5-1962

# An Economic Study of Alternative Methods of Obtaining Dairy Herd Replacements in Northern Utah, 1961

J'Wayne McArthur
*Utah State University*

# AN ECONOMIC STUDY OF ALTERNATIVE METHODS OF OBTAINING DAIRY HERD REPLACEMENTS IN NORTHERN UTAH, 1961

by

J'Wayne McArthur

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Agricultural Economics

UTAH STATE UNIVERSITY
Logan, Utah

1962

ACKNOWLEDGMENT

Grateful appreciation is expressed to Earnest M. Morrison, Professor of Agricultural Economics at Utah State University, for his patience and valuable guidance in developing the data and writing the manuscript.

Sincere appreciation is extended to Professors Lynn Davis, Rondo Christensen, and Robert Lamb who so willingly gave of their time in counseling and reading this manuscript.

Special thanks are offered to the dairymen who gave of their time in providing the data used in this study.

I wish to express my appreciation to my father and mother who have encouraged me throughout my college work and provided financial assistance during the past year. I particularly wish to thank my wife, Jolene, who provided immeasurable help and encouragement throughout the task of preparing this manuscript. Appreciation is given to others who have done secretarial work and offered helpful suggestions.

J'Wayne McArthur

TABLE OF CONTENTS

LIST OF TABLES

# INTRODUCTION

Dairying ranked second in producing farm income in the state of Utah in 1929 (11). Twenty-two and two tenths percent of cash receipts from the sale of agricultural products came from dairying. Beef enterprises were the only larger source of farm income in the state, with 24.7 percent of the total cash receipts. Because of the importance of dairying in the state, much work has been done to provide dairymen with information that will enable them to obtain a higher net return from dairying.

All dairymen realize that their present herds will not last forever. Disease, injuries, low production, and other factors cause dairymen to cull some cows. This situation causes replacements equal to a complete herd turnover every two to six years depending on intensity of operation. During this period, dairymen must provide replacements for cows that were removed from the herd.

Many dairymen are asking the question, "What is the most advisable practice for me to follow to obtain replacements in my herd?" This problem faces every dairyman who is trying to maintain a dairy herd.

He may consider the possibility of raising his own heifers. The cost to the producer of raising dairy heifers determines the advisability of using this alternative to obtain his needed replacements. The cost to

the producer may be figured in two ways. A producer may figure only cash costs or he may figure all costs including family labor, depreciation, interest on investment etc. to find the total cost of producing needed replacements.

There are other alternatives available for dairymen to obtain replacements, such as purchasing them or contracting heifers raised. Heifers are sold year round at auction, by cattle dealers, and at private treaty. Some dairymen might prefer to buy cows that have had one calf and are freshening with their second calf because of higher production in the second lactation. Some dairymen may desire to contract their heifers to a heifer specialist or to a neighbor who has excess pasture, time, and labor and by adding heifers may increase the efficiency of raising replacements. If contracting is desired a written contract is needed that will safeguard both parties from problems that may arise.

After alternatives available to a dairyman are studied and evaluated, a choice of alternatives can be made that will best suit the prevailing situation.

## OBJECTIVES OF THE STUDY

The objectives of this study were:

1. To determine the cost of producing a dairy heifer from birth until she was ready to enter the milking herd and to study the relationship of factors affecting the cost of production.
2. To determine the desirability of alternatives available to the dairymen for herd replacements which include situations where:
   a) Dairy heifers were raised by the dairyman
   b) Dairy heifers were purchased; and
   c) Dairy heifers were raised by a feeder.[1]
3. To formulate a suitable contract[2] to be used by growers[3] who would like to contract for raising of their heifers, or by feeders contracting to raise heifers.

---

[1]Feeder refers to a dairyman that raises dairy heifer calves for another dairyman.

[2]Contract refers to a written agreement between two or more dairymen pertaining to the raising of dairy heifers.

[3]Grower refers to the dairyman that contracts his heifers to a feeder to raise for him.

## REVIEW OF LITERATURE

There has not been a study made of the cost of producing a dairy heifer in the state of Utah. There has been information published in other states on this subject. From study to study and state to state the inputs differed and for this reason the cost of production also differed.

Studies pertaining to the cost of producing a dairy heifer are reviewed in the first portion of this section. Following the cost of production studies, contracts for raising dairy heifers are reviewed. The final part of this section is a review of an article dealing with the break even point for producing a dairy heifer.

From data collected in New Hampshire by Frick and Henry dealing with cow removal from herds (5), there seemed to be no difference in raised or purchased cows on the removal from herds for reasons of sterility, brucellosis, and udder trouble. About 43 percent of those purchased, and 40 percent of those raised were removed for these reasons. They found that purchased cows had a longer total productive life than raised cows. The average age of disposal for non-dairy purposes of purchased cows was 7.1 years, while that of cows raised on the farm was 5.7 years. Total herd life of purchased cows was 4.9 years while that of raised cows was 3.6 years. This was due to purchased cows being

separated into two groups, some for dairy use and some being sold for beef. Cows sold for milk production were better quality than those sold for beef. Raised heifers may not have been high producers or may have had bad dispositions, therefore they were sold for non-dairy use. Frick and Henry concluded that whether cows should be raised or purchased for herd replacements depended on the quantity and flexibility of farm resources.

John W. Corncross made a study in 1955 and 1956 of dairy heifer enterprises on farms in New Jersey (2). The total of 1,536 heifers were involved. He found the largest item of expense was feed cost. This amounted to 61 percent of total cost. The combined cost of other items for raising a dairy heifer to 28 months of age, such as labor, buildings, bedding, breeding fees, water and lights, interest and other costs accounted for 31 percent of total cost of production and individual producers within a breed had different total costs of production. Feeds fed made differences in cost.

A study made by John A. McCormick at Newlands Field Station in Nevada, began in April 1954 and continued for 27 months (7). This study involved 35 holstein heifers. These heifers received whole milk to the age of eight weeks, concentrates from age two weeks to 23 weeks and nothing but hay after that age. In this study, no costs other than feed were studied. Other costs were estimated for a dairyman operating a 60 cow dairy. Costs other than feed amounted to $66.75 or 25 percent of total cost. The feed cost, at $20 a ton for hay, was $202.61. When hay was figured at $25 a

ton it cost $258.92 to feed a heifer. When other costs were added to feed cost, raising a dairy heifer from birth to 27 months cost $269.36 when hay was $20 per ton and $313.67 when hay was $25 per ton.

Feed costs alone were studied by Conrad, Gilmore, and Hibbs in 1959 at the Wooster Experiment Station in Ohio (4). Production of heifers was studied from birth to 25 months of age. They found heifers of larger breeds cost more to produce than those of smaller ones.

Carpenter and Stone made two studies of Jersey replacement heifer enterprises in eastern Texas. One study was made in 1950 and one in 1955 (3). From these studies they found that the cost of producing Jersey heifers to 25½ months of age amounted to more per head in 1950 than in 1955. The difference was that the latter were fed on milk substitutes and lower priced grain. The estimated price at which these herd replacements could have been purchased was $100 more than the cost of raising heifers. This indicated that in this part of Texas it was cheaper to raise heifers than to buy them.

Brundage and Sweetman stated in an Alaska Agricultural Experiment Station Circular that the feed cost to raise a dairy heifer was $304.39 (1). This was for a two year period. No charge was made for labor. They figured only cash out-of-pocket costs and allowed no value for other factors of production. Costs other than cash costs are only theoretical costs according to this study. They stated that if only the cash out-of-pocket money was figured they could lower the cost to $65 as the direct cost of

raising a heifer, assuming land was on hand to raise plenty of hay and silage. When only these factors were considered, it was less expensive to raise replacements than to purchase them from other sources.

Weeks, Frick, Boynton, and Colby prepared contracts for raising dairy herd replacements in 1957 (10). One contract was a general contract form with options for purchasing. The other contract was a form for direct contracting. Each contract had a separate method for calculating the final payment. In the first contract total payment was based on a set price per pound gained on an adjusted basis according to a USDA market reported price of heifers for that particular area. The adjustment in price paid to the feeder by the grower was figured from an agreed difference between the total price, when figured on a per pound gain, and the USDA quoted price, causing a one cent change in the price charged per pound of gain. For example, if the agreed price per pound gain was 25 cents and a heifer gained 1,000 pounds, the grower would owe the feeder $250, but if the USDA price was $230 per head for dairy heifers, the grower would be charged less than $250. The difference would be calculated from a given change, such as $15, causing a one cent per pound gain change in price paid by the grower. The feeder would pay 23 cents per pound gain rather than 25 cents. This would amount to $230 per heifer. The second contract was figured on a per pound gain from the time the heifer entered the enterprise until she was removed.

A sample contract for raising dairy replacements was contained in a Western Extension Farm Management Committee Mimeo (12). In that contract,

final payment was calculated on a given price per pound gain. The feeder was thus encouraged to make the greatest possible weight gain in the shortest time. This contract was in a form of a rigid contract with no options.

Frick and Henry suggested a method to find the break even point when resources were used for milk production or raising heifers (6). All cash costs of production for heifers and for milk were calculated. Resources required to produce a 26 month old heifer were equivalent to 80 percent of the resources needed to maintain a cow in milk production one year. Total receipts were than figured and cash costs subtracted from them. Eighty percent of the difference between total receipts and cash costs was cash income over cash costs for .8 of a cow. The cash costs of raising a dairy heifer were added to 80 percent of the income from a cow to arrive at the total cost. The total cost was then multiplied by the expected years of herd life, a salvage value was added, and this total was divided by expected years of herd life plus one year. The answer was the break even point for raising or buying a dairy heifer.

## SOURCE OF DATA AND METHODS OF PROCEDURE

Data were obtained by the survey method. A sample of farmers were interviewed and each farmer's answers recorded on prepared schedules. Cache, Box Elder and Weber counties were selected for this study because the dairymen of these counties produced one-third of the dairy products in the state. Data were collected during the period July 1, 1961 to August 15, 1961 from 67 dairymen. The information included costs of raising dairy heifers from birth until they were ready to enter the milking herd.

The population of this study was limited by size and type of enterprise. Only holstein herds of 15 or more cows per herd were surveyed. The number of 15 or more cows per herd was selected because this size of herd would likely have a sufficient number of calves of the same age to make a reasonable unit. This size unit was large enough to challenge a producer to be a dairyman. It eliminated small project herds such as 4-H, FFA, and hobby type operations which, in general, had returns that were monetarily unmeasurable. From the assorted ages of dairy heifers on each farm, one uniform age group was chosen to study from birth until freshening. They were generally a group of heifers that were to freshen in the fall of 1961.

Labor used for this enterprise was changed when necessary to a man hour basis. This was done by evaluating childrens labor as follows: Children 16 years old or more were considered equal to one man, and one eighth of a man hour was deducted for each year under 16.

The market price for dairy heifers was arrived at by using market reports made available by the Smithfield Livestock Auction for a six month period beginning July 1961 to January 1962. These reports were analyzed and values were arrived at for good to choice cows and heifers and for small and common cows and heifers.

Letters were written to dairymen in different areas within the United States to obtain information about contracts being used at present. These dairymen provided sample contracts used in their area for raising dairy heifers. They gave a critical analysis of the contract they were using. Contracts developed by state extension specialists and state experiment station employees were also reviewed. An analysis was made of existing contracts and a suitable contract was developed.

## ANALYSIS OF COST ITEMS

By use of average amounts of inputs as developed from this study of 67 dairy heifer enterprises, a total cost per heifer was determined.[4] This cost does not include the initial value of a new born calf[5] or the death loss cost.[6] The value of the manure was not deducted from the total cost per heifer. These items will be accounted for later in the study.[7]

---

[4]Dairy heifer enterprise refers to the combined processes that are required to produce a dairy heifer from birth to the time of entering the milking herd.

[5]New born calf value refers to the monetary value of a dairy heifer calf at birth. In this study $28 was the average value of each calf.

[6]Death loss cost refers to the added cost of production levied on each remaining heifer due to heifers that died. This cost was calculated by adding the value at time of death of all heifers that died, then dividing by the ending inventory or heifers.

[7]Manure value was the monetary value placed on the manure that was dropped by the heifer. The manure value was based on chapter 24 of Feeds and Feeding by Frank B. Morrison. Manure and bedding for one animal unit equals 15 ton per year.[7a] From this, age of heifers and days on pasture were evaluated on a per animal unit basis. Each age group had a different animal unit value. The price of elemental fertilizer was obtained and the pounds of nitrogen, phosphorous and potassium in the manure was then valued. Manure was valued at $2.50 a ton when deposited directly on the pasture or field. If the manure was hauled from corrals to the field, the manure was valued at $1.15 a ton. The reduction in value was due to the cost of applying manure to the field.

[7a]One animal unit being a feed consumption measure equivalent to what a 1000 pound beef cow would consume in a year. One mature dairy cow equals 1.25 animal units. A dairy heifer over one year old equals .7 of an animal unit. A dairy heifer under one year old equals .4 of an animal unit.

Feed cost was 69.98 percent of the cost for producing a dairy heifer, table 1. This amounted to $177.43 per heifer and was the largest cost item. Labor was the second largest cost, $33.50 or 13.21 percent of total cost. Overhead cost was $27.40. That cost amounted to 10.8 percent of the total cost. The least cost item of production was material. Material cost was $15.23 and was 6.01 percent of the total cost. The total cost for raising a dairy heifer from birth to freshening was $253.56.

Each category of cost within the total cost was analyzed separately to enable a closer analysis of the makeup of total cost. These analyses appear as follows: feed, labor, overhead, and material.

## Feed Cost

Feed cost made up the largest proportion of the total cost of producing heifers. It ranged from 50 to 80 percent of total costs. Because of its importance in cost of production this section was used to divide feed cost according to the age of heifers when feed was consumed. From this division a further analysis was made of the feed cost incurred from producing dairy heifers.

