs.

The Ration for the Beef Cow Herd

Feed and pasture are the biggest cost items in the production of feeder calves. In a study of beef cow herd costs and returns in southern Indiana hay, silage, and concentrates were found to constitute 36.0 percent of the total costs while pasture costs accounted for an additional 26.5 percent of the total costs.[1] A western Ohio study found

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[1]Masten, John E. T., "An Analysis of Costs, Returns, and Resources Used by the Beef Breeding Herd in Southern Indiana," unpublished M.S. thesis, 1958, Purdue University.

that harvested feeds accounted for 38.4 percent and pasture 28.2 percent of total costs.[2] Due to its magnitude, variations in feed cost are key determinants of profits. Janssen discovered that net returns over variable costs per cow decreased from $23.92, when feed costs were under $40, to a minus $6.94, when feed costs per cow were above $70.[3]

Beef cows can utilize large quantities of low-quality forage. Grain is usually not required in the ration.[4] Many farmers feed more and better feed than is necessary to meet the nutritional requirements of the beef cow. Henquinet's study of beef cow herds in northern Wisconsin discovered a strong tendency to overfeed. The farmers in this study who fed a winter ration of hay alone were found to be feeding at the rate of 27.2 pounds per day per cow when only 20 pounds would have been adequate to meet the beef cow's nutritional requirements. This meant that based on a 180-day winter feeding period the actual winter feed costs were $41.58, when they could have been only $30.60 if the recommended ration of 20 pounds of hay per day had been fed. The

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[2]Shaudys and Sitterly, Costs and Returns of the Beef Breeding Enterprise in Western Ohio, Research Circular 73, Ohio Agricultural Experiment Station, August 1959, p. 3.

[3]Janssen, M. R., Beef Cow Herd Costs and Returns in Southern Indiana, Research Bulletin No. 725, Purdue University, August 1961, p. 6.

[4]Snapp and Neuman, Beef Cattle, 5th edition, John Wiley and Sons, Inc., 1960, p. 202.

farmers who fed grain in addition to hay were found to have even higher feed costs with no apparent advantages from the grain feeding.[5] In addition to feeding only the required amounts of forage during the winter season, feed costs can be reduced by making maximum use of pasture so as to shorten the winter feeding season. High profit beef herds had higher pasture costs but lower costs for feed other than pasture (and lower total feed costs) than did lower profit herds in a Minnesota study.[6] The use of forage by-products from grain production such as small grain stubble and cornstalk pastures, cornstalk silage, and corn cobs may also result in lower feed costs.[7]

In most instances, the creep-feeding of calves does not pay if the calves are sold as feeder calves; however not all experimental results agree on this subject.[8]

Labor Requirements

The labor requirements for beef breeding herds are

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[5]Henquinet, Wm. D., "Beef Cow Herd Development Opportunities in Northern Wisconsin," unpublished M. S. thesis, 1964, University of Wisconsin.

[6]Wells and Nodland, "Beef Cow Herd Costs and Returns," Minnesota Farm Business Notes, University of Minn., June 1963.

[7]Garst, David, "Cows and Calves on a Feed Grain Farm," paper presented at the Indiana Grassland Council, July 1964.

[8]Snapp and Neuman, op. cit., p. 164.

quite low. Recent studies have indicated that labor requirements may be considerably less than the standard guidelines used in many farm planning manuals. Based on the data given in two typical farm planning guides the labor requirement per cow for a beef breeding herd would be 32.2 hours assuming one bull per 25 cows, heifer calves equal to 25 percent of the cows retained, bred heifers equal to 20 percent of the cows retained, and no labor attributed to calves sold at weaning.[9] The 1963 records of the Missouri Beef Cow Research Panel show an average of 5.95 hours per cow required by the beef herd including bulls and replacement heifers.[10] Wells' study in Minnesota found that labor requirements per cow were 18.5 hours for small herds (8-25 cows), 11.5 hours for medium sized herds (26-49 cows) and 8.9 hours for large herds (50-119 cows).[11] Labor requirements per cow, excluding labor required by replacements and bulls, were approximately 11.5 hours in a 1946-51 study conducted in northeastern Michigan. Average herd size in the above study was 29

[9] Wheeler, R. G., Planning Your Michigan Farm, Extension Bulletin 379, Michigan State University, November 1963, p. 109; and Brake, et al., Michigan Farm Management Handbook, A. E. No. 929, Michigan State University, September 1963.

[10] Lanpher and Hagan, Beef Cattle Labor Requirements, Special Report 45, University of Mo., October 1964.

[11] Wells, A. R., unpublished data from 1962 records of 48 beef cow herds in Minnesota, see Wells and Nodland, op. cit.

cows.[12] Similar results were obtained in other studies of beef cow herd costs and returns.[13]

Labor needs are the greatest during the winter feeding period with the peak requirements occurring at calving time, usually late winter or early spring. Labor requirements during the summer grazing period are very low; making up perhaps only 25 to 30 percent of the total labor requirements.[14]

Capital Requirements

The beef cow enterprise is of an extensive nature in that it requires relatively large amounts of capital investment per dollar of return and per unit of labor utilized. Gross returns per dollar invested in livestock, feed, buildings and equipment may be only about 30 cents for beef cows compared with approximately $1.75 for hogs and $1.05[15]

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[12] Wright, K. T., Beef Costs and Returns in Northeastern Michigan, 1951, A. E. No. 526, Michigan State College, March 1953.

[13] For example, see Shaudy's and Sitterly, op. cit., p. 4; and Janssen, M. R., op. cit., p. 4.

[14] Lanpher and Hagan, op. cit., p. 6.

[15] Beef Cow Herd Management, Extension Circular 497, Purdue University, p. 8.

for dairy cattle. Average investment per cow in livestock, buildings and equipment was $309 for small herds (6-23 cows) and $279 for large herds (over 45 cows) in southern Indiana study.[16] The main source of difference in investment between small and large herds was investment in buildings per cow.

Building costs varied widely among farms in the above study. Some herds had access to elaborate and expensive buildings, while others had no buildings at all. The herds that used no buildings had calving percentages and weaning weights similar to those of herds with buildings.[17] Henquinet's study in northern Wisconsin did not indicate any significant advantage for either calving inside or outside. Producers with cows calving outside did so later in the spring than those who calved inside for fear of heavy calf losses from cold weather, but some producers were found whose cows calved outside in early March with good results.[18] Investments and attendant costs for beef cow herds may be lowered without sacrifice of production by keeping investments in buildings at a minimum.

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[16] Janssen, op. cit., p. 8.

[17] Ibid., p. 7.

[18] Henquinet, op. cit., p. 45.

An economic analysis of beef cow farms in Virginia indicated that high total investment per cow was the one factor most often associated with low returns to labor and management. Total investment in livestock, real estate, machinery, equipment, feed, etc. per cow was $927 for the low return herds and $738 for the high return herds in the Virginia study.[19] Henquinet also found that high profit herds had lower investments per cow than did low profit herds.[20]

Effects of Calving Percentage, Weaning Weight, and Other Factors on Profitability

Since the only source of income from the beef cow herd is the feeder calf, calving percentage, weaning wieght, and quality of calves produced are of great economic importance. It costs about the same amount to support a cow that raises a calf as it does to support a cow that doesn't raise a calf. Records of Minnesota beef cow herds indicated that feed cost per cow for cow herds with calf crops below 80

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[19] Kline, R. G., Economic Analysis of Beef Cow and Calf Farms and Manufacturing Milk Dairy Farms, Washington and Smyth Counties, Virginia, Bulletin 529, Virginia Polytechnic Institute, September 1961.

[20] Henquinet, op. cit., pp. 36, 37.

percent was nearly the same (slightly higher) as for herds with calf crops above 90 percent. Returns over feed cost per cow decreased rapidly as the percent calf crop fell below 80 percent.[21] An 85 percent calf crop was required to break even under 1956-1959 price conditions and weaning weights in southern Indiana. The main reasons for low percentage of calf crop noted in some southern Indiana herds were: a) lack of attention by the producer at calving time, b) unsuitable buildings and lots, c) drowning of young calves, d) failure of cows to conceive, and e) lack of or improper culling. Most calves were lost at calving time or soon afterward, therefore, successful producers placed cows due to calve in clean lots or maternity stalls where any calving difficulties could be readily observed.[22]

The Minnesota study found that feed cost per cow did not increase as weaning weights increased, and that returns over feed cost per cow increased as weaning weight increased.[23]

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[21] Wells and Nodland, op. cit.

[22] Janssen, op. cit., p. 5.

[23] Wells and Nodland, op. cit.

Aside from a slightly higher investment in breeding stock it costs no more to produce a high-quality calf than a poor-quality one. Shaudys and Sitterly found that higher quality herds had lower costs and higher returns per 100 pounds of beef produced than low-quality herds in their survey of southeastern Ohio beef cow herds.[24] It should be noted that the quality of cattle in the above study was closely associated with the level of management and, therefore, part of the differences in profits may be attributable to differences in management and not quality of cattle.

In the southern Indiana study profits were increased when calving was grouped from January to March rather than later in the spring. Early calves were large enough to more fully utilize the increased milk flow when the cows were placed on spring pastures, thereby avoiding udder troubles sometimes experienced when calving occurs later in the spring (April through June). Early calves can also get more feed from the pasture. Weaning weights were heavier for those calved earlier.[25] Herds which calved before April first

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[24] Shaudys and Sitterly, Costs of Producing Beef in Southeastern Ohio, 1954, Research Circular 45, Ohio Agricultural Experiment Station, May 1957, p. 16.

[25] Janssen, op. cit., p.5.

produced calves which averaged 500 pounds at time of sale as compared to 418 pounds for those calving after April first in northern Wisconsin. The herds which calved early had considerably higher net returns.[26]

Another factor affecting the returns per cow in the herd is the age at which heifers give birth to their first calf. An experiment in Oklahoma indicated that cows which first calved as 2-year olds produced more total weaned calf weight at a lower cost per pound over their lifetime than did cows which first calved as 3-year olds. However, heifers first calving as 2-year olds are much more likely to require assistance at calving time and are more subject to injury during calving than are 3-year olds.[27]

Conclusions as to the Profitability of the Beef Cow Herd Under Various Conditions

Most cost studies have indicated that commercial beef cow herds on the average yield fairly low returns. However, returns to individual herds vary over a wide range. Data from the Michigan mail-in account farms for the years

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[26] Henquinet, op. cit., p. 45.

[27] Snapp and Neuman, op. cit., p. 99.

1960 through 1963 indicate that farms with beef cow herds as the major enterprise had the lowest average return on investment and labor income of all the types of farms analyzed over the four years. The four-year average return on investment for beef cow herds was 1.4 percent as compared to 5.4 percent for all farms. The average labor incomes were a minus $606 for beef cow farms versus $2,939 for all farms. It should be noted that the sample of beef cow farms was quite small, being only 12 out of 772 total farms in 1963, and therefore may not be representative.[28] Labor income and rate earned on investment for the 12 beef cow farms in 1963 ranged from a high of $9,663 and 16.6 percent, respectively, to a low of a minus $10,648 labor income and a minus 5.5 percent return on investment.[29]

Budgets developed from data from a detailed survey of 42 beef cow operations in late 1963 and early 1964 in northern Wisconsin showed an average return to management of minus $23,04 per cow. Returns to management per cow increased as herd size increased. Small herds averaging 12

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[28] Kyle, L. R., Michigan Farm Business Report for 1963, Research Report 30, Michigan State University.

[29] Kyle, L. R., Beef Cow Farming Today, A. E. 966, Michigan State University, published 1964, p. 8.

cows received a minus $37.76 return to management per cow as compared to minus $15.50 for medium sized herds (33 cows) and $15.77 for large herds of an average of 80 cows.[30]

In a study of 102 western Ohio beef cow herds in 1957-58 net income per cow ranged from minus $44.43 for herds of 10 to 15 cows to a high of $7.20 for herds of 51 to 75 cows. The average herd returned 83 cents less than total costs per cow but $44.88 above the value of salable inputs and cash costs. The $44.88 was the return to the fixed assets such as pasture, stalk fields, labor, buildings and equipment.[31] The very small herds had higher costs for labor, buildings and equipment, Most of the advantages of size were reached when the herd had 30 or more cows.[32]

One hundred and sixteen Missouri farms with beef cow herds had an average return on investment of 6.0 percent and a labor income of $4,214 in 1962. These returns are for the whole farm even though the beef cow enterprise was not the major enterprise on some of these farms. Some of them fed out the calves which they raised. Of those who

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[30] Henquinet, op. cit., p. 36.

[31] Shaudys and Sitterly, op. cit., p. 6.

[32] Ibid., p. 7.

sold their calves as feeders at weaning time the group with less than 35 cows had an average labor income of $924 and return on investment of only 1.4 percent, while those with more than 35 cows received labor incomes of $2,047 and a return on investment of 5.0 percent.[33]

The southern Indiana study found that incomes varied widely during the cattle cycle as the prices of feeder cattle changed. It concluded that a beef cow herd will show a profit under average weaning weights, calving percentages and costs of production when returns are averaged over the cycle. Estimated long-run net return over variable costs was $28.71 per cow while net return over all costs was $2.35 per cow. The variability in net returns among herds was wide. High calving percentages and weaning weights, maximum use of pasture, and minimal winter feeding consistent with nutritional needs were associated with higher profits.[34]

The above study indicated that beef cow herds may be profitable and adaptable on three types of farms. One type is the large rolling to hilly farm that produces an abundance of pasture and harvested forage required to

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[33]Hagan and Wiggins, Beef Cow Systems, B 823, University of Missouri, July 1964, p. 6.

[34]Janssen, op. cit.,pp. 1-4.

control erosion. Another was the small farm, particularly in rough land areas, where the operator has full-time employment off the farm and, therefore, finds beef cows adaptable due to their low labor requirements. For the same reasons they also may fit on farms whose operator is old and wishes to reduce the work load. The final type of farm where beef cows may fit is the grain farm with sufficient quantities of stalk, stubble, and native pasture and other forages that would not be used if the cow herd were not kept. Usually, when the herd is increased beyond the size necessary to utilize these cheap forages, so that cropland must be used to specifically produce feed for the beef herd, profits will fall.[35]

Wiggins and Hagan reach similar conclusions regarding the situations under which beef cows may be profitable. They state that beef cows may be adaptable as a major enterprise on large farm units in areas adapted primarily to forage production, or as a major enterprise on small part-time farms. However, they report that the majority of the beef cow herds in Missouri are secondary or minor enterprises. These herds

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[35] Ibid., p. 10.

are used to utilize crop residues and forage crops which must be grown on land not suited to row crops. Resources suitable for other enterprises such as hogs, beef feeding, dairying, or crop production, generally, are more profitably utilized by those enterprises than beef cows. Therefore, beef cow numbers on these farms should be restricted to the size necessary to utilize those resources not suited to other more profitable enterprises.[36]

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[36]Wiggins and Hagan, Economic Potential for Beef Cows, SB 827, University of Missouri, February 1965, pp. 7-9.

CHAPTER III

METHOD OF STUDY

This study involved the preparation of budgets for some hypothetical beef cow herd enterprises. Total farm budgets showing costs and returns for whole farms were used for those cases in which the beef cow herd was the single major enterprise. Partial budgets showing only the costs and returns for the cow herd itself were calculated to show the effects of adding a cow herd as a sideline enterprise to a going farm business. Various budgets were developed to show the effects of location, land value and productivity, size of herd, levels of production efficiency in the crop and beef enterprises, and type of feeding program on income.

In the fall of 1964 more than two dozen farms with beef cow herds were visited in Calhoun, Ionia, Iosco, Cheboygan, Mackinac, Delta, Marquette, and Ontonagon Counties. These visits and consultation with extension personnel provided insights into the types of farms on which beef cow herds are kept, common production practices, and input-output

relationships in beef cow herds in various parts of the state. No detailed survey was made. The farm visits were primarily for the purpose of providing background information and guidelines for the designing of hypothetical beef cow enterprises which may be typical of those found in various parts of the state.

The data used for these budgets was synthesized largely from secondary sources. A careful review of the literature reporting results from past research on costs and returns and physical input-output relationships for beef cow herds was conducted in order to develop data for budgeting. Data generated from the review of literature was checked against the data from the farm visits and farm account data before use. To further protect against bias and errors in judgment which could enter into such synthesized data, it was reviewed by staff members in the departments of Animal Husbandry, Crop Science, and Agricultural Economics.

