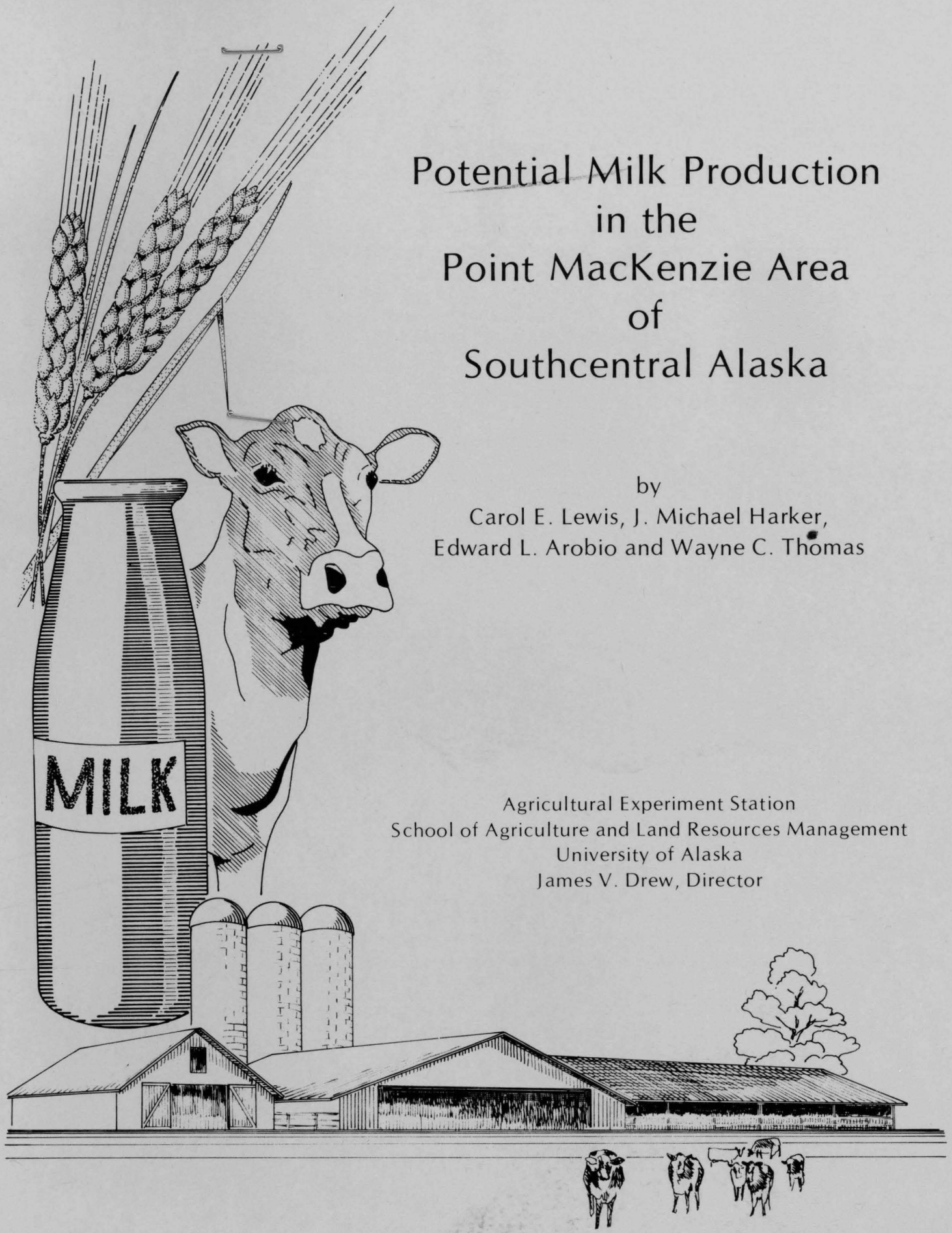
Potential Milk Production in the Point MacKenzie Area of Southcentral Alaska

by
Carol E. Lewis, J. Michael Harker,
Edward L. Arobio and Wayne C. Thomas



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FOREWORD

The information presented in this bulletin is part of a report prepared for the Agricultural Action Council of the State of Alaska. The group was formed in 1979 by legislative action and is chaired by W. I. "Bob" Palmer, Special Projects Director, Office of the Governor. The purpose of the group is to plan and manage agricultural development projects within the state.

The report on the feasibility of milk production in the Point MacKenzie Area presented to Governor Hammond through the Alaska Agricultural Action Council was prepared by the authors of this bulletin and Dr. Boyd Buxton, Agricultural Economist, U.S.D.A., stationed at the University of Minnesota at St. Paul and Dr. Paul Fuglestad, Agricultural Economist, U.S.D.A., stationed in Anchorage, Alaska, both of whom are acknowledged with gratitude.

The authors also wish to thank Cathy Warren who reviewed extensively the tabular data.

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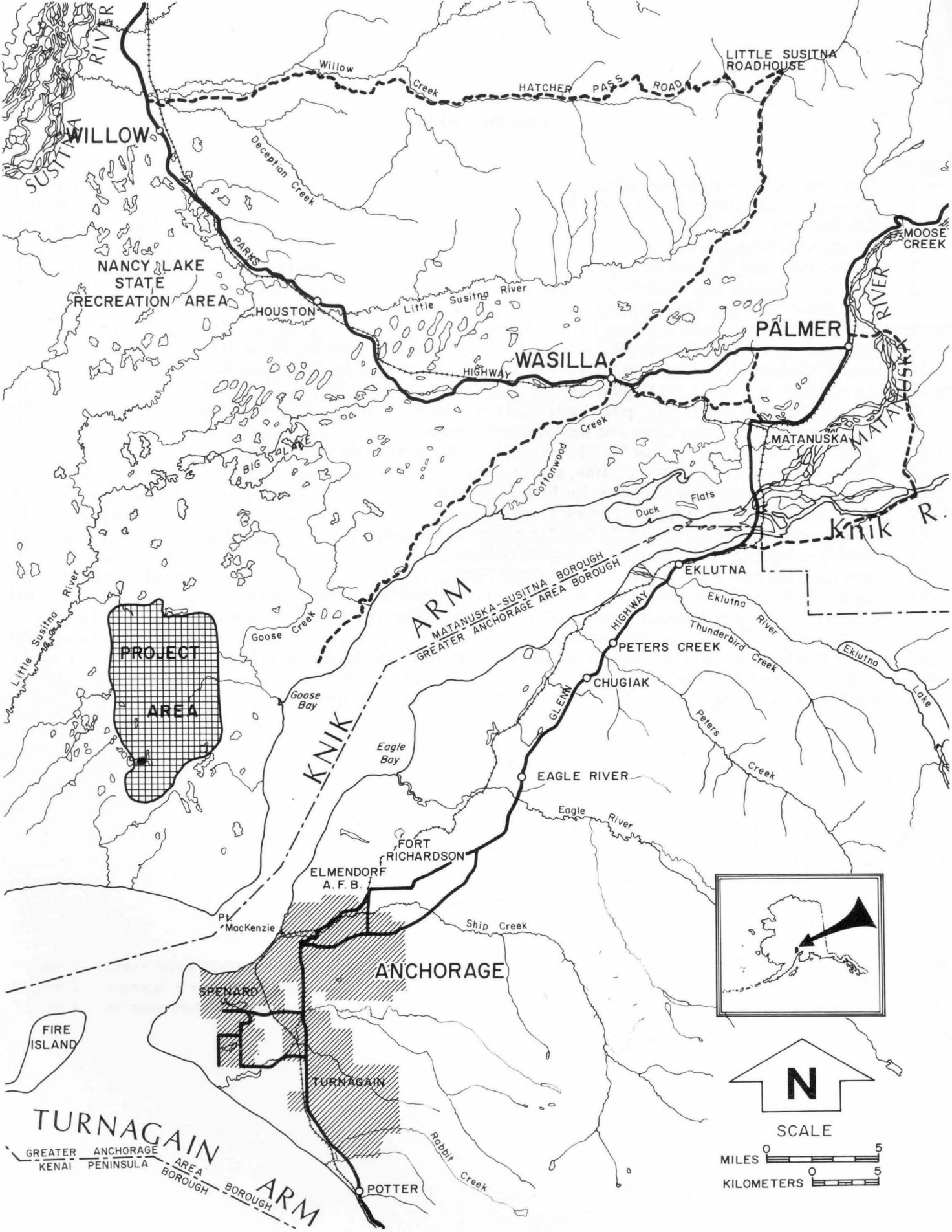


Figure 1: Point MacKenzie, just northwest of Anchorage, is the proposed project area for an expansion of Alaska's dairy industry.

CHAPTER 1

INTRODUCTION

Point MacKenzie is an area northwest of Anchorage directly across the Knik Arm of Cook Inlet (Figure 1). This area contains a substantial amount of latent agricultural land and discussion regarding its potential has been going on for some time. The catalyst which activated the recent planning process directed at Point MacKenzie was concern over potential loss of the southcentral Alaska dairy industry expressed on May 4, 1979, in a letter from Jack Flint, General Manager, Matanuska Maid, Inc., to Governor Jay Hammond: "It is my opinion that if we do not take immediate steps to stabilize this important phase of agriculture, [the dairy industry] will pass from the scene. I think that if it should occur, it would be a serious blow to the State of Alaska, economically and socially. I believe we should also realize that if the dairy industry should cease to exist within the state, it is going to be very difficult to re-establish it."

Mr. Flint's letter and corresponding action by the Matanuska-Susitna Borough have directed planning processes of the State of Alaska toward Point MacKenzie. The Alaska Agricultural Action Council, created by the 1979 state legislature to plan, recommend, and administer agricultural development projects on state lands in Alaska, held a meeting in the Matanuska Valley in September, 1979, and determined that an economic feasibility study, directed toward dairy production, should be undertaken for the Point MacKenzie area. This report is that feasibility study.

In order to perform the analysis, certain general assumptions are made. These include:

1. Sufficient state land is available in the Point MacKenzie area for a dairy farm development project.
2. Land price is $100 per acre with a $50 homestead credit making the effective price $50 per acre to the farmers.
3. Land-clearing costs are $220 per acre for project farms.
4. The dairy farms will be designed for forage production in the form of silage and haylage; concentrate, hay, and straw requirements will be met by off-farm purchases.
5. Private slaughter facilities are currently available in the Matanuska Valley to handle cull cows and calves from project lands.
6. Electrical power hook-up will be provided each farm.
7. Roads to each farm will be constructed.