From birth to three months, heifers were generally fed milk or milk substitutes, prepared feeds, and a small amount of hay, table 2. Heifers consumed more hay during the three to six month period than they had previously. No heifers were placed on pasture before the age of six to

Table 1. Cost of producing dairy heifers, by item, Northern Utah 1961

| Cost item | Cost per animal | Percent of total cost | Sub-total percent of total cost |
|---|---|---|---|
| | (dollars) | (percent) | (percent) |
| Feed cost | | | |
| Milk | 11.99 | 4.73 | |
| Milk substitute | 2.81 | 1.11 | |
| Prepared feed | 19.85 | 7.83 | |
| Oats | .95 | .37 | |
| Barley | 3.26 | 1.28 | |
| Hay | 106.11 | 41.86 | |
| Pasture | 22.21 | 8.76 | |
| Silage | 9.07 | 3.58 | |
| Miscellaneous | 1.18 | .46 | |
| Total | 177.43 | | 69.98 |
| Labor cost | | | |
| Procuring calves | .10 | .04 | |
| Procuring feed | .43 | .17 | |
| Preparing feed | .16 | .06 | |
| Daily routine | 25.86 | 10.20 | |
| Adding bedding | 3.73 | 1.47 | |
| Removing bedding | 2.34 | .92 | |
| Dehorn, vaccinate, brand | .39 | .15 | |
| Transportation | .45 | .18 | |
| Marketing | .04 | .02 | |
| Total | 33.50 | | 13.21 |
| Overhead cost | | | |
| Interest on bldgs. and land | 3.52 | 1.39 | |
| Bldg. depreciation | 3.76 | 1.48 | |
| Interest on heifers | 3.43 | 1.35 | |
| Interest on operating money | 13.88 | 5.47 | |
| Insurance on buildings | .46 | .18 | |
| Property tax on heifers | 2.35 | .93 | |
| Total | 27.40 | | 10.80 |
| Material cost | | | |
| Bedding | 6.97 | 2.75 | |
| Water | .54 | .21 | |
| Medicine and veterinary | 1.52 | .60 | |
| Machine and power | .16 | .06 | |
| Electricity | .04 | .02 | |
| Breeding fee | 6.00 | 2.37 | |
| Total | 15.23 | | 6.01 |
| TOTAL COST | 253.56 | 100.00 | 100.00 |

Table 2. Amount and cost of feed per heifer for producing dairy heifers by age group, Northern Utah 1961

| Months | Milk | Milk sub-stitute | Pre-pared feed | Oats | Bar-ley | Hay | Pasture | Sil-age | Misc. | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0-3.0 | | | | | | | | | | |
| Pounds | 475 | 23 | 130 | 18 | 25 | 357 | | | 1 | 1029 |
| Cost-(dols.) | 11.99 | 2.81 | 4.40 | .47 | .55 | 4.46 | - | - | .05 | 24.72 |
| 3.1-6.0 | | | | | | | | | | |
| Pounds | - | - | 170 | 12 | 60 | 945 | - | 39 | 4 | 1230 |
| Cost-(dols.) | - | - | 4.74 | .31 | 1.36 | 10.55 | - | .14 | .11 | 17.21 |
| 6.1-12.0 | | | | | | | | | | |
| Pounds | - | - | 145 | 6 | 28 | 1710 | - | 1.97 | 19 | 2105 |
| Cost-(dols.) | - | - | 3.84 | .17 | .76 | 19.17 | 6.13 | .88 | .02 | 30.96 |
| 12.1-24.0 | | | | | | | | | | |
| Pounds | - | - | 120 | - | 18 | 4809 | - | 1654 | 207 | 6808 |
| Cost-(dols.) | - | - | 4.95 | - | .39 | 56.04 | 12.81 | 6.54 | .76 | 81.50 |
| 24.1-30.0 | | | | | | | | | | |
| Pounds | - | - | 80 | - | 10 | 1328 | - | 390 | 11 | 1819 |
| Cost-(dols.) | - | - | 1.92 | - | .20 | 15.89 | 3.27 | 1.51 | .24 | 23.04 |
| Total | | | | | | | | | | |
| Pounds | 475 | 23 | 645 | 36 | 141 | 9149 | - | 2280 | 242 | 12991 |
| Cost-(dols.) | 11.99 | 2.81 | 19.85 | .95 | 3.26 | 106.11 | 22.21 | 9.07 | 1.18 | 177.43 |
| Percent of total cost | 6.76 | 1.58 | 11.19 | .53 | 1.84 | 59.81 | 12.52 | 5.11 | .66 | 100.00 |

12 month period hay consumption more than doubled over the preceeding period but time on feed also doubled. Some heifers were receiving silage during the six to 12 month period. Days on pasture doubled from the six to 12 month group to the 12 to 24 month group. The 12 to 24 month old group consumed more hay and silage than previous age groups. Some heifers did not appear in the 24 to 30 month old group because they freshened at

24 months, others appeared but freshened during this time period, therefore, they did not remain with the enterprise for the full period. These older heifers received hay and silage as major feeds during the period prior to freshening.

Oats and barley were used very little in the production of dairy heifers. These two feeds combined accounted for 2.4 percent of the total feed cost. Pasture accounted for $22.21 or 12.5 percent of feed cost. The amount of prepared feeds in the ration decreased after heifers reached six months of age. Total cost for prepared feeds was $19.85 or 11.2 percent of total feed cost. The cost per heifer for whole milk and milk substitutes was $11.99 and $2.81 respectively. That indicated more farmers fed their heifers whole milk. The cost of milk and milk substitutes combined amounted to 7.34 percent of the total feed cost. Silage cost was $9.07 or 5.1 percent of the total feed cost. The total feed cost per heifer averaged $177.43. Each heifer consumed an average of 12,991 pounds of feed at an average cost of $1.36 per hundredweight plus the feed consumed from the pasture. The average cost of hay was $23.19 per ton. Prepared feeds had an average cost of $3.08 per hundredweight.

## Labor Cost

The labor cost was the second largest cost item.[8] All labor operations involved in producing a heifer from birth to freshening were

[8]The amount of labor involved in operating the enterprise multiplied by $1.25 was the labor cost. All labor inputs were valued in this manner.

studied.[9] Daily routine accounted for the largest amount of labor per heifer of any operation, table 3. This was 77.2 percent of the total labor required. The accumulative amount of labor used increased at a decreasing rate as heifers aged. A few reasons why labor increased at a decreasing rate were discontinued use of milk for feed at age three months, heifers put on pasture at six to 12 months of age, and utilization of more days on pasture as heifers grew older. Adding bedding required 11.1 percent of the total labor required per heifer. That was the second largest use of labor. Removing manure, which amounted to seven percent of the total labor required, was the only other major use of labor. Very little of the total labor was used to procure calves or market heifers. Dairymen who spent time procuring calves were also those who used labor to market heifers. A few dairymen prepared their own feed. Labor used per heifer in this manner was .48 percent of the total labor. Procuring feed amounted to 1.28 percent of total labor used per heifer. That was used by farmers who hauled silage or other feeds to heifers. Heifers were dehorned, vaccinated and branded between birth and six months of age. Heifers that were turned out on pasture the following spring were vaccinated prior to being turned out. Heifers that utilized pasture required labor to transport them from pens to pastures and back again. That did not occur until they reached the age of six months. Only 1.34

---

[9]Labor refers to all human services except decision making that was required to operate an enterprise.

Table 3. Amount and cost of labor used per heifer for producing dairy heifers, by age group, Northern Utah 1961

| Months | Procuring calves[a] | Procuring feed[b] | Preparing feed[c] | Daily routine[d] | Adding bedding[e] | Removing manure[f] | Dehorn vaccinate brand[g] | Transportation[h] | Marketing[i] | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0-3.0 | | | | | | | | | | |
| Hours | .08 | .01 | .06 | 4.56 | .72 | .53 | .20 | - | - | 6.16 |
| Cost-(dols.) | .10 | .01 | .08 | 5.70 | .90 | .66 | .25 | - | - | 7.70 |
| 3.1-6.0 | | | | | | | | | | |
| Hours | - | - | .02 | 2.52 | .69 | .46 | .08 | - | - | 3.78 |
| Cost-(dols.) | - | - | .03 | 3.15 | .86 | .58 | .10 | - | - | 4.72 |
| 6.1-12.0 | | | | | | | | | | |
| Hours | - | .02 | .05 | 3.98 | .40 | .21 | .02 | .12 | - | 4.80 |
| Cost-(dols.) | - | .03 | .06 | 4.98 | .50 | .26 | .03 | .15 | - | 6.00 |
| 12.1-24.0 | | | | | | | | | | |
| Hours | - | .29 | - | 7.81 | .97 | .55 | .01 | .21 | - | 9.84 |
| Cost-(dols.) | - | .36 | - | 9.76 | 1.21 | .69 | .01 | .26 | - | 12.30 |
| 24.1-30.0 | | | | | | | | | | |
| Hours | - | .02 | .004 | 1.82 | .20 | .12 | - | .03 | .03 | 2.22 |
| Cost-(dols.) | - | .03 | .005 | 2.28 | .25 | .15 | - | .04 | .04 | 2.78 |
| Total | | | | | | | | | | |
| Hours | .08 | .34 | .13 | 20.70 | 2.98 | 1.87 | .31 | .36 | .03 | 26.80 |
| Cost-(dols.) | .10 | .43 | .16 | 25.86 | 3.73 | 2.34 | .39 | .45 | .04 | 33.50 |
| Percent of total cost | .30 | 1.28 | .48 | 77.20 | 11.13 | 7.00 | 1.16 | 1.34 | .11 | 100.00 |

[a]Procuring calves refers to time involved in obtaining extra dairy heifer calves to add to a dairyman's heifer enterprise. Only time involved in actual bargaining and purchasing for heifer calves was recorded.

[b]Procuring feed refers to time spent obtaining feed from mills and stores and/or hauling silage to heifers when purchased from off-the-farm sources.

[c]Preparing feeds encompassed all cracking, rolling, chopping, mixing, etc. to the feed that was performed by the dairyman.

Table 3. Continued

[d]Daily routine included the daily operations of feeding, watering, and managing dairy heifers.

[e]Adding bedding refers to actual time involved in obtaining bedding and scattering it in pens or sheds.

[f]Removing manure refers to time involved in forking droppings from calf pens, and removing manure from pens, sheds, and corrals used by dairy heifers.

[g]Branding, dehorning and vaccinating refers to time incurred gathering corralling, and throwing calves then performing the operations and returning calves to their place of confinement.

[h]Transportation refers to time involved in transporting heifers to and from pastures or fields. Heifers were transported by truck or trail driven.

[i]Marketing refers to time involved in selling heifers that were in excess of dairymen's replacement needs.

percent of total labor was used in that operation. The amount of labor for all operations increased at a decreasing rate as heifers aged. The total amount of labor used for all operations was 26.8 hours costing $33.50 per heifer.

The largest amount of labor connected with the dairy heifer enterprise was contributed by the operator, table 4. Eighty-eight percent of labor used to produce dairy heifers was operator labor. Of the remaining 12 percent, 10 percent was family labor and two percent was hired labor.

Table 4. Labor inputs per heifer for producing dairy heifers, by age, Northern Utah 1961

| Heifers age | Operator | | Family | | Hired | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Hour | Cost | Hour | Cost | Hour | Cost | Hour | Cost |
| months | | dol. | | dol. | | dol. | | dol. |
| 0.0-3.0 | 4.93 | 6.16 | 1.01 | 1.25 | .24 | .29 | 6.16 | 7.70 |
| 3.1-6.0 | 3.19 | 3.99 | .54 | .68 | .05 | .06 | 3.78 | 4.73 |
| 6.1-12.0 | 4.41 | 5.51 | .36 | .45 | .03 | .04 | 4.80 | 6.00 |
| 12.1-24.0 | 8.92 | 11.15 | .74 | .93 | .17 | .22 | 9.85 | 12.30 |
| 24.1-30.0 | 2.12 | 2.65 | .07 | .09 | .02 | .03 | 2.21 | 2.77 |
| Total | 23.57 | 29.46 | 2.72 | 3.40 | .51 | .64 | 26.8 | 33.50 |

## Overhead Cost

Overhead cost was composed of interest on capital invested in buildings and land, building depreciation, interest on capital invested in heifers, interest on operating money, building insurance, and property tax on heifers. Interest was figured on capital invested in buildings used for the production of dairy heifers. Only the portion used by heifers in this study was charged as an overhead cost. These buildings were open front sheds, converted buildings or portions of barns. On these same buildings a depreciation was calculated. The depreciation and interest on capital invested in buildings, each amounted to about 13 percent of the total overhead cost, table 5. Interest was also calculated on

Table 5. Overhead cost per heifer for producing dairy heifers, Northern Utah 1961

| | Average cost per heifer | Percent of total |
|---|---|---|
| | dollars | percent |
| Interest, buildings, and land | 3.52 | 12.8 |
| Building depreciation | 3.76 | 13.8 |
| Interest on heifers | 3.43 | 12.5 |
| Insurance on buildings | .46 | 1.6 |
| Property tax on heifers | 2.35 | 8.5 |
| Total | 27.40 | 100.0 |

capital invested in each heifer. That was accomplished by use of the value at birth of heifers as a base with an interest rate applied to it according to the age of heifers at freshening. By that method, money invested was receiving interest until the heifer left the enterprise. That item accounted for 12.5 percent of the total overhead cost. Interest on operating money was calculated on labor and feed costs. It was calculated on an accumulative basis from the heifers date of birth until she freshened. That was the largest overhead cost item amounting to 50.6 percent of the total overhead cost. Insurance purchased on buildings used by the dairy heifer enterprise was charged to the enterprise. That was the least cost item in overhead cost.

The property tax on heifers was different in each county. Property taxes were calculated according to age of heifers at freshening. This tax amounted to 8.6 percent of the total overhead cost. The total overhead cost amounted to $27.40 or 10.8 percent of the total cost.