Three basic types of beef cow enterprises were budgeted and analyzed. The first type was large herds of 200 cows as the sole major enterprise on full-time farms. Acreage requirements, costs, and returns were computed for conditions in the upper peninsula, northern lower peninsula, and southern Michigan under two levels of soil productivity

with various combinations of crop yields, calving percentages, weaning weights, and winter feeding programs. The effects of varying cattle prices and land values on incomes for these large full-time beef cow farms were determined. The capitalized land value used for such enterprises was also determined.

Similar budgets were developed for small part-time farms supporting a 25-cow beef herd as the sole major enterprise. Alternative budgets for the renting out of these farms were developed to compare the returns from the beef herd with alternative opportunities.

The third type of beef cow program budgeted was 50-cow herds added as sideline enterprises to existing farm units in replacement of/or in addition to other alternative enterprises.

All budgets were developed with the number of cows held constant as the single limiting factor, except in the case of the 25-cow part-time farms where the acreages were also held constant at the level necessary to support the cow herd under the least efficient conditions. Differences in income due to better management of the cropping program could thus be readily assessed.

CHAPTER IV

THE LARGE FULL-TIME BEEF COW ENTERPRISE

Very few of Michigan's beef cow herds are of sufficient size to provide full-time employment for their operators. According to the 1959 census 197 out of 5,478 Michigan farms, which reported more than one beef cow, had 50 or more beef cows.[1] Hartwig states that a gross income of $20,000 to $25,000 is required to produce a net farm income of about $4,500, and that a full-time operator requires a herd of 100 to 150 cows to get a gross income of $15,000 to $20,000 per year.[2] There are relatively few herds of 100 or more cows in the state.

In order to analyze the profitability of the large full-time beef cow enterprise budgets were prepared for hypothetical farms featuring a 200-cow beef herd as the sole

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[1] 1959 Census of Agriculture. Note that the number of farms with beef cow herds of various sizes is calculated by deducting the number of farms with dairy herds of a certain size from the total number of farms with cows of all types in that particular size group. Since some farms have both beef and dairy cows, the total number of farms with beef cows may be understated and the size distribution may be distorted somewhat.

[2] Hartwig, Richard, "Can Beef Cow Enterprises Be Profitable," presented at 1964 Farmers' Week, Michigan State Univ.

major enterprise. Two hundred cows were arbitrarily selected as a herd size likely to be sufficient to fully employ a farm operator and to provide a satisfactory income for a farm family. The sole fixed factor in the preparation of the budgeted farm situations was the herd size, i.e. acreages, etc. were based on what would be necessary to support a 200-cow herd under the relevant assumptions. The budgets prepared are complete farm budgets including all costs and returns for the complete farm businesses.

The budgeted enterprises include 200-cow operations in the Upper Peninsula and northern Lower Peninsula on moderately productive and less productive soils and in southern Michigan on less productive soils. The effects of varying levels of performance in the cropping program and beef enterprise were determined. The use of a corn silage wintering ration was compared with a conventional hay feeding program in the southern Michigan budgets. The effects of varying cattle prices and land values upon labor income were also calculated. Finally, the capitalized value of land used for the full-time beef cow enterprise was calculated.

Assumptions

All the budgets were based on the assumptions elaborated here. Acreage and capital requirements were based on what would be necessary to support a 200-cow herd under the relevant assumptions. The beef cow enterprise producing weanling feeder calves to be sold in the fall of the year was the major and only livestock enterprise for the budgeted farms. Cropping programs were designed solely for the purpose of feeding the beef herd. The only crops sold were oats, which were produced as a nurse crop for establishing the alfalfa-brome hay and pasture fields, and which were in excess of the amount required to feed the beef herd. It was assumed that the northern Michigan operators obtained two thirds of their pasture requirements from permanent pastures consisting of quackgrass, bluegrass, etc. and which might be up to 50 percent covered with brush. The southern Michigan operations were assumed to obtain one third of their pasture requirements from open permanent pastures. Pasture acreages for both permanent and improved rotation pastures exceeded the requirements (based on yields) by 10 percent in order to partially account for variation in yield from season to season. All hay and improved rotation pastures were assumed

to be in alfalfa-brome grass mixtures.

Estimated crop yields and acreage requirements for the various alternatives are given in Table 1a in the Appendix. The estimated crop yields are at levels slightly above average which might be indicative of what could be expected under ordinary conditions when good but not excellent management practices were followed. In addition, the Upper Peninsula and northern Lower Peninsula alternatives, which were assumed to have the same yields, on moderately productive soils were also budgeted with higher levels of crop yields commensurate with excellent management practices. With good management, alfalfa-brome hay yields were estimated at 2.4 tons per acre in moderately productive soils and 1.9 tons per acre on less productive soils. The use of excellent management practices was assumed to increase hay yields to 2.9 tons per acre on soils of moderate productivity. The permanent pastures, which were assumed to be up to one half covered with brush, were estimated to produce from .5 to .7 tons of hay equivalent per acre. All yields are expressed in terms of yield preserved for feeding (i.e. harvesting losses, storage losses, and trampling losses are deducted where appropriate from total potential yields). Fertilizer requirements consistent with the estimated crop yield levels are given in

Table 2 in the Appendix.

Cropping programs, labor, and capital requirements were based on a conventional winter ration of hay for the brood cow herd, unless otherwise indicated. Daily feed requirements for the beef cow and calf and for the replacement heifer are given in Tables 3 and 4 in the Appendix. The winter ration for the brood cow was assumed to be 20 pounds of mixed hay per day or its equivalent. The wintering period was assumed to be 190 days, and the grazing season to be 175 days in northern Michigan (including the U.P.). Southern Michigan was assumed to have 195 days of grazing and a 170 day winter feeding period.

Estimated land values and property tax rates are given in Table 5 in the Appendix. The only difference between the Northern Lower Peninsula and Upper Peninsula enterprises as budgeted was the value of land. Therefore, differences in capital requirements, property taxes, and interest on investment exist between these two areas.

Estimated labor requirements are given in Table 6. An estimated 9 hours per cow was required for feeding and care of the herd of 40 or more cows. The farm operator was assumed to supply up to 250 hours of labor per month. Labor required in excess of the operator's was assumed to be hired

at $1.25 per hour.

Expected prices for inputs and products for the next 5 years or so are elaborated in Table 7 in the Appendix. Steer calves of good to choice quality were estimated to bring 27 cents per pound. Steer calves of this quality when fed to good to choice grades were predicted to bring 24 to 25 cents per pound; thus cattle feeders are expected to operate on a price margin of minus 2 to 3 cents.[3] The assumption was made that all the budgeted enterprises produce good to choice feeder calves which would sell for the same price (27 cents per pound for steers) regardless of weight.

Feed Requirements and receipts are based on the assumption that heifer calves equal to 25 percent of the cow herd are held over as replacements. Twenty percent of the cows are actually replaced, with the remaining heifers sold as long yearlings. Death losses in breeding stock were estimated to be 2 percent. Calves weaned as a percent of breeding age females in the herd in the previous fall were estimated to be 85 percent for producers using slightly above average or good management practices and 90 percent for those using excellent management practices. Weaning

[3]Conversation with J. Ferris, Agricultural Economics Department.

weights of 425 pounds for steer calves were expected under good management and heavier weights were expected when improved managerial practices were followed. All steer calves were assumed to outweigh heifer calves by 25 pounds.

The 200-cow herd in Northern and Upper Peninsula Michigan

Cropping program and acreage requirements.

With good crop management on moderately productive soils approximately 1,042 acres would be required for a 200-cow beef operation. About 665 of these acres would be in permanent pastures which might be up to 50 percent covered with brush. If the pastures were more open, proportionately fewer acres would be required. The permanent pasture would meet about two thirds of the total pasture requirements for the herd. The additional one third of the pasture would be supplied by grazing about 200 acres of alfalfa-brome grass in the late summer and early fall after the first cutting of hay had been removed. This is a fairly common practice since permanent pastures often dry up in late summer. An additional 86 acres of alfalfa-brome grass cut twice would be required to produce enough hay to winter the herd. About 71 acres of oats would be grown as a nurse crop for the new

seedings of alfalfa-brome grass assuming that stands last for 5 years. Twenty-seven acres of oats straw would provide bedding for the beef herd. The balance of the oats straw was assumed to go to waste, although it could provide an additional reserve of cheap feed for the beef herd.

When excellent crop and pasture management practices were followed, the total acreage requirement was reduced to 883 acres. The acreage requirements increased when less productive soils were utilized. About 1,272 acres would be required for the 200-cow operation on less productive soils such as well-drained sandy loams and loamy sands when good management practices were followed. Nearly 800 acres of permanent pasture would be necessary in such a situation. Soils of very low productivity, such as extremely drouthy sands, would necessitate considerably larger acreages than indicated to support the cow herd.

Capital and Labor Requirements.

The crop yields and acreage requirements were considered to be essentially the same for the Upper Peninsula and northern Lower Peninsula. Land values, however, were somewhat higher in the Lower Peninsula than in the Upper Peninsula. Capital requirements were, therefore, somewhat

higher for the full-time beef cow enterprise located in the Lower Peninsula. The 200-cow operation on moderately productive soils with good crop yields required a total investment of about $129,000 in the Upper Peninsula compared to $142,000 in the northern part of the Lower Peninsula. With the full use of improved crop management, acreages required were reduced and total investment dropped to $120,000 and $131,000, respectively. Total investments required when less productive soils were used were similar. With good crop yields and estimated land values, the total investment with less productive soils was $124,000 in the Upper Peninsula and $135,000 in the northern Lower Peninsula.

The total capital requirements for these 200-cow beef units, thus, range from $120,000 to about $142,000. For comparison, this would be about the same as for a 60 to 70-cow specialized dairy farm.

Labor requirements were greater on those operations which required larger acreages due to lower levels of crop management or to less productive soils. The 200-cow operations required roughly 1.3 man equivalents of labor. Hours of labor hired varied from 780 for the operation with high crop yields on moderately productive soil to 1,250 for the operation on less productive soils. Peak labor loads occurred

in the months of June and July during hay harvesting. The calving season, usually from February through April, is a period of maximum work load for the operator. No hired labor was required during the fall and winter months. Labor requirements are usually at their minimum during the fall after the hay harvesting season and before the winter feeding season sets in.

Income potential.

Labor income for the 200-cow operation in the upper Peninsula with moderately productive soils and typical good management was $2,990. The term "typical good management" refers to the attainment of slightly above average crop yields, weaning weights of 425 pounds for steer calves, and a calf crop of 85 percent. Due to increased property taxes and greater interest charges on investment, the same operation in the northern Lower Peninsula would produce the somewhat smaller labor income of $2,246. Whether this difference is real depends on what individual farmers can purchase land for in the two areas. On less productive soils the 200-cow beef farms under typical good management would generate labor incomes of $2,099 and $1,451 in the Upper Peninsula and northern Lower Peninsula, respectively. The difference in labor income between locations reflects the lower land values and

associated costs assumed for the Upper Peninsula. The operations on less productive soils had lower labor incomes than those on the moderately productive soils because the reduced receipts from surplus crops and higher expenses for seed, lime, fuel, and fences for the operations on less productive soils more than offset the reduction in interest charges on investment resulting from their smaller total investment. The complete budgets are given in Tables 8, 9, and 10.

The labor incomes for the beef cow farms budgeted ranged from only one half as high to approximately equal to average labor income per farm earned by all the farms in the Michigan Mail-In Record Project for the years 1960-1963. The average labor income over the four years for the account farms was only $2,939 which is a low return to the operator's labor and management.[4] Measured in terms of total investment, the account farms, which averaged $99,418, were somewhat smaller than the budgeted 200-cow farms which required total investments of from $120,000 to $142,000.[5] It is of interest that the few beef cow farms in the record project had a four-year

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[4] Kyle, L. R., op. cit., p. 2.

[5] Ibid., p. 3.

average labor income of minus $606.[6] These farms were considerably smaller than the budgeted beef cow farms. It should be emphasized that the budget results are based on levels of performance somewhat above average such as might be expected from the use of what has been termed good but not excellent management practices. A fair but not complete degree of application of practices recommended by the agricultural experiment stations and extension services might be characteristic of these slightly above average or good managers. The comparison of the budget results for the large beef cow farms with the farm record results for all farms indicates that at least above average or good management is required in order for the full-time beef cow-calf program in northern Michigan to produce incomes similar to other enterprises in various parts of the state.

Effects of managerial performance on income.

Higher levels of management produce larger incomes as the budgets show. An increase of five percentage points in calf crop weaned increased labor incomes by $1,032 above the level reported for the Upper Peninsula 200-cow operation on moderately productive soils with good management. An

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[6] Ibid., p.2.

increase in percent calf crop weaned of only 5 percentage points boosted labor income up nearly 33 percent. A small decrease in percent calf crop would cause a proportionate decline in income. The attainment of a high percent calf crop is thus of critical importance. Practices which promote better calving percentages such as close attention and provision of proper facilities at calving time, and close culling of non-pregnant cows, can be of vital importance to the profitability of the beef herd.

Heavier weaning weights also boost incomes. A 50 pound increase in weaning weight raised labor income by $1,274 above the level earned by the Upper Peninsula operation on moderately productive soils with good management. This is slightly more than the increase in income resulting from a 5 percent increase in calf crop. A change in percent calf crop of five percentage points or a change in weaning weights of something slightly less than 50 pounds would have similar effects on income. Heavier weaning weights may result from earlier calving, the use of bulls capable of transmitting higher gaining ability to their progeny, and proper nutrition of the lactating cow. The budgeted change in income resulting from an increase in weaning weight is based on the assumption that better and more expensive bulls

were used, and, therefore, bull depreciation expenses were increased. If calving had formerly been concentrated later in the spring, it is likely that weaning weights could be increased by earlier calving with little difference in expense. It should be pointed out that these results are based on the somewhat unrealistic assumption that calf prices will remain constant as weaning weights increase. Actually, prices tend to decrease gradually as weights increase. In defense of the assumption of constant prices it may be claimed that the better, more expensive bulls used in this example to increase weaning weights would also increase the quality of the calves enough to counteract the effect of heavier weights on prices, thereby, causing calf prices to remain constant.

The use of better management practices in the cropping and pasture program results in higher yields and, therefore, a reduction in acreage required to support the cow herd. An increase in crop yields from good to excellent levels increased labor income by $1,127 for the 200-cow enterprise in the Upper Peninsula with moderately productive soils. Higher crop yields mean that less land is required, thereby, reducing total investment in land which decreases interest on investment and property taxes. When the better

crop and pasture management practices were followed, expenses for seed, fuel, fences, and labor reduced, but expenses for fertilizer were slightly higher since the increase in fertilizer required to produce the higher yields was proportionately greater than the reduction in acreage obtained. The net result of better crop yields were reduced expenses for the beef cow operation. It is not surprising that efficiency in the crop and pasture program has considerable effect on the profitability of the beef cow enterprise when it is realized that from 60 to 70 percent of the total costs in the production of feeder calves is attributed to the cost of feed and pasture (see Chapter II, p. 19). One of the primary functions of the beef cow may be to provide an indirect means of marketing the forage produced on the land, hence, it should be expected that increased efficiency in the production of forage (feed and pasture) would result in higher profits as reflected by increased returns from the beef cow enterprise.

The budgets delineated in Tables 8, 9, and 10 show the effects of increased calf crop percentages, weaning weights, and crop yields, individually and cumulatively, upon labor incomes. For example, the 200-cow beef enterprise in the Upper Peninsula with moderately productive soils under the conditions outlined previously for typical good management

had a labor income of $2,990. As indicated, a five percentage point increase in calf crop weaned boosted labor income by $1,032, while a 50 pound increase in weaning weights caused labor income to rise by $1,274. When calculated from a base with a 90 percent calf crop rather than 85 percent as used above, an increase in crop yields to the higher level would raise labor income by $1,127. The cumulative effect of a five point increase in percent calf crop, a 50 pound hike in weaning weights, and an increase in crop yields to the higher level associated with excellent crop management was an increase in labor income of $3,541 (i.e. labor income more than doubled). Thus, a labor income of $6,531 was obtained with a 90 percent calf crop, an average weaning weight of 475 pounds for steer calves, and high crop yields. An additional 25 pound increase in weaning weights would raise labor income to $7,342. Excellent management in all phases of the beef cow enterprise and crop and pasture program is required to obtain these results.