The land price of $100 per acre for purchase of agricultural rights only is set by the Alaska Land Statutes, Section 38.05. It is an average price and may vary depending on soil type and timber on the property. The homestead credit, repealed in 1979, will be reinstated in 1980. The land-clearing costs were based on a $165-per-acre cost in 1979 in interior Alaska. An additional 15 per cent was added to bring them to 1980 costs. The heavier timber cover will probably require more machine time estimated at $30 per acre.

CHAPTER 2

FARM ECONOMICS

The total capital investment cost for the physical facilities used in the simulated dairies is estimated for four sizes of farms milking 50, 75, 100, and 150 cows. These are the numbers of cows milked daily. Because cows are dry for two months each year, herds actually total 60, 90, 120, and 180 cows, respectively. Total farm budgets for these dairy herds are also provided, followed by a suggested plan for bringing new dairy farms into full production and a cash flow analysis for these farms during their first three years of operation.

Capital Costs for Four Dairy Sizes

Capital costs are determined using examples from existing dairy farms in Alaska's Matanuska Valley, Minnesota, and Wisconsin. It is assumed that the 50- and 75-milking-cow herds will be housed in stanchion barns. As milking herd size increases to 100 and 150 cows, the less labor-intensive, free-stall barn design is used. Milking in the stanchion barns is accomplished with a pipeline system while a milking parlor is used in the free-stall system. All barns are controlled-environment facilities. Housing for replacement heifers and dry cows is assumed to be in an uncontrolled-environment or "cold" facility. Silage, haylage, and/or hay is fed year-round. Feeding is automated, using auger load-out into feed mixers and either feed carts or augers to move the feed into feed bunks.

Costs of buildings and silos are estimated on a per-square-foot basis. It is possible that the larger structures could be built at less cost per square foot as there is not twice as much material in a 100-cow barn as there is in a 50-cow barn. If several structures are under construction at once, there may also be a savings. These two considerations are not used in the calculations here. An average cost for all size structures is applied. Deviations from this average, relevant to specific cases, will become evident as construction begins. Economies of size are recognized in feed and milk-handling equipment. For example, feed load-out service for 100 cows is also adequate for 150 cows.

Trade-offs are made between labor and technology. The technology level in all units is kept in the medium range typical of that in existence in the majority of dairy farms in the United States. Alternative-energy technology is not incorporated, although such technologies may offer economic opportunities in the near future. Individual farmers may wish to pursue some of the recent developments in this field, particularly as technology improves.

Barns and Milking Facilities

Barn and milking facility construction costs are based on a full-truss structure, 4-inch insulation in walls and ceiling, and concrete floors and bunks. A figure of $\$15/ft.^2$ was estimated from Fairbanks construction costs for utility buildings. This figure includes the iron work for free stalls and stanchions, the heating system, and the electrical work.

Typical layouts for stanchion barns and free-stall barns are shown in Figure 2. The stanchion barns are based on 36-foot barn widths, two rows of cows facing out. Free-stall barns are 78 feet wide with four rows of stalls and a center-feed bunk. The stanchion operations do not require a milking parlor but do require a bulk tank for which space is provided. Milking is performed in the stalls using individual milkers and a pipeline to the milk room. Office space and a lavatory area are not included in the barns. Free-stall barns are provided with a milking parlor and an area for holding cows, maternity pens, hospital area, office, and lavatories, as well as a milk room.

Interior temperatures of all barns are kept at a minimum of $45^\circ F$ throughout the year. Ventilation systems for the barns are adequate to move a maximum of 200 cfm of air per 1,000 pounds of animal weight in the barns, 3,000 cfm in the milk house, and 400 cfm per stall in the milking parlor. Heating is accomplished through the ventilation system using

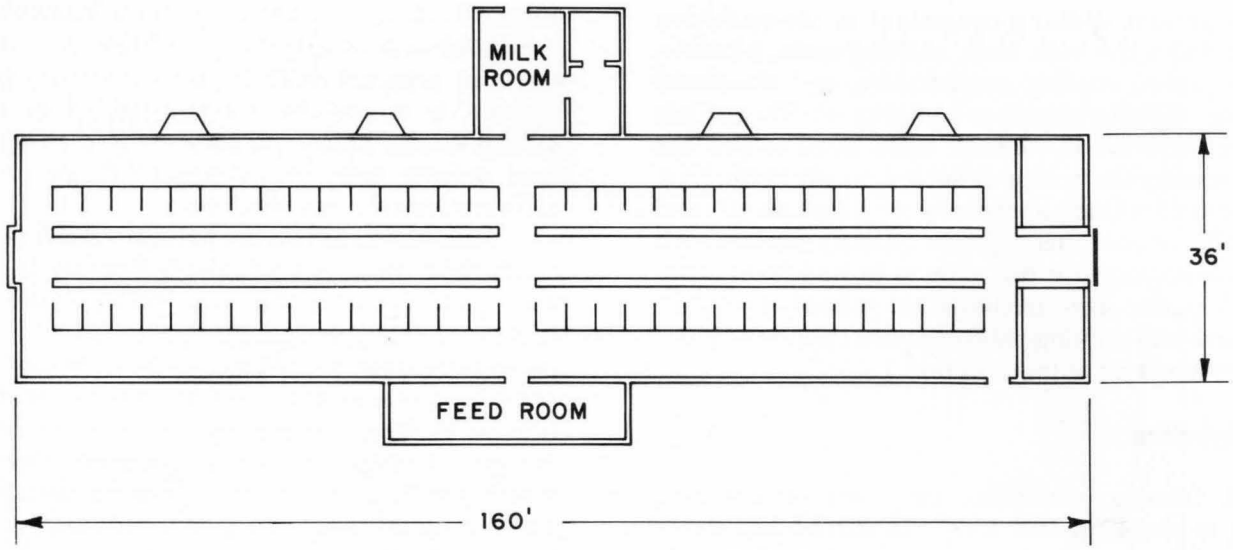
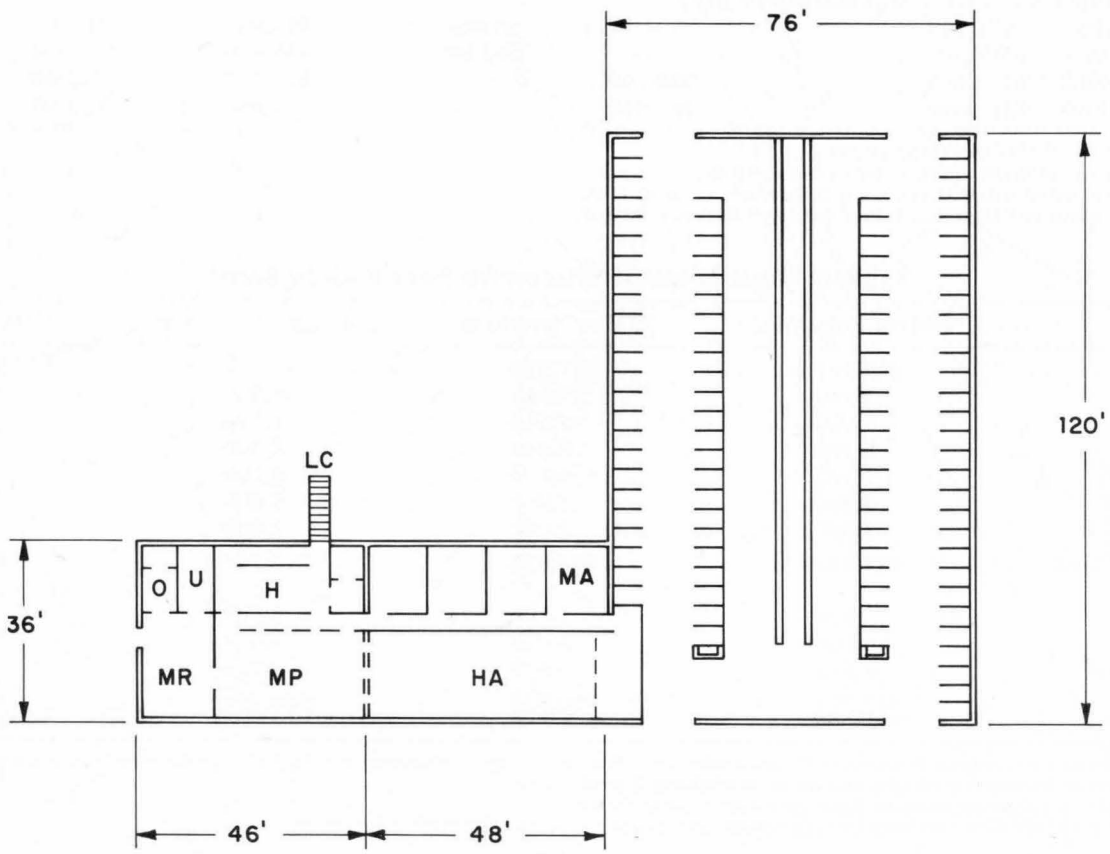


Figure 2: Typical Stanchion Barns. The upper drawing illustrates a typical stanchion barn. The unit shown houses 60 milking cows. The lower illustration is a 100 cow, free-stall facility including a holding area (HA), maternity area (MA), hospital (H), milking parlor (MP), milk room (MR), utility and office area (U, O), and a loading chute (LC). (From: Midwest Plan Service, Dairy Housing and Equipment Handbook. Iowa State University, Ames, 1978).



oil-fired burners. Milking equipment in the stanchion barns includes the bulk tank, milking units, pipeline, vacuum pump, cooling compressors, and associated plumbing. Milking machines handling 40-50 cows per hour are included as are bulk tanks sized to suit the dairy assuming the milk is collected on alternate days. The free-stall milking operations are based on six- and eight-stall, double herringbone (DHB) parlors. All other components are the same as in stanchion facilities. Milk-parlor sizes are based on gallons of production. Barn- and milking-parlor specifications and costs of components are summarized in Table 1.

Waste Handling

All farming operations are based on handling manure in the semisolid form. An earth-basin slurry system without a liner, similar to that shown in Figure 3, should be adequate in the Point MacKenzie area. Removal of manure from barns is accomplished by barn scrapers dumping into a settling pit where manure is moved by a piston pump to the earth storage basin. Slurry pumps are used to agitate and load manure into tank wagons. Mats are provided in all barns for ease in stall cleanup.

Milk-house waste is handled using a separate leach field for this cost study. Because barn wastes are handled as semisolids, milk-house wastes need not necessarily have a separate system. In fact, there are indications that problems, such as plugging of the drain field, may occur in colder climates. It is informative to include the separate system in this report, however. Lavatory wastes are diverted into a separate septic system at a cost of $3,000 for each farm unit. Table 2 shows the components and component costs for farm-waste-disposal systems.