## Material Cost of Production

Material cost included such items as bedding, water, medicine and veterinary bills, machine and power, electricity, and breeding fees. Some dairymen produced heifers with no use of bedding while others fed in dry lot and bedded heifers regularly. For the average dairyman, bedding was 46 percent of material cost, table 6. That was the largest cost item of material cost. Some dairymen were using water that was metered to water heifers, others used creeks or wells. Water cost was 3.5 percent of the total material cost. Medicine and veterinary expenses were the third largest cost of material. That included any medicines given by the dairymen or expense incurred when a veterinarian was called. Machine and power included costs attributed to heifers for transportation to and from the pasture, and machinery used for preparing feed to be used in the heifers ration. That was a very small part of material cost.

When electricity was used for energy to operate machinery for preparing feeds it was charged to heifers. That was the least cost item of material cost.

Table 6. Material cost per heifer for producing dairy heifers, Northern Utah 1961

| | Average cost per heifer | Percent of total |
|---|---|---|
| | dollars | percent |
| Bedding | 6.97 | 45.8 |
| Water | .54 | 3.5 |
| Medicine and vet. | 1.52 | 9.9 |
| Electricity | .04 | .2 |
| Machine and power | .16 | 1.0 |
| Breeding fee | 6.00 | 39.5 |
| Total | 15.23 | 100.0 |

Breeding fees were charged at $6 per heifer for all heifers. Breeding fees made up 39.4 percent of material costs. That was the second largest material cost of production. All material cost combined amounted to $15.23 per heifer or 6.01 percent of the total cost, table 6.

## FACTORS ASSOCIATED WITH SUCCESS OF THE DAIRY HEIFER ENTERPRISE

Cross tabular analysis was used in analyzing the relation which existed between various factors studied. This method allowed comparison of variation in one factor with that of others. The records were classified into groups according to one factor (causal) in an effort to hold the affect of that factor relatively constant within classes. Averages were then calculated for other factors. In that way, it was shown whether or not the average of other factors increased or decreased as the causal factor changed from one level to another. Total adjusted cost was the primary measure of success used.[10]

### Feed Cost

The total cost of a livestock enterprise is usually governed by the cost of feeding livestock in the enterprise because this cost ranges from 50 to 80 percent of the total cost, depending on the type of enterprise and the efficiency with which feed is used. In this study 70

---

[10]Total adjusted cost refers to total cost plus cost of death loss minus credit for manure plus the value of a new born calf.

| | |
|---|---|
| Total cost | 254. |
| Death loss cost | 2. |
| Manure credit | -32. |
| Value of calf | 28. |
| Total adjusted cost | 252. |

percent of the total cost was feed costs. It could reasonably be expected that the variations in the feed inputs would be associated directly with variations in total adjusted costs. Pasture may tend to substitute for dry lot feeding at a cost reducing rate if lower dollar values were placed on pasture because of less harvesting expenses. Feed cost would therefore be inversely related to pasture. To discover what gross associations existed, if any, between feed cost and total adjusted cost, a sort of the records was made based on feed costs.

The records were divided into four groups: seventeen records had feed costs below $150 with an average feed cost of $114 per heifer, 20 records had feed costs from $151 to $174 with an average of $163 per heifer, 20 additional records had feed costs from $175 to $227 and averaged $197 per heifer, the highest 10 records had feed costs above $227 with an average of $263 per heifer. The average feed cost for all enterprises was $177, table 7.

As feed cost increased from $114 for the low group to $263 per heifer for the high group, total adjusted cost increased from $179 to $363. This was a direct relationship between feed cost and total adjusted cost, although feed costs above would not account for all the variations in total adjusted cost. Heifer conditions were not directly studied, but it was observed by the enumerator and there seemed to be no sign of over feeding or under feeding. Although there was variation between heifers it did not appear to be associated with an improper feed input.

Table 7. Relation of feed cost per heifer to total adjusted cost and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Feed costs, heifer | | Number of records | Average age of heifer | Days on pasture per heifer | Labor cost per heifer | Total Adjusted cost per heifer |
|---|---|---|---|---|---|---|
| Range | Average | | | | | |
| dollars | dollars | number | months | number | dollars | dollars |
| Below 151 | 114 | 17 | 24.8 | 348 | 29 | 179 |
| 151-174 | 163 | 20 | 25.7 | 288 | 27 | 228 |
| 175-227 | 197 | 20 | 27.7 | 216 | 37 | 276 |
| Above 227 | 263 | 10 | 27.3 | 66 | 48 | 363 |
| All enterprises | 177 | 67 | 26.3 | 247 | 33.5 | 252 |

All feed was valued in the same manner, therefore the difference in feed cost was not due to under or over valuing feed stuff. The components of the ration were different from farm to farm causing differences in the ration cost.

Inversely associated with feed cost was days on pasture. Days on pasture substituted at a cost reducing rate for dry lot feeding because of a lower dollar value placed on pasture due to lower harvesting costs.

Associated directly with feed cost was age of heifers. Higher feed cost was connected with heifers in older age groups. The longer heifers were fed the greater was the possibility of high feed cost because of more consumption.

There tended to be a direct relationship between feed cost and labor cost. Different levels of feed inputs were associated indirectly with days on pasture. Therefore, as feed cost rose labor input rose also because of more time involved in putting feed before heifers.

There appeared to be no marked associations between feed cost per heifer and death loss, material cost per heifer, or average number of heifers per herd.

## Labor Inputs

Since the labor input in dairy heifer production averaged about 13 percent of total cost it could reasonably be expected that variations in the labor input would be associated directly with variations in total adjusted costs unless increased labor inputs were substituting at an advantage for other inputs, thus making additional labor a cost reducing investment. If the latter prevailed then labor inputs would be inversely associated with total cost. To discover what gross associations existed, if any, between the labor input and total adjusted cost, a sort of the records was made based on dollar labor cost. Since all labor was valued at a uniform rate, that measure also reflects total hours of labor invested. Thirteen records had labor costs per heifer of $24 or less with an average of $17; 19 records had labor costs per heifer between $24.01 and $34 with an average of $27; 18 records had labor cost per heifer between $34.01 and $44 with an average of $39; and 17 records had labor cost per heifer of $44.01 or more averaging $71, table 8.

Table 8. Relation of labor input per heifer to total adjusted cost and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Labor cost/heifer Range | Average | No. of record | Avg. age of heifers | Avg. no. of heifers per herd | Death loss | Days on pasture per heifer | Feed cost per heifer | Material cost per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|---|---|
| dols. | dols. | no. | months | no. | percent | no. | dols. | dols. | dols. |
| 24 and less | 17 | 13 | 26.4 | 21 | 6.4 | 290 | 164 | 13.5 | 215 |
| 24.01-34.00 | 27 | 19 | 26.8 | 11 | 7 | 271 | 170 | 15 | 235 |
| 34.01-44.00 | 39 | 18 | 25.3 | 8 | 13.6 | 244 | 182 | 16 | 267 |
| 44.01 and more | 71 | 17 | 26.6 | 8 | 9 | 128 | 211 | 17 | 334 |
| All enterprises | 33.50 | 67 | 26.3 | 11.5 | 8.5 | 247 | 177 | 15 | 252 |

As labor cost per heifer increased from $17 for the low labor cost group to $71 for the high labor cost group, total adjusted cost per heifer increased consistently from $215 to $334. This would suggest a direct association between labor cost and total adjusted cost although labor alone would not account for all variations in total adjusted cost.

Associated directly with labor cost per heifer was feed cost per heifer. While a greater labor input might be associated with reduced feed cost by more care in feeding to prevent waste, there would seem to be no reason why labor costs should increase as feed costs increased unless different levels of labor inputs were associated with different

methods of feeding. Since labor cost per heifer was inversely associated with days heifers were on pasture, a difference in method of feeding was influencial. Heifers on pasture were going to their feed supply, eliminating the necessity of labor placing feed before them. The necessity of cleaning corrals and other relative labor items were reduced or eliminated also. Hence lower labor inputs were associated with long pasture periods. (Association between days on pasture and feed cost are discussed in another section.)

Labor cost per heifer was also inversely related with number of heifers per herd. Lower labor cost per heifer was associated with larger herds. While size of herd did not account for total variation in labor cost per heifer, the total labor cost for an average herd of 21 heifers in the low labor cost group was $357 while the total labor cost for an average herd of eight heifers in the high labor cost group was $568. It seemingly did not take producers proportionately longer to take care of a large herd than a small herd.

There appeared to be no marked association between labor cost per heifer and average age of heifers, or death loss, or material cost per heifer.

Labor cost was directly associated with total adjusted cost and while the quality of heifers produced was not measured directly, all herds were observed by the enumerator and no apparent evidence existed to suggest that low labor inputs were associated with neglect. Variation in the quality

of heifers did exist but it seemed not to be observably associated with a lack of an adequate labor input.

## Dollars Invested in Land, Buildings and Equipment Per Heifer

Capital can be invested in land, buildings and equipment in a manner that will reduce some functions of labor and completely eliminate others, or it may be invested in fancy and maybe unnecessary facilities that only add to the cost of production. Capital used in the proper manner will cause higher productivity per labor. If capital is invested in elevators for hay or storage sheds that are close to the mangers it will cut amount of labor needed and still maintain the same output.

Capital can be invested in a manner that will cut feed costs if it shelters feed from the elements of nature, thus reducing waste and spoilage.

Death loss can be decreased by use of adequate facilities in the first few months after birth, or capital can be used to provide elaborate buildings that do not cut down death loss above adequate facilities.

To discover what gross association existed, if any, between dollars invested in land, buildings, and equipment per heifer and total adjusted costs, a sort of the records was made based on dollars invested in these factors. Records were divided into four groups; twenty-five records had investments of $50 or less with an average of $36 invested in land, buildings, and equipment per heifer; 17 records had $51 to $80 invested

which averaged $67 per heifer; 15 records had $81 to $128 invested with an average of $104 invested per heifer; 10 records had $137 or more invested which averaged $172 invested in land, buildings, and equipment per heifer. The average investment for all enterprises was $70 per heifer, table 9 .

Table 9. Relation of dollars invested in land, buildings, and equipment per heifer to total adjusted costs and other factors for 67 dairy heifer enterprises of Northern Utah, 1961

| Land, buildings and equipment invested per heifer | | No. of records | Average number of heifers per herd | Death loss | Feed cost per heifer | Labor cost per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|
| Range | Average | | | | | | |
| dols. | dols. | no. | no. | perc. | dols. | dols. | dols. |
| 50 or less | 36 | 25 | 15 | 5.6 | 180 | 30 | 242 |
| 51-80 | 67 | 17 | 9 | 11.0 | 194 | 38 | 278 |
| 81-123 | 104 | 15 | 10 | 14.0 | 170 | 34 | 251 |
| 137 or more | 172 | 10 | 8 | 8.0 | 150 | 39 | 244 |
| All enterprises | 70 | 67 | 11.5 | 8.5 | 177 | 33.5 | 252 |

There was no association between land, buildings, and equipment invested and total adjusted cost, hence, investment in land, buildings, and equipment per heifer did not tend to raise or lower total cost in the aggregate.

Investment in land, buildings, and equipment per heifer was neither inversely or directly related to labor cost per heifer, therefore, capital did not substitute for labor but rather provided housing only.

No association was discovered between land, buildings, and equipment invested per heifer and death loss. Death loss usually occurred in the first two weeks after birth and during this period most dairymen provided adequate housing. Those with more invested provided more elaborate housing than was necessary.

There tended to be an inverse relationship between land, buildings, and equipment invested per heifer and average number of heifers per herd. Lower investments were associated with larger herds because investment in land buildings, and equipment increased at a decreasing rate as heifers were added to the herd. There were some investment reducing effects that accompanied increases in herd size.

There was a tendency for land, buildings, and equipment to be inversely related to feed cost per heifer. The buildings may have sheltered mangers and stored feed to prevent losses from waste and spoilage.

Land tended to be an overhead cost that was directly related with size of herd. Larger herds needed more corral space than small herds. Buildings tended to be more variable than land. Some dairymen had elaborate facilities while others had adequate or less facilities.

## Days on Pasture

As number of days heifers were on pasture increased, it would be reasonable to expect labor cost per heifer to decrease because heifers would be performing some of the actions of labor that were performed by

man labor when heifers were in dry lot. Hauling feed and manure would not be necessary while heifers were on pasture.

As number of days heifers were on pasture increase it would be resonable to expect feed cost per heifer not to change unless pasture substitutes for harvested feeds at a cost reducing rate. This was so if lower dollar values were placed on pasture because of smaller harvesting expenses. If pastures had a lower dollar value placed on them, then days on pasture would be inversely related to labor and feed costs. Labor and feed costs made up 83 percent of the total adjusted cost, therefore, as days on pasture increased it could reasonably be expected that total adjusted cost would decrease. To discover what gross associations existed, if any, between number of days heifers were on pasture and total adjusted cost, a sort of the records was made based on days on pasture.

Records were divided into three groups; 12 records had no use of pasture, 20 records had 60 to 240 days of pasture with an average of 156 days on pasture per heifer; 35 records had 270 days on pasture and over which averaged 361 days per heifer, table 10. The average for all enterprises was 247 days on pasture per heifer.

As days on pasture increased from 0 days for the low group to 361 days for the high group, total adjusted costs per heifer decreased consistently. This would suggest an inverse association between days on pasture and total adjusted cost, although days on pasture alone would not account for all variations in total adjusted cost.