Effect of cattle price levels on income.

The level of prices received for the cattle sold strongly influences income levels. The budget results analyzed are all based on moderate price levels. The prices used in the budgets may be somewhat indicative of the average

prices which could be received over the cattle price cycle; and, to the extent that they do actually reflect the average price which could be obtained over the cycle, they are the best level of prices to use for long-range planning. Either higher or lower prices might be expected at various points in the price cycle and may be accordingly more appropriate to use for short-range planning.

In order to demonstrate how profits from the beef enterprise vary as prices change, the effects upon labor income of prices at both a higher and a lower level than the budgeted level have been calculated (see Tables 11 and 12). The moderate prices used for the budgets on a per pound basis were 27 cents for steer calves, 24-1/2 and 20-1/2 cents for heifer calves and cull yearling heifers, respectively, 16 cents for cull cows, and 18 cents for bulls sold for slaughter. The set of low prices was based on 24 cent steer calves, 21-1/2 cents heifer calves, and proportionate prices for the other cattle. When prices decreased from the moderate to the low level, labor income fell by $2,823 on the 200-cow herds with good management (i.e. with an 85 percent calf crop and weaning weights of 425 pounds for steer calves). Those with higher levels of performance in the beef enterprise suffered decreases in labor income proportionate with

their greater production of beef; however, they, of course, still had higher absolute levels of labor income than the less efficient enterprises. The absolute gap in labor incomes between high and low performance enterprises narrows slightly as prices fall, however, at the low price level a higher level of performance may result in positive rather than a negative labor income. The decrease in labor income of $2,823 noted for herds with good management is sufficient to reduce labor income to very low or negative figures for these herds. For instance, the Upper Peninsula herd on moderately productive soils had a labor income of $2,990 under the moderate prices, but would earn only a $167 labor income under the low price assumptions. When moved to less productive soils, the operation would earn labor income of $2,099 with moderate prices and minus $724 with low prices.

An increase in cattle prices to levels commensurate with 30 cent per pound steer calves would raise labor incomes. The increase would be $2,430 when an 85 percent calf crop and average weaning weights of 425 pounds for steer calves were realized. Thus, a change in cattle prices of 3 cents per pound for calves and proportional change for older stock would either nearly completely erase or would nearly double labor incomes for the enterprises with good management. The

beef cow enterprise with higher levels of performance would have proportionally smaller changes in labor income, than would those with lower levels of performance.

This tremendous variation in income due to changes in price levels emphasizes the critical importance of prices. A relatively small error in price expectations could cause anticipated results to be at considerable variance with the actual results, hence, careful selection of price levels for budgeting and planning is imperative.

Effect of land values on income and capitalized land value.

Because of the large acreages of land required by the beef cow enterprise, land values are an important determinant of the level of investment necessary for the enterprise, and they, therefore, have considerable effect upon the returns which the operator receives for his labor and management. Table 13 shows the labor incomes obtained under three different levels of land values by the 200-cow beef enterprise in northern Michigan (including the Upper Peninsula) on moderately productive soils with good management. At an average land value of $62 per acre labor income is $2,246. A reduction in land value to about $46 per acre, a decrease of 25 percent, raises labor income by approximately

35 percent to $3,050. Other things being equal, the lower the cost of land is the more profitable the beef cow enterprise will be.

The returns to land from the beef cow enterprise are not high, hence, it is usually not profitable to use high priced land solely for the purpose of supporting a beef cow enterprise under the usual systems of management. The capitalized values of the returns to land from the 200-cow beef herd in northern Michigan are presented in Tables 14, 15, and 16. The usual capitalization formula of $V = \frac{R}{i}$; where V is the capitalized land value, R is the expected return to land, and i is the expected interest rate or capitalization rate; was used in the computations.[7] The returns to land were calculated by deducting charges for the operator's labor and management and for nonland capital from net farm income.[8] The net income figures used were based on use of good management practices. Operators with very high or excellent managerial ability should receive higher returns for their labor and management as compensation for their greater ability, and as long as these individuals remain only a small

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[7]Murray, William G., Farm Appraisal and Valuation, Iowa State University Press, 1961, p. 238.

[8]Ibid., p. 19.

portion of the bidders for land and/or as long as they remain unwilling to capitalize their higher earnings into land values they will, in fact, receive greater returns for their labor and management.

The computations show the capitalized value of moderately productive land with improvements in northern and Upper Peninsula Michigan used for the full-time beef cow enterprise is $61 per acre when a five percent capitalization rate is used and only $3,000 is deducted as a charge for the operator's labor and management. Should the operator desire a higher return for his labor and management the capitalized value of the land will decrease. For instance, if the charge for the operator's labor and management is increased to $5,000 then the capitalized land value drops up to $23 per acre. As computed, the value of unimproved land (i.e. land without the necessary fences, buildings, wells, etc.) is about $14 per acre less than the value of improved land for the cow herd. The value of the less productive land with improvements was $33 per acre assuming a $3,000 deduction for the operator's management and labor. It is apparent that the beef cow enterprise cannot compete on high priced land. The results are based on good management, therefore, beef cow operators with average or poorer management

could afford to pay even less for land than these values. These results are consistent with the capitalized values of land used for beef cow herds in northern Wisconsin as calculated by Henquinet. The values from the Wisconsin study ranged from zero dollars per acre for small herds and herds of average profitability to about $61 per acre for large herds.[9]

Based on the 1959 Census of Agriculture, the average value of farmland per acre in the northern areas of the Lower Peninsula was about $82. In the Upper Peninsula the average value was near $70 per acre.[10] These averages are somewhat higher than the land values which the beef cow herds could pay for. However, it should be pointed out that the computed values of land used for the beef herd were based on average or moderately productive soils and less productive soils which included a very large proportion of brushy unimproved permanent pastures. Some land suited for beef cows may not be included in the farmland valued by the census. There no doubt is considerable land in northern Michigan suitable for beef cow herds which may be priced reasonably close to the

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[9] Henquinet, op. cit., p. 56.

[10] Wirth, M. E., "Land Prices--Should Continue Moderate Upward Trend," Michigan Farm Economics, January 1963.

earning capacity of the beef cow enterprise; however, the averages indicate that much of the farmland may be valued at or above the maximum which the beef cow enterprise could pay for. Careful selection of land is imperative if the full-time beef cow enterprise is to be profitable.

The 200-Cow Herd in Southern Michigan

Cropping program and acreage requirements.

A 200-cow beef enterprise in southern Michigan on less productive soils using the conventional hay and pasture program would require about 626 acres of land based on good management and the assumptions outlined at the beginning of this chapter. A third of the pasture requirements would be met by using 223 acres of open permanent pasture consisting of such grasses as bluegrass and quackgrass.

The remaining two thirds of the pasture would come from about 278 acres of alfalfa-brome grass, or similarly yielding mixtures, pastured after the first cutting of hay had been removed. This 278 acres of first cutting hay plus an additional 28 acres of hay cut two or three times would be sufficient to feed the herd for the winter. Sufficient oats would be grown to provide a nurse crop for enough new

seedings to replace the hay fields every five years. About 32 acres of oats straw would be required for bedding. The remaining 40 plus acres of oats straw and stubble could provide a reserve source of feed and pasture for the beef herd. (Acreage requirements are presented in Table 1a) These acreage requirements are based on net yields of 11.7 tons of cow silage, 3.0 tons of hay, and 59 bushels of oats per acre.

Acreage requirements are reduced to 525 acres when corn silage is produced instead of hay for the winter feed supply. About 84 acres of corn silage would be needed to feed the herd. The pasture would consist of 223 acres of open permanent pasture and about 159 acres of alfalfa-brome pasture. The acreage of oats grown would drop to about 40 acres. Since about 32 acres of oats straw would be needed for bedding, little oats straw would be available as a reserve source of feed as compared to the case when the hay program is used.

The southern Michigan operations required considerably less total acreages than did those in northern Michigan due primarily to a much smaller proportion of permanent pastures, which are quite low yielding, in their pasture programs, and, furthermore, due to the assumption that the permanent pastures in southern Michigan were all open rather

than nearly 50 percent covered by brush, which lowers yields proportionately, as was assumed for northern Michigan. Also, crop yields in general were slightly higher in southern Michigan.

Capital and labor requirements.

Total capital requirements for the southern Michigan full-time beef cow enterprises were greater than for those in northern Michigan due to higher investments in land. The southern Michigan operation, using hay as the winter feed source, required a total investment of about $159,000. When a corn silage program was used, the total investment fell to $144,000 due to a reduction in acreage required. The investment required for this system was based on the assumptions that the silage was stored in a bunker silo and that a self-unloading wagon was used to distribute the silage in inexpensive wooden feed bunks. More elaborate storage and feeding systems would require considerably higher investment.

These investments for the southern Michigan enterprises compare with the total investments for the northern Michigan operations which ranged from $120,000 to $142,000. Although the southern Michigan beef cow enterprises used

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considerably less total acreage, the land value per acre was so much higher than in northern Michigan that the total investment in land was greater for the southern than for the northern Michigan enterprises.

Labor requirements were quite similar for both the northern and southern operations when using the conventional hay and pasture program. The southern Michigan operation required about 986 hours of hired labor. When the corn silage winter feeding program was used, the total labor requirements and the distribution of peak labor loads were changed. Under this system the peak work loads came in the spring during the calving season in early spring and the plowing and planting period which overlapped the end of the calving season and during the corn silage harvesting in early fall. Hired labor requirements were reduced to about 464 hours.

Income potential.

Labor income for the 200-cow operation in southern Michigan was $1,741 when good crop yields, as 85 percent calf crop, and 425 pound weaning weights were obtained. All of the comparable enterprises in northern Michigan had greater labor incomes than this, except the 200-cow herd on less productive soils in the northern Lower Peninsula

which had a slightly lower income of $1,451. Labor incomes for the other northern operations ranged from $2,099 to $2,990 under similar levels of performance. The southern Michigan enterprise had slightly lower expenses for fertilizer, fuel, and fences, but had higher property taxes and a higher charge for interest on investment.

The enterprise with a corn silage program produced a labor income of only $71 under the assumed levels of production performances. Expenses for labor and fuel were lower under this program, but the cost of the large quantity of purchased protein supplements required for the feeding program was the key factor in causing total expenses to be greater for this program than for the hay program. Receipts from surplus crops (oats) were also smaller.

The southern Michigan full-time beef cow enterprises, thus, look less attractive, in general, than do the northern Michigan operations. Perhaps of more importance than the differences in absolute levels of income of beef cow enterprises between the two areas is the income level of the beef cow enterprise in each area relative to the incomes of alternative enterprises in its area. There probably are more alternatives to the full-time beef cow enterprise in southern Michigan which may be more profitable than the beef cow

enterprise than there are in northern Michigan. The farms suitable for beef cow herds in southern Michigan may likely be well suited to other enterprises such as beef feeding and dairy. The northern Michigan beef cow farms would be less suitable for such alternatives due to their limited ability to produce grain, their large acreages of low-quality permanent pastures, and the lack of markets. The average labor incomes for the period 1960-1963 for beef feeding and specialized dairy farms in southern Michigan enrolled in the Michigan Mail-In Account Project were $2,749 and $3,766, respectively.[11] Northern Michigan specialized dairy farms averaged $2,107 of labor income for the four years.[12] Thus, in terms of both absolute levels of income and income relative to alternative enterprises the full-time beef cow enterprise looks less attractive in southern Michigan than in northern Michigan.

Problems of and Prospects for Full-Time Beef Cow Enterprises

Problems in the acquisition of capital.

Relatively large investments are required for a beef cow enterprise of sufficient size to provide an adequate

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[11] Kyle, L. R., op. cit., p. 2.

[12] Ibid., p. 2.

income for a farm family. A total investment of $120,000 to $140,000 or more would be required for a 200-cow operation. The investment in livestock, machinery, feed and supplies for a 200-cow enterprise would be nearly $60,000. An additional $60,000 to $80,000 or more would be required for land and improvements.

The financing of such an investment may be troublesome due to the slow rate of capital turnover. A 200-cow beef enterprise would require an investment of about $130,000 but would provide an annual gross of only about $23,000 and a net farm income of about $9,000. When depreciation charges are added in, net cash income from a 200-cow herd under good management is about $12,000. From this amount family living expenses, interest, and principle payments on borrowed capital must be paid. The amount equal to depreciation charges should be used only for paying off debts on depreciable assets, at least in the long run. This means that over the long run the family living expenses, interest, and principle payments on debts for real estate or other non-depreciable assets (including brood cows since they were not depreciated in the budgeted examples) should be paid out of the net farm income. If family living expenses were about $4,000, which should be fairly typical of a family of three or four persons,

then only about $5,000 per year would be available for interest and principle payments on debts for real estate, and breeding stock in the long run.[13] Investment in real estate and breeding stock for the 200-cow operation is about $100,000 or more. The $5,000 available for debt servicing and repayment would be enough to pay only the interest on a debt of $100,000 at five percent interest. Therefore, if a sizable portion of the capital required for the full-time beef cow enterprise were to be borrowed the length of time required to repay the loan may be extremely long.

Additional difficulties in financing the operation may occur due to the unusual nature of the cash flow over the year and to variations in income from year to year. Nearly all of the receipts from the enterprise are received in the fall when the calves are sold. However, expenses must be paid throughout the year. Difficulties in financing may arise due to this incongruence of incoming cash flows with outgoing cash flows.

Variation of income from year to year could also contribute to difficulties in financing. As has been demonstrated earlier in the chapter, changes in cattle prices such as may occur over the cattle cycle cause rather wide

[13] Brake, et. al., op. cit., p. I.E. 1.

fluctuations in incomes from the beef cow herd.

Even if adequate finances were available, the operator wishing to establish a full-time beef cow enterprise may face difficulties in locating suitable tracts of land of sufficient size to support the enterprise. From 900 to 1,200 or more acres of land would be necessary for the northern Michigan full-time beef herd. There are relatively few farms of this size in the state. The 1959 Census of Agriculture found only 103 farms with 1,000 or more acres in economic subregion SRC-1, which includes most of northern Michigan and the Upper Peninsula.[14] In most situations it appears that it would be necessary to combine contiguous smaller units in order to obtain sufficient acreage for the full-time beef cow herd. The opportunities to do so at a reasonable price may be limited.

If satisfactory arrangements could be made, it might be possible for established farmers to alleviate some of the problems of acquiring the additional funds and land necessary to start a full-time beef cow herd by leasing adjoining farms. A considerable proportion of land in western beef cattle operations is leased. The beef cow herd yields very low and

[14] 1959 Census of Agriculture for Michigan by Area, Type, and Economic Class, Volume E, Autostat copies of unpublished worksheets.

variable returns to land, as has been previously discussed, and therefore could not be able to pay a very high rental rate for land. It might be possible, however, that some sort of leasing arrangement may be the best way to cope with the problems in acquisition of capital and land. Additional analysis would be required to determine the feasibility of such arrangements.

Prospects for success.

The analysis of the budgets for full-time beef cow enterprises presented in this chapter indicate that if satisfactory incomes are to be obtained good management is necessary. Reasonably high percent calf crops, weaning weights, and crop yields were necessary if profits were to be made. The 200-cow herds under good management, which obtained an 85 percent calf crop, an average weaning weight of 425 pounds for steer calves, and slightly above average crop yields, generated labor incomes of from roughly $1,500 to $3,000 under the various conditions budgeted for northern Michigan. The southern Michigan enterprises earned labor incomes of about $1,700 for the conventional hay and pasture program and practically no labor income at all for the corn silage program. Improved performance in calf crop percentages,

weaning weights, or crop yields increases income substantially. However, most operators would be doing well to obtain the minimum budgeted levels associated with good management.

Incomes from the beef cow herd are quite sensitive to changes in the price of feeder calves. A change in the price of feeder calves of three cents per pound with proportionate changes in the price for culled breeding stock could either nearly double or completely eliminate the labor income from the 200-cow herd under the assumptions of good management. Hence, the prospects for the beef cow enterprise to a large degree depend on what the future prices of feeder calves will be. The incomes in this analysis were based on moderate price levels of 27 cents per pound for steer calves and 24-1/2 cents per pound for heifer calves. If long run prices are expected to average much higher or lower than this level, then one might arrive at much different conclusions than are drawn from the results presented in this chapter.