Table 1: Barn and Milking Facility Specifications

	Barn	Ft^2 per Cow	Milk Parlor	Milk Room	Milking Equipment	Bulk Tank	Ventilation
FACILITY TYPE AND SIZE							
50-Cow Stanchion	36'x133'	96	–	20'x20'	1½" pipeline	825 gal.	133 ft[a]
75-Cow Stanchion	36'x200'	96	–	20'x20'	2" pipeline, 3 units	1,000 gal.	200 ft[a]
100-Cow Free-Stall	78'x120'	94	36'x94'	–	6 stall DHB	1,375 gal.	120 ft[a]
150-Cow Free-Stall	78'x180'	94	36'x96'	–	8 stall DHB	2,200 gal.	180 ft[a]
COST OF COMPONENTS FOR EACH FACILITY SIZE							
50-Cow Stanchion	$71,820	–	–	$6,000	$30,000[c]	$10,000	$7,500
75-Cow Stanchion	$108,000	–	–	$6,000	$45,000[d]	$10,000	$11,278
100-Cow Free-Stall	$140,400	–	$50,760	–	$65,000	$15,000	$10,000
150-Cow Free-Stall	$210,600	–	$51,840	–	$65,000	$15,000	$15,000

[a]Moves 200 cfm per 1,000 lbs. of animal weight.
[b]As in above but also handles the milk parlor as noted in text.
[c]Assumes a pipeline cost of $10,000 and two milking machines at $20,000.
[d]Assumes a pipeline cost of $15,000 and three milking machines at $30,000.

Table 2: Waste Disposal Systems for Four Facility Sizes[a]

	50-Cow Stanchion	75-Cow Stanchion	100-Cow Free-Style	150-Cow Free-Style
Basin[b]	$ 6,392	$ 7,936	$11,664	$11,664
Barn Cleaner	5,040	9,040	10,300	10,300
Mats	4,020	5,640	7,176	8,058
Piston Pump[c]	8,300	8,300	8,300	8,300
Load-out Pump[c]	4,100	4,100	4,100	4,100
Slurry Pump[c]	5,000	5,000	5,000	5,000
Piping	2,000	2,000	2,000	2,000
Manure System Total	$34,852	$42,016	$48,540	$49,422
Leach Field	800	1,198	1,598	2,298
Septic System	3,000	3,000	3,000	3,000
Tank and Wagons[d]	4,619	4,619	6,720	6,720
TOTAL	$43,271	$50,833	$59,858	$61,440

[a]All hardware based on University of Wisconsin 1977 estimates. 1979 Wisconsin = 1977 Wisconsin x 1.20. 1979 Alaska = 1979 Wisconsin x 1.15.
[b]Basin size based on an 8-month or 240-day storage period holding 2 ft^3/day/cow.
[c]Pumps 20 HP in size are adequate to move 3,000 gpm over a rise of 10 feet.
[d]Tank capacities are 152 ft^3 with a 60 PTO HP requirement and 243 ft^3 with a 100 PTO HP requirement.

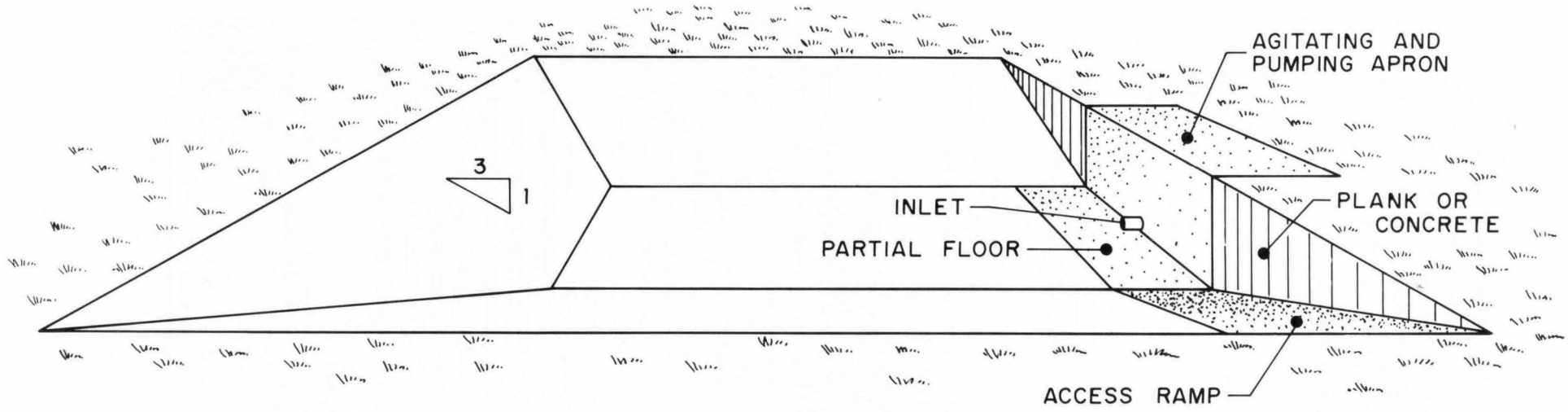
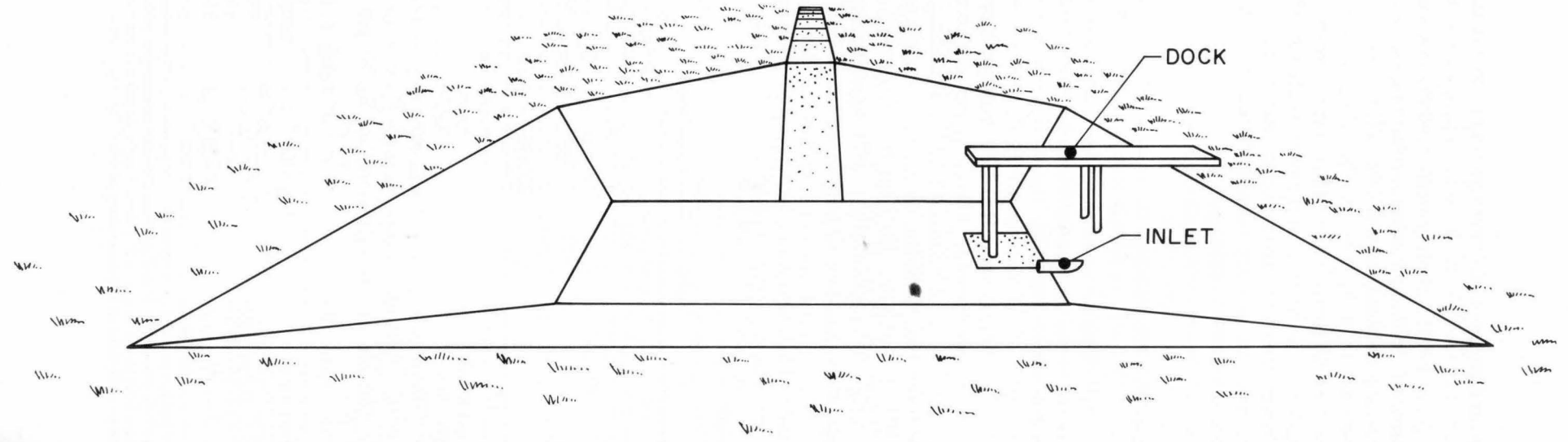


Figure 3: Manure Storage Basins. Two types of manure storage basins. The upper illustration includes a picket gate or a plank or concrete wall to facilitate unloading. (From: Midwest Plan Service. Dairy Housing and Equipment Handbook. Iowa State University, Ames, 1978).



Feed Storage

The feed components used in rations were roughage (including silage or haylage) concentrates, and hay. Calf starter will be required for the calving operation. To obtain storage facility sizes, it is assumed all components will handle a yearly supply. This may not be the case with calf starter. However, it forms a small portion of the total feed requirement and less than a yearly supply would alter the space requirement very little.

Silos

Silos are assumed to be uninsulated. The maximum height of the silos is 60 feet, 10 feet of which is unloader space. The silo-loading system uses a 30-HP electric motor with blowers for top loading. Top-unloading silos load out feed at the silo side into the feed room. This requires a 20-HP electric motor. To obtain a capital cost per ft^3, 1979 Wisconsin prices and adjusted southcentral Alaska prices are used. The estimated erected cost is $\$2.18/ft^3$ including loading and unloading facilities. Because of possible problems with freezing along silo sides, base diameters are kept as large as possible while still maintaining a near 60-foot height. The additional parameter of a load-out rate of no less than 6 inches per day is used to further alleviate the possible freezing problems. Table 3 gives silo sizes and capacities and total cost of silage storage.

Table 3: Silo Capacities

Facility Size	Silage Stored	Silo Size	Number of Silos	Total Cost
50 Cow Stanchion	1077T	28'x60'	2	$160,999
75 Cow Stanchion	1622T	28'x60'	3	$241,499
100 Cow Free Stall	2154T	30'x60' +	3	$316,488
		22'x48'	1	
150 Cow Free Stall	3231T	30'x60'	5	$462,051

Concentrate

The concentrate fed will probably be purchased in bulk. The cost of construction of a storage area for the concentrate is estimated at $1.00 per bushel. Table 4 lists storage required and total cost assuming only one purchase is made annually. An alternate method would be to purchase a pelleted feed several times during the year. Less storage space would be required in this case.

Table 4: Concentrate Storage

Facility Size	Bushels Required	Storage Size	Total Cost
50 Cow Stanchion	9,226	10,000 BU	$10,000
75 Cow Stanchion	13,862	15,000 BU	$15,000
100 Cow Free Stall	18,434	20,000 BU	$20,000
150 Cow Free Stall	26,643	30,000 BU	$30,000

Starter, Hay, Bedding

Storage for calf starter, hay, and bedding is in metal, uninsulated buildings with concrete floors. The buildings are ventilated through louvres and eaves. Current Fairbanks cost estimates indicate that such buildings can be constructed for $\$13,000/ft^2$. Table 5 gives the amount of feed and bedding stored, building size, and cost of construction.

Machinery Storage and Workshop

The dairy farms will be producing silage and haylage. In addition to equipment associated primarily with this operation, at least front-end loader storage will be required for the dairy. The storage buildings will probably not be heated. Additionally, a heated workshop will be necessary for repairs and maintenance. The storage space required per machine includes 15 per cent space for movement. The workshop size is based on the largest piece of equipment on the farm and includes a working area of 8 feet on the sidewalls and 5 feet at each end. Also included are a grease pit and fuel tanks. Capital cost and construction for the machinery storage are the same as those for hay and bedding storage. Workshop capital costs include a metal building with four inches of insulation and a heating system using oil-burning units. Construction costs are estimated at $\$14.50/ft^2$. Table 6 (next page) gives the machinery and workshop sizes and total costs.