Table 10. Relation of days on pasture per heifer to total adjusted costs and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Days on pasture | | Number of records | Death loss | Feed cost per heifer | Labor cost per heifer | Manure credit per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|
| Range | Average | | | | | | |
| no. of days | no. of days | no. | percent | dols. | dols. | dols. | dols. |
| 0 | 0 | 12 | 12.5 | 230 | 50 | 22 | 335 |
| 60-254 | 156 | 20 | 7 | 190 | 37 | 28 | 273 |
| 255-540 | 361 | 35 | 8 | 157 | 27 | 37 | 218 |
| All enterprises | 246.83 | 67 | 8.5 | 177 | 33.5 | 32 | 252 |

Associated directly with days on pasture was manure credit per heifer. While the heifers did not defecate or urinate any more while on pasture they did deposit it where it would not have to be moved, therefore, there was no charge deducted for hauling manure.

An inverse association was found between days on pasture and feed costs. Days on pasture substituted for harvested feeds fed in dry lot at a cost reducing rate. Pastures were rented for less than the feed would have cost if the heifers had been fed in dry lot. This was also true regarding the value reported by dairymen owning their own pastures.

Associated inversely with days on pasture was labor cost per heifer. While heifers were on pasture they harvested their own feed supply doing away with the necessity of labor placing feed before them. The necessity

of cleaning corrals and other relative labor items were reduced or eliminated also. Hence long pasture periods were associated with lower labor costs per heifer.

No use of pasture was associated with a higher death loss than for enterprises which had pastured heifers. Disease spread more rapidly in herds that were confined to small areas compared to those on pastures.

Quality of heifers produced was not measured directly though all herds were observed by the enumerator and no apparent evidence existed to suggest that longer pasture periods were associated with inferior type heifers. Variation in the quality of heifers did exist, but it did not seem to be associated with any single factor of production.

Since days on pasture were associated inversely with total adjusted costs per heifers, in general costs were reduced when the producer lengthened the number of days heifers were on pasture.

## Number of Heifers Per Enterprise

The size of an enterprise generally contributes to efficiency in use of factors of production. As size of enterprise is expanded accumulative labor and facilities usually increase but at a decreasing rate. If efficiencies of size are utilized, it will be reflected in lower per unit cost.

In order to discover what gross associations existed, if any, between number of heifers per enterprise and total adjusted cost, records were

sorted into three groups based on number of heifers per enterprise; 23 records had three to seven heifers per enterprise with an average of 5.4 heifers; 32 records had 8 to 13 heifers per enterprise with an average of 10.6 heifers; 12 records had 14 or more heifers per enterprise with an average of 25.7 heifers. The average for all enterprises was 11.5 heifers per enterprise, table 11.

Table 11. Relation of number of heifers per enterprise to total adjusted costs and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Heifers per enterprise | | No. of records | Death loss | Days on pasture | Feed cost per heifer | Labor cost per heifer | Material cost per heifer | Land buildings & equipment invested per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|---|---|
| Range | Average | | | | | | | | |
| no. | no. | no. | perc. | no. | dols. | dols. | dols. | dols. | dols. |
| 3-7 | 5.4 | 23 | 11 | 198 | 183 | 62 | 18 | 111 | 298 |
| 8-13 | 10.6 | 32 | 10 | 264 | 168 | 31 | 16 | 69 | 248 |
| 14 over | 25.7 | 12 | 6.4 | 247 | 185 | 25 | 13 | 56 | 246 |
| All enterprises | 11.5 | 67 | 8.5 | 247 | 177 | 33.5 | 15 | 70 | 252 |

Associated inversely with heifers per enterprise was total adjusted cost. As average number of heifers increased from 5.4 to 25.7 per enterprise, total adjusted costs dropped from $298 to $246 per heifer. Enterprises with an average of 10.6 heifers had a total adjusted cost per heifer of $212. This was the lowest total adjusted cost, but this was

due to high amount of pasture used by the group and this caused feed costs to decrease. If pasture had been between the other two groups the total adjusted cost would have had a true inverse relationship.

As heifers per enterprise increased, labor cost per heifer decreased showing an inverse relationship. As size increased, labor increased at a decreasing rate because it did not take twice as much time to bed and feed 20 heifers as it did 10 heifers.

There was an inverse relationship discovered between heifers per enterprise and material cost. A large segment of material costs was the cost of bedding. As heifers per enterprise was increased, bedding was also increased but at a decreasing rate. Vaccination, bedding, and other material costs that were related directly to a set amount per heifer was not changed by adding more heifers to the enterprise.

Heifers per enterprise were related inversely with land, buildings, and equipment. As size of enterprise was increased, it did not require a proportional increase in investment. The investment must be divided between heifers in the enterprise. Those enterprises with less heifers than capacity had high investments in land, buildings, and equipment.

As number of heifers increased it could reasonably be expected that less time would be spent with each calf. This would tend to prevent dairymen from observing scours or other infectious or contagious diseases. Offsetting this would be the fact that larger herds are more challenging to dairymen and if a contagious disease did break out they would have more

to lose, therefore, they would watch for this type of disease. An inverse relationship was discovered between heifers per enterprise and death loss. Larger size challenged dairymen to control disease and minimize death loss.

Heifers per enterprise was neither directly or inversely related to days on pasture or feed cost per heifer. It required as much feed per heifer to feed heifers in enterprises averaging 5.4 heifers as it did in herds of 25.7 heifers. Enterprises with an average of 10.6 heifers used more pasture thus reducing feed costs.

## Death Loss

In a herd of dairy cows, some are calving at all times of the year. This may cause excessive death loss if there are not proper facilities to house calves and sufficient labor and management to take care of calves.

Calves taken off dams at three days of age get the value of colostrum milk while calves that are fed milk from cows that have already passed the colostrum period will not have immunities that colostrum provides.

Percentage death loss was changed into a dollar value by taking the heifers value at death and dividing it equally among the remaining heifers. This was a cost to the enterprise because factors of production had been invested in the heifers as a group and when this was charged to a per heifer basis the total inputs were divided equally among the remaining heifers.

To discover what associations, if any, existed between death loss and total adjusted cost, the records were sorted into four groups. Twenty-eight records had no death loss; 15 records had 2 to 10.9 percent death loss with an average of seven percent; 17 records had death losses from 11 to 20 percent and averaged 15 percent; seven records had death losses from 21 to 44 percent for the high group with an average of 30 percent death loss, table 12.

Table 12. Relation of death loss to total adjusted costs and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Death loss | | No. of records | Avg. no. heifers per herd | Days on pasture | Feed cost per heifer | Labor cost per heifer | Death loss cost per heifer | Land buildings and equipment invested per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|---|---|
| Range | Average | | | | | | | | |
| percent | percent | no. | no. | no. | dols. | dols. | dols. | dols. | dols. |
| 0 | 0 | 28 | 9.1 | 291 | 164 | 39 | 0 | 68 | 237 |
| 2-10.9 | 7 | 15 | 20.4 | 236 | 186 | 27 | 2.10 | 63 | 250 |
| 11-20 | 15 | 17 | 9.6 | 209 | 182 | 33 | 4.98 | 78 | 262 |
| 21-44 | 30 | 7 | 6.6 | 207 | 184 | 54 | 12.17 | 112 | 306 |
| All enterprises | 8.5 | 67 | 11.5 | 247 | 177 | 33.5 | 2.61 | 70 | 252 |

Death loss was not associated directly or inversely with average age of heifers. This relationship existed because the major death losses

occurred in the first two weeks after birth. Extra months on the end of the growing period did not affect death loss.

Associated inversely with death loss was days on pasture. Cows on pasture during summer months had calves that were not introduced to barnyard diseases like those that are dropped in the middle of a manury corral. A dairyman that pastures heifers would tend to pasture dry stock also.

Death loss tended to be directly related to land, buildings, and equipment invested per heifer. If buildings provided shelter for calves it would be reasonable to expect an inverse relationship to exist. It is concluded that calves had adequate housing during the first two weeks of life.

Death loss was not directly or inversely related to average number of heifers per herd, although records with the highest death loss were those with the smallest number of heifers per herd.

No association was discovered between death loss and feed cost per heifer. Heifers that died within the first two weeks of life had not consumed enough feed to affect the average for the herd. If heifers had died later in life it would be reflected by a direct relationship of death loss to feed cost per heifer.

Death loss was directly associated with total adjusted cost. Records with no death loss had a total adjusted cost of $237 per heifer while records in the high death loss group 30 percent death loss had a total adjusted cost of $306 per heifer. Some of the increase in total adjusted

cost is due to higher death loss cost and some from less manure credit because as death loss increased and days on pasture decreased.

## Age of Heifer at Freshening

Age of heifer at freshening would determine the length of the feeding period. Heifers that were on feed for longer periods may have consumed more feed than heifers fed shorter periods, if feed was fed at the same rate. If less feed was fed per day to one age group, it would tend to decrease feed cost. If more feed was fed it would have required more labor. Days on pasture could have reduced both feed and labor cost if it was utilized to a maximum. Heifers in older age groups were subjected to the probabilities of death for a longer period of time.

To discover what gross association existed, if any, between age of heifer and total adjusted cost, a sort of the records was made based on age of heifer. Records were divided into three groups; ten records had heifers from 24 to 25 months old with an average of 24.1 months old; 10 other records had heifers from 26 to 27 months old averaging 26.9 months of age; 15 records had heifers 28 to 30 months old with an average of 29.8 months of age. The average for all enterprises was 26 months of age at freshening, table 13.

As age increased, total adjusted cost per heifer increased. Heifers averaging 24.1 months of age cost $232 per heifer to raise while heifers averaging 29.8 months of age cost $279 per heifer to raise.

Table 13. Relation of age of heifer to total adjusted cost and other factors for 67 dairy heifer enterprises, Northern Utah, 1961

| Age of heifers at freshening | | No. of records | Death loss | Days on pasture per heifer | Feed cost per heifer | Labor cost per heifer | Land buildings and equipment invested per heifer | Manure credit per heifer | Total adjusted cost per heifer |
|---|---|---|---|---|---|---|---|---|---|
| Range | Average | | | | | | | | |
| months | months | no. | perc. | no. | dols. | dols. | dols. | dols. | dols. |
| 24-25 | 24.1 | 35 | 11 | 252 | 152 | 33 | 95 | 29 | 232 |
| 26-27 | 26.9 | 12 | 6 | 239 | 177 | 31 | 62 | 33 | 244 |
| 28-30 | 29.8 | 20 | 7 | 245 | 207 | 35 | 45 | 35 | 279 |
| All enterprises | 26 | 67 | 8.5 | 247 | 177 | 33.5 | 70 | 32 | 252 |

Directly related to age of heifers was feed cost per heifer. As age increased, feed cost per heifer rose, indicating older heifers had consumed more or the feeds in the ration were more expensive. There were variations among feeds fed, but they were not great enough to influence feed cost to an appreciable extent, therefore, it would be assumed that older heifers consumed more feed per heifer. The longer the heifer stayed with the enterprise the more opportunity there would have been for heifers to be put on pasture. Age of heifers were, however, inversely related to days on pasture. As age increased, days on pasture decreased in proportion to length of time with the enterprise. Hence feed cost was also reduced in younger age groups.

As age of heifers increased manure credit also increased, showing a direct relationship. Older heifers deposited more manure while in the enterprise. There was a $6 variation in manure credit. More might have been received except for the inverse relationship between age and days on pasture.

No association was discovered between age of heifers and death loss. The majority of deaths accured in the first two weeks after birth. Leaving heifers in the enterprise longer did not effect the death rate.

Age of heifers was inversely related to land, buildings, and equipment invested per heifer. This relationship was an effect of size of herd to land, buildings, and equipment invested rather than that of age. There was no reason discovered why age of heifer would be inversely related to land, buildings, and equipment invested per heifer.

There was no direct relationship found between age of heifers and labor cost per heifer, but older heifers tended to require the most labor due to a longer feeding period.

There was a difference of $12 between the low age group and the 26.9 average age group. Between the 26.9 average age group and the group averaging 29.8 months there was $35 difference. The difference in feed cost was $25 and $30 respectively therefore with other factors remaining constant there would be about the same difference in total adjusted cost, but this was not the case. The group averaging 24.1 months of age had a higher than average death loss causing death loss cost to be higher,

interest on investment was high, labor cost was about average while the next group's labor cost was $2.50 below average, manure credit was $3 under average for the first group and $1 over for the second group. For these reasons the first group's series tended to push costs up while the second group's series tended to pull costs down thus narrowing the gap between these two groups.

## ALTERNATIVES AVAILABLE FOR OBTAINING DAIRY HEIFERS

In considering his replacement problem, a dairyman must decide what proportion of his farm resources to devote to the production of dairy heifers and what proportion to the production of milk. Hay can usually be fed to either cows or heifers. Most pasture is equally suited to grazing by cows or heifers. Labor can be utilized in taking care of either cows or heifers. In other words, the dairyman must decide how he can best use his feed, buildings space, labor, and other productive resources in view of the costs of these resources and the prices he receives for his products.

Location of the individual farm affects culling and replacement practices to some extent. In general, farms that are near markets where prices for milk are high would tend to raise fewer replacements and concentrate resources on milk production. Farms farther from markets where prices of milk are less favorable would tend to have a higher proportion of heifers to milking cows. But, aside from some differences that result from location with respect to market, the problem of deciding how to use productive resources must be solved within the framework of the individual farm situation.

Rational dairymen must consider all available alternative uses he has for the resources that are required to produce a dairy heifer. Most dairymen raise the feed and bedding, and use their own labor to raise

heifers, therefore, dairymen must consider available alternatives for home grown inputs required to produce a heifer. There are three alternatives that are available to most dairymen.

1. Dairy heifers may be raised by the dairymen
2. Replacements may be purchased, and
3. Dairy heifers may be contract raised by a "heifer specialist."

An economic evaluation of the use of production resources on a dairy farm with respect to the number of needed heifers that should be raised, purchased or contracted must take into account the advantages and disadvantages of each system.

Advantages from dairymen raising their own heifers are as follows:

(a) Many highly specialized milk producers have excellent quality, high producing cows and keep records on abilities of individual cows. These dairymen like to obtain replacements for their herds with calves from these high producing cows. This gives dairymen an idea of the production to expect from these heifers when they freshen.