Investments must be minimized if a profit is to be made from the beef cow herd. Relatively low land values are required if satisfactory returns for the operator's labor and management are to be obtained. This is one of

the reasons why the northern Michigan and, especially, the Upper Peninsula beef cow operations tended to have higher labor incomes than did those in southern Michigan. The capitalized value of land used for the full-time beef cow enterprise is below average, hence, caution must be observed in the purchase of land for the beef cow enterprise. There may, however, be substantial quantities of land in some areas of northern and Upper Peninsula Michigan which is priced at levels not too far from what the beef cow enterprise could pay for if good management were used and if the operator was willing to settle for very modest returns for his labor and management.

With good management the 200-cow enterprises produced labor incomes of $7 to $15 per cow. This rate of return is quite similar to the reported results of studies of beef cow costs and returns in other areas. Southern Indiana data indicate a labor income of roughly $9.50 per cow for the average herd, but only about one dollar per cow for large herds (due to smaller calf crop percentages and lighter weaning weights).[15] The median group of beef cow farms in a Virginia study produced labor incomes of about $16 per cow in 1957.[16]

[15] Janssen, op. cit., p. 4.

[16] Kline, op. cit., p. 42.

The budgeted Michigan beef cow enterprises also appear to be competitive with other areas in terms of total investment required per cow. The northern Michigan 200-cow herds required total investments of from $600 to $700 per cow. Total investment per cow on the group of Virginia beef cow farms mentioned was $760.[17] It should be pointed out that these were very small farms and hence likely to have higher total investments per cow than would larger operations.

Even if the full-time beef cow enterprise can earn profits which are competitive with beef cow herds in other parts of the country, the key determinent as to whether they are feasible under Michigan conditions is the relationship between the earnings of the beef cow enterprise and those of alternative enterprises. In this respect as has been discussed earlier in this chapter the larger beef cow herd in southern Michigan appears to be considerably less profitable than possible alternative enterprises such as beef feeding or dairy. The northern Michigan 200-cow enterprises, when under good or higher levels of management, appear to produce incomes which are competitive with alternative enterprises. In many cases, perhaps there may be no alternative

[17] Ibid., p. 42.

enterprise to the beef cow herd in northern Michigan except possibly forestry or recreational uses.

In assessing the place of the full-time beef cow enterprise in Michigan the following tentative conclusions are made. On the basis of the assumptions made for the budgets, the full-time beef cow herd does not appear to be a particularly feasible enterprise on an economic basis for southern Michigan. It is better suited to the conditions in northern Michigan and the Upper Peninsula. Due to the problems of acquisition of finances and land, the necessity of good or better management in order to be profitable, and the necessity for very low cost land, it is likely that large full-time beef cow enterprises will remain fairly limited in numbers. Growth in the numbers of large beef cow herds in Michigan will likely occur, but probably at a very moderate rate.

CHAPTER V

THE SMALL PART-TIME BEEF COW ENTERPRISE

Most of the beef cows in the state are in small herds which may be either secondary enterprises on large farms or major enterprises on small part-time farms. Due to their relatively low and flexible labor requirements, beef cows are well adapted to these part-time farms which produce large amounts of forage and for which the farm income needs are not high. For similar reasons they may also be suitable for farms on which the operator is elderly, perhaps eligible for retirement benefits, and interested in reducing the labor load.[1, 2] A large and growing percentage of Michigan's farms are part-time units, many of which may be suitable for small beef cow enterprises. In 1959, about 42 percent of Michigan's farmers worked off the farm 100 or more days during the year. Ten years previously the proportion of such part-time farmers was 31 percent.[3] No empirical data are available to indicate how many of Michigan's

[1] Wiggins and Hagan, op. cit., p. 8 and 9.

[2] Janssen, op. cit., p. 11.

[3] Schmid and Abel, op. cit., p. 15.

beef cow herds are on part-time farms, but it is likely that a substantial number of them are. Over a third of the herds in a southern Indiana beef cow study were on small farms whose operators had full-time employment off the farm or were semi-retired.[4]

To study the economic feasibility of part-time beef cow enterprises, budgetary analyses of hypothetical small part-time farm units which featured a 25-cow beef herd as the major enterprise were made for varying levels of management and locations. A herd of 25 cows is generally considered to be about the optimum size for a one bull herd. Budgets were made for farms of the necessary size to support a 25 cow herd. Acreages were held constant at the level required under the least efficient system of management assumed for the enterprises in a particular location. Other than this the basic assumptions upon which these budgets were constructed are the same as those elaborated in Chapter IV for the full-time beef cow herd enterprise. The budgets include various combinations of managerial performance on moderately productive soils in the Upper Peninsula, northern lower Michigan, and southern Michigan. A corn silage feeding program was compared with the conventional hay feeding

[4]Janssen, op. cit., p. 11.

program in southern Michigan also, and returns from renting out the farms were compared with those from the beef cow enterprise.

The 25-Cow Part-time Herd in Northern Michigan

Cropping program and acreage requirements.

The 25-cow herd in northern Michigan (including the Upper Peninsula) requires about 140 acres of moderately productive land when slightly above average or good crop yields are obtained. About 83 acres of permanent pasture, which may be up to one half shaded by brush, would be sufficient to supply about two thirds of the herd's pasture. Twenty-five acres of alfalfa-brome pastured after the first cutting of hay had been removed would supply the remainder of the pasture. To obtain enough hay to winter the herd about 11 more acres of alfalfa-brome hay cut twice would be needed. It has been arbitrarily assumed that all budgeted farms would have a minimum of 15 acres of oats, which could be used as the nurse crop for reestablishing seedings of alfalfa-brome. Therefore, this budget includes 15 acres of oats.

When higher crop yields are obtained, fewer acres are required to support the beef cow herd. To show the

effect of better crop yields on the same farm, acreages have been assumed constant. The land now in excess of that required to support the 25-cow herd could be used to produce extra crops for sale as has been assumed here or it could support additional beef cows or some other secondary livestock enterprise. The 140 acre farm on moderately productive soils, when operated under excellent crop management, had about 18 more acres available to produce additional crops for sale (as budgeted) or to support additional livestock than did the same farm when under good management. With excellent management, about 71 acres of permanent pasture, 19 acres of alfalfa-brome pastured after the first cutting of hay, and 10 acres of second cutting hay would be required. Since many farms in northern Michigan may not be suited to production of corn or other high value cash crops, the 18 extra acres were assumed to be used to produce oats for sale. If other higher valued crops such as corn could be grown instead of oats, then it might be more profitable to grow them instead of the oats.

Capital and labor requirements.

The investment in machinery, livestock, equipment, feed and supplies for the 25-cow operation was about $10,000.

The investment in the beef herd, feed, supplies, and livestock equipment accounted for about two-thirds of this. Total investments, including land and improvements, varied from about $20,000 for the Upper Peninsula operation with good management to about $23,000 for the northern Lower Peninsula operation with excellent management. The latter operation had a slightly greater percentage of cropland, which was valued higher than the operation with good management.

Total labor requirements were about 545 hours for the operation with good management and about 565 hours for the one with excellent management. The maximum labor load occurred in the months of April and June. The operation with good management required about 72 hours of labor in April and 87 hours in June. It was assumed that the operator and his family could provide this much labor, therefore, no charges for hired labor were made. It should be noted that all harvesting was assumed to be custom hired and that the labor contributed by the custom operators was not included in the total labor requirements.

Income potential.

The 25-cow part-time beef farm in the Upper Peninsula with moderately productive soils, slightly above average crop

yields, an 85 percent calf crop, and average weaning weights of 425 pounds for steer calves and 400 pounds for heifer calves produced a net income of $662 when no depreciation was charged on improvements. Many farm units which previously had a small dairy enterprise have more than adequate facilities already on the farm for beef cows. Depreciation was not charged to the improvements on these farms since the operators were interested in the returns to the fixed resources already on the farm and since most of the existing improvements would likely not be replaced when they were worn out. However, expenses for repairs on improvements were included. The net income of $662 included returns to the operator's labor, interest on investment, and depreciation on improvements. Property taxes on the entire farm were included in the expenses. Net income was $646 in the northern Lower Peninsula or essentially the same as for the Upper Peninsula. (See tables 18 and 19)

These operations under slightly above average or good management, however, produced negative labor incomes when a charge of 5 percent on total investment was deducted from the net income. The Upper Peninsula operation had a labor income of minus $209, while the northern Lower Michigan operation had a labor income of minus $317. The difference

in labor incomes was due primarily to variations in the total investment for the farms in the two areas.

High levels of managerial performance increased incomes considerably. For instance, the Upper Peninsula farm had a net income of $1,543 and a labor income of $640 when excellent crop yields, a 90 percent calf crop, and average weaning weights of 475 pounds (for steers) were obtained. Even at this very high level of production efficiency the returns per hour of labor were only $1.13.

Although the returns from the small part-time beef cow enterprise were quite low in absolute terms the most important factor was how they compared with alternatives. If the farm were left idle, no returns would be received, but such expenses as real estate taxes would still have to be paid. For example, the idle farm in northern Lower Michigan would have a net income of about minus $99 and a labor income of minus $698. The farm would receive no return on investment and would not pay for the fixed expenses such as taxes as long as it was idle. The part-time beef herd under good management would pay the property taxes, and would provide a return on investment of something less than 5 percent, but would provide no return for the operator's labor. In most instances it is apparent that the operation of the

part-time beef cow herd is more economically advantageous than allowing the farm to be idle.

Very little in the way of alternative farming enterprises may exist for small, part-time farms in northern Michigan. If the land is adapted only for forage production, then some sort of forage consuming livestock would likely be required. Dairy herds would not likely be suitable on small part-time farms in northern Michigan due to high labor requirements, need for large investments in bulk tanks, and other equipment needed to remain competitive, and the decline in markets for milk in some northern areas. Beef feeding enterprises, except for grazing programs, may not be suitable due to the high cost of grain which must be trucked in. The beef cow enterprise may be the only feasible one for many small, part-time farms, particularly those with large amounts of permanent pasture.

Table 22 shows the effects on income if the farm was rented out rather than used to maintain the 25-cow beef herd. If the cropland could be rented at $6.00 per acre and the pasture at $2.75 per acre, then the net income would be about $348 and the labor income about minus $251 for the operation in the northern Lower Peninsula. This net income of $348 is equivalent to a return on total

investment of 2.9 percent if no deductions for depreciation on improvements or the operator's labor and management were made. This compares to a 3.3 percent return from the beef cow enterprise if no depreciation on improvements was deducted and the operator's labor was assumed to be free (i.e. have an opportunity cost of zero.) If these estimated returns from renting out the farm represent the best alternative to keeping the part-time beef cow herd, then the part-time beef cow enterprise may be the best or, at least, equal to the best alternative use for the farm if the operator's labor has a very low or negligible opportunity cost.

Assuming no opportunity cost for the operator's labor and no depreciation on improvements, the rate of return on total investment of only 3.3 percent from the beef cow enterprise seems quite low. For the purpose of decision making, an operator who wishes to retain ownership of the farm may be more interested in the rate of return he could expect from additional investments on the farm and not the return on total investment. The rate of return on the investment in livestock, machinery, equipment, feed and supplies for the beef cow program was about 6.5 percent assuming no depreciation on improvements and no charge for the operator's labor. This rate of return is still quite low

but may be sufficient to just cover the financing of the enterprise. In addition, various non-pecuniary motives for maintaining the small part-time farm with the beef cow herd or some other appropriate enterprise exist. The desire to live on the farm and raise the family there; the consideration of a small beef herd as a hobby or recreational activity, and the holding of land in expectation of gains in value are all possible motives for maintaining the small part-time beef cow farm. Therefore, the beef cow program may be appropriate for part-time farms where the operator's labor required for the enterprise has a low opportunity cost and/or where non-pecuniary motives for maintaining the part-time farm exist.

The effects of varying price levels for cattle on incomes from the 25-cow enterprises should be similar to those for the large herds discussed in the previous chapters. Likewise, land values affect labor incomes from the 25-cow herds in a manner similar to the way they affected the 200-cow herds. Although computations were not made it is obvious that the 25-cow beef enterprise could not afford to pay as much for land as could the large 200-cow operations studied in the previous chapter. Some economies to scale appear to exist in the beef cow enterprise.

The 25-Cow Part-time Herd in Southern Michigan

Cropping program and acreage requirements.

An 80 acre farm with moderately productive soil in southern Michigan would be sufficient to support the 25-cow beef enterprise when good crop and pasture yields were obtained. Such a farm might include 23 acres of open permanent pasture, 19 acres of alfalfa-brome pasture, 16 acres of alfalfa-brome hay and 15 acres of oats.

Crop yields at higher levels commensurate with excellent management practices reduced the acreage required for feeding the herd by about nine acres. These extra acres could be used to support additional livestock or to grow crops for sale. The budgeted example assumes that a cash crop, corn, is grown on these extra 9 acres.

When corn silage was produced instead of hay for the winter herd feed, the acreage required to feed the herd was reduced further. The 16 acres of alfalfa-brome grass hay would be replaced by about 9 acres of corn silage and around 7 acres of corn, which could be sold when this system was used. With excellent management a little more than 6 additional acres would be available to produce corn for sale under this system.

Capital and labor requirements.

Investments in cattle, machinery, equipment, feed, and supplies for the 25-cow enterprise is about the same for the southern Michigan farms as for those in northern Michigan. However, the corn silage program requires a slightly larger investment for forage handling equipment. Note that all the part-time operations are assumed to custom hire all their harvesting done rather than to own the harvesting equipment themselves. Total value of the cattle, machinery, etc., for these operations was about $10,000.

Investment in real estate, however, was much higher for the 25-cow farm in southern Michigan than for similar operations in northern Michigan. The value of the land and improvements on the 80 acre farms was about $18,000. The farms with the corn silage program had slightly higher investments in improvements, mainly because of the silos necessary for silage storage. Farms with less productive soils may be lower in value.

Labor requirements are similar to but perhaps slightly less than those for the northern part-time beef farm. The operation using the conventional hay feeding program required about 507 hours of labor under good management and about 517 hours with excellent management. The increase was due to the

fact that the farm with excellent management grew some corn in addition to the hay and oats for the herd. The corn silage program reduced total labor requirements under good management to about 479 hours, but raised them to about 539 hours with higher management.

Income potential.

The 25-cow operation using the conventional hay feeding program had a net income of $792 under good management. This was $129 higher than for the Upper Peninsula part-time herd. The southern Michigan operation had slightly higher receipts from crop sales, and lower expenses for seed, fertilizer, fuel, and custom hire which offset the higher property taxes. However, when compared in terms of labor income the northern Michigan operations exceeded the southern ones due to the considerably greater investment and, hence, interest charges on investment for the southern Michigan farms. Labor incomes under good management were minus $463 in southern Michigan versus minus $209 in the Upper Peninsula. This net income expressed as a percent return on investment is about 3.1 percent for southern Michigan if no depreciation were charged to the improvements and if the operator's labor was assumed to have an opportunity

cost of zero. This compares to a 3.3 percent return for the northern Lower Michigan enterprise.

When corn silage was used instead of hay for winter feed, incomes at the slightly above average levels of management were reduced. Net income under the corn silage program was $689 as compared to $792 with the hay program. Labor income fell from a minus $463 to minus $607 when the corn silage program was used instead of the hay program. However, when excellent management in the cropping program was assumed, the corn silage program produced slightly more income than did the hay program. When high crop yields, a 90 percent calf crop, and average weaning weights of 475 pounds (steer calf basis) were obtained, net income with the corn silage program was $1,734 as compared to $1,655 for the hay program. Labor incomes were $407 and $361 respectively. Apparently under these conditions of moderately productive soils the use of corn silage to feed the cow herd is more profitable than feeding hay only at high levels of management and crop yields.