Table 5: Hay, Bedding and Starter Storage

Facility Size	Total Hay[a]	Total Bedding[b]	Total Starter[c]	Building Size	Total Cost
50-Cow Stanchion	9,599 ft^3	10,935 ft^3	75 ft^3	40 x 60	$31,200
75-Cow Stanchion	14,587 ft^3	16,515 ft^3	109 ft^3	50 x 70	$45,500
100-Cow Free Stall	19,053 ft^3	21,645 ft^3	146 ft^3	50 x 90	$58,500
150-Cow Free Stall	28,507 ft^3	32,310 ft^3	216 ft^3	40 x 80 + 40 x 90	$88,400

[a]Hay bale size is 4' x 2' x 2' and weight is 70 pounds per bale.
[b]Straw bale size is 4' x 2' x 2' and weight is 50 pounds per bale.
[c]100-lb. bags sized at approximately 1.3 $ft.^3$.

Table 6: Machinery Storage and Workshop

Facility Size	Machinery	Workshop	Total Cost
50, 75 Cow Stanchion	40'x60'	40'x46'	$57,880
100, 150 Cow Free Stall	40'x75'	40'x46'	$65,680

Calf, Heifer, and Dry-Cow Housing

There are controversies concerning the housing of calves. Indications are that calf death rates are less if they are removed to cold housing one day after birth. The cold housing recommended is a 4' x 14' hutch, 4' x 8' of which is a plywood shed free from drafts and bedded with straw, 4' x 6' being an exposed area enclosed in hog wire for feeding. In high snow areas, management of the hutches may be difficult. Therefore, an alternative is offered by putting the "hutches" in a cold building. An additional advantage of this practice is that the calf housing can be combined with that for heifers and dry cows in a single building. The major advantages of this system is that feeding can be accomplished in one building and that manure handling (a straw pack removed in spring and periodically throughout the summer) is a single operation. The straw pack waste is removed to the fields in spring and fall.

Housing costs are the same as those used for hay and straw storage plus $1.00/ft^2 for iron and $2,000 for all units for plumbing. Space for animals is determined using standard allotments. Twice the hutch area per calf is used to enable hutches to be moved before being occupied by a new calf. Table 7 shows space per cow by age, total number of cows housed, total space and total cost.

Feed Handling

Feed handling in stanchion units is accomplished by electric cart although a feed bunk system could also be used. Free-stall barn feeding is accomplished by augering the feed into the feed bunks. Provisions have been included for feed mixing at the silo unload area. The silos load out into a feed mixer and then either into carts or an auger hopper. A feed mixer is provided to keep feed consistency constant if both haylage and silage are fed. Approximate cost is $4,000 per silo.

Well

There is limited data to indicate the depth of wells required in the Point Mackenzie area. It is

Table 7: Calf, Heifer, and Dry-Cow Housing

	Space Per Cow			Number of Cows Housed[a]						
Facility Size	0-2 mo.	2-12 mo.	12-24 mo. & dry cows[b]	0-2 mo.	2-12 mo.	12-24 mo.	dry cows	Total Space (ft^2)	Building Size	Total Cost $
50-Cow Stanchion	56 ft^2	25 ft^2	110 ft^2	19	19	16	10	3,499	40' x 90'	52,400
75-Cow Stanchion	56 ft^2	25 ft^2	100 ft^2	28	28	25	15	5,380	50' x 100'	72,000
100-Cow Free Style	56 ft^2	25 ft^2	110 ft^2	37	37	32	20	7,037	50' x 140'[c]	100,000
150-Cow Free Style	56 ft^2	25 ft^2	110 ft^2	55	55	48	30	10,515	60' x 180'[c]	153,200

[a] Assumes a 15% loss at 0-3 months, no losses at 3-12 months, 12% loss at 12-24 months and a herd replacement of 25% of the total.
[b] Includes 45 ft^2 of resting area and 65 ft^2 of "lot" area.
[c] Two 50' x 70' or two 60' x 90' buildings could be used.

Table 8: Total Capital Investment for Four Facility Sizes

	50-Cow Stanchion	75-Cow Stanchion	100-Cow Free Stall	150-Cow Free Stall
Barn and Iron	$ 71,820	$108,000	$140,400	$ 210,600
Ventilation	7,500	11,278	10,000	15,000
Milk Room	6,000	6,000	N/A	N/A
Milk Parlor	N/A	N/A	50,760	51,840
Milking Equipment	40,000	55,000	80,000	80,000
Silos	160,999	241,499	316,988	462,501
Manure Handling	43,271	50,833	59,858	61,440
Concentrate Storage	10,000	15,000	20,000	30,000
Hay and Bedding Storage	31,200	45,500	58,500	88,400
Machine Storage	31,200	31,200	39,000	39,000
Workshop	26,680	26,680	26,680	26,680
Calf- and Dry-Cow Housing	52,400	72,00	100,000	153,200
Well	3,500	3,500	3,500	3,500
Feed-Handling Equipment	8,000	12,000	16,000	20,000
TOTAL	$492,570	$678,990	$921,686	$1,241,711

assumed a 100-foot well eight inches in diameter is adequate to provide a 3,000 gpm flow rate. The current average cost for drilling, casing, and pump is $35 per running foot. This cost is included in each farm unit.

Total Capital Costs

The total capital investment for the four dairy systems is given in Table 8 (pg. 9). On a per-cow basis, the 150-cow, free-stall dairy requires the least capital injection. Tables 9 through 12 (pgs. 9 and 10) show the annual cash and noncash owner costs associated with the dairy farms. Costs allocated to the dairy operation only are associated with milking and dry cows. Those allocated to the replacement heifers include animals required for a 25% annual herd replacement and are aged 0 to 24 months. Feed-associated cost allocation and calf and dry-cow housing cost allocation are accomplished on a feed-requirement and a space-occupied basis respectively. The percentages used in allocation are shown in Table 13.

Table 13: Cost Allocation to Dairy Cows and Replacement Heifers

Facility	Dairy Cows	Replacement Heifers
Silos	84%	16%
Hay and Bedding Storage	17%[a]	83%
Concentrate Storage	81%	19%
Calf and Dry-Cow Housing[b]	22%	78%

[a]Only dry cows use straw bedding. Milking cows are not fed hay.
[b]Based on space occupied.

Farm Budgets

Enterprise costs and returns presented in this report are estimated for dairy-farm operations milking 50, 75, 100, and 150 cows daily. Returns from the sale of calves and culls are specifically identified. However, a specific assumption of per-herd milk production is not used in the analysis. Rather, revenues from calf and cull sales are first subtracted from costs, and then the average milk production per cow required to break even (cover all remaining costs) is calculated. Included in the costs is a charge for operator labor of $15,000 per year. Returns arising from milk production above that required to break even is the return to management.

Basic assumptions reflected in the estimated budgets are:

1. Cows are milked ten months of the year and are dry two.
2. All feed is purchased except for silage or haylage which is grown on the farm.
3. Land-clearing costs and purchase price are included in silage (haylage) costs.
4. Dairy farmers replace 25% of their herds annually with springer* heifers.
5. All replacement heifers are provided by the dairy farms in the third year of operation.
6. All breeding is by artificial insemination.
7. Dairy farms of 50 and 75 cows use a stanchion confinement-stall system. With 100 and 150 cows, a free-stall system is used.
8. Family labor is the only labor used on 50-and 75-cow dairy farms. It has been suggested that the 75-cow dairy farm may require one additional laborer if a stanchion barn is used.
9. Dairy farms with 100 cows require family labor plus one hired laborer while the 150-cow dairy farm requires two laborers and one herdsman in addition to family labor.
10. Three acres of cropland in silage production are required for each milking and dry cow in the dairy herd.
11. An interest rate of 6%, that charged by the Alaska Agricultural Revolving Loan Fund, is charged against the capital investment. A 9% interest charge is leveled against operating capital assuming a mixture of private and public loan monies.

Data for this analysis were obtained from several sources. Feed rations, production techniques, and production costs were developed in consultation with animal scientists of the University of Alaska Agricultural Experiment Station and experienced Alaskan dairymen. Silage and haylage production costs are detailed in a preliminary USDA working paper available from the authors (Fugelstadt, U.S.D.A.-E.S.C.S.). Investment requirements are described in an earlier section. Milk prices were obtained from Matanuska Maid Inc., while prices for calves and culls were provided by marketing specialists of the Alaska Division of Agriculture and Alaskan dairymen.

Production costs are summarized in Table 14 (pg. 11). Total annual costs for the 50-, 75-, 100-, and 150-cow dairy farms are $175,061; $237,471; $323,853; and $479,008, respectively. Costs are divided into feed cash costs, non-feed cash costs, and noncash costs. Of these three categories, feed is the major expense accounting for approximately 39 per cent of total cost for each herd. Major costs in non-cash costs are operator labor and interest and depreciation on facilities. As noted previously, we have included an operator labor charge of $15,000 annually as an absolute minimum under which an owner would be willing to remain in business.

In Table 15 (pg. 12), returns from sales of calves and culls and the average milk production per cow

Table 9: Annual Cash and Non-Cash Capital Associated Costs for the 50-Cow, Stanchion Dairy

	Depreciation (years)	Depreciation[a] ($)	Investment Cost[b] ($)	Insurance[c] ($)	Taxes[d] ($)	Repairs & Maintenance[e] ($)	Total Cost ($)
DAIRY							
Barn & Iron	30	2,394	2,155	503	934	1,436	7,422
Ventilation	10	713	236	53	98	150	1,250
Milk Room	30	200	180	42	78	120	620
Milking Equipment	10	3,800	1,260	280	520	800	6,600
Silos	20	6,762	4,057	947	1,758	2,704	16,228
Manure Handling	20	2,164	1,298	303	563	865	5,193
Concentrate Storage	20	405	243	57	105	162	972
Hay & Bedding Storage	20	265	159	37	69	106	636
Machine Storage	20	1,560	936	218	406	624	3,744
Workshop	20	1,334	800	187	347	534	3,202
Calf & Dry-Cow Housing	20	577	346	81	150	231	1,385
Well	350	105	25	46	70	596	
Feed-Handling Equipment	10	760	252	56	104	160	1,332
ANNUAL TOTAL		21,284	12,027	2,789	5,178	7,962	49,242
REPLACEMENT HEIFERS							
Silos	20	1,288	772	180	334	515	3,099
Concentrate	20	95	57	13	25	38	228
Hay and Bedding Storage	20	1,295	777	181	337	518	3,108
Calf & Dry-Cow Housing	20	2,044	1,226	286	531	817	4,904
ANNUAL TOTAL		4,722	2,832	660	1,227	1,888	11,329

[a] Depreciation is calculated using the straight line method. Salvage value is 5% of new cost for equipment and zero for buildings.
[b] Investment costs are charged at 6% annual rate using:

$$\text{Investment Cost} = \frac{\text{New Cost} + \text{Salvage}}{2} \text{ (Interest Rate)}$$

[c] Insurance rates are $7.00 per $1,000 new cost.
[d] Taxes are 13 mil, the current rate in the Matanuska-Susitna Borough.
[e] Repairs and maintenance are charged at 2% of new cost.