(b) By using high quality sires it is possible to improve the average level of production of a herd, ceteris paribus. A bull may sire a high producing calf by one dam but may not by another dam because of nicking.[11] This advantage does not always hold true, but is generally accepted.

---

[11]Nicking refers to the mating of a bull and cow that produces a particularly good offspring.

(c) Dairymen will have no large cash outlay at one time. There will be small cash outlays encountered when raising heifers. Most resources are home grown and, therefore, are not paid for in cash.

(d) Any empty buildings on the farm that are not suited for cows may be converted to calf pens or sheds for raising heifers. Heifers require less elaborate housing and can, therefore, utilize many buildings that are not suited for other species of large farm animals.

(e) Surplus feed and labor, if available, can be used to produce heifers. There may be a higher return received by the farmer if home grown feed is fed to heifers on the farm to utilize excess labor that would not have another available alternative.

(f) Some dairymen obtain personal satisfaction from producing their own heifers and some have high pride in ownership. This may not be realized in dollars and cents, but if it satisfies a need it has utility.

(g) In some areas disease is a major problem. When heifers are brought in from other farms there is a chance they may transmit disease. When heifers are raised on one farm this chance is cut down. The commercial markets today are very stringent about diseased cattle and, therefore, all heifers are inspected and vaccinated for disease before entering the marketing system.

Some disadvantages that may arise from dairymen raising their own heifers are as follows:

(a) There are risks that must be bourne by the dairymen because heifers may die, become injured, fail to breed, show inferior dairy type,

and/or be low producers once they come into production. If any one of these situations developed, the heifers would not be suitable to enter the milk herd.

(b) For reasons stated in the above disadvantage and to permit selection and culling, dairymen must start more heifers than will be required to provide necessary replacements. Dairymen will need approximately three replacements for every 10 cows. (This will vary with intensity of milk production.) From 10 cows, a dairyman should receive nine calves or 90 percent calf crop. Half of these calves will be bulls, leaving four to five heifer calves to raise as potential replacements. The average death loss for heifer enterprises is 8.5 percent, leaving four heifers or less. Of the remaining four heifers, only one can be culled and still meet replacement needs with home grown heifers.

(c) If dairymen have excess facilities for cows they will not be able to add more cows because needed feed and labor would be used to raise heifers, unless they buy feed and hire labor, if they are to retain their heifer enterprise.

Dairymen who wish to raise their own heifers should select bulls of the highest quality to sire their calves. Only healthy normal calves from high quality dams should be raised.

Dairymen that purchase replacements have the advantages of the following:

(a) Where facilities permit, labor, feed, and housing needed for raising heifers can be used to maintain more cows in milk production. Some facilities are not suitable for cows, but are for heifers. These would, therefore, remain idle if heifers were purchased. Some feed of low quality can be fed to heifers but cows would drop in milk production if this type feed was fed to them.

(b) Dairymen may buy heifers and/or second or third calf cows. Heifers have a longer productive life after purchase than do second or third calf cows, but the older cows will produce heavier for the first lactation after purchase. If after one lactation the dairyman wishes to dispose of the replacement because of low production, bad disposition or other factors, older cows will have a higher salvage value than the first calf heifers.

(c) Dairymen would not have to wait two years for heifers to freshen and would not have factors of production invested in a heifer.

(d) Heifers can be selected with body type in mind and when possible progeny records of the heifer's parents can be checked. By these methods dairymen could up grade their herds. These methods are not exact methods of up grading herds but they are better and faster than selecting the best heifers from low producing cows that are already in the herd.

Purchasing replacements has disadvantages that should be realized by dairymen, they are as follows:

(a) Dairymen cull cows from the milking herd because of the cow's deficiencies. These cows go to market to be sold for beef and some for dairy purposes. Those sold for beef are of poor quality or poor physical conditions, but those sold for dairy purposes may appear to be high quality milking prospects when in reality they are not.

Dairymen select the best prospects from their heifer enterprises to enter their own milking herds. Heifers that are of lesser quality and expected potential are sold on the market.

Heifer specialists and dairymen that dispose of all their dairy animals will be putting the best as well as the inferior cows and heifers on the market.

(b) Prices paid for dairy heifers fluctuate with the price of beef cattle causing some degree of uncertainty and r8sk when buying heifers at the time they are needed. When beef prices fluctuate, dairymen have an opportunity to speculate on price change and plan for these changes to help offset the risk and uncertainty of buying replacements.

(c) Purchasing replacements requires a large cash outlay. Dairymen receive the income from dairying over 12 months and therefore would have to save or borrow to pay a large cash bill.

(d) Replacements need time to adjust to new environment. Some dairymen prefer to have heifers on their farms one month prior to calving time, thus giving them time to stable replacements and allow adjustment so replacements will be at ease when they do freshen.

Dairymen who wish to purchase heifers should buy only from reliable dealers or markets and should look for heifers with parential performance records of high production. High quality dairy characteristics should also be a measure of quality of replacements. When possible, replacements should be bought at disposal sales from high test herds or from heifer specialists that sell high quality heifers along with inferior ones.

Contracting heifers raised has advantages and disadvantages also. The advantages of this system are as follows:

(a) Dairymen that believe their heifers are of high quality and will add to the average production of the herd can contract their heifers raised. By contracting them raised, dairymen can operate a breeding program that is geared to upgrade their herd. By using high quality sizes, it is possible to improve the average level of production of a herd, ceteris paribus.

(b) Cost to dairymen may be spread out over two years so there is no large cash cost to be paid. This is in keeping with the income supply from a dairy enterprise. The total amount must still be paid, but it will not require saving ahead or borrowing to finance the replacement.

(c) Feed and labor required to raise heifers will be available for adding extra cows if size of plant will allow. If this is not an economical advantage, there will be idle labor and surplus feed available.

(d) Heifer specialists would be able to be informed and adapt new improved practices that would make his unit more efficient and add to the quality of service rendered. He would also be in a position to spend all needed labor on the heifers and be more efficient in doing so than dairymen because dairymen are usually producing heifers with time that is available between other operations.

(e) Dairymen can share some risks with heifer specialists. This is done by the dairyman being free from feed costs that might rise, labor shortages, higher wages, and/or unexpected sickness or accidents of heifers.

(f) Pride of ownership can be had by dairymen when they contract heifers because they receive their own heifers back and never relinquish title of them.

Disadvantages from contracting heifers raised by a heifer specialist are as follows:

(a) Instead of using home grown feed, there is a cash outlay that must be paid for services rendered. If there are no alternatives for excess resources, they will lie idle.

(b) More heifers would need to be started than are necessary for replacements because of death loss, accident, poor quality, and to allow selection.

(c) There is a possibility of the heifer specialist not providing high quality services. In this case the dairymen would receive inferior

produced heifers that may not add to the quality of the herd.

(d) If the contract is terminated, the dairyman must find other means of raising the heifers he has or sell them before they are ready to freshen. This may cause a loss of both time and money to the dairymen.

Dairymen who wish to contract heifers raised should select a dependable heifer specialist to raise the heifers and a complete and workable written contract should be drawn up. Agreements of this contract should be followed by both parties. Dairymen should be just as selective in their breeding program under this system as they would be if they were to raise their own heifers.

Most dairy units are operating at less than capacity. Only about 10 percent of the farms fully utilize all available space with cows (6). Many farms have cow stanchions that are adle or filled with young stock. Profits per cow, increase as size of herd increases (8).

These factors indicate that it is profitable and generally possible to increase size of milking herd. In order to do this, extra feed and labor are needed. By eliminating the heifer enterprise from the farm more feed and labor would be available. To determine the productive value, such resources would have in the production of milk, the cost of these factors were equated to the percent of a producing cow which they would maintain in production. The total cost of producing a heifer divided by the total cost of producing milk equals the exchange value of all factors or production from raising heifers to milk production. It cost $252 to

produce a dairy heifer from birth to freshening in northern Utah in 1961. From a study reported by the Utah Agricultural Experiment Station (8) the total cost of producing milk in 1956 was found to be $404.50 per cow. This figure was adjusted to 1961 prices by use of a price index. The 1956 prices were reduced to the base period price when the percentage change in the index between the base period and 1961 was calculated. That change was added to 100 (the base index) then that sum was multiplied by the corrected price (1956 price reduced to the base period). After the price index adjustment the cost of producing milk in 1961 was $417.64 per cow. The ratio of exchange[12] for factors of production from raising dairy heifers to producing milk was 60.33 percent. This was found by dividing the total cost of producing milk into the total cost of raising dairy heifers.

Total receipts from milk for 1956 were $439.16 per cow and when multiplied by the appropriate price index receipts, based on 1961 prices, were $442.67 per cow. The difference between receipts and expenditures in the production of milk was $25.03. The difference of $25.03 was multiplied by the ratio of exchange to arrive at the amount of income that could be had if the resources for raising a dairy heifer had been used to produce milk. The amount of income added by these resources was $15.10 and by adding this with the cost of raising a heifer the break

---

[12]The ratio of exchange refers to the percent of cows that can be maintained in production by use of resources required to produce a heifer.

even point was found. The break even point in this study was $267.10. This figure was used to determine whether to raise or procure replacements. If the cost of procuring heifers was less than $267.10, ceteris paribus, it would have been cheaper to purchace replacements, but any time the cost of procuring exceeded $267.10, it would have been cheaper to raise heifers, table 14.

Table 14. How to figure break even point

| Items | Percent | Dollars |
|---|---|---|
| Total cost of raising dairy heifer | | $252.00 |
| Total cost of producing milk per cow for one year | | 417.64 |
| Ratio of exchange | 60.33 | |
| Total receipts from milk per cow for one year | | 442.67 |
| Net income from milk | | 25.03 |
| 60.33 percent of net income per cow for one year | | 15.10 |
| Adjusted income per cow for one year | | 15.10 |
| Cost of raising heifer | | 252.00 |
| Break even point | | $267.10 |

The break even point would need adjustment according to availability of resources. As it was presented, it gave an average of all costs for enterprises that have been studied. A dairyman that could add to the size of his milking herd by only the purchase price of extra cows would have a higher break even point because existing facility costs could be divided among more cows thus lowering the costs in proportion to the receipts. Dairymen that would need to add additional facilities in order to expand the dairy herd would have a higher break even point because the added cost would have to be divided over the herd and each cows cost of production would increase at an increasing rate to her returns. Dairies producing market milk would have to have a wider spread between costs and receipts. Dairies producing manufacturing milk and dairies with lower than average efficiency performance in milk production would tend to have a low break even point. Lower cost of producing milk and higher returns for products will result in a higher break even point.

Dairymen cannot leave or enter the dairy heifer enterprise at will because it is sometimes costly to convert a portion of the milking enterprise into a heifer enterprise just because the price of heifers rose that month. Once a dairyman decides to raise, buy, or contract heifers he should follow that practice until he is satisfied he can change procedures and cut costs while holding constant or increasing quality of heifers.

After a dairyman calculated his break even point he could then observe the market and check with heifer specialists to see if he can

procure heifers for less than the break even point. If he found that heifers were selling higher than his break even point, but he could contract them raised for a little less than the break even point, he would expect this method to be the most economical. The cost of contracting heifers raised is not just the total payment. When partial payments are made interest must be charged against these payments as long as the money is not available for other uses. The initial value of a new born calf plus interest on that value for two years must also be added to the cost of contracting heifers raised. Dairymen contracting heifers raised should also place a value on non monetary returns that they feel they receive. If they receive satisfaction, timeliness of operation, or other factors that create utility, they must be weighted toward contracting. These non monetary values may tend to offset the interest and initial value of the new born calf when heifers are contract raised.

During the period of time when this study was conducted, the price of good to choice dairy heifers at the Smithfield Livestock Auction averaged $257.50 per head. The average price for small and common heifers during the same period of time was $190 per head. Depending on the quality of heifers a dairyman was presently raising, he could determine the price he would have to pay to replace these heifers with purchased heifers of the same quality.

Heifer specialists, in the area studied, were contracting heifers for different prices. Some were using a given charge per pound gain while

others were using a charge according to days fed to calculate the cost to the contractor. One such heifer specialist was contracting heifers for 23 cents per pound gain. He expected to put 1000 lbs. gain on the heifers from age 2 to 24 months. This cost the grower $230 plus interest on partial payments and production cost to the age of two months. Heifers fed by this heifer specialist received calf manna to the age of six months then were fed on alfalfa hay and protein and mineral block meal. Under this system heifers utilized no pasture.

Dairymen that were able to purchase heifers or contract heifers raised for less than the break even point were able to do so because of specialization on the part of the dairy heifer specialist. Through larger size, dairy heifer specialists were more efficient with factors of production. Their resources then yield a higher rate of return than they would in the production of milk. For that reason some dairymen were converting their inefficient milking enterprise into efficient heifer enterprises, thus being more profitable for both dairymen and the heifer specialist to use their resources in that manner.

Data used here can be adjusted by any dairyman to fit his particular situation.

## CONTRACTUAL AGREEMENT

Agriculture in Utah is becoming more and more specialized. Modern machinery, improved production practices, and increased competition from newer agricultural areas have gradually reduced the economic advantage of supplementary enterprise on the dairy farm. This situation makes possible increased efficiency through size. Some dairymen are not able to increase the size of their producing herd because of limiting factors of production, therefore they find they are in a position where they are operating inefficiently. Rather than operate an inefficient milking enterprise, they have the possibility of using their resources to raise dairy heifers. Raising heifers requires less modern machinery, barns and sheds. It does require that dairymen have factors of production that can be tied up for some time. For this reason an agreement between a feede and a grower pertaining to the raising of dairy heifers would be necessary. An agreement, or contract, insures future prices the grower will pay and the feeder will receive. A provision for partial payments can be used to help the feeder finance the enterprise. In dairying, forward contracts of this nature reduce uncertainty and the possible range of outcome because this industry is quite stable in both yields and prices.