The level of returns from the part-time herd relative to alternative enterprises is more important than the absolute level of income. The part-time beef cow herd does provide some return to the use of land and improvements as

well as paying for real estate taxes and, therefore, may be preferable to letting the farm be idle. However, alternatives do exist such as renting the farm out or grazing and feeding a few beef feeders. If the farm could be rented out at the rate of $14 per acre for cropland and $5.50 per acre for the permanent pasture, then a net income of $571 could be obtained. After deduction of a 5 percent charge on investment, the return to the owner's labor and management was a minus $310 which was somewhat higher than that obtained from the part-time beef cow enterprise at slightly above average levels of management. If rental payments such as these described previously could be obtained, then it would be preferable to rent the farm out rather than keeping a part-time beef cow herd on it, unless very high levels of management were expected to be applied to the beef cow operation. Thus, the part-time beef cow herd looks less attractive compared to possible alternatives in southern Michigan than it does in northern Michigan.

Problems and Prospects for the Small Part-time Beef Cow Enterprise

Returns from the 25-cow operations budgeted and analyzed previously are quite low. Except under very high levels

of management these enterprises yield only enough income to pay the real estate taxes, other expenses, except depreciation on improvements, and provide a return on total investment of only about 3 percent with no return to the operator's labor and management. Returns from renting out the farms are, at the estimated rates, slightly less than the returns from the beef cow enterprise in northern Michigan when the labor of the operator is assumed to have little or no value if not used for the beef cow enterprise. In southern Michigan the returns from renting out the farm are greater than the returns from the part-time beef cow enterprise. If the estimated returns from renting out the farms represented the expected returns from the best alternative use of the land, then the part-time beef cow herd appears better adapted to the northern Michigan farm whose operator works off the farm than it does to the southern Michigan part-time farm. It is likely that the beef cow enterprise is most likely to be the best alternative on those part-time farms with less productive soils which are suited primarily for forage production.

A growing proportion of Michigan's farmers are part-time operators. Good opportunities for off-farm employment in southern Michigan are an important factor in this trend to

part-time farming. Several of these part-time operators with rougher land suitable only for forage production maintain small beef cow herds. It is probable that the number of part-time beef cow herds will grow in the future. The extremely low returns from such enterprises, however, may discourage any rapid increase in the number of such small herds.

CHAPTER VI

THE BEEF COW HERD AS A SECONDARY ENTERPRISE

Many beef cow herds are secondary or minor enterprises on various types of farms, both large and small. The cow herd may have a place on farms with pasture, crop residues such as cornstalks and grain stubble, and other resources which would not be utilized if the cow herd were not kept. Profits are usually maximized when the beef cow herd is restricted to the size necessary to utilize the cheap pasture and other unsalable forages produced on the farm.[1]

Roughly 96 percent of Michigan's beef cow herds have fewer than 50 cows.[2] Nearly all of these herds are secondary enterprises on full-time farms or either major or secondary enterprises on part-time farms.

This chapter includes the budgetary analysis of three basic situations. The first shows the effect on

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[1] Wiggins and Hagan, op. cit., p. 9.

[2] 1959 Census of Agriculture (see footnote 1 in Chapter IV).

income of placing a 50-cow herd on land capable of producing corn, i.e., the land used for hay and pasture for the herd could have been in corn if the beef cow herd were not kept. The second budget determines the change in income expected when a 22-cow dairy herd is replaced by a 50-cow beef herd. In this case it is assumed that a given acreage of legume, grass mixture, must be grown in the rotation. The budget thus compares the utilization of this forage with a beef cow herd as opposed to a small dairy herd. The third budget shows the effect on income of adding a 50-cow herd kept on drylot the year around using a ration of cornstalk silage. The first two budgets compare cornstalk silage with corn silage feeding programs. All these budgets are based on the assumptions of moderately productive soils in southern Michigan. These are partial budgets showing only the changes in receipts and expenses directly affected by adding the beef cow enterprise to each situation as opposed to complete budgets for the entire farm business as used in the two previous chapters. The basic assumptions for budget construction are the same as in the previous chapters except as noted.

The 50-Cow Herd on Land Suitable for Corn

Cropping program and acreage requirements.

These budgets are for a 50-cow herd maintained on land which could be used entirely for the production of corn if the beef cow herd were not kept. Two programs are compared; one using cornstalk silage for the wintering ration and the other using corn silage. The use of cornstalk silage for wintering beef cows is a relatively new idea. However, available experiences indicate that it can be used successfully.[3] Both programs are based on the assumption that a substantial acreage of corn is grown on the farms in each case so that cornstalk fields would be available for grazing by the beef cow herd for a period of about 45 days immediately following corn harvesting.

Both programs require about 56 acres of alfalfa-brome grass pasture. No permanent pasture was assumed to be available. Fifteen acres of oats were included in each budget based on the assumption that a minimum of 15 acres of oats would be grown on any farm requiring them. About

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[3] Newland, H. W., Center-Cut and Corn Stalk Silage for Fattening Calves and Beef Cows in Dry-Lot, AH 98, Animal Husbandry Department, Michigan State University, 1963.

63 acres of cornstalks would provide forage for the herd during a 45 day period after corn harvesting and preceding the heavy winter snows. The winter feed would be provided by about 33 acres of cornstalk silage or alternatively by about 13 acres of corn silage. The cornstalk silage program requires the direct use of about 71 acres of cropland to support the beef cow herd with a few surplus oats being produced for sale. In addition to this amount, about 96 acres of cornstalks would be required to provide the cornstalk silage and some grazing. The corn silage program involved the direct use of some 84 acres of cropland for the support of the 50-cow herd. Sixty-three acres of cornstalks for grazing were also utilized. All acreage requirements were based on yields expected from moderately productive soils in southern Michigan when slightly above average or good management was applied. These estimated yields were 14.2 tons corn silage, 6.4 tons cornstalk silage, 3.0 tons hay equivalent for alfalfa-brome grass pasture, and 75 bushels of oats. These are net quantities available for feeding.

Capital and labor requirements.

Either program requires an investment of about $13,000 in livestock, equipment, feed and supplies. Almost

$12,000 of this represents investment in cattle.

The addition of a 50-cow herd adds about 200 more hours of labor than what would be needed if corn was grown on the land and no beef herd was kept. The cornstalk silage program has its peak labor requirement during October, when the demands on labor for corn harvesting are already at their peak. Estimated labor requirements excluded the labor of the custom operator assumed to be hired for harvesting the silage. If the farm operator harvested his own silage then labor requirements would be higher during the critical harvesting season. Added labor requirements may be a significant disadvantage for the cornstalk silage program on many farms where labor is not plentiful during this period.

Income potential.

When the land which would otherwise be used for corn production is used to grow pasture and feed for the beef cow herd, net income for the farm will be reduced, at least, under the assumed conditions budgeted here. Net income was reduced by $1,344 when the cornstalk silage program was used and by $2,141 when the corn silage program was used. These results are based on slightly above average or good crop

yields on moderately productive soils in southern Michigan. Returns from the beef herd were based on average weaning weights of 425 pounds for steer calves and an average calf crop of 90 percent, which is 5 percentage points above the basis used in the previous budgets for slightly above average or good management. Adequate buildings, silos, and fences were assumed to already be on the budgeted farms and no depreciation or interest was charged to these improvements. The income figures above this represent the return to the use of these improvements plus the approximately 200 additional hours of labor required by the cow herd.

The 50-cow herd actually covered all direct expenses and made a profit, but the foregone profits from the corn production more than offset the profits from the cow herd so that the addition of the cow herd decreased net income.

The cornstalk silage program required slightly higher expenses for fuel, oil, and custom hire, but had much smaller foregone receipts, since it utilized a by-product feed which would otherwise have been wasted rather than using a feed (corn silage) which had a high opportunity cost.

The results would have been much different if the cow herd could have been pastured on permanent pastures on

land not suitable for cropping, especially if this pasture would have been wasted otherwise. In such a situation the addition of the beef cow herd may be highly profitable. However, when land is taken out of the production of profitable crops such as corn and used to grow pasture and feed for a beef cow herd, farm income is likely to fall as was shown above. (See Table 23)

The 50-Cow Beef Herd in Replacement of a 22-Cow Dairy Herd

Many farms may of necessity grow some legumes and grasses in their rotations to control erosion. Dairy herds are often used as the indirect market for these forages on many Michigan farms. Many of the small, relatively inefficient dairy units are hard pressed to compete effectively with the larger more modern dairy operations. Numbers of dairy herds with less than 20 cows have decreased rapidly in recent years.[4] The beef cow herd may be a possible replacement for the small dairy herd on some farms.

The following budgets indicate the effects of replacing a 22-cow dairy herd with a beef cow herd of 50 head. The dairy operation is assumed to be a stanchion barn setup.

[4]Hoglund, C. R., op. cit., p. 8.

Milk sales were assumed to be 9,500 pounds per cow. Further assumptions are outlined below.

Cropping program and acreage requirements.

Both alternatives utilized the same acreage (56 acres) of alfalfa-brome grass. Of this total, about 34 acres were for hay and about 22 acres for pasture for the dairy herd. The 50-cow beef herd would utilize the entire 56 acres as pasture. The dairy herd would also need 7 acres of corn silage. Fifteen acres of oats were included for each alternative. Total cropland required for the 22-cow dairy herd was about 78 acres. This compares to 71 acres for the 50-cow beef herd when a cornstalk silage program was used or about 84 acres when corn silage was used as the winter ration for the beef herd. (See the previous section on acreages required by the 50-cow herd.) Thus, under the assumed conditions it took roughly the same acreage to support a 22-cow dairy herd as it did to support a 50-cow beef herd. All acreage requirements were calculated using the slightly above average yield levels which have been designated as those expected when good management is used.

Capital and Labor requirements.

Total capital requirements may be reduced slightly

by switching to the beef cow enterprise. Total investment in cattle, equipment, feed and supplies was about $15,000 for the 22-cow dairy herd as compared to about $13,000 for the 50-cow beef herd. If the dairy herd and equipment could be liquidated at its inventory or depreciated value, then sufficient funds should be available to establish the beef cow herd. The buildings, silos, and feeding equipment used by the dairy herd should be adequate for the beef herd with little or no remodeling.

The most dramatic effect of the switch from a small dairy herd to a medium sized beef cow herd was the drastic reduction in labor requirements. In this case the estimated labor requirements for the dairy herd including growing feed for the herd was about 2,600 hours. The 50-cow beef herd required roughly 600 hours of labor. Therefore, the shift from a 22-cow dairy operation to a 50-cow beef herd reduced labor requirements by nearly 2,000 hours under the assumed conditions. The use of the cornstalk silage program for the beef cows reduced labor needs by about 2,014 hours, whereas the corn silage program cut labor needs by about 1,991 hours.

The reduction in labor requirements by shifting to the beef cow herd was sufficient to allow a major increase in some other enterprise or a shift from full-time to part-

time farming or some other major readjustment.

Income potential.

The replacement of the 22-cow dairy herd with a 50-cow beef herd resulted in a reduction in net income of $1,365 when the cornstalk silage program was used for the beef cow herd and $2,290 when the corn silage program was used. Returns from the dairy herd were based on 9,500 pounds of milk per cow sold at $3.80 per hundredweight, a replacement rate of 25 percent with cows selling for $143 (1100 pounds x 13¢ per pound), and a 90 percent calf drop with deacon calves selling for $30 each. Returns from the beef cow herd were calculated assuming average weaning weights of 425 pounds for steer calves (400 for heifers), 90 percent calf crop weaned, and good crop yields (See Table 24).

The reduction in income doesn't appear quite so formidable when the reduction in labor requirements is taken into account. When the beef cow herd is wintered on cornstalk silage, labor income is reduced by $1,365 while labor utilized decreases by 2,014 hours; therefore, if the released labor was worth 67¢ per hour no reduction in income would occur when the dairy herd was replaced by the beef herd.

Under the corn silage program for the beef cow herd the breakeven value of the released labor is $1.15 per hour. Thus, if the labor, which would be freed when the dairy herd was replaced, could be used in some other enterprise or in off-farm employment to earn the above amounts per hour or more, then the switch from the dairy herd to the beef cow herd would be profitable.

It appears that the beef cow herd may be a reasonable alternative to the small dairy herd on many Michigan farms, which of necessity must grow some forages, if the labor which is thus released can profitably be used elsewhere. Such a shift may allow a small full-time farmer to shift to a part-time operation, or may allow the older operator to go into semi-retirement. On other farms, the replacement of the small dairy herd with a beef cow herd would release labor to be used in the expansion of other enterprises or would reduce hired labor requirements. The shift to the beef cow herd would not be profitable if the freed labor could not be used to earn the specified breakeven amount of 67¢ or $1.15 per hour, respectively. Even if this could not be done, the shift might still be desirable for the dairy farmer who wants to reduce his labor load and is willing to accept a lower income.

The 50-Cow Herd Kept Year Around on Drylot

In recent years some interest has been shown in keeping beef cows on drylot the year around, particularly in areas with relatively expensive and productive land.[5] One Minnesota study indicated that calf crop percentages and birth weights were not adversely affected by keeping cows in drylot. Feed costs per cow, however, are much higher for the drylot cows fed hay and silage than for the cows which were pastured in summer in this project.[6] The calves produced by the drylot cows had somewhat lighter weights than did pasture reared calves in spite of the fact that the drylot calves consumed considerably more creep feed.[7]

To obtain some conception of the returns which might be expected from a beef cow herd kept on drylot the year around the following budget was prepared for a 50-cow herd fed a ration of cornstalk silage. Due to the limited data available concerning performances of beef cows on drylot and, particularly, when fed cornstalk silage, the input-

[5]Newland, op. cit.

[6]Meiske, et al., Beef Cow Herd Management at Rosemount, B-58, University of Minn., Agr. Exp. Sta., Sept. 1964.

[7]Meiske, et al., Grain Preference of Creep-Fed Beef Calves, B-57, University of Minn., Agr. Exp. Sta., Sept. 1964.

output assumptions and the results for this budget should be regarded as highly tentative. Two budgets were prepared, one for farms with adequate facilities for the cow herd already on the farm, and the other for farms requiring new facilities to accommodate the herd.

Cropping program and acreage requirements.

With excellent crop yields, about 14 acres of corn would be the only cropland directly required to feed the cow herd under this system. In addition about 70 acres of cornstalk silage would be needed to furnish sufficient forage for the entire year with the exception of a 45 day period of direct grazing of cornstalk fields. About 63 acres of cornstalks would be used during this grazing period. Bedding requirements could be met by 17 acres of straw or by using corn cobs or corn stalks. Thus, the 50-cow herd on a drylot program would require 133 or more acres of cornstalks in addition to 14 acres of corn grain to provide adequate feed for the year using a cornstalk silage ration. This particular program would be possible only where large acreages of cornstalks were available. The example above is based on the crop yields obtained when excellent management practices are applied on moderately productive soils in

southern Michigan. Similar results would be obtained on more productive soils with slightly lower levels of management.

Capital and labor requirements.

The average investment in cattle, equipment, feed and supplies for the 50-cow herd is about $13,000. Average investment in minimal improvements for the drylot operation including silage storage and shelter for the cattle would be about $4,500. The new cost of a silo, shed, and other minimum improvements for the herd would be around $9,000. Some farms may already have sufficient facilities available which would not be used otherwise. Note that concrete yards and elaborate sheds and feed handling facilities have not been assumed to be necessary. Farms with other livestock enterprises should already have sufficient specialized machinery to care for the cattle such as a forage wagon, manure spreader and loader. If these items were not available an additional average investment of about $1,600 would be required.

The 50-cow drylot operation required an estimated 754 hours of labor to care for the herd and harvest the feed. The peak labor load occurred in the month of October

when about 140 hours was required to harvest the cornstalk silage in addition to about 48 hours spent directly caring for the herd. The large acreage of corn which must be grown to supply enough stalks for the silage means that October would be a month of maximum labor requirements even without the additional job of harvesting cornstalk silage. This may be a major drawback to the cornstalk silage program.

Income potential.