Table 10: Annual Cash and Non-Cash Capital Associated Costs for the 75-Cow, Stanchion Dairy[a]

	Depreciation (years)	Depreciation ($)	Investment Cost ($)	Insurance ($)	Taxes ($)	Repairs & Maintenance ($)	Total Cost ($)
DAIRY							
Barn & Iron	30	3,600	3,240	756	1,404	2,160	11,160
Ventilation	10	1,071	355	79	147	226	1,878
Milk Room	30	200	180	42	78	120	620
Milking Equipment	10	5,225	1,733	385	715	1,100	9,158
Silos	20	10,143	6,086	1,420	2,637	4,057	24,343
Manure Handling	20	2,542	1,525	356	661	1,017	6,101
Concentrate Storage	20	578	383	85	158	243	1,447
Hay & Bedding Storage	20	387	232	54	101	155	929
Machine Storage	20	1,560	936	218	406	624	3,744
Workshop	20	1,334	800	187	347	534	3,202
Calf & Dry-Cow Housing	20	792	475	111	206	317	1,901
Well	10	350	105	25	46	70	596
Feed-Handling Equipment	10	1,140	378	84	156	240	1,998
ANNUAL TOTAL		28,922	16,428	3,802	7,062	10,863	67,077
REPLACEMENT HEIFERS							
Silos	20	1,932	1,159	270	502	773	4,636
Concentrate Storage	20	135	90	20	37	57	339
Hay & Bedding Storage	20	1,888	1,133	264	491	755	4,531
Calf & Dry-Cow Housing	20	2,808	1,685	393	730	1,123	6,739
ANNUAL TOTAL		6,763	4,067	947	1,760	2,708	16,245

[a] Footnotes as in Table 9.

Table 11: Annual Cash and Non-Cash Capital Associated Costs for the 100-Cow, Free-Stall Dairy[a]

	Depreciation (years)	Depreciation ($)	Investment Cost ($)	Insurance ($)	Taxes ($)	Repairs & Maintenance ($)	Total Cost ($)
DAIRY							
Barn & Iron	30	4,680	4,121	983	1,825	2,808	14,508
Ventilation	10	950	315	70	130	200	1,665
Milk Parlor	30	1,692	1,523	355	660	1,015	5,245
Milking Equipment	10	7,600	2,520	560	1,040	1,600	13,320
Silos	20	13,313	7,988	1,864	3,462	5,326	31,953
Manure Handling	20	2,993	1,796	419	778	1,197	7,183
Concentrate Storage	20	810	486	113	211	324	1,944
Hay & Bedding Storage	20	497	298	70	129	199	1,193
Machine Storage	20	1,950	1,170	273	507	780	4,680
Workshop	20	1,334	880	187	347	534	3,202
Calf & Dry-Cow Housing	20	1,100	660	154	286	440	2,640
Well	10	350	105	25	46	70	596
Feed-Handling Equipment	10	1,520	504	112	208	320	2,664
ANNUAL TOTAL		38,789	22,377	5,185	9,629	14,813	90,793
REPLACEMENT HEIFERS							
Silos	20	2,536	1,522	355	659	1,014	6,086
Concentrate Storage	20	190	114	27	49	76	456
Hay & Bedding Storage	20	2,428	1,457	340	632	971	5,828
Calf & Dry-Cow Housing	20	3,900	2,340	546	1,014	1,560	9,360
ANNUAL TOTAL		9,054	5,433	1,268	2,354	3,621	21,730

[a]Footnotes as in Table 9.

Table 12: Annual Cash and Non-Cash Capital Associated Costs for the 150-Cow, Free-Stall Dairy[a]

	Depreciation (years)	Depreciation ($)	Investment Cost ($)	Insurance ($)	Taxes ($)	Repairs & Maintenance ($)	Total Cost ($)
DAIRY							
Barn & Iron	30	7,020	6,318	1,474	2,738	4,121	21,762
Ventilation	10	1,425	473	105	195	300	2,498
Milk Parlor	30	1,728	1,555	363	674	1,037	5,357
Milking Equipment	10	7,600	2,520	560	1,040	1,600	13,320
Silos	20	19,406	11,644	2,717	5,046	7,762	46,575
Manure Handling	20	3,072	1,843	430	7,99	1,229	7,373
Concentrate Storage	20	1,215	729	170	316	486	2,916
Hay & Bedding Storage	20	751	451	105	195	301	1,803
Machine Storage	20	1,950	1,170	273	507	780	4,680
Workshop	20	1,334	800	187	347	534	3,202
Calf & Dry-Cow Housing	20	1,685	1,011	236	438	674	4,044
Well	10	350	105	25	46	70	596
Feed-Handling Equipment	10	1,900	630	140	260	400	3,330
ANNUAL TOTAL		49,436	29,249	6,785	12,601	19,385	117,456
REPLACEMENT HEIFERS							
Silos	20	3,696	2,218	517	961	1,479	8,871
Concentrate Storage	20	285	171	40	74	114	684
Hay & Bedding Storage	20	3,669	2,201	514	954	1,467	8,805
Calf & Dry-Cow Housing	20	5,975	3,585	836	1,554	2,390	14,340
ANNUAL TOTAL		13,625	8,175	1,907	3,543	5,450	32,700

[a]Footnotes as in Table 9.

Table 14. Total Costs for Dairy Herds of 50, 75, 100, and 150 Cows in Third Year of Operation

		50 COWS		75 COWS		100 COWS		150 COWS	
	Cost per Unit	Amount	Total Cost	Amount	Total Cost	Amount	Total Cost	Amount	Total Cost
FEED:									
1. Silage[a]	$18.20-$22.87/ton	1,028.84T	$ 23,529.57	1,539.39T	$ 31,295.80	2,057.69T	$ 38,540.53	3,086.53T	$ 56,174.85
2. Concentrate	$220/ton	187.98T	41,355.60	281.78T	61,991.60	375.95T	82,709.00	563.93T	124,064.60
3. Hay	$120/ton	6.84T	820.80	10.04T	1,204.80	13.69T	1,642.80	20.53T	2,463.60
4. Salt	$14/cwt	104.94 cwt	1,469.16	156.95 cwt	2,197.30	209.88 cwt	2,938.32	314.81 cwt	4,407.34
Total Feed Cash Costs			$ 67,175.13		$ 96,689.50		$125,830.65		$187,110.39
NON-FEED COSTS:									
1. Replacement Heifers[b]			$ 27,296.15		$ 39,719.14		$ 52,510.33		$ 78,585.96
2. Hired Labor		0	0	0	0	1	12,000.00	3	44,000.00
3. Property Tax[c]	$13/$1000		5,899.80		8,144.70		11,072.60		14,766.40
4. Dairy R&M			7,962.00		10,863.00		14,813.00		19,385.00
5. Electricity			6,000.00		6,000.00		8,000.00		8,000.00
6. Breeding Fees	$10/head	60 cows	600.00	90 cows	900.00	120 cows	1,200.00	180 cows	1,800.00
7. Semen (1.75 ampul/head)	$12/ampul		1,260.00		1,890.00		2,520.00		3,780.00
8. D.H.I.A.	$.25/head/mo.		180.00		270.00		360.00		540.00
9. Fuel & Oil			800.00		900.00		1,000.00		1,100.00
10. Insurance[d]	$7/$1000		3,177.20		4,384.30		5,961.40		7,949.60
11. Vet & Drugs	$20/head		1,200.00		1,800.00		2,400.00		3,200.00
12. Bedding	$2/65 lbs.	2,700.00 lb.	83.08	4,050.00 lb.	124.62	5,400.00 lb.	166.15	8,100.00 lb.	249.23
13. Dairy Supplies & Misc.	$25/milking head		1,250.00		1,875.00		2,500.00		3,750.00
Total Non-Feed Cash Costs			$ 55,708.23		$ 76,870.76		$114,503.48		$187,106.19
NON-CASH COSTS:									
1. Operator Labor			$ 15,000.00		$ 15,000.00		$ 15,000.00		$ 15,000.00
2. Interest on Investment:									
Cows[e]			3,690.00		5,535.00		7,380.00		11,070.00
Facilities (includes equipment)			12,027.00		16,428.00		22,377.00		29,249.00
Feed[f]			1,577.54		2,184.65		2,771.78		4,084.04
Operating Capital[g]			1,688.40		217.55		381.19		703.15
3. Depr. on Capital Investment			21,284.00		28,922.00		38,789.00		49,436.00
Total Non-Cash Costs			$ 53,747.38		$ 68,287.20		$ 86,699.68		$109,542.19
TOTAL COST			$176,630.79		$241,843.30		$327,033.81		$483,758.77

[a] The silage budgets were slightly revised so that the working paper described on page 17 shows slightly different figures.
[b] See Table 17 for replacement heifer cost summary.
[c] Includes an annual property tax of $12.03/cow.
[d] Includes an annual insurance cost of $6.47/cow.
[e] $(6\%)\left(\frac{1600 + 450}{2}\right)$(milkers + dry cows)
[f] Interest calculated as follows:
$$\left(\frac{\text{silage cost}}{2} + \frac{\text{hay cost}}{2} + \frac{\text{concentrate cost}}{8} + \frac{\text{salt cost}}{8}\right)(.09)$$
[g] Interest calculated as follows: 1/12 of operating costs less feed, replacement heifer cost, and property taxes times 9%.