There are three general classes of contracts: express, implied, and quasi or constructive. Express contracts are definite agreements arrived

at directly by word of mouth or writing. Implied contracts result where parties act in such a way as to create mutual obligations without actually entering into an express verbal or written agreement. Quasi contracts are not agreements between parties at all but are obligations created by law where justice demands that one party should compensate another for benefits received. Contracts should be in writing whenever they involve money or property of even moderate value and wherever there is some chance of future misunderstanding about terms of the contract. The express written agreement was chosen for the type to be used for a dairy heifer raising contract because of the following:

(a) Parties of an express written contract are likely to more fully realize their obligations and be able to settle more points of difference.

(b) When future controversies arise there is less question about what was actually agreed upon.

(c) A dairy heifer raising contract contains some detailed specifications which can be recorded in an express written agreement and therefore eliminating questionable memories.

(d) Express written agreements are valid under law.

(e) Heirs and assigns are protected through the use of express written agreements.

Experience coupled with a working knowledge of the elements of written contracts make a dairyman better able to handle his affairs

soundly and avoid trouble. When two or more parties wish to do business with each other they try to "come to terms" or reach a basis of understanding. In the case of heifer raising contracts the following should be agreed upon and specified in the contract:

1. Identification of contracting parties.

No contract can be enforced unless it is certain who is obligated to perform and who is entitled to benefit from the agreement. The name of each party should be written with sufficient accuracy to identify them. Including the address, county and state of the contracting parties is helpful for identification. The date the contract is entered into should be specified.

2. Duration of contract.

The contract can be written for as short or long a period as contracting parties desire. A contract that is written for a short period of time (under two years) will not provide either party with enough time to plan for alternatives if the contract is not renewed. On the other hand, a contract written for a long period of time (over two years) will not allow either party to change methods of procedure, if necessary.

3. Rights to terminate.

A contract should be binding to both parties unless through extenuating circumstances one or both parties wish to terminate the contract. If the contract is allowed to be terminated for any reason in a short period of time, then the purpose of the contract is defeated. If both

parties wish to terminate the contract then no specific amount of time need be set between announcement of termination and actual termination date.

Reasons for termination should be made very explicit to avoid disagreements. Some reasons the contract may be terminated are as follows:

(a) Death or incapacitation of the feeder.

(b) Management by the feeder that is not conducive to proper growth.

(c) Death loss occurred while in the care of the feeder that is in excess of a pre-set percent.

(d) Feeder goes out of business.

(e) Grower sells heifers.

If the contract is terminated for any of these reasons there should be an established monetary obligation set up to assure gratuity where it is due.

4. Inspection and culling rights.

To provide for herd improvement through selection there must be a provision to allow both the grower and the feeder to cull heifers that are not growing in a manner that is desired to produce high quality milking prospects. The grower can not inspect the feeders operation at his own leisure because he can become a determent to the heifer raising enterprise. There should be specific periods during the growth of a heifer when the grower can inspect them and, with the feeders approval, can remove them from the enterprise. By using a contract that has a final payment with

an incentive payment for optimum growth rate both the grower and the feeder will benefit from this culling practice.

5. Adding heifers to the contract.

The grower will have calves born all year round. He will not want to write a new contract for every group of two or three calves he wants to add to the contract. For that reason the contract must have a provision whereby the grower can add heifers with a minimum of effect. When the first contract is drawn up a description sheet of the heifers should also be drawn up. At that time all heifers should be accounted for on the description sheet. Any new additions necessary after that period can be made by describing the heifer and both the grower and the feeder initialing the description sheet.

6. Specific practices to be carried out.

The type of dairy operation the grower has and the area he is in will designate to some degree the type of practices that will be needed for his heifers. A commercial dairymen's herd that utilizes pasture will need heifers branded. Some heifers will need tattoos or only ear tags depending on the chance of cows becoming lost or a need for identification.

Heifers should be vaccinated for brucellosis and blackleg. If heifers are to be turned on pastures red water vaccine should be administered each spring. Veterinarians in the immediate area will be able to inform contracting parties of needed vaccinations and this can be included in the contract.

Heifers should be bred to a high quality dairy type bull of the same breed as the heifer. Some dairymen feel it is better to have first calf heifers calve out with small calves. Some dairymen even use beef type bulls to accomplish this purpose. There is information available for both pros and cons as to whether beef type bulls really do sire smaller calves when crossed to dairy cows than the dairy cows would normally have from dairy bulls. There is a good possibility that by artifically breeding heifers, bulls can be selected that tend to sire smaller calves at birth. Some young dairy bulls may be of high enough quality that a feeder can pasture breed heifers. Both grower and feeder should agree upon the bull to be used or the type of breeding practice.

The cost of all specific practices to be carried out should be assigned to one or the other parties. When a grower purchases a heifer all these practices are included in the purchase price and for this reason the feeder would be the logical party to pay these costs.

7. Payment arrangements.

There are many cash costs incurred when heifers are grown. These costs are hard to meet by a feeder unless he has idle cash, therefore a partial payment should be set up to help finance many cash costs. This payment can be as large or as small as desired. It should be larger in areas of high costs and lower in areas of low costs of production. Payments should be paid at set intervals. These intervals can range from one month to four months. Dairymen have an income that is fairly stable

over the years, therefore it is easier for them to pay more payments of smaller size.

The final payment should cover all of the total payments not covered by partial payments. There are five different criteria for figuring the total cost of producing dairy heifers that are in use today, they are as follows:

(a) The feeder may set a total price for which he will raise heifers. Under this type of pricing system, the feeder is free to choose the quantity and quality of feed to be used in the ration.

(b) The feeder may figure his cost according to present factor prices, then add a margin for management. This system does not encourage efficient use of factors of production.

(c) The feeder may feed heifers for a flat rate of so much per day per heifer. The feeder is free to choose the quantity and quality of feed under this system.

(d) The feeder may receive a set price per pound gained while heifers are under his care and management. This system allows the feeder to choose quantity and quality of feed to be used.

(e) The feeder may receive a set price per pound gained on an adjusted basis according to a USDA market report price of heifers for his particular area. By this method the cost to the grower is calculated at a given price per pound gain, then this value may be adjusted up or down depending on the difference between the total price, when figured

on a per pound gain, and the USDA price list. The adjustment in price paid to the feeder by the grower is figured from an agreed upon difference between the total price, when figured on a per pound gain, and the USDA quoted price causing a one cent change in the price charged per pound of gain. This method allows the feeder to choose the amount and ingredients of the ration.

8. Ownership of heifers.

Either party can hold title to heifers but if the feeder holds title to them he accepts all risks such as death, injury and poor conformation. All taxes and fees must be paid by the party holding title to heifers. Instead of shifting the risk of raising heifers it may be preferable to provide for the grower to hold title to the heifers and be liable for all losses not due to neglect on the part of the feeder. The grower is shifting some risk to the feeder because the feeder must be willing to feed for the incentive. If the grower holds title to heifers the risk is more evenly divided.

9. Repossession of heifers.

The grower should arrive at a set age at which he would like his heifers to freshen. The feeder should have heifers bred to freshen at the age specified. Holstein heifers, if grown at an optimum rate, should be ready to breed at 15 months or 750 pounds. If they are bred at that age they will calf at 24 months of age. With a normal growth rate heifers bred at that age will be mature enough by the time they calve to carry

on the functions of a cow (9). There should be a short period of adjustment to the environment in which the heifer will be milked, before the heifer freshens. One month should be allowed for adjustment, therefore heifers should be reclaimed by the grower at the age of 23 months or one month before freshening whichever is earlier.

If the grower was to purchase a heifer at the market he would have to haul him home or pay transportation, therefore the grower should provide transportation for heifers from the feeders establishment to his own.

10. Arbitration of difference.

If there arises some disagreement that was not forseen b y the contract and agreed upon then a means of settlement must be provided. If one person can be found that will be an arbitrator and is accepted by both parties then that would be all that is necessary but that usually is hard to find. Three arbitrators usually are the best number to settle disputes that arise under the contract; one chosen by each party and the two parties so chosen can select a third party. While arbitration is under way both parties should proceed deligently with the performance of the contract. This will not disrupt the contract in any way and after the dispute is settled the majority decision of the arbitrators should be presented to both parties in writing. The expense of the arbitrators should be divided equally between the parties.

11. Mutual agreements.

In case one or both parties die or are incapacitated to the point that it is impossible to fulfill the terms of the contract there should be arrangements for his heirs, executors, administrators are assigned to continue to fulfill the terms of the contract unless terminated by use of a termination clause. Fulfillment of the contract will enable the remaining party to adjust his methods of procedure by the time the contract expires.

12. Non partnership.

To protect both parties against each other it is necessary to declare the contract is neither a partnership nor does it give rise to a partnership. In this way neither party shall have authority to obligate the other without written consent.

# GENERAL CONTRACT FOR RAISING DAIRY HEIFERS

## Parties

This indenture is made this _____ day of _____, 19_____ between _____, the feeder, county of _____ state of _____, and _____, the grower, county of _____, state of _____.

## Purpose

The purpose of this contract is to supply the grower with continuing services of a feeder that will provide high quality dairy heifers and also furnish the feeder a continuing supply of heifers to provide employment, and through his initiative allow him to receive an incentive payment for high quality services.

## Duration of Contract

The duration of this contract shall be for 23 months from the _____ day of _____, 19_____ to the _____ day of _____, 19_____ and shall automatically renew from year to year unless otherwise terminated in accordance with the provisions herein or amended as mutually agreed upon.

The feeder hereby agrees to accept possession of the heifer(s) listed on the Description Sheet attached hereto and made a part hereof at his establishment. The grower will deliver the heifer(s) to the feeder or pay for transportation of the heifer(s).

The grower will hold title for the heifer(s). The person holding title to the heifer(s) must pay taxes and fees assessed on the heifer(s). He must also be liable for injury or death of the heifer(s), except those due to negligence on the part of the feeder. The feeder will be liable for any and all damages inflected to persons or property by heifers in his care.

Termination

This contract may be terminated at any time by mutual agreement in writing, or by at least three months written notice from either party prior to the annual renewal date.

Termination by the grower may be permitted for the following reasons:

1. Neglect on the part of the feeder that causes the group of heifers to deviate from the expected gain more than .5 of a pound per day from optimum growth for that age.

2. Improper feeding on the part of the feeder that causes the group of heifers to deviate from the expected gain more than .5 of a pound per day from optimum growth for that age.

3. Death loss of heifers exceeded 10 percent.

4. Grower sells heifer(s) and the purchaser does not want to remain bound to the contract.

5. If the feeder dies or is incapacitated to the extent that he is unable to fulfill the contract the grower may terminate the contract rather than allowing the feeder's heirs, executors, administrators or assigned to fulfill the contract.

If the contract is terminated according to provisions 1, 2, or 3, no gratuity will be due the feeder.

If the contract is terminated according to provision 4, the grower must pay the feeder the amount that would have been owed if the heifer had remained with the feeder until the duration of the contract was completed.

If the contract is terminated according to provision 5, there will be no gratuity due either party.

Termination by the feeder may be permitted because:

1. Feeder goes out of business.

2. Death, injury, and/or sickness that prohibits the feeder from performing as agreed upon.

3. Grower neglects paying partial payments.

If the contract is terminated according to provision 1, the feeder must pay back all partial payments thus far received. If the contract is terminated according to provision 2 the feeder will not be required to pay back partial payments, but he will not receive additional payments

for services already rendered. If the contract is terminated according to provision 3, the grower will pay all partial payments due the feeder plus five percent of market price for each month feeder has cared for heifers.

## Inspection and Culling Rights

When the heifer(s) reaches nine months of age, the grower has the right to inspect and cull heifers that he and the feeder feel are inferior milking prospects. Heifers that are culled will be sold and the feeder will be paid for his investment in the culled heifers at the time the remaining heifers leave the care of the feeder. The total payment will be calculated by multiplying 9/23 or 31 percent by the total payments per heifer received by the feeder for the remaining heifers. The final payment will be the difference between the total payment and partial payments already received.

## Additional Heifers

Additional heifers may be added to this contract. All conditions of the contract shall apply to the addition. Both parties shall initial the entries and exits on the Description Sheet of all original and additional heifers.

## Other Conditions

Heifers will be vaccinated for red water disease each spring. Ten cc of Clostridun hemolyticum bacterin should be given. Heifers will be vaccinated at age six months for brucellosis, and blackleg. Heifers will be branded and dehorned at or before three months of age. These operations will be done by the feeder and he will be responsible for all costs involved.

The heifer(s) will be artifically bred to high quality dairy type bulls of the same breed as the heifer. This service will be a cost to the feeder.

## Partial Payment

The grower in return for the services, fees, and facilities provided by the feeder does hereby agree to make partial payment for each heifer described herein or subsequently added to this contract in the amount of $___.20___ per day, from the date such heifer is turned over to the feeder in accordance with this contract. All sums involved for partial payment services, fees, and facilities are due for the preceeding __3__ months on January 1, April 1, July 1, and October 1.

## Final Payment

At the time the grower takes the heifer(s) from the feeder, he shall pay to the feeder an additional sum representing the difference between

actual cumulative partial payment and total payment due the feeder. The total payment will be computed as follows:

The feeder and the grower will agree on the market that will be considered base price. The market price will be arrived at by averaging the weekly sales price of good to choice heifers over the complete period of time beginning when the feeder receives the heifer until the grower removes her from the care of the feeder. If the market is not in the immediate are, a correction factor will be added to the market price. The market and correction factor will be specified.