Labor income from the 50-cow drylot operation was minus $243 when it was assumed that new facilities were required for the herd and all costs for the improvements were charged against the herd. When it was assumed that adequate facilities with no alternative uses were already available on the farm, no depreciation or interest or investment charges for the improvements were made, labor income was then $477. These results are based on a 90 percent calf crop and average weaning weights of 425 pounds (for steer calves). No charge for repairs or depreciation on machinery were made in either case under the assumption that adequate machinery for the beef cow herd such as forage wagon, manure spreader and loader would already be on the farm and that the addition of the beef cow enterprise would not appreciably affect the costs of operating these items of machinery. If the full

cost of operating these machines were charged against the beef cow herd then expenses would be increased by about $450. (See Table 25)

The returns from the 50-cow drylot operation expressed as return per hour of labor required are minus $.32 for the situation when the full costs of the improvements are charged against the herd and $.63 per hour when depreciation and interest on the improvements are not charged to the herd. If the specialized machinery necessary for the cow herd had to be purchased solely for use by the herd then the returns per hour of labor would fall to about minus $.92 or $.04, respectively. The drylot operation thus appears to be profitable only when unused resources such as sheds, silos, and machinery are available on the farm. The above returns are based on a proposed cornstalk silage feeding program. If corn silage was used instead, it is likely that returns would be even lower as the budgets in the previous sections of this chapter indicated.

Problems and Prospects for the Secondary Beef Cow Enterprise

The beef cow herd may be a profitable addition to those farms which have forages and other resources suitable

for the cow herd which would not otherwise be used. The budgets indicate that beef cows may profitably replace small relatively inefficient dairy enterprises on some farms as a means of marketing the forage produced on the farm if the labor which is released by the transition to the beef cow enterprise can be profitably employed elsewhere.

When the herd is expanded beyond the amount necessary to utilize the forages which of necessity must be produced on the farm so that land is taken out of crop production in order to produce feed for the herd, profits are likely to fall. The use of land suitable for the production of corn and other high valued crops in the production of pasture and feed for the beef cow herd may be highly unprofitable.

The proposed drylot beef cow enterprise using a by-product feed, cornstalk silage, was moderately profitable only when facilities and machinery suitable for the enterprise were already available on the farm and, therefore, the full costs of these were not charged against the beef cow enterprise. In all the budgets where corn silage was compared with cornstalk silage, the latter was more profitable. However, a major disadvantage of the cornstalk silage program is that it creates a problem of labor distribution

in that cornstalk silage must be harvested in conjunction with or immediately following the harvesting of the corn and, thus, intensifies labor needs, during this already critical time period.

In summary, the beef cow enterprise can be profitable as a secondary enterprise on farms which have adequate resources for the cow herd such as crop residues, other forages, buildings, etc., which have little or no alternative uses. When resources which are suitable for other, more profitable enterprises are used for the beef cow enterprise, profits will be reduced.

Undoubtedly, there are many Michigan farmers who could increase profits by adding a secondary beef cow enterprise to utilize crop residues, other cheap forages, unused buildings, and other resources with little alternative value. The beef cow enterprise may profitably replace the small, relatively inefficient dairy enterprise in those situations where the labor which is freed in the process can be employed elsewhere at moderate returns. High labor costs and favorable opportunities for off-farm work in southern Michigan may encourage the replacement of inefficient dairy enterprises with beef cows. Expansion in the number of secondary beef cow herds may be likely.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary

Budgets for beef cow enterprises under various hypothetical conditions were calculated using input-output data synthesized from information from a review of past research and modified to fit expected conditions in Michigan in the near future.

The full-time 200-cow beef enterprise in northern Michigan required from 900 to 1,300 acres of land. With good management these operations produced labor incomes of from $1,500 to $3,000 when moderate prices were received. Changes in prices, crop yields, weaning weights, and percent calf crop had significant effects on incomes. Likewise land values were an important determinant of the level of return to the operators for their labor and management. Only moderate to low priced land could be afforded for the large beef cow enterprise. Returns from the well-managed 200-cow enterprise seemed to be competitive with possible alternatives

in many northern Michigan and Upper Peninsula situations. Principal problems facing these operations include the large capital requirements and the very slow rate of capital turnover.

The 200-cow enterprise on less productive soils in southern Michigan was not as profitable as most of those budgeted under northern Michigan conditions. Labor income for the enterprise in southern Michigan using a conventional hay wintering ration was $1,700. An alternative program using corn silage as the wintering ration was unprofitable in that labor income was nearly zero. The beef cow enterprise appeared to be considerably less profitable than possible alternative enterprises in southern Michigan.

Twenty-five cow part-time enterprises required about 140 acres of land in northern Michigan or about 80 acres in the southern part of the State under the assumed conditions. When good management was assumed, net incomes were about $650 in northern Michigan and from $700 to $800 in southern Michigan. Labor incomes, however, ranged from minus $200 to minus $300 in northern Michigan and from minus $450 to minus $600 in southern Michigan. A corn silage program on the southern Michigan farms was slightly less profitable than the hay program except at very high levels of management.

Returns from renting the farms out rather than keeping the beef cow herd on them were quite similar to the returns from the beef cow enterprise in northern Michigan when a very low (near zero) value was placed on the operator's labor. However, in southern Michigan the beef cow enterprise did not earn quite as much as the rental alternative even when no charge was made for the operator's labor.

The use of corn land to grow feed and pasture for a 50-cow herd was very unprofitable. Labor income was reduced by $1,350, when a cornstalk silage program was used, or by $2,150 when a corn silage program was used, from the total possible labor income if the land had been used to produce corn for sale. About 200 added hours of labor would be necessary for the beef cow herd over and above the amount of labor which would have been required if only corn was grown on the land.

The replacement of a 22-cow dairy enterprise with a 50-cow beef herd would require little change in total investment or in acreage requirements. Labor requirements would be cut by nearly 2,000 hours, however. Net income would be reduced by about $1,350 when a cornstalk silage program was used for the beef herd, or by $2,300 when a corn silage program was used, if the dairy herd was replaced. Net returns

from the two alternatives would be equal if the labor, which was released by the replacement of the dairy herd, could earn $.67 or $1.15 per hour, respectively, in some other use.

Labor income from a 50-cow drylot operation utilizing a proposed cornstalk silage ration was minus $250 when new facilities were required by the herd. If adequate facilities, with no alternative uses, were available for the enterprise and no charges for depreciation or interest in improvements were made, then the labor income was about $500. Labor income expressed as a return per hour was minus $.32 and plus $.63 respectively. If the specialized machinery such as forage wagons and manure spreaders, which would be required by the beef cow enterprise, were used solely for that enterprise, then the returns per hour of labor would fall to minus $.92 and $.04, respectively, assuming the full costs of the machinery were charged against the beef cow herd.

Conclusions

The beef cow enterprise, if well managed, can be competitive with alternative enterprises in northern Michigan. However, under most southern Michigan conditions the

beef cow herd was relatively less profitable. The larger herds appeared to be considerably more profitable than the small ones, however, the importance of part-time farming and the difficulties in organizing and financing large beef cow units may mean that the relative proportion of large to small herds may not change appreciably. The beef cow herd appears to be adapted to and profitable in certain situations likely to be found in Michigan. However, it also can be a highly unprofitable enterprise in other situations where higher earning alternatives are available.

The beef cow herd seems best adapted where an abundance of forage is available, alternative enterprises are limited, and land values are low. Such conditions are found in some areas of Michigan, particularly in some northern areas where dairy markets are limited. A moderate increase in beef cow numbers may likely occur in Michigan in the next few years. High labor costs and good opportunities for off-farm work in southern Michigan will be important factors in the competitive position of the beef cow enterprise. Price levels and production patterns on the national level will also be important determinants of the competitive position of beef cow herds in Michigan's future.

Table 1a.--Crop Acreages and Yields[1]
200-Cow Enterprise

	Moderately Productive Soils[2]				Less Productive Soils[2]	
	-Good Management[3]		Excellent Managment[3]		Good Management	
	Acres	Yield/A	Acres	Yield/A	Acres	Yield/A
1. 200 Cows--N. Mich. (including U.P.)						
Alfalfa-brome hay, 2 cuttings	86.2	2.4 T	81.3	2.9 T	114.2	1.9 T
Alfalfa-brome hay, pastured after 1st cutting	199.4	1.3 hay 1.0 past.	153.4	1.5 hay 1.3 past.	249.1	1.0 hay .8 past.
Permanent pasture (50% open)[4]	664.6	.6	569.7	.7	797.4	.5
Oats[5]	71.4	70 bu.	58.7	84 bu.	90.8	51 bu.
Oat straw	(26.9)	1.2 T	(23.1)	1.4 T	(32.3)	1.0 T
Total crop & pasture land	1021.6		863.1		1251.5	
Buildings, waste, etc.	20.0		20.0		20.0	
Total acreage	1041.6		883.1		1271.5	
2. 200 Cows--S. Mich.--Hay Program						
Alfalfa-brome hay, 3 cuttings	--		--		28.0	3.0
Alfalfa-brome hay, pastured after 1st cutting	--		--		278.3	1.2 hay 1.6 past.
Permanent pasture (open)[6]	--		--		222.6	1.0
Oats	--		--		76.6	59
Oat straw	--		--		(32.3)	1.0
Total Crop and pasture land	--		--		605.5	
Buildings, waste, etc.	--		--		20.0	
Total acreage	--		--		625.5	
3. 200 Cows--S. Mich.--Corn Silage Program						
Corn Silage	--		--		83.5	11.7
Alfalfa-brome pasture	--		--		159.1	2.8
Permanent pasture	--		--		222.6	1.0
Oats	--		--		39.8	59
Oat straw	--		--		(32.3)	1.0
Total crop and pasture land	--		--		505.0	
Buildings, waste, etc.	--		--		20.0	
Total acreage	--		--		525.0	

Note: Footnotes follow on page 106.

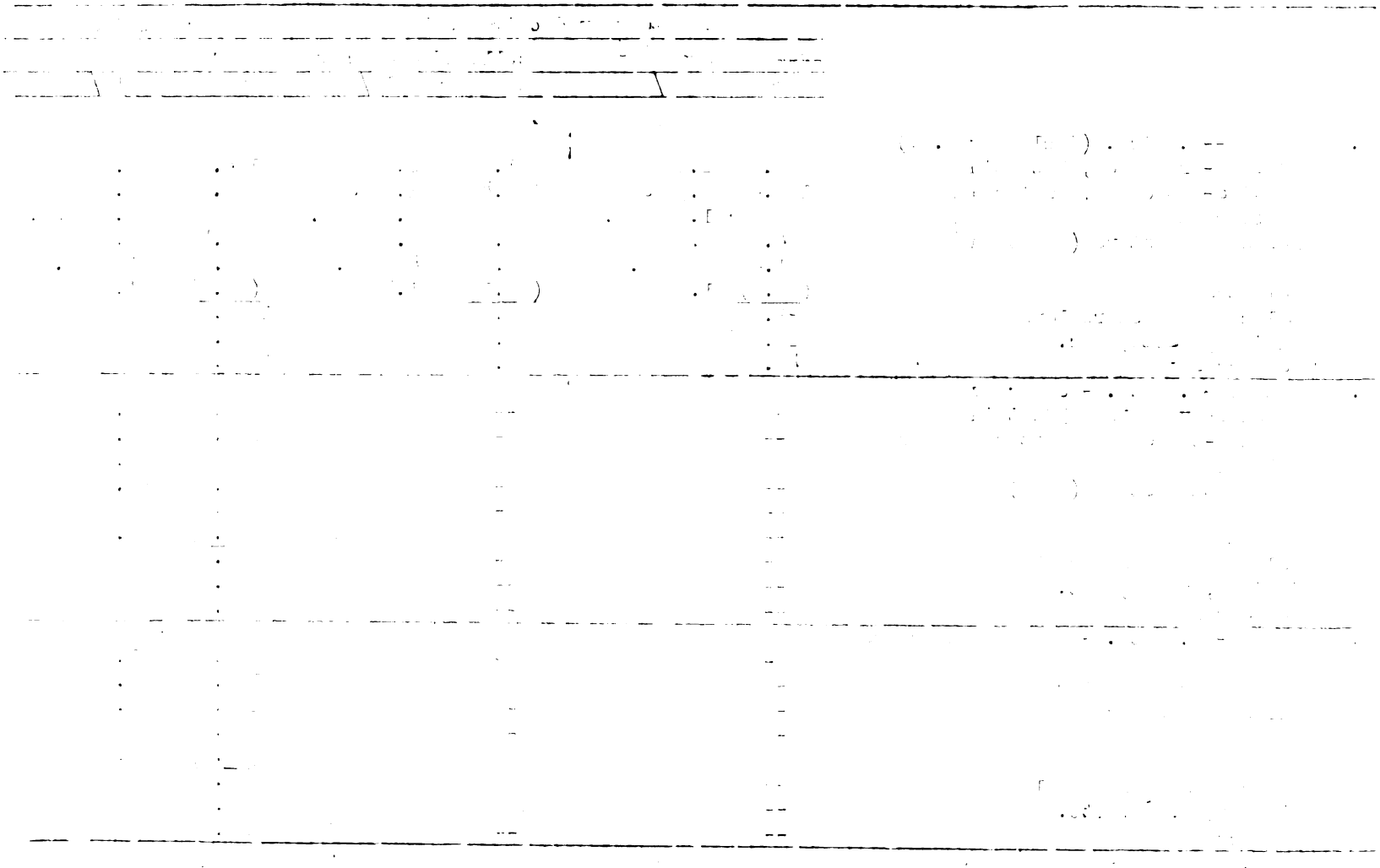

Table 1b.--Crop Acreages and Yields
25-Cow Enterprise

	Moderately Productive Soils			
	Good Management		Excellent Management	
	Acres	Yield/A	Acres	Yield/A
4. 25 Cows--N. Mich.--(including U.P.)				
Alfalfa-brome hay, 2 cuttings	10.8	2.4 T	10.1	2.9 T
Alfalfa-brome, pastured after 1st cutting	24.9	1.3 hay 1.0 past.	19.2	1.5 hay 1.3 past.
Permanent pasture (50% open)	83.2	.6	71.3	.7
Oats	15.0	70 bu.	33.3[7]	84 bu.
Oat straw	(3.3)	1.2	(2.8)	1.4
Total crop and pasture land	133.9		133.9	
Buildings, waste,etc.	6.9		6.9	
Total acreage	140.8		140.8	
5. 25 Cows--S. Mich.--Hay Program				
Alfalfa-brome hay, 3 cuttings	16.3	3.2	13.7	3.8
Alfalfa-brome pasture	18.6	3.0	15.5	3.6
Permanent pasture (open)	23.2	1.2	19.8	1.4
Oats	15.0	75	15.0	90
Oat straw	(3.3)	1.2	(2.8)	1.4
Corn[8]	--	--	9.1	92
Total crop and pasture land	73.1		73.1	
Buildings, waste, etc.	6.9		6.9	
Total acreage	80.0		80.0	
6. 25 Cows--S. Mich.--Corn Silage Program				
Corn Silage	8.7	14.2	7.4	16.5
Alfalfa-brome pasture	18.6	3.0	15.5	3.6
Permanent pasture (open)	23.2	1.2	19.8	1.4
Oats	15.0	75	15.0	90
Oat straw	(3.3)	1.2	(2.8)	1.4
Corn, grain[8]	7.6	77	15.4	92
Total crop and pasture land	73.1		73.1	
Buildings, waste, etc.	6.9		6.9	
Total acreage	80.0		80.0	

Note: Footnotes follow on page 106.

Table 1c.--Crop Acreages and Yields
50-Cow Enterprise

	Moderately Productive Soils			
	Cornstalk Silage Program		Corn Silage Program	
	Acres	Yield/A	Acres	Yield/A
7. 50 Cows--S. Mich.--Good Management[9]				
Cornstalk silage	32.7	6.4	--	--
Corn silage	--	--	13.0	14.2
Cornstalk fields grazed	63.0	.5	63.0	.5
Alfalfa-brome pasture	55.7	3.0	55.7	3.0
Oats	15.0	75	15.0	75
Oat straw	(6.8)	1.2	(6.8)	1.2
Total crop and pasture land	70.7		83.7	
Plus cornstock acreage of	95.7		63.0	
8. 22 Dairy Cows--S. Mich.--Good Mgmt.				
Alfalfa-brome hay	33.9	3.2	33.9	3.2
Alfalfa-brome pasture	21.8	3.0	21.8	3.0
Corn silage	7.4	14.2	7.4	14.2
Oats	15.0	75	15.0	75
Oat straw	(9.2)	1.2	(9.2)	1.2
Total crop and pasture land	78.1		78.1	
9. 50 Cows--S. Mich.--Drylot--Exc. Mgt.				
Cornstalk silage	70.1	7.4	--	
Cornstalk grazed	63.0	.5	--	
Corn, grain	14.0	92	--	
Straw (cornstalks on cobs could be used)	(17.3)	1.4	--	
Total crop and pasture land	14.0		--	
Plus cornstalk acreage of	133.1			

Note: Footnotes follow on page 106.