Table 15: Break-Even Analysis for 50, 75, 100, and 150-Cow Dairy Farms

Herd Size	Cull Cows		Cull Heifers		Cull Calves		Required Annual
	Number	Revenue	Number	Revenue	Number	Revenue	Milk Production[a]
50	15	$ 6,750	1.5	$1,200	40.5	$ 486	16,646 lbs./cow
75	22.5	10,125	2.25	1,800	60.75	729	15,122 lbs./cow
100	30	13,500	3.0	2,400	81	972	15,348 lbs./cow
150	45	20,250	4.5	3,600	121.5	1,458	15,124 lbs./cow

[a]Calculated Using:

[(Total cost - $ rec'd fr. cull cattle)/$ rec'd per lb. milk] /Total no. cows = lb. milk per cow

Table 16: Replacement Heifer Cost Summary for Four Facility Sizes

	50-Cow	75-Cow	100-Cow	150-Cow
Overhead Costs:				
Repair & maintenance	$ 1,888	$ 2,708	$ 3,621	$ 5,450
Interest on investment	2,832	4,067	5,433	8,175
Depreciation	4,722	6,763	9,054	13,625
Property tax	1,227	1,760	2,354	3,543
Insurance	660	947	1,268	1,907
Total Overhead Cost	$11,239	$16,245	$21,730	$32,700
Feed Costs:				
Silage	$ 3,634.27	$ 4,845.96	$ 5,92.77	$ 8,676.49
Concentrate	4,870.80	7,306.20	9,741.60	14,612.40
Hay	3,223.80	4,835.70	6,447.60	9,671.40
Salt	632.10	948.15	1,264.20	1,896.30
Interest on feed[a]	390.05	557.83	720.89	1,069.97
Milk Replacer	1,182.17	1,773.25	2,364.33	3,546.50
Calf Starter	554.04	831.07	1,108.09	1,662.13
Bedding	1,269.92	1,925.98	2,580.85	3,850.77
Calf Supplies	300.00	450.00	600.00	900.00
TOTAL	$27,296.15	$39,719.14	$52,510.33	$78,585.96
PER COW[b]	$ 1,707.34	$ 1,652.90	$ 1,637.94	$ 1,633.95

[a]Interest on feed = $\left(\frac{\text{Silage}}{2} + \frac{\text{Hay}}{2} + \frac{\text{Concentrate}}{8} + \frac{\text{Salt}}{8} + \frac{\text{Milk Replacer}}{8} + \frac{\text{Starter}}{8}\right) \cdot (.09)$

[b]Cost per heifer = $\frac{\text{Total cost} - \text{calf and cull heifer receipts}}{\text{Number of replacement heifers required annually}}$

required to cover all remaining costs are provided. Farmers receive 30 cents per pound for cull cows, $800 per animal for cull heifers, $12 per head for calves, and $16.84 per cwt for milk.

The milk production required to cover all costs generally decreases as herd size increases. The 50-cow dairy farm requires an annual, average, per-cow production of 16,646 pounds of milk. This decreases to 15,124 pounds for a herd of 150 cows. Although it has been assumed that dairy herd sizes up to 75 cows need only family labor, it has been suggested that a 75-cow dairy farm may well require one hired laborer. If this is the case, then required milk production would have to increase from an average of 15,122 pounds per cow for 75 cows to an average production of 15,963 pounds per cow because of the additional labor cost.

Can Alaskan dairymen expect to obtain these per-cow, milk-production averages? With good management this should be possible. The current average production per cow for the six Alaskan herds belonging to the Dairy Herd Improvement Association (DHIA) is 16,844 pounds. This compares favorably with the California, Wisconsin, and New York averages of 18,674 pounds, 15,558 pounds, and 15,768 pounds, respectively.

It has been assumed throughout this report that each dairy enterprise would raise its own replacement heifers. However, as the Alaskan dairy industry enlarges, it is quite possible that replacement heifers would be available from other sources. Table 16 summarizes the cost of production for dairy heifers on a dairy farm.

Herd Development and Projection of Revenues and Expenses

The farm budgets presented above are for dairy farms that are fully developed. This will not occur, however, until the third year of operation. How farms reach this developed stage and the revenue and expense picture for the first two years of operation must now be addressed.

Herd Development

One of the first problems in starting a dairy farm is stocking the new farm so that full production can be reached as quickly as possible and milk production can be constant from month to month. One possible plan for accomplishing these goals is presented here in which cows are assumed to be milked ten months and dry two (See Tables 17, 18, 19, and 20, pgs. 14-17). Dairy farms are also assumed to cull 25 percent of the milking herd annually with cows culled when dry.

Initially, herds are stocked with purchased bred heifers. Animals arrive by contract air carrier before their last trimester of pregnancy, in two lots spaced six months apart. One-third of the heifers calve three months after arrival with the remaining two thirds calving two and four months later. By the end of the ninth month of the first year, dairy farms have reached full capacity in milking cows. However, purchases of replacement heifers are required in month eleven of year one and year two. Starting with the third year, dairy farms are able to provide all their own replacements.

For a herd of 100 milking cows (Table 16), for example, the development plan works as follows: 60 bred heifers are purchased initially, with one-third scheduled to start milking in months one, three, and five of year one. These cows are then dry in month eleven of the first year and in months one and three of the second year. As they become dry, 15 of the 60 are culled. A second lot of 60 heifers is delivered in month four of the first year and calve in months seven, nine, and eleven. As these cows become dry, 15 are again culled. An additional 30 heifers are purchased and brought on line in the second year. No more livestock purchases are required thereafter, since all replacements can be provided by the dairy farms beginning in the third year. It should be noted that these development plans are based on exact schedules that may be highly idealized. It may be that a producer would want a larger number of animals in the first purchase to increase immediate cash flow and compensate for possible delays in future calving schedules.

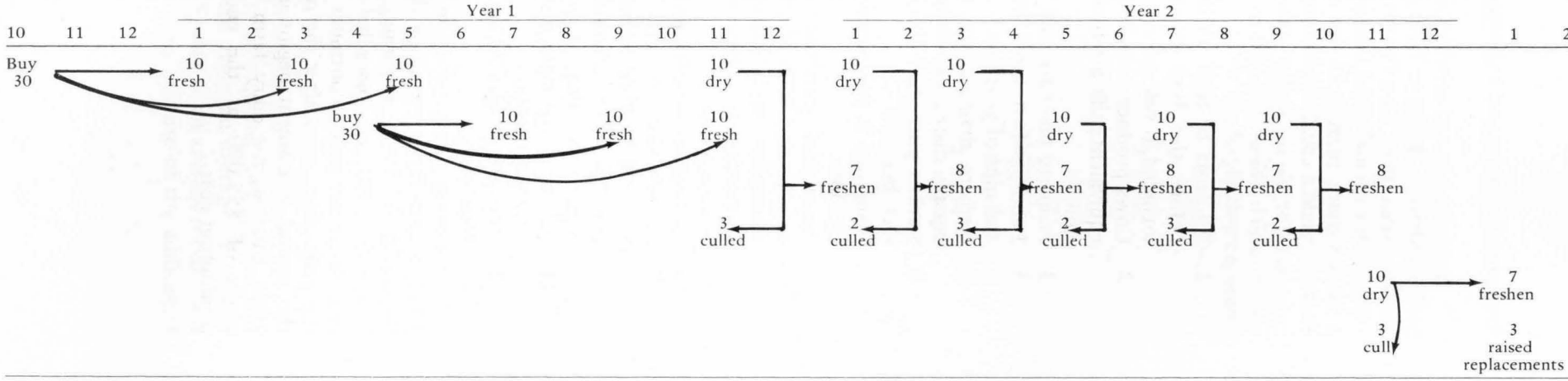
Projected Revenues and Expenses

Table 21 (pg. 18) provides a revenue and expense projection for a 150-cow farm during the first three years of operation. The figures in this table can be adjusted for smaller sized farms—for example, .33 for a 50-cow-dairy farm or .5 for a 75-cow-dairy farm. This will yield a rough approximation of revenues and expenses for these smaller enterprises. Assumptions under which these projections are prepared are as follows:

1. All costs of feed for the first three months before the first lot of cows freshen are included in first quarter costs.
2. Cows produce only 85% of expected mature equivalent milk production during first lactation.
3. Property taxes are paid in January.
4 Labor is first hired in months five, seven, and nine of year one.
5. Repairs, maintenance, and electric costs are equally distributed through the year.
6. Fuel is purchased twice yearly in April and October.
7. Insurance is paid semiannually in April and October.
8. An initial purchase of $1,000 of dairy supplies and $600 of calf supplies is assumed. Thereafter, replacement of these supplies is proportionate to the number of cows milked in each quarter.
9. All bedding is purchased October 1.
10. Seventy-five per cent of silage costs are incurred in April through May. The remaining 25 per cent is encountered in July through September. Hay is purchased October 1.
11. All other costs are distributed equally over yearly quarters.
12. Repayment of debt on capital begins in the third year.

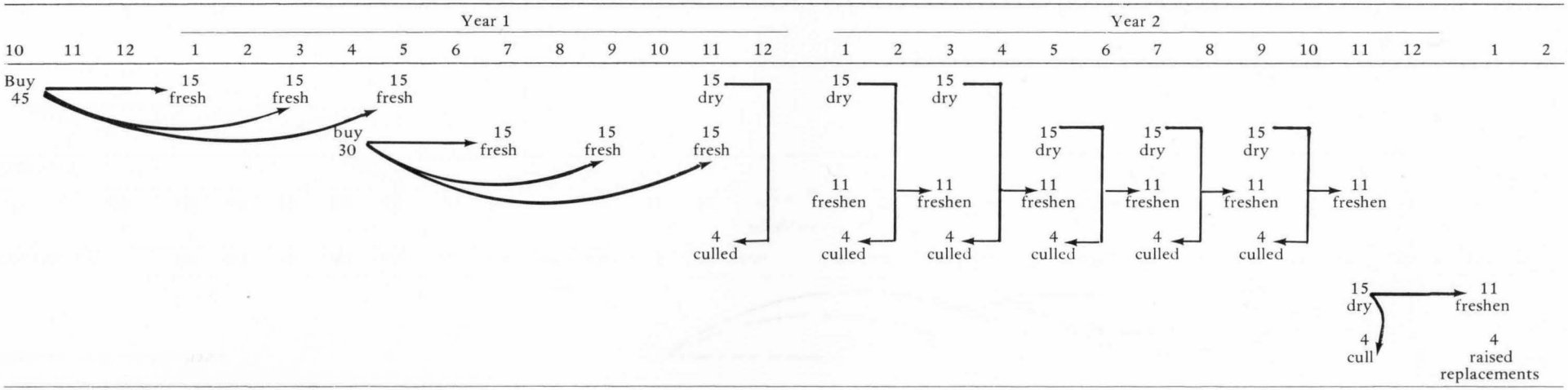
Assuming that production begins in October of 1981, a cumulative operating deficit results through December of 1982. Beginning in January through March of 1983, all losses have been recovered. A cumulative net profit continues for the remainder of the projection, even after the repayment of debt on the capital investment begins in the last quarter of 1983. Further, the dairy farm has cumulative silage assets of $55,000 at the end of the 1983-1984 production year.