Heifers will be weighed when the feeder receives them. The grower will provide accurate weights of each heifer's dam. Each heifer will be weighed at nine months and again when the grower removes her from the feeder's care. From these weights, the final payment will be figured. Weights of all dams of heifers in question will be averaged and compared to an average weight for that breed. The deviation of these dams from normal will be recorded, table 15. For every pound the group of dams average weight varies from normal weight, tables 17 and 18 will be adjusted in the same direction by 25 and 50 percent respectively on the end weight expected for heifers. The average rate of gain which heifers make up to nine months will be evaluated according to table 17. The average rate of gain which heifers

Table 15. Average weight of holstein dairy cows by age[a]

| Age of cow | Total body weight |
|---|---|
| months | lbs. |
| 36 | 1292 |
| 42 | 1342 |
| 48 | 1382 |
| 54 | 1407 |
| 60 | 1437 |
| 66 | 1451 |
| 72 | 1482 |
| 78 | 1480 |
| 84 | 1492 |

[a]Based on comparative measurements of Holstein, Ayrshire, Guernsey and Jersey Females from birth to seven years. H. P. Davis and I. L. Hathaway Research Bulletin 179, March 1956. Lincoln, Nebr.

make up to 23 months will be evaluated according to table 18. The two percentages arrived at from the nine and 23 month evaluation will then be averaged. The average percentage arrived at will be multiplied by the market price to arrive at the total cost to the grower. This will not be less than 90 percent of the market price. At 90 percent it is expected that the feeder will be guaranteed enough to cover cash costs plus.

Table 16. Average weight and per pound daily gain for Holstein Heifers, by age[a]

| Age | Average weight | Gain | Pounds per day gain |
|---|---|---|---|
| months | lbs. | lbs. | lbs. |
| Birth | 88 | | |
| 3 | 215 | 127 | 1.41 |
| 6 | 399 | 184 | 2.04 |
| 9 | 568 | 169 | 1.88 |
| 12 | 704 | 136 | 1.51 |
| 18 | 924 | 220 | 1.22 |
| 24 | 1149 | 225 | 1.25 |
| 30 | 1239 | 90 | .50 |
| Average gain for 9 months | 480 lbs. | | 1.78 pound per day gain |
| Average gain for 24 months | 1061 lbs. | | 1.47 pound per day gain |

[a]Based on Comparative Measurements of Holstein, Ayrshire, Guernsey and Jersey Females from birth to seven years. H. P. Davis and I. L. Hathaway. Research Bulletin 179, March 1956. Lincoln, Nebraska.

Table 17. Evaluation of heifers gains up to nine months calculated from table 16

| Percent of market value | Pounds per day gained | Heifers final weight at 9 months |
|---|---|---|
| 110 | 1.75 to 1.8 | 560 - 574 |
| 105 | ± .1 | (534-560) & (574-601) |
| 100 | ± .2 | (506-534) & (601-628) |
| 95 | ± .3 | (480-506) & (628-655) |
| 90 | ± .4 | (452-480) & (655-682) |

Table 18. Evaluation of heifer's gains up to 23 months, calculated from table 16

| Percent of market value | Pounds per day gained | Heifers final weight at 23 months |
|---|---|---|
| 110 | 1.45 to 1.5 | 1088 - 1123 |
| 105 | ± .1 | (1020-1088) & (1123-1192) |
| 100 | ± .2 | (950-1020) & (1102-1261) |
| 95 | ± .3 | (882-950) & (1261-1330) |
| 90 | ± .4 | (812-882) & (1330-1399) |

Repossession

The feeder of the heifers listed on the description sheet does hereby agree to relinquish care of the heifer(s) to the grower at the age of 23 months, or one month before freshening, whichever is earlier. The grower will provide transportation for heifers from the feeders establishment to his own.

Mutual Agreement

All covenants and agreements herein contained shall extend to and be obligatory upon the heirs, executors, administrators and assigns of the respective parties.

Arbitration

Any disputes arising under terms of this contract shall be referred by the parties hereto to three arbitrators, one chosen by each party and the two so chosen shall select a third. The majority decision of the arbitrators shall be presented to both parties in writing. Arbitrators shall have power to make an award or determination on any issue which arises out of the contract and it shall be binding on both parties. The expense of the arbitrators shall be divided equally between the parties. Pending final decision of a dispute hereunder, the parties hereto shall proceed deligently with the performance of the contract.

Nonpartnership

This contract shall not be deemed to give rise to a partnership relation, and neither party shall have authority to obligate the others without written consent.

Witness the hand and seal of the undersigned this _____ day of _____, 19_____.

_____Witness _____ Feeder

_____Witness

_____Witness _____ Grower

_____Witness

HEIFER DESCRIPTION SHEET

| Entry initials | | Date of entry | Weight on date of entry | Age on date of entry | Bred | Ear tag number | Tattoo number | Registration number | Date of exit | Weight on date of exit | Exit initials | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grower | Feeder | | | | | | | | | | Grower | Feeder |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

## JUSTIFICATION OF CONTRACT PROVISIONS

The proposed contract will provide sound and workable agreements between grower and feeder. Twenty-three months are required for both parties to obtain benefits derived by this method of heifer procurement. Twenty-three months will provide the feeder with enough time to grow one group of heifers out for a grower to show the quality of service he can render and also to provide both parties with security for a long enough period of time to allow adjustments in variable resources. Feeders may not have enough capital to purchase each calf and pay all costs for raising the heifers. This contract provides for the grower to hold title to the heifers, cutting the cost and risks involved to the feeder that would come with ownership. It also provides for partial payments to alleviate cash costs to the feeder.

To allow for extenuating circumstances this contract permits termination but only under conditions that are extremely nonconducive to proper growth. Any group deviations greater than .5 of a pound per day gain from optimum growth for that age of heifers is considered extreme and would be grounds for termination. If deviations of .5 of a pound per day gain from optimum growth was found it would have the effect of producing heifers that were either very small and poor or very large and fat. Either extreme would not be in the best interest of the grower and

with the method of figuring the final payment would not be in the best interest of the feeder.

The contract can be terminated by the grower if death loss exceeds 10 percent. Average death loss for this study was found to be 8.5 percent. Death losses of 8.5 percent raises the growers cost per heifer. When death loss exceeds 10 percent the cost per heifer is enlarged and number of heifers for selection is decreased.

To protect the feeder from going out of business because heifers are unexpectedly withdrawn from his care, in the case of a grower selling heifers, the contract provides for the grower to buy the remaining portion of the contract. This will provide security for the feeder and discourage the grower from following this course of action.

If the feeder dies or for other reasons is not able to provide services agreed upon in the contract, the grower may terminate the contract if he feels the person(s) designated to carry on the contract are not qualified or in any way unfit for the duties assigned. Because the feeder has provided services agreed upon up to this time the grower will receive no refund on partial payments and the feeder will receive no final payment because the services were severed before the contract expired.

The feeder may terminate the contract if he goes out of business, death, injury, and/or sickness that prohibits the feeder from performing services agreed upon. This should not be used as a loop hole for feeders to break this contract and therefore if the feeder terminates the contract

due to going out of business he must forfeit all partial payments thus far received. This should tend to discourage feeders from droping out of business at their leisure.

The grower would contract all his heifer calves raised. When heifers reach the age of nine months the grower could, with the feeders consent, cull any heifers that are inferior, or are not responding as desired to the feeding program. By culling inferior heifers the grower could cut costs of production and would have the higher quality heifers to put in his herd. This procedure would benefit the feeder also because he is paid a premium for heifers that gain at an optimum growth rate. The inferior heifers would pull the average away from optimum causing the feeder not to receive the premium. Heifers that are culled are sold and the feeder will be paid for his services up to that period at the same time he received final payment on remaining heifers. Total payment for cull heifers is calculated in a manner that will discourage growers from culling heifers because they have more than they need or they are trying to get cheap feeding on heifers that they expect to sell for beef anyway.

Growers will have heifers born all year round and for this reason this contract provides for addition of new heifers. Dairymen do not want to draw up a new contract for each group of heifers and if they are satisfied with this contract they can add heifers to it with little effort. It requires description of heifers and both parties' initials to make additions.

Special practices that are outlined in the contract are applicable to most areas of Utah. All heifers need black leg and brucellosis vaccine but in some cases red water is not administered. If the three vaccines were administered it would relieve any chance of the three diseases. Heifers have less ill effects if dehorning and branding are done by or before three months of age. In Utah pasture is utilized by both heifers and cows, for this reason branding heifers would be most practical. In purebred herds, tattooing and ear tagging may be preferred.

When the feeder must pay for these operations he will tend to be more careful and do a good job the first time so that he will not have to handle stock again to correct improper work.

Heifers are to be bred artificially to high quality bulls because a cow has only four to six calves during her productive life and half of these are bulls so it requires obtaining every potential replacement possible to fill needs of dairymen for replacements. If size of the first calf is important dairymen can select bulls that tend to sire smaller calves at birth.

All cost involved with specific practices mentioned above are to be paid by the feeder. If the grower was to purchase heifers they would be branded, dehorned, vaccinated, and bred for the one price paid. These practices are a cost of raising heifers and for this reason should be bourne by the feeder.

The contract specifies 20 cents a day be paid to the feeder by the grower for services rendered. These payments are to be paid every three months. This payment will amount to 18 dollars per heifer every three months. At the end of two years the grower will have paid $146 to the feeder. This amount will be sufficient in most areas of Utah to cover cash costs, plus. It is also large enough to decrease the final payment due the feeder to about 2/5 of the total payment, yet small enough to be paid by the grower without much prior preparation. Three month intervals between payments is advocated because more payments would be bothersome and fewer payments would increase size of each payment.

Previously used methods of calculating the final payment have had disadvantages that may cause the feeder to produce heifers that were not of superior quality. For this reason a new method has been arrived at to try to eliminate all feeders and growers that are trying to make an "easy buck" and encourage dairymen that want a contract that will help channel the feeder's actions in a way that will provide the grower with superior type heifers to enter the milking herd. With this method of calculating total payment the feeder receives an incentive payment for producing the type of heifer that will do the best job in the milking parlor. The total payment should be tied to the purchase price of heifers in the market because purchasing heifers is an alternative to the grower.

Tying total payment to market price insures cost of contracting heifers raised will never become much higher than the purchase price or that the feeder will receive much less than purchase price. This cuts risks and uncertainties to both parties. If the market chosen is not in the near vicinity a correction factor for hauling and expense of purchasing a heifer at that market will be added to market price. The grower must realize that that would be an added cost and therefore should be included in market price. Calculating an average of market prices during the period the heifer was in the feeder's care would tend to balance out high and low prices.

Heifers are weighed three times while the feeder has them. They are weighed when they arrive at the feeder's establishment and again at nine months and then just prior to being removed from the feeder's establishment. The purpose of weighing heifers is to determine gain from new born to nine months and from nine months to 23 months. The first nine months of growth on a heifer is a very important period. At this time the bone structure is developing rapidly. A heifer can be stunted more in this period than the later months of feeding, therefore as much weight is given gains up to nine months as is given gains from nine months to 23. This will give a feeder an incentive to develop the heifers at optimum during this early age.

The incentive plan set forth in the contract provides for a 10 percent profit over market price if heifers are growing at optimum during

both weight checks. This would be about $25 incentive payment for doing an exceptional job of raising the heifers. On the other hand, if heifers were not growing at optimum the feeder could expect to be penalized as much as $25 below market price. Culling inferior heifers at nine months would cause less deviation from optimum growth rate in the remaining heifers. The feeder will be guaranteed 90 percent of market price to insure he does not loose money on heifers that are of inferior quality at their best and will not develop as normal heifers would. To adjust for parential influence on size of heifers, each heifer must be accompanied by the dams age and weight. This information can be compared to average cows for that age and any deviation from normal can be accounted for in the heifers expected weight. This procedure will allow heifers to grow to different sizes at a given age and if these sizes are optimum the feeder will receive the incentive payment.

When the heifers reach 23 months of age or one month before freshening, whichever is earlier, the grower will regain possession of the heifers and transport them to his establishment at his cost. At 23 months heifers that are grown at the prescribed rates will be mature enough to become cows. By breeding heifers to calf at 23 months the grower will be able to have cows with a longer productive life than would be the case if heifers were bred to calf later in life. When a cow is only with the herd for four to six years a dairyman must get all the production possible during this time and any lengthening of this time will add to production.

If either party dies or is physically unable to provide services required by the contract their heirs, executors, administrators and/or assigns must fulfill the contract unless it is terminated because of the above reasons. This provides continuing service that is needed by both parties. The grower has the right to sell the heifers but the contract will be binding on the buyer of the heifers. If the grower or the buyer wants to buy the contract out then they can pay the feeder the amount he would have received if the contract had not been terminated. This gives the feeder security and eliminates some uncertainty that would otherwise be in effect.

All situations can not be foreseen and there may be disputes over the terms of the contract, in this case an arbitrating committee is set up to handle these disputes. Three arbitrators are much easier to agree upon than one, therefore there will be no attempt to find one to do the arbitrating.

To protect both parties from obligations made upon him by the other the contract includes a clause that declares this contract does not give rise to a partnership.

# SUMMARY

1. An economic study was made of 67 dairy heifer enterprises in Cache, Box Elder, and Weber Counties, Utah. Data were obtained from producers by use of survey techniques and pertained to the 1961 production year.

2. Size of dairy heifer enterprises ranged from 9 to 100 heifers. The average number of heifers in the groups studied was 11.5 heifers. Data were analyzed on a per heifer basis.

3. Average total costs for producing a dairy heifer was $253.56. On a percentage basis, the costs were accounted for as follows: feed cost, 69.98 percent; labor cost 13.21 percent; overhead cost, 10.80 percent; and material cost, 6.01 percent, table 1.

4. There was a direct association between feed costs per heifer and total adjusted cost per heifer. Feed cost increased from the low group average of $114 per heifer to the high group of $263 per heifer. The average for all groups was $177 per heifer for feed, table 7.

5. A direct relationship existed between labor cost per heifer and total adjusted cost per heifer. Labor cost increased from $17 for the low group to $71 for the high cost group, while total adjusted cost ranged from $215 to $334. The average labor cost for all enterprises was $33.50 per heifer, table 8.