[1] Yields are amounts preserved for feeding, ie, harvesting and storage losses have been deducted. Yield estimates are based on data from E. P. Whiteside, Soils Department; L. V. Nelson, Farm Crops Department; and C. R. Hoglund, Agricultural Economics Department.

[2] Moderately productive soils--represents such soil groups as upland loams, silt loams, and clay loams.

Less productive soils--represents such soil groups as sandy loams and loamy sands. Soils of very low productivity such as drouthy sands have been excluded.

[3] Good management refers to the use of average to above average (but not excellent) practices. Yields listed under good management are slightly above average.

Excellent management refers to the use of above average and improved production practices.

[4] Northern Michigan budgets (including U. P.) are based on the assumption that 2/3 of the pasture requirements are obtained from permanent pasture. These permanent pastures consist of quackgrass, bluegrass, etc., and are assumed to be up to 50% covered with brush. Note that pasture acreages exceed the requirements (based on yields) by 10% in order to partially account for variation in yield from season to season.

[5] Oat acreage based on amount necessary to reseed alfalfa-brome stands every five years. The minimum acreage of oats for any budget has been arbitrarily set at 15 acres.

[6] Southern Michigan budgets assume that 1/3 of pasture requirements are obtained from open permanent pastures.

[7] Assumes oats are grown on the acreage which is in excess of the amount necessary to support the cow herd.

[8] Assumes corn is grown on the acreage which is in excess of the amount necessary to support the cow herd.

[9] Cornstalk silage yield is assumed to equal 60% of the corn silage yield on a dry matter basis. (Cornstalk silage assumed to be 60% moisture.) See Newland, Complete Energy Corn Silage, AH 89, M.S.U., 1963.

Table 1d.--Estimated Total Required Investments[1]
200-Cow Enterprise

200-Cow Farms	Land	Improve-ments	Mach. and Equip.	Live-stock	Feed and Supplies	Total
	($)	($)	($)	($)	($)	($)
Upper Peninsula:						
Moderately productive soils - good management	51,536	14,538	11,089	46,640	5,185	128,988
Moderately productive soils - excellent management	43,445	14,038	11,089	46, 640	5,185	120,397
Less productive soils - good management	46,011	15,288	11,089	46,640	5,185	124,213
Northern Lower Peninsula:						
Moderately productive soils - good management	64,284	14,538	11,089	46,640	5,185	141,736
Moderately productive soils - excellent management	54,128	14,038	11,089	46,640	5,185	131,080
Less productive soils - good management	57,109	15,288	11,089	46,640	5,185	135,311
Southern Michigan:						
Less productive soils - good management	84,286	12,488	11,089	46,640	4,668	159,171
Less productive soils - corn silage program	67,737	12,056	12,248	46,640	5,099	143,780

[1]Average investments over time.

Table 1e.--Estimated Total Required Investments
25-Cow Enterprise

25-Cow Farms	Land	Improvements	Machinery and Equipment	Livestock	Feed and Supplies	Total
Upper Peninsula: (moderately productive soils)						
Good management	7232	2888	3704	5830	647	20,301
Excellent management	7702	2888	3704	5830	647	20,771
Northern Lower Peninsula: (mod. prod. soils)						
Good management	9088	2888	3704	5830	647	22,157
Excellent management	9802	2888	3704	5830	647	22,871
Southern Michigan: (mod. prod. soils)						
Good management	14,984	2638	3704	5830	585	27,741
Excellent management	15,426	2638	3864	5830	585	28,343
Corn silage program--good management	14,984	3262	4471	5830	640	29,187
Corn silage program--exc. management	15,426	3262	4471	5830	640	29,629

Table 1f.--Estimated Total Required Investments
50-Cow Enterprise

50-Cow Herd	Improvements[1]	Machinery[1]	Equipment	Livestock	Feed and Supplies	Total
Southern Michigan:						
Corn silage program	2962	--	120	11,660	1064	15,806
Cornstalk program	3162	--	120	11,660	755	15,697
Drylot program	4500	1573	145	11,660	1447	19,325

[1]If not already available.

Table 2.--Fertilizer Requirements[1,2]

	Moderately Productive Soils				Less Productive Soils	
	Good Management		Excellent Management		Good Management	
	N	P K	N	P K	N	P K
Alfalfa-brome hay	0	20 - 40	0	28 - 52	0	15 - 30
Alfalfa-brome pasture	0	15 - 30	0	20 - 40	0	10 - 20
Oats	0	40 - 20	26	52 - 26	12	24 - 24
Corn	25	60 - 60	32	78 - 78	25	40 - 40
Permanent pasture	0	0 - 0	0	0 - 0	0	0 - 0

[1]Expressed in pounds of actual N, P_2O_5, and K_2O per acre. Estimates are based on Fertilizer Recommendations for Michigan Crops, Extension Bulletin E-159, April, 1963, Michigan State University.

[2]All soils are also assumed to require .1 T of lime per acre annually.

Table 3.--Daily Feed Requirements, Beef Cow and Calf[1,2,3,4]

Hay Program		Corn Silage Program	
Winter:		Winter:	
Mixed hay	20 lbs.	Corn silage	47 lbs.
		Protein supplement	1
Summer:		Summer:	
Pasture (hay equiv.)	27	Pasture (hay equiv.)	27
Cornstalk Silage		**Cornstalk Silage - Drylot**	
Winter:		Winter:	
Cornstalk silage	56 lbs.	Cornstalk silage	56 lbs.
Protein supplement	1	Protein supplement	1
Summer:		Summer:	
Pasture (hay equiv.)	27	Cornstalk silage	56
		Protein supplement	1
		Grain[5]	5
		Grain (creep)[5]	5

[1]Estimated requirements for cow and pre-weaning calf only.

[2]All rations include an annual requirement of 20 pounds of salt and mineral and 250 pounds of straw for bedding per cow (except the drylot program which includes 750 pounds of bedding.)

[3]The wintering period is assumed to be 190 days, and the grazing season to be 175 days in Northern Michigan. Southern Michigan is assumed to have 195 days of grazing and a 170 day winter feeding period.

[4]Up to 45 days of the winter feeding period may be used for grazing cornstalk fields in place of the usual ration. Feed consumption is about 25 lbs. of cornstalk (hay equiv.) plus 1 lb. of protein supplement per day.

[5]Cows are fed grain for the first 120 days of lactation. Calves are creep fed for 120 days.

Table 4.--Daily Feed Requirements, Replacement Heifers[1,2]

Hay Program		Corn Silage Program	
Winter:		Winter:	
Mixed hay	12 lbs.	Corn silage	30 lbs.
Grain	2	Protein supplement	1
Summer:		Summer:	
Pasture	15	Pasture	15

Cornstalk Silage		Cornstalk Silage - Drylot	
Winter:		All year:	
Cornstalk silage	25 lbs.	Cornstalk silage	25 lbs.
Grain	3	Grain	3
Protein supplement	1	Protein supplement	1
Summer:			
Pasture	15		

[1]Estimated requirements for heifers fed to gain 1.25 pounds per day for the 12 months following weaning.

[2]Total requirements are based on a 215 day winter feeding phase and a 150 day grazing season in Northern Michigan and a 195 day wintering period with a 170 day grazing season in Southern Michigan.

Table 5.--Estimated Value of Unimproved Cropland and Permanent Pasture Land, and Property Tax Rates

Land Values	Cropland (dollars/acre)	Permanent Pasture Land (dollars/acre)
U. P., moderately productive soil	75	35
Northern Lower Michigan, moderately productive	100	40
U. P., less productive	55	25
Northern Lower Michigan, less productive	70	30
Southern Michigan, moderately productive	225	95
Southern Michigan, less productive	165	80

Estimated Property Tax Rates	Tax Rates Per $1,000 of Assessed Value[1]
Northern Michigan including U. P.	$25
Southern Michigan	30

[1]Assessed value is assumed to be 33% of actual market values.

Table 6.--Labor Requirements

Beef Breeding Herd:[1]	Hours	
1 - 15 cows	22 per cow	
16 - 39	14	
40 and up	9	
40 and up (drylot)	12	
Crops:[2]		(If Custom Harvested)
Hay, 2 cuttings	8.0 per acre	6.0 per acre
Hay, 1 cutting then pastured	4.0	2.3
Corn silage	11.4	9.1
Oats	3.4	2.4
Corn	-	5.0
Alfalfa-brome pasture	.3	-
Permanent pasture	.2	-
Cornstalk silage harvesting	3.0	2.0
Straw baling	1.2	.8

[1]Estimates based on data from Wells, unpublished 1963 study, University of Minnesota; Lampher and Hagan, Beef Cattle Labor Requirements, Special Report 45, Oct., 1964, University of Missouri; Wright, Beef Costs and Returns in Northeastern Michigan, Ag. Econ. 489, June 1951, Michigan State University.

[2]Estimates based on data from Michigan Farm Management Handbook, Ag. Econ. 929.

Table 7.--Estimated Prices for Products and Inputs

Item	Unit	Prices for Products [1/2]
Steer Calves	pound	$.27
Heifer Calves	pound	.24-1/2
Yearling Heifers	pound	.20-1/2
Cull Cows	pound	.16
Cull Bulls	pound	.18
Oats	bushel	.55
Corn	bushel	1.00

Item	Unit	Prices for Inputs
Hired Labor	hour	$1.25
Nitrogen (actual N)	pound	.12
Phosphate (actual P_2O_5)	pound	.09
Potash (actual K_2O)	pound	.04
Protein Supplement	pound	.05
Salt and Mineral	pound	.03
Gasoline	gallon	.25
Alfalfa seed	pound	.57
Brome Grass Seed	pound	.25
Oats Seed	bushel	1.65
Corn Seed	bushel	12.50
Lime	ton	5.85

Table 7a.--General Livestock and Custom Hire Expenses

Item	Unit	Cost per Unit
Veterinary and medical expenses	cow	$2.00
Utilities: 200 cow farm	cow	2.50
25 cow farm	cow	4.00
50 cow herd	cow	1.00
Miscellaneous expenses	cow	1.00
Livestock marketing expenses	% of sales	3
Bull depreciation:		
(when 425 pound steer calves)	bull	12.00
(when heavier steer calves)	bull	37.00
Custom hire:		
Baling hay or straw	bale	.12
Combining small grain	acre	6.00
Planting corn	acre	2.00
Picking corn	acre	6.00
Harvesting silage, chop, haul, and fill	hour	10.00

Table 8.--Budgeted Annual Costs and Returns--200-Cow Enterprises[1]
Upper Peninsula Michigan

	Moderately Productive Soils						
	Good Crop Yields[2]			Excellent Crop Yields[3]			
Weaning Weight[4]	425#	425#	475#	425#	450#	475#	500#
% Calf Crop	85%	90%	85%	90%	90%	90%	90%
	($)	($)	($)	($)	($)	($)	($)
Receipts:							
Cattle	21,027	22,091	22,604	22,091	22,944	23,796	24,648
Crops	2,338	2,338	2,338	2,301	2,301	2,301	2,301
Total	23,365	24,429	24,942	24,392	25,245	26,097	26,949
Expenses:							
Seed,fert.,lime	2,658	2,658	2,658	2,560	2,560	2,560	2,560
Fuel,oil,cust.hire	1,617	1,617	1,617	1,412	1,412	1,412	1,412
Power & machinery	2,874	2,874	2,874	2,874	2,874	2,874	2,874
Hired labor	1,252	1,252	1,252	975	975	975	975
Purchased feed	155	155	155	155	155	155	155
Veterinary, med.	400	400	400	400	400	400	400
Utilities	500	500	500	500	500	500	500
Marketing	631	663	678	663	688	714	739
Improvements	2,361	2,361	2,361	2,280	2,280	2,280	2,280
Equipment	107	107	107	107	107	107	107
Bull depreciation	96	96	296	96	296	296	296
Property taxes	1,075	1,075	1,075	1,003	1,003	1,003	1,003
Miscellaneous	200	200	200	200	200	200	200
Total	13,926	13,958	14,173	13,225	13,450	13,476	13,500
Net Income	9,439	10,471	10,769	11,167	11,795	12,621	13,448
Int. on Investments at 5%	6,449	6,449	6,505	6,020	6,075	6,090	6,106
Labor Income	2,990	4,022	4,264	5,147	5,720	6,531	7,342

[1]Complete budget for farm organized to support a 200-cow beef herd as the sole major enterprise.

[2]1,042 acres required--crop yields are based on good but not excellent management practices--see tables of crop yields and production.

[3]883 acres required--crop yields are based on very good or excellent management practices--see tables of crop yields and production.

[4]Weights given are for steer calves; heifers assumed to be 25 pounds lighter.

Table 9.--Budgeted Annual Costs and Returns, 200-Cow Enterprises
Northern Lower Michigan

--	Moderately Productive Soils[1]						
	Crop Yields			Excellent Crop Yields			
Weaning Weight	425#	425#	475#	425#	450#	475#	500#
% Calf Crop	85%	90%	85%	90%	90%	90%	90%
Receipts: (same as for U.P.) Total	23,365	24,429	24,942	24,392	25,245	26,097	26,949
Expenses: (all expenses except property taxes same as for U.P.)	12,851	12,883	13,098	12,222	12,447	12,473	12,498
Property taxes	1,181	1,181	1,181	1,092	1,092	1,092	1,092
Total	14,032	14,064	14,279	13,314	13,539	13,565	13,590
Net Income	9,333	10,365	10,663	11,078	11,706	12,532	13,359
Interest on Investment at 5%	7,087	7,087	7,142	6,554	6,609	6,625	6,640
Labor Income	2,246	3,278	3,521	4,524	5,097	5,907	6,719

[1]All receipts and all expenditures, except as noted below, are assumed to be equal for the upper peninsula and the northern areas of the lower peninsula. Land values and, hence, interest on investment and property taxes are higher in the northern lower peninsula. (Acreage requirements and crop yields are assumed to be identical.)

Table 10.--Budgeted Annual Costs and Returns, 200-Cow Enterprise
Northern Michigan

	Less Productive Soils[1]			
	Upper Peninsula		North Lower Penin.	
Weaning Weight	425#	425#	425#	425#
% Calf Crop	85%	90%	85%	90%
	($)	($)	($)	($)
Receipts:				
Cattle	21,027	22,091	21,027	22,091
Crops	2,136	2,136	2,136	3,136
Total	23,163	24,227	23,163	24,227
Expenses:				
Seed, fertilizer, lime	2,837	2,837	2,837	2,837
Fuel, oil, custom hire	1,974	1,974	1,974	1,974
Power and machinery	2,874	2,874	2,874	2,874
Hired labor	1,561	1,561	1,561	1,561
Veterinary, medical	400	400	400	400
Purchased feed	155	155	155	155
Utilities	500	500	500	500
Marketing	631	663	631	663
Improvements	2,483	2,483	2,483	2,483
Equipment	107	107	107	107
Bull depreciation	96	96	96	96
Property taxes	1,035	1,035	1,128	1,128
Miscellaneous	200	200	200	200
Total	14,853	14,885	14,946	14,978
Net Income	8,310	9,342	8,217	9,249
Interest on Investment at 5%	6,211	6,211	6,766	6,766
Labor Income -	2,099	3,131	1,451	2,483

[1]1,272 acres required--crop yields are based on good but not excellent management practices--see tables of crop yields and production.

Table 11.--Change in Labor Income Resulting from Price Changes 200-Cow Enterprise[1]

Weaning weight, lbs.	425	425	450	475	475	500
Percent calf crop	85	90	90	85	90	90
	($)	($)	($)	($)	($)	($)
I. Lower prices[2]						
200 cow herd	-2823	-2940	-3038	-2998	-3133	-3227
50 cow herd	-706	-735	-760	-750	-783	-807
25 cow herd	-353	-368	-380	-375	-392	-404
II. Moderate prices[3]						
200 cow herd						
50 cow herd	....(No change from budget results)....					
25 cow herd						
III. Higher prices[4]						
200 cow herd	+2430	+2550	+2644	+2604	+2739	+2833
50 cow herd	+608	+638	+661	+651	+685	+708
25 cow herd	+304	+319	+330	+326	+342	+354

[1]Change in labor income from budgeted levels resulting from higher or lower prices received for cattle, assuming all costs except marketing expenses are unaffected. This, therefore, tends to slighly overstate the actual changes in labor income, since interest on investment and property taxes would tend to vary with the price level.