Table 17: Herd Development Plan for the 50 Cow Dairy Farm



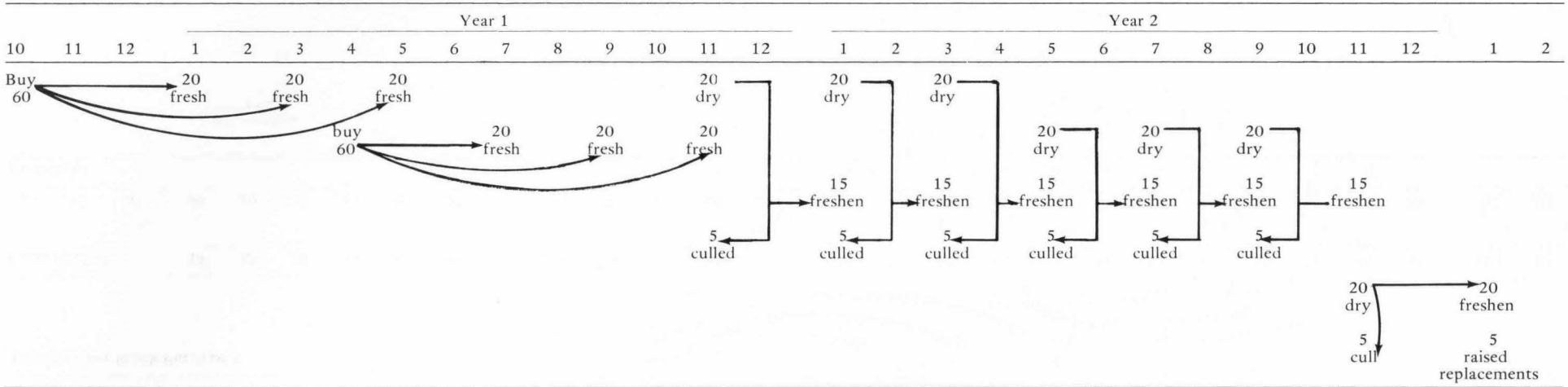
Cows Milked			10	10	20	20	30	30	40	40	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50				
															Dry Cows																	
30	30	30	20	20	10	40	30	30	20	20	10	18	15	15	13	13	10	17	15	15	12	12	10	10	7	7	8	8				
Culls Sold													3		2		3		2		3		2		3		2					

Table 18: Herd Development Plan for the 75 Cow Dairy Farm



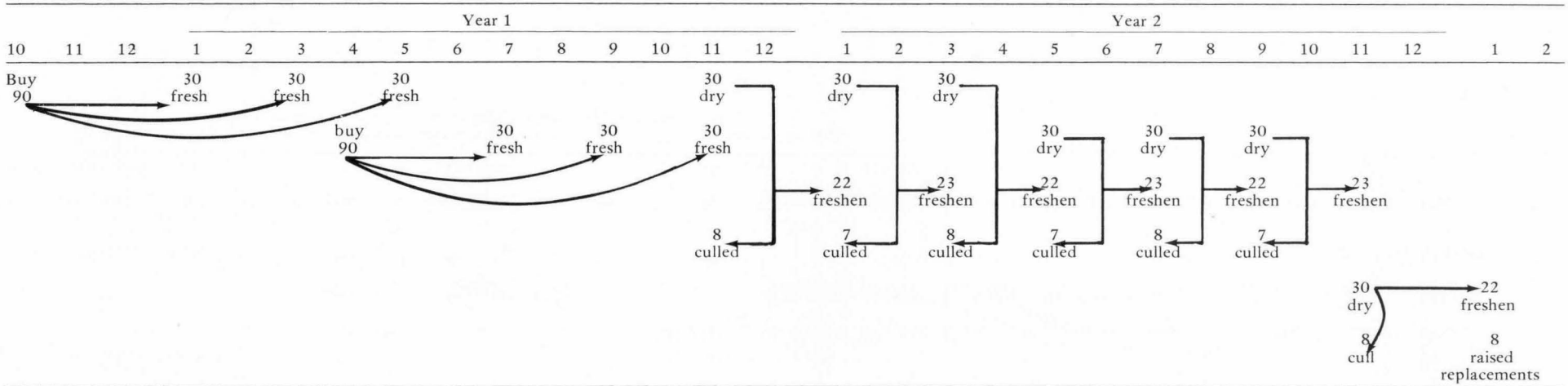
Cows Milked			15	15	30	30	45	45	60	60	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Dry Cows																														
45	45	45	30	30	15	60	45	45	30	30	15	27	23	23	19	19	15	27	23	23	19	19	15	15	11	11	11	11		
Culls Sold													4		4		4		4		4		4		4		4			

Table 19: Herd Development Plan for the 100 Cow Dairy Farm



Replacement Stock Purchased													buy 15			5 fresh		5 fresh		5 fresh	buy 15		5 fresh		5 fresh		5 fresh									
Cows Milked			20	20	40	40	60	60	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100								
														Dry Cows																						
60	60	60	40	40	20	80	60	60	40	40	20	35	30	30	25	25	20	35	30	30	25	25	20	20	15	15	15	15								
Culls Sold													5		5		5		5		5		5		5		5									

Table 20: Herd Development Plan for the 150 Cow Dairy Farm



Cows Milked			30	30	60	60	90	90	120	120	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150		
														Dry Cows																
90	90	90	60	60	30	120	90	90	60	60	30	53	45	45	38	38	30	52	45	45	37	37	30	30	22	22	23	23		
Culls Sold												8		7		8		7		8		7		8		7			

Table 21: Quarterly Projection of Revenues and Expenses for the 150-Cow-Dairy Farm[a]

	1981-1982				1982-1983				1983-1984			
	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.
Cash Receipts												
Calves	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364	$ 364
Cull Cows	0	0	0	3,375	5,062	5,062	5,062	5,062	5,062	5,062	5,062	5,062
Cull Heifers	0	0	0	0	0	0	0	0	900	900	900	900
Milk	26,360	51,575	84,811	97,419	102,003	106,587	112,318	114,610	114,610	114,610	114,610	114,610
Total	$26,724	$51,939	$85,175	$101,158	$107,429	$112,013	$117,744	$120,036	$120,936	$120,936	$120,936	$120,936
Cash Expenses												
Feed[b]	$66,625	$23,052	$ 81,549	$63,391	$36,711	$37,458	$ 86,235	$65,895	$37,574	$37,536	$ 86,197	$65,868
Hired Labor	0	2,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Property Taxes	0	18,309	0	0	0	18,309	0	0	0	18,309	0	0
Repairs & Maintenance	6,208	6,208	6,208	6,208	6,208	6,208	6,208	6,208	6,208	6,208	6,208	6,208
Electricity	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Breeding Fees	0	300	300	300	300	450	450	450	450	450	450	450
Semen	0	630	630	630	630	945	945	945	945	945	945	945
D.H.I.A.	540	0	0	0	540	0	0	0	540	0	0	0
Fuel & Oil	550	0	550	0	550	0	550	0	550	0	550	0
Insurance	4,928	0	4,928	0	4,928	0	4,928	0	4,928	0	4,928	0
Vet. & Drugs	800	800	800	800	800	800	800	800	800	800	800	800
Dairy Supplies	1,000	235	470	700	937	937	937	937	937	937	937	937
Calf Supplies	600	100	200	225	225	225	225	225	225	225	225	225
Bedding	3,750	0	0	0	4,100	0	0	0	4,100	0	0	0
Total	$87,001	$53,634	$106,635	$85,254	$68,929	$78,332	$114,278	$88,460	$70,257	$78,410	$114,240	$88,433
Net Profit (Loss)	($60,277)	($1,695)	($21,460)	$15,904	$38,500	$33,681	$ 3,466	$31,576	$50,679	$42,526	$ 6,696	$32,503
Payment to Debt									$38,854	$38,854	$38,854	$38,854
Cumulative Operating Deficit or Net Profit	($60,277)	($61,972)	($83,432)	($67,528)	($29,028)	$4,653	$8,119	$39,695	$51,520	$55,192	$23,034	$16,683
Livestock Purchases	$144,000	$144,000		$36,800		$36,800						

[a] All costs incurred in period prior to freshening of first cows are charged to first quarter of first year.
[b] In revenue and expense projection, feed cost includes feed fed to replacement stock.

CHAPTER 3

MARKETING AND COMPETITIVE POSITION

Marketing

Milk is one of the few agricultural products having a well-organized marketing system in Alaska. Matanuska Maid, a dairy farmer cooperative, has identified the fresh milk market in Alaska, excluding the southeast portion of the state, at approximately 6,500,000 pounds per month. About 19 per cent is milk produced in Alaska, with the remaining 81 per cent shipped in by bulk and processed here or processed and packaged for retail sales outside the state before shipment to Alaska.

There are currently two major milk processors in Alaska—Matanuska Maid and Arden Farms—both located in Anchorage. Matanuska Maid processes all the milk produced in Alaska. The problem for these two processors lies in retaining a market share sufficient to maintain a volume of milk for efficient processing while competing with falling prices for imported milk. In-state milk production has declined from 22.1 million pounds in 1961 to 14.4 million pounds in 1978 with imported milk replacing the loss.

Fresh-milk producers in Alaska are being pressured by high land values in the Matanuska Valley. Dairymen are now able to realize significant gains by selling their land to speculators and subdividers, gains much higher than would be realized by continuing to farm or by selling to another farmer. As a result, since the 1960s dairy farms have been declining rapidly. The industry, thus weakened, has had a difficult time meeting increased competition from "outside" dairymen. Increased milk production from Point MacKenzie farms may help increase the competitiveness of the industry.

An important question is whether or not new milk producers at Point MacKenzie can reasonably expect to have a market for their milk. Some consumers may not choose Alaska-produced milk , even if it is price competitive, while others would probably be willing to pay a premium for local milk. Some retail firms may prefer, due to economic pressure, not to handle local milk unless it is competitive with outside milk. It is probable that considerably less than 100 per cent of the market will be supplied by local milk even with the additional production from Point MacKenzie.

Competitive Position of Alaskan-Produced Milk

The current competitive position of Alaskan-produced milk compared with alternative sources is analyzed below. Such analysis is important in considering the future of the Alaskan dairy industry. While disagreement is possible for any figure given, cost data in the analysis are as accurate as possible at this time. The magnitude of any inaccuracies would not be great enough to alter the conclusions.