6. There were no direct associations between land, buildings, and equipment invested and any other factor. The average investment per heifer in land, building and equipment of all enterprises was $70 with a range from a low group of $36 to a high of $172 per heifer, table 9.

7. Associated inversely with days on pasture was total adjusted cost per heifer. The group with no days on pasture had the highest total adjusted cost of $335 per heifer. The high group with an average of 361 days on pasture had a total adjusted cost of $218 per heifer. The average days on pasture was 247 days. Pasture was a cost reducing factor in the production of heifers, table 10.

8. As heifers per enterprise increased there was a tendency for total adjusted cost to decrease. An inverse association was found between heifers per enterprise and labor cost per heifer. The group containing 5.4 heifers per enterprise had the highest labor cost of $62. This was twice as great as the next larger group of 10.6 heifers per enterprise with a labor cost of $31 per heifer, table 11.

9. Associated directly with death loss was total adjusted cost per heifer. The group with no death loss had a total adjusted cost of $237 per heifer. The high group with a death loss of 21 percent or more had a total adjusted cost of $306 per heifer, table 12.

10. There was a direct relationship between age of heifers and total adjusted cost per heifer. The low group of 24.1 months of age had a total adjusted cost of $232 per heifer while the high age group had a

total adjusted cost of $279 per heifer. The average for all enterprises was 26 months of age, table 13.

11. There were three alternatives available to dairymen. These were: raising their own heifers, purchasing heifers in the market, or contracting their own heifers raised. To determine which alternative to choose, a break even point was calculated. The break even point was a point of indifference to dairymen. The break even point was calculated to be $267.10, table 14.

12. Dairymen that raised their own heifers had an average total adjusted cost of $252 per heifer.

13. Dairymen that purchased heifers during that period of time had an average total cost of $257.50 per heifer for good to choice heifers and $190 per heifer for small and common heifers.

14. Heifer specialists were contracting heifers for 23 cents per pound gain during that period and expected 1000 pounds gain from age two months to 24 months. The cost to the contractor was $230 plus interest on partial payments and production costs up to two months of age.

15. A written contract was developed to help protect rights and insure services of both grower and feeder. This contract included any and all clauses that would eliminate misunderstanding of the obligations of both feeder and grower. Included in the contract was many new innovations to dairy heifer contraction. Culling heifers at nine months of age and the method of determining total cost to the grower were the main

ones. Culling heifers allowed the grower to eliminate inferior heifers from the herd and by so doing increased the opportunity for the feeder to receive the incentive payment provided for in the contract. The total payment was calculated in a manner that would channel the feeders management practices so as to produce heifers to their optimum, dairy potential. Every effort was made to eliminate improper operations on the part of either party by penalizing the party that inconvenienced the other party.

# CONCLUSIONS

The most successful enterprises were those larger than average in size. This study was not expanded on the upper limits of size far enough to determine where, if existant, larger size causes inefficiency. Since maximum size was not reached, increasing the number of heifers per enterprise seemed to be a means of reducing costs.

Dairy heifer specialists have an advantage in raising heifers because they can devote all their facilities and feed to heifers. They can increase the size of their operations and thus benefit by size economy. Dairy heifer specialists can produce heifers for less in most instances than can milk producers. Dairymen with a milking enterprise have resources tied up that cannot be used for heifers thus limiting the size of the heifer enterprise and decreased size is accompanied by higher costs.

Lower feed cost resulted in lower total adjusted cost; lower feed costs often resulted from use of pasture and by eliminating waste through careful feeding practices. Since number of days heifers spent on pasture was a significant factor in cutting feed cost, it was concluded that the type of pasture utilized by heifers was somewhat different from other feeds and that pasture was given a lower dollar value than most feeds. Lower dollar values were placed on pasture because of smaller harvesting

cost expenses due to heifers harvesting their own feed supply. Since feeding programs and pasture management were factors which a producer could control to a great extent, practices he used determined to a large degree his success in production.

Labor cost provided an opportunity for reducing total adjusted cost. Labor cost per heifer was cut by increasing the number of heifers per enterprise and utilization of pasture. At no point did labor cost cease to decrease as size of enterprise increased. Dairymen that adopted labor saving techniques and utilized building and equipment that were a substitute for labor greatly reduced labor cost. Labor is one important input that can be controlled to a large extent. Dairymen should realize this fact and adjust accordingly.

Dairymen have different costs of producing heifers therefore all will not choose the same alternative method for obtaining heifers. The desirability of an alternative depends on the existing conditions. Dairymen with unused factors of production would be able to expand their heifer enterprises and decrease the cost of production. Dairymen that are selling manufacturing milk or are below average in efficiency in the production of a market milk would not have as high a return on heifers after they freshen and therefore their break even point would be lower. The break even point must be calculated with all existing factors considered thus it may cause some dairymen to have a break even cost that is below the cost of producing a heifer. In this case the dairymen

should convert his resources to the production of dairy heifers and discontinue producing milk.

Efficient dairymen that are producing grade A milk may have a high break even point because of the net returns to the enterprise. Most of these dairy units are operating under capacity. By increasing size while maintaining efficiency they can increase net returns. Dairymen in this position should convert their resources into producing milk and discontinue raising heifers unless for some reason heifers can utilize a resource that milk cows cannot on a particular farm.

Some dairymen may be in a position to do both efficiently because they are operating a large scale unit and have resources in excess of capacity milk production. If the break even point for this type unit is lower than the cost to obtain heifers elsewhere, all advantages and disadvantages evaluated, then the dairymen should raise his own heifers.

If dairymen can prove that heifers from their own herd return higher profits or for other reasons are more advantageous than purchased heifers the dairyman should consider contracting heifers raised. They may realize they can benefit the quality of their milking herds by bringing in heifers of higher quality and breeding than the type produced by raising heifers from cows of their own herds. They should determine the extra value contributed by one method over the other and add this to the break even point.

Alternatives and the break even point should be calculated by each dairyman. From those actual calculations the dairyman should rationally determine which method would be the most economical for him.

The contract formulated in this thesis should be used by dairymen contracting heifers to assure him of the type of service from the feeder that will provide him with heifers that will yield higher returns. The contract will also benefit the feeder and allow him to make more returns from his factors of production than he would by raising purchased calves and selling them as springing heifers. Dairymen using this contract can look for more returns on the heifer investment than might be had through other contracts.

## LITERATURE CITED

(1) Brundage A. L., and W. J. Sweetman. Raising dairy herd replacements in Alaska. Alaska Agr. Exp. Sta. Extension Circular 10. June 1958.

(2) Carncross, J. W. Costs $338 to raise dairy heifer to 28 months of age. New Jersey Agr. Exp. Sta. 41:6-8. 1954.

(3) Carpenter, S. E., and B. H. Stone. Dairy herd replacement costs. Texas Agr. Exp. Misc. Publication 307:1-7. 1958.

(4) Conrad, H. R., L. O. Gilmore, and J. W. Hibbs. Feed costs for raising dairy herd replacements on high roughage systems. Ohio Exp. Res. Circular 67:1-4. 1959.

(5) Frick, G. E., and W. F. Henry. Should dairymen raise replacements. New Hampshire Agr. Exp. Progress Report 3:3-4. October 1956.

(6) Frick, G. E., and W. F. Henry. Production Efficiency on New England dairy farms, V. Adjustments in obtaining dairy herd replacements. New Hampshire Agr. Exp. Sta. Bulletin 430. 1956.

(7) McCormick, J. A. Raising holstein dairy replacements in Nevada. Nevada Agr. Exp. Bulletin 195:1-12. 1957.

(8) Morrison, Earnest M. Cost and returns in grade A and manufacturing milk production selected areas of Utah, 1956. Utah State University Exp. Sta. Bulletin 401. 1957.

(9) U.S.D.A. Technical Bulletin No. 1099. Beltsville growth standard for holstein. Washington, D.C., Government Printing Office, 1954.

(10) U.S.D.A. Agricultural Research Service. Sample contracts for raising dairy herd replacements. Cooperative Ext. Serv., University of New Hampshire and Farm Economics Research Division Extension Circular 243. December 1957.

(11) Utah State University. Estimated cash receipts received by Utah farmers from sale of agricultural products and from government payments by counties, Utah Resources Series 3. Utah State University Agr. Exp. Sta., Logan, Utah. 1959.

(12) Western Extension Farm Management Committee. Livestock feeding and marketing contracts for farmers and ranchers. Agr. Ext. Serv. of New Mexico, Colorado, Wyoming, Montana, Idaho, Washington, Oregon, California, Nevada, Utah, and Arizona in cooperation with the Farm Foundation and the United States Department of Agriculture. (Mimeographed) June 1960.

# APPENDIX

Record Number _____

DAIRY HEIFER REPLACEMENT SURVEY
Utah State University
Utah Agricultural Experiment Station

Operator _____ Date _____

Town _____ County _____ P.O. _____

Breed _____ Dairy Experience _____

Crop and Livestock Inventory

| Crop Production | Acres | Livestock Production | Herd |
|---|---|---|---|
| Alfalfa | | Dairy cows | |
| | | Dairy heifers | |
| | | Other dairy | |
| Grains | | Beef cattle | |
| | | Beef fattening | |
| | | Sheep | |
| | | Lamb fattening | |
| Contract Crops | | Hogs | |
| | | Hens | |
| | | Pullets raised | |
| Pasture | | Broilers | |
| Fruits | | Turkeys raised | |
| Other | | Other | |
| | | | |
| | | | |
| Total | | | |

Heifer Inventory

| Heifers | Beginning | | Purchases | | Sales | | Ending | | Death Loss | | | Avg. Inv. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months | No.& Date | Val-ue | No.& Date | Val-ue | No.& Date | Val-ue | No.& Date | Val-ue | No. | Date | Value | No. | Value |
| 0-3 | | | | | | | | | | | | | |
| 3-6 | | | | | | | | | | | | | |
| 6-12 | | | | | | | | | | | | | |
| 12-24 | | | | | | | | | | | | | |
| 24-over | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | | |

What is the value of a new born heifer calf in your area? _____ _____
(year) (season)

Total Number of cows culled from herd _____

| Number | Age | Raised | Purchased | Reason for culling |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Total number of herd replacements _____

| Number | Age | Price | Where obtained |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Where can you obtain dairy herd replacements?

| Where | Distance | Price | Quality |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Feed Costs

| Type of Feed | Lbs. Per Head per Day | Days Fed | Raised Price per cwt. | Purchased Price per cwt. | Total Cost |
|---|---|---|---|---|---|
| 0 to 3 months | | | | | |
| Milk | | | | | |
| Milk substitute | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Hay | | | | | |
| | | | | | |
| 3 to 6 months | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Barley | | | | | |
| Hay | | | | | |
| | | | | | |
| 6 to 12 months | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Barley | | | | | |
| Hay | | | | | |
| | | | | | |
| 12 to 24 months | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Barley | | | | | |
| Hay | | | | | |
| Pasture | | | | | |
| 24 to 30 months | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Barley | | | | | |
| Hay | | | | | |
| Pasture | | | | | |
| 30 to 36 months | | | | | |
| Prepared feeds | | | | | |
| Oats | | | | | |
| Barley | | | | | |
| Hay | | | | | |
| Pasture | | | | | |
| | | | | | |
| Total | | | | | |

Labor Requirements

| Operation | 24 to 30 months | | | 30 and over | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Oper. hr. | Fam. hr. | Hir. hr. | Oper. hr. | Fam. hr. | Hir. hr. | Hours | Value | |
| Procuring: | | | | | | | | | |
| Calves | | | | | | | | | |
| Feed | | | | | | | | | |
| Supplies | | | | | | | | | |
| | | | | | | | | | |
| Preparing feed | | | | | | | | | |
| | | | | | | | | | |
| Daily routine | | | | | | | | | |
| | | | | | | | | | |
| Adding bedding | | | | | | | | | |
| | | | | | | | | | |
| Removing bedding | | | | | | | | | |
| | | | | | | | | | |
| Dehorning | | | | | | | | | |
| | | | | | | | | | |
| Vaccinating | | | | | | | | | |
| | | | | | | | | | |
| Branding | | | | | | | | | |
| | | | | | | | | | |
| Transportation | | | | | | | | | |
| | | | | | | | | | |
| Marketing | | | | | | | | | |
| | | | | | | | | | |
| Other | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Total | | | | | | | | | |

Fixed Capital

| Item | Age | Size | Begin Value | Repair | Depre. | End Value | Avg. Value | Charge to heifers Perc. | Value | Repair | Depc |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Buildings | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Corrals | | | | | | | | | | | |
| | | | | | | | | | | | |
| Equipment | | | | | | | | | | | |
| | | | | | | | | | | | |
| Feed bunk | | | | | | | | | | | |
| Land in corrals | | | | | | | | | | | |
| Total | | | | | | | | | | | |

Material Costs

| Item | Cost |
|---|---|
| Bedding | |
| Water | |
| Temporary feeders | |
| Medicine and vet. | |
| Machine & power costs | |
| Electricity | |
| Breeding fee | |
| | |
| Total | |

Interest

| Item | Amount | Rate | Total Charge |
|---|---|---|---|
| Interest on invest. | $ | % | $ |
| Buildings & land | | | |
| Machines-equipment | | | |
| Heifers | | | |
| Feed | | | |
| Straw | | | |
| Labor | | | |
| Water | | | |
| Total | | | |

Overhead Expense

| Item | Cost |
|---|---|
| Properts taxes | |
| Insurance | |
| Depreciation and repairs to capital | |
| Interest on operating money | |
| Interest on capital invested | |
| | |
| | |
| | |
| Total | |

Financial Summary

| Receipts: | | Expenses: | |
|---|---|---|---|
| Manure credit | | Feed | |
| Sacks returned | | Labor | |
| Dead or worth-less animals | | Material | |
| | | Overhead | |
| Net inventory decrease | | Calves | |
| | | | |
| Total | | | |

Date _____

Enumerator _____

Field check _____

Office check _____