[2,3,4]Price levels:

	(Budgeted Level)		
	Low	Moderate	High
Steer calves	$.24/lb.	$.27/lb.	$.30/lb.
Heifer calves	.215	.245	.275
Yearling Heifers	.175	.205	.235
Cows	.13	.16	.18
Bulls	.15	.18	.20

Table 12.--Labor Incomes under Varying Levels of Prices
200-Cow Enterprise

	U.P.--Moderately Productive Soils						
	Good Crop Yields			Excellent Crop Yields			
Weaning weight, lbs.	425	425	475	425	450	475	500
Percent calf crop	85	90	85	90	90	90	90
	($)	($)	($)	($)	($)	($)	($)
I. Low prices:[1]							
Total rects.	20,455	21,395	21,851	21,358	22,113	22,867	23,622
Total exp.[4]	13,839	13,864	14,080	13,132	13,356	13,379	13,348
Net income	6,616	7,531	7,771	8,226	8,757	9,488	10,274
Int. on inv. at 5%[5]	6,449	6,449	6,505	6,020	6,075	6,090	6,106
Labor income	167	1,082	1,266	2,206	2,682	3,398	4,168
II. Moderate prices:[2]							
Total rects.	23,365	24,429	24,942	24,392	25,245	26,097	26,950
Total exp.	13,925	13,957	14,172	13,224	13,449	13,475	13,500
Net income	9,440	10,472	10,770	11,169	11,796	12,622	13,450
Int. on inv. at 5%	6,449	6,449	6,505	6,020	6,075	6,090	6,106
Labor income	2,991	4,023	4,265	5,149	5,721	6,532	7,344
III. High prices:[3]							
Total rects.	25,870	27,058	27,626	27,021	27,971	28,921	29,871
Total exp.	14,001	14,037	14,254	13,303	13,532	13,560	13,575
Net income	11,869	13,021	13,372	13,718	14,439	15,361	16,296
Int. on inv. at 5%	6,449	6,449	6,505	6,020	6,075	6,090	6,106
Labor income	5,420	6,572	6,867	7,698	8,364	9,271	10,190

[1,2,3] Price Levels:

	Low	Moderate	High
Steer calves	$.24/lb.	$.27/lb.	$.30/lb.
Heifer calves	.215	.245	.275
Yearling heifers	.175	.205	.235
Cows	.13	.16	.18
Bulls	.15	.18	.20

(The complete budgets, elsewhere, are based on the moderate prices.)

[4] Marketing expense varies with receipts.

[5] Livestock investment varies with price level, hence, interest on investment changes with the price level.

This factor has not been shown in these figures since interest on investment was assumed constant at all price levels for the calculations. Differences in labor incomes between price levels is thus slightly overstated.

Table 13.--Effect of Land Values on Labor Income[1]

	Northern Michigan, moderately productive soils, good management, 200-cow operation.[2]		
	($)	($)	($)
Average land value per acre	62	46	31
cropland value per acre	100	75	50
pasture land value per acre	40	30	20
Net Income	9333	9333	9333
- Interest on Investment at 5%	7087	6283	5480
Labor income	2246	3050	3853

[1]Effect of land value on labor income occurring because of changes in level of and, hence, interest on investment is shown. Real estate taxes are assumed constant. Since real estate taxes are positively correlated to land value, the changes in labor income due to varying levels of land value are understated here.

[2]Good crop yields, 85% calf crop, 425 lb. weaning weights (steer basis).

Table 14.--Capitalized Land Values, Land with Improvements

Northern Michigan, moderately productive soils, good management, 200-cow operation.[1]	$3000 charge for operator's labor and management.	$5000 charge for operator's labor and management.
Net Income	$9333	$9333
- Charge for Operator's Labor	3000	5000
Return to Capital	6333	4333
- Charge for Non-real estate capital	3146	3146
Return to Real Estate	3187	1187
Capitalized Value of Returns to Real Estate @ 5%	63740	23740
Value per acre (1041.6 acres)	61	23

[1]Good crop yields, 85% calf crop and 425 lb. weaning weight (steer basis).

Table 15.--Capitalized Land Values, Land without Improvements

Northern Michigan, moderately productive soils, good management, 200-cow operation.[1]	$3000 charge for operator's labor labor and mgmt.	$5000 charge for operator's labor and mgmt.
Net Income	$9333	$9333
- Charge for Operator's Labor	3000	5000
Return to Capital	6333	4333
- Charge for Non-land Capital	3873	3873
Return to land	2460	460
Capitalized Value of Returns to Land at 5%	49200	9200
Value per acre (1041.6 acres)	47	9

[1]Good crop yields, 85% calf crop and 425 pound weaning weight (steer basis).

Table 16.--Capitalized Land Values

Northern Michigan, less productive soils, good management, 200-cow operation.[1]	Land without improvements	Land with improvements
Net Income	$8217	$8217
- Change of Operator's Labor	3000	3000
Return to capital	5217	5217
- Charge for Non-Land Capital[2]	3910	3146
Return to land	1307	2071
Capitalized Value of Returns to Land at 5%	26140	41420
Value per acre (1271.5 acres)	21	33

[1]Good crop yields, 85% calf crop and 425 pound weaning weight (steer basis).

[2]Non-land capital includes improvements in the first case, but not in the second.

Table 17.--Budgeted Annual Costs and Returns, 200 Cow Enterprise, Southern Michigan

	Less Productive Soils[1]			
	Hay Program[2]		Corn Silage Prog.[3]	
Weaning Weight	425#	425#	425#	425#
% Calf Crop	85%	90%	85%	90%
	($)	($)	($)	($)
Receipts:				
Cattle	21,027	22,091	21,027	22,091
Crops	2,109	2,109	915	915
Total	23,136	24,200	21,942	23,006
Expenses:				
Seed, fertilizer, lime	2,002	2,002	2,046	2,046
Fuel, oil, custom hire	1,619	1,619	984	984
Power and machinery	2,874	2,874	3,244	3,244
Hired labor	1,232	1,232	580	580
Purchased feed	155	155	2,498	2,498
Veterinary, medical	400	400	400	400
Utilities	500	500	500	500
Marketing	631	663	631	663
Improvements	2,028	2,028	1,958	1,958
Equipment	107	107	107	107
Bull depreciation	96	96	96	96
Property taxes	1,592	1,592	1,438	1,438
Miscellaneous	200	200	200	200
Total	13,436	13,468	14,682	14,714
Net Income	9,700	10,732	7,261	8,292
Interest on Investment at 5%	7,959	7,959	7,189	7,189
Labor Income	1,741	2,773	71	1,103

[1]Crop yields are based on good but not excellent management practices.

[2]626 acres required.

[3]525 acres required.

Table 18.--Budgeted Annual Costs and Returns, 25-Cow Enterprise[1]
Upper Peninsula

	Moderately Productive Soils			
	Good Crop Yields		Excellent Yield	
Weaning Weight	425#	425#	425#	475#
% Calf Crop	85%	90%	90%	90%
	($)	($)	($)	($)
Receipts:				
Cattle	2628	2761	2761	2974
Crops	526	526	1487	1487
Total	3154	3287	4248	4461
Expenses:				
Seed, fertilizer, lime	431	431	692	692
Fuel, oil, custom hire	536	536	662	662
Power and machinery	873	873	873	873
Hired labor	-	-	-	-
Purchased feed	19	19	19	19
Veterinary, medical	50	50	50	50
Utilities	100	100	100	100
Marketing	79	83	83	89
Improvements (repairs only)	173	173	173	173
Equipment	25	25	25	25
Bull depreciation	12	12	12	37
Property taxes	169	169	173	173
Miscellaneous	25	25	25	25
Total	2492	2496	2887	2918
Net Income	662	791	1361	1543
Interest on Investment at 5%	871	871	894	903
Labor Income	-209	-80	467	640

[1]Budget for a 140 acre farm adequate to carry a 25-cow beef herd under assumed conditions and yields--see tables of crop yields and production.

Table 19.--Budgeted Annual Costs and Returns, 25-Cow Enterprise[1]
Northern Lower Michigan

	Moderately Productive Soils			
	Good Crop Yields		Excellent Yields	
Weaning Weight	425#	425#	425#	475#
% Calf Crop	85%	90%	90%	90%
	($)	($)	($)	($)
Receipts: (same as for U.P.)				
Total	3154	3287	4248	4461
Expenses:				
All expenses except property taxes (same as for U.P.)	2323	2327	2714	2745
Property taxes	185	185	191	191
Total	2508	2512	2905	2936
Net Income	646	775	1343	1525
Interest on Investment at 5%	963	963	999	1008
Labor Income	-317	-188	344	517

[1]Budget for 140A farm.

Table 20.--Budgeted Annual Costs and Returns, 25-Cow Enterprise[1]
Southern Michigan

	Moderately Productive Soils			
	Good Crop Yields		Excellent Yields	
Weaning Weight	425#	425#	425#	475#
% Calf Crop	85%	90%	90%	90%
	($)	($)	($)	($)
Receipts:				
Cattle	2628	2761	2761	2974
Crops	572	572	1533	1533
Total	3200	3333	4294	4507
Expenses:				
Seed, fertilizer, lime	377	377	575	575
Fuel, oil, custom hire	419	419	578	578
Power and machinery	873	873	913	913
Hired labor	-	-	-	-
Purchased feed	19	19	19	19
Veterinary, medical	50	50	50	50
Utilities	100	100	100	100
Marketing	78	83	83	89
Improvements (repairs only)	158	158	158	158
Equipment	25	25	25	25
Bull depreciation	12	12	12	37
Property taxes	271	271	283	283
Miscellaneous	25	25	25	25
Total	2408	2412	2821	2852
Net Income	792	921	1472	1655
Interest on Investment at 5%	1255	1255	1285	1294
Labor Income	-463	-334	187	361

[1]Budget for an 80A farm--see tables of crop yields and production.

Table 21.--Budgeted Annual Costs and Returns, 25-Cow Enterprise[1]
Southern Michigan--Corn Silage Program

	Moderately Productive Soils			
	Good Crop Yields		Excellent Yields	
Weaning Weight	425#	425#	425#	475#
% Calf Crop	85%	90%	90%	90%
	($)	($)	($)	($)
Receipts:				
Cattle	2628	2761	2761	2974
Crops	1157	1157	2112	2112
Total	3785	3918	4873	5086
Expenses:				
Seed, fertilizer, lime	550	550	750	750
Fuel, oil, custom hire	409	409	451	451
Power and machinery	1046	1046	1046	1046
Hired labor	-	-	-	-
Purchased feed	312	312	312	312
Veterinary, medical	50	50	50	50
Utilities	100	100	100	100
Marketing	79	83	83	89
Improvements (repairs only)	196	196	196	196
Equipment	25	25	25	25
Bull depreciation	12	12	12	12
Property taxes	292	292	296	296
Miscellaneous	25	25	25	25
Total	3096	3100	3346	3352
Net Income	689	818	1527	1734
Interest on Investment at 5%	1296	1296	1318	1327
Labor Income	-607	-478	209	407

[1]Budget for a 80A farm--see tables of crop yields and production.

Table 22.--Costs and Returns for Renting Out the 25-Cow Farm

	Moderately Productive Soils	
	Northern Michigan	Southern Michigan
	($)	($)
Receipts:		
Cropland rental[2]	304	699
Pasture rental[3]	229	127
Total	533	826
Expenses:		
Real estate taxes	99	176
Improvements (repairs only)[1]	87	79
Total	185	255
Net Income	348	571
Interest on Investment at 5%	599	881
Labor Income	-251	-310

[1]Repairs at one half the amount they would be if the beef herd were kept.

[2]Cash rental rate for cropland--$6/acre in N. Michigan and $14/acre in S. Michigan.

[3]Cash rental rate for permanent pasture--$2.75/acre in N. Michigan and $5.50/acre in S. Michigan.

(It is assumed that no additional rent is received for the buildings.)

Table 23.--Change in Income from Putting a 50-Cow Beef Herd on Moderately Productive Corn Land[1]

	So. Michigan--Good Crop Yields	
Beef Herd Ration	Cornstalk Silage	Corn Silage
Weaning Weight	425#	425#
% Calf Crop	90%	90%
	($)	($)
Receipts:		
Cattle	5522	5522
Oats	483	530
Reduced Expenses:		
Cost of growing and harvesting corn	1414	1414
Total Gains	7419	7466
Expenses:		
Seed and fertilizer	373	373
Fuel, oil, custom hire	588	472
Power and machinery	234	234
Purchased feed	625	625
Veterinary, medical	100	100
Utilities	50	50
Taxes on beef herd	125	128
Miscellaneous	50	50
Marketing	166	166
Improvements (repairs only)	190	178
Equipment	31	31
Bull depreciation	24	24
Interest on beef herd at 5%	627	642
Reduced Receipts:		
Value of oats fed	136	89
Value of corn (that would have been raised)[2]	5444	6445
Total losses	8763	9607
Net Change in Income[3]	-1344	-2141

[1]Assumes all land used for pasture and feed for the beef herd would be in corn otherwise. See crop production table.

[2]If the beef herd were not kept, 70.7 acres of corn would be available for sale if the cornstalk silage program had been used. 83.7 acres of corn would be available if the corn silage program had been used. Net corn yields were estimated to be 77 bushels per acre. The corn was valued at $1.00 per bushel.

[3]Returns to the approximately 200 hours of additional labor required.

Table 24.--Change in Income from Replacing a 22-Cow Dairy Herd With 50 Beef Cows

	So. Mich.--Moderately Productive Soils--(Good Crop Yields)	
Beef Herd Ration	Cornstalk Silage	Corn Silage
Weaning Weight	425#	425#
% Calf Crop	90%	90%
	($)	($)
Receipts:		
Beef cattle	5522	5522
Corn	570	-
Oats	483	530
Reduced Expenses:		
Purchased concentrates	732	732
Dairy equipment	600	600
Veterinary, breeding, misc.	440	440
Interest on dairy herd at 5%	764	764
Taxes on dairy herd	153	153
Fuel, oil, custom hire	851	851
Seed and fertilizer	29	29
Total Gains	10144	9621
Expenses:		
Fuel, oil, custom hire	448	448
Purchased feed	625	625
Veterinary, medical	100	100
Utilities	50	50
Miscellaneous	50	50
Marketing	166	166
Bull depreciation	24	24
Interest on beef herd at 5%	627	642
Taxes on beef herd	125	128
Reduced Receipts:		
Value of additional corn fed	-	431
Value of oats fed	136	89
Receipts from dairy herd	9158	9158
Total losses	11509	11911
Net Change in Income	-1365[1]	-2290[2]

[1]Labor needs reduced by 2014 hours, hence the released labor must be worth $.67/hour to break even.

[2]Labor needs reduced by 1991 hours, hence the released labor must be worth $1.15/hour to break even.

Table 25.--Budgeted Costs and Returns for a 50-Cow Beef Herd on Drylot Using a Cornstalk Silage Ration

	Southern Michigan Moderately Productive Soil (excellent crop yields)	
	New Facilities Required	Facilities Already Available
Weaning Weight	425#	425#
% Calf Crop	90%	90%
	($)	($)
Receipts:		
Cattle	5522	5522
Expenses:		
Fuel, oil, custom hire	927	927
Purchased feed	1243	1243
Veterinary, medical	100	100
Utilities	50	50
Miscellaneous	50	50
Marketing	166	166
Bull depreciation	24	24
Taxes on beef herd investment	193	148
Equipment	38	38
Power and machinery[1]	-	-
Improvements--repairs	270	270
Improvements--depreciation	450	-
Reduced Receipts:		
Corn fed	1288	1288
Total Expenses	4799	4304
Net Income	723	1218
Interest on Investment at 5%	966	741
Labor Income[2]	-243	477

[1]Assumes needed machinery is already on hand, if not then about $450 additional expense may be incurred (for forage wagon, manure spreader and loader).

[2]Returnto the 754 hours of additional labor required--return per hour of labor is $-.32 and $.63 respectively.

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