Milk produced in Alaska must compete for a reasonable share of the market with milk shipped in from outside the state. As shown in Table 22 (pg. 20) Alaska farmers were receiving $16.84 per hundred weight in November, 1979. Farm-to-processor transportation cost by regulated carrier was $1.36 per cwt. Therefore, the total cost for Alaska-produced milk to an Anchorage processor was $18.20 per cwt. Local processing cost adds another $13.61 per cwt and brings the total cost, when delivered to the retail store dock, to $31.81 per cwt. Milk shipped in by bulk and processed locally had a slightly higher wholesale cost of $33.04 per cwt. This is primarily because regulations require that bulk milk shipped into Alaska must be pasteurized a second time, adding a cost of $2.00 per cwt. Prepackaged milk shipped in from the Puget Sound had a significantly lower wholesale cost. Table 22 presents the cost of prepackaged milk using a Class I price (regulated handler) and blend price (non-regulated producer/distributer). These total $27.66 and $26.66 per cwt which is $4.15 and $5.15 less than Alaskan produced and processed milk, respectively. Recombined milk (dry skim milk and butterfat shipped in from out of state and recombined with water in Alaska) was competitive with the prepackaged milk even with the higher Alaska processing costs.

Table 22: Estimated Costs Per Hundred Weight and Per 1/2 Gallon for Alternative Sources of Milk Delivered to Anchorage Retail Stores, November 1979

		Fresh Milk from Seattle			
	Local Farmers	Bulk	Class I	Prepackaged Processor-Distributor	Ingredients to Recombine
Farm Value	$16.84[a]	$12.85[b]	$12.85[b]	$11.85[b]	
Delivered to Plant	18.20[c]	13.10[d]	13.10[d]	12.10[e]	$11.34[f]
Haul to Washington Pier		.65[g]			
Transportation to Alaska	–	3.68[g]	8.83[h]	8.83[h]	.70[i]
Service charges	–	2.00[j]	–	–	
Processing Cost	13.61[k]	13.61[k]	5.73	5.73	13.61
Butter and Powder					1.00[l]
Recombining Cost	–	–	–	–	.10[l]
Cost at Wholesale Per 100 Pounds	$31.81	$33.04	$27.66	$26.66	$26.75
Cost Per 1/2 Gal. Wholesale	$1.37	$1.42	$1.17	$1.15	$1.15
Cost Per 1/2 Gal. Retail[m]	$1.58	$1.63	$1.37	$1.32	$1.32

[a] FOB price at farm for milk produced in the Matanuska Valley.
[b] Transportation cost of $.25 from farm to processor in Puget Sound area is an estimate.
[c] Cost of local milk at an Anchorage processing plant.
[d] Estimated Puget Sound Class I price, November 1979.
[e] Estimated Puget Sound Blend price, November 1979.
[f] Estimated manufacturing milk price in all federal order marketing areas.
[g] Source: An Anchorage milk processing firm.
[h] $.38 per half gallon transportation cost between Seattle and Anchorage.
[i] $4.50 transportation cost per 100 pounds of non-fat dry milk or 100 pounds of butter.
[j] Primarily the cost of pasteurization before transporting bulk milk to Alaska. This milk is pasteurized a second time in Alaka. Source: An Anchorage milk processing firm.
[k] Includes fluid bottling and distribution to retail. Source: An Anchorage milk processing plant.
[l] Source: Hammond, Buxton and Thraen, 1979.
[m] Assumes 15% markup.

Table 23: Estimated Cost Per Hundred Weight of Milk Through a Typical Anchorage Milk Processing Plant and Delivered to Retail Stores

	VOLUME PER MONTH		
	2 Million Pounds	5 Million Pounds	
	No Change in Technology	No Change in Technology	Improved Technology
Milk and Carton	$19.64	$19.64	$19.18[a]
Plant Labor	1.80	1.17	.99
Plant Overhead	1.77	1.15	.98
Distribution to Retail	6.28	4.08	4.08
Administration and Profit	2.32	1.50	1.50
TOTAL	$31.81	$27.54	$26.73

[a] Reduction in bulk transportation cost from Matanuska Valley/Point Mackenzie to Anchorage due to deregulation of intrastate bulk milk movement.
SOURCE: An Anchorage milk processing firm.

This is a large difference in processing cost between local and outside processors. Further consideration is required to understand this large difference. Anchorage milk-processing plants have substantially lower volume than do their Seattle competitors, therefore incurring a higher cost per processed unit. Additional sources of higher costs for Anchorage plants arise from outdated plant equipment and higher labor costs. Can these economic disadvantages be overcome? Table 23 represents the costs associated with a typical processing plant in Anchorage. Assuming a monthly volume of 2 million pounds, the total cost per cwt was determined to be $31.81. The typical plant capacity is 5 million pounds per month. This production level, therefore, implies that such a plant is substantially underutilized. If volume were to increase to 5 million pounds per month (production from existing dairy herds and 3,000 additional cows in Point MacKenzie), plant costs per unit of production would drop substantially. Cost per cwt at this volume would be approximately the same as prepackaged Class I milk shipped in from Seattle. Further, if improved technology were incorporated into this plant and intrastate bulk milk shipment was deregulated, then

local milk could be produced and processed at a cost approaching processor-distributor milk from Puget Sound. In other words, with changes in the industry, Alaska milk can again become competitive.

Is this scenario a real possibility? First, 5 million pounds is 76 per cent of the current market for fresh milk in Alaska excluding southeast. State population is expected to grow to 496,000 in five years (Kruse, 1979). This means that the milk market, assuming no change in consumption patterns, would increase to 8 million pounds. The 5 million pounds of locally produced milk would then account for only 62 per cent of total consumption compared to 20 per cent currently. Because Alaska milk would be merely competitive in production and processing costs with outside milk, not lower priced, it is difficult to determine whether consumers would prefer comparatively priced Alaskan or outside milk. Nevertheless, for 5 million pounds of Alaska-produced milk to be sold annually, assuming the above population growth, 62 per cent of the market would have to be captured.

It is clear that, without greater volume and plant modernization, dairy farmers in Alaska must bear a greater portion of the cost differential that currently exists between prepackaged outside milk and local milk to be fully competitive. The existing small-dairy industry may be able to survive with its premium-priced product. However, the only way to lower the price of Alaska milk to the consumer, assuming no relative cost changes, is through expansion of local milk production, subsequent increases in processing volume and additions in processing technology.

An additional marketing question for which no analysis has been undertaken is the response of sellers of prepackaged outside milk to competitively priced Alaskan milk. If Alaskan milk begins to capture a larger share of the market, what will be the response of these outer sellers. Will they be in the position to reduce prices? If they do, can Alaskan producers compete? If Alaskan producers cannot compete, should the state of Alaska attempt to interfere in the market to protect the Alaskan producers?

Economists generally hold that competition brings about the most desirable balance between production and consumption and leads to maximum welfare for all citizens. The major force that brings about this ideal pattern is price. Prices provide signals to producers and consumers which lead to the most desirable level of production and consumption. Interference in the market by the state would probably distort these signals. Thus, any interference by the state in the market through either marketing orders, fair trade legislation, or producer subsidies should be undertaken only after careful and thorough consideration of the welfare implications resulting from any such action. However, such involvement may be necessary if outside producers should sell their milk in Alaska below production cost in an effort to maintain their market share.

CHAPTER 4

FINAL THOUGHTS

Dairying at Point MacKenzie appears economically feasible if the price paid to dairymen remains at $16.84 per cwt. The largest herd size considered, 150 cows, was the most economically viable. A positive revenue and expense flow could be generated for this dairy enterprise by the middle of the second year of operation. Table 24 indicates the number of pounds of milk per cow required annually to cover all costs at $16.84 per cwt.

A critical aspect of an expanded milk industry in Alaska is processing. The dairy farmers, both old and new, must press for greater efficiency in processing. A major concern is high labor costs relative to "outside" competitors. For an efficient, competitive milk-processing capability in Alaska, careful attention must be given to the cost and productivity of each unit of labor and capital. The optimum combination of these two factors of production in terms of costs and returns is essential for efficient processing.

Although it is possible that private financial institutions would finance a modernization program, it is more likely that milk processors will depend on the state for capitalization through several existing low-cost loan programs. In this event, the state may exercise some degree of control over the management of milk-processing firms. This could ensure reaching and maintaining a high level of efficiency in order to make certain that Alaskan milk could capture and hold the necessary 62 per cent of the market.

There is an advantage to the Alaskan processor if state loan programs are used. State loan-program managers can exercise a degree of flexibility in payback periods. If outside milk processors consider maintaining their share of the Alaskan market to be important enough, prices could be lowered below those of Alaskan milk over the short run. The state could delay payments on capital loans to allow Alaskan processors to engage in price competition and attempt to maintain their market share.

Future transportation rates to Alaska may reflect a greater-than-relative change in comparison to other costs due in large measure to the higher costs of petroleum. If so, the transportation advantage currently available to imported prepackaged milk may be reduced. If this situation develops, the competitive position of Alaskan dairy farms and milk processors vis-a-vis outside competitors will improve.

In conclusion, several points should be made. The analysis presented is a reasonable approximation of present conditions in the Alaskan dairying industry. Although some of the data are estimates, they are based on relevant components of the dairy industry in other states.

There is risk associated with any action. However, if two conditions are met, it is quite reasonable to believe that the dairy industry in the state can grow. First, individual farms must utilize best management practices. Second, the processing sector must become more efficient. If the first is realized, milk production will increase. This will partially affect the second condition with no action required by the processing sector. Full realization of potential plant efficiency will come if processors take advantage of cost reductions available through installation of equipment utilizing new technology. With the prospect of a continuing industry and possible low-cost state loans, milk processors should be able to realize a high efficiency for the present size of plant.

Table 24: Production Rates and Returns for 50-, 75-, 100-, and 150-Cow Dairy Farms

	50 Cows	75 Cows	100 Cows	150 Cows
lbs per cow to cover all costs at $16.84 per cwt	16,646	15,122	15,348	15,124
Net return per cwt (17,000 lbs per cow[a])	$ .35	$1.85	$1.63	$1.85
Net return per cwt (16,000 lbs per cow[a])	($ .68)[b]	$ .92	$ .68	$ .92
Net return per cwt (15,000 lbs per cow[a])	($1.85)	($ .14)	($ .39)	($ .14)

[a] Calculated using: $\frac{[(\text{lbs. production per cow})(\$ \text{ per lb.})] - (\text{Total production cost} - \text{Revenue from cattle})/\text{total no. cows}}{\text{lbs. production per cow}/100}$

[b] ( ) implies negative returns.

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