SB
110

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February 18, 1985

Arliss Sturgulewski
Chairman Resources Committee
Alaska State Senate
Pouch V
Capital Building
Juneau, Alaska

SUBJECT: SENATE BILLS NOS. 110 AND 155

Dear Arliss:

Pursuant to our conversation yesterday, I am submitting data regarding Senate Bills Nos. 110 and 155. Before I address these items, however, I would like to express my thoughts on the agriculture industry.

First I ask "Can the dairy industry be viable?" Yes. Our figures indicate that we can provide milk that is competitive with Outside milk because of the freight advantage that exists. The additional total cost of producing milk locally versus Outside is less than the freight on milk shipped from Seattle.

The goal at the Tucker dairy is to produce milk at the lowest cost possible per unit of milk produced. The local dairies must be as efficient and as well managed as Outside dairies or they cannot compete in the local market place. Most of the local dairies have never become efficient enough to bring their operating costs down to be competitive with Outside dairies. For example, our cost of feed is $4.29 per day per cow when we bring in soybean meal and barley in bulk and mix our own feed. The cost of this same feed purchased locally is $1.00 per day per cow more. That $1.00 savings is the farmer's profit on the milk produced.

Historically, the various State administrations have had no comprehensive plan. Thus, agriculture has been an unorganized, unplanned and poorly administered industry. This situation has left Alaskan agriculture in a state of chaos and near bankruptcy. It is not too late to save agriculture. Many things must be done and many changes in policies and practices must immediately take place if we are to save the industry.

We are fortunate that for the first time in Alaskan agricultural history we now have a Commissioner who is genuinely concerned about agriculture. She is willing to change obsolete policies and thinking and is doing the things necessary to save the industry -- and the state's investment. This is the direction in which Esther Wunnicke and Deputy Director James K. Barnett are embarking. Senate Bill No. 110 and Senate Bill No. 155 are a vital part of that comprehensive plan that will make the dairy industry viable.

SENATE BILL NO. 110

Proposes increasing loan limits of the Agricultural Revolving Loan Fund (ARLF) from $1,000,000 to $2,000,000

A number of things have made this increase necessary.

1. When the State's figures were done in 1979 (see Exhibit A "Potential Milk Production in the Point MacKenzie area of Southcentral Alaska") the Consumer Price Index was 233.2 (1/1/80). Today the Consumer Price Index is 316 which is a 36% increase in costs since 1/1/80.

2. The initial plan at Point MacKenzie was for the establishment of 19 small family-run dairies. However, the $200,000 cash requirement for even the smallest dairy prohibited the building of these smaller dairies. The larger dairies actually being built require more total borrowing, but result in lower borrowing per cow.

3. The State's figures (see page 7 of Exhibit A) showed that the total capital investment for a 150-cow facility was estimated to be $1,241,711. However, these numbers do not include housing, working capital or machinery costs. These add an additional $500,000 to the 1979 figure of $1,241,711.

4. Current farms are undercapitalized and there is no other source of funds available. The current dairies are:

	Facility Size	Actual Cows Milking	Difference
Tucker Dairy	480 cows	360	120 cows
Lee Dairy	300 cows	160	140 cows
James Dairy	260 cows	40	220 cows
Rudgers Dairy	150 cows	50	100 cows
TOTAL	1190	610	580

It does not make sense to create facilities and then not provide ~~in~~adequate funds for cows. These dairies are all up against the $1,000,000 loan limit, but need additional funds to bring these dairies up to maximum capacity. Increasing the loan limit will allow these dairies to be brought up to 100% milk producing potential. This will generate the greatest return on scarce funds because of a better utilization of existing facilities.
Every cow generates $3,000 in revenues for the farm. In addition, according to Matanuska Maid each additional cow generates $420 per year in additional net income for the creamery (see Exhibit B).

580 additional cows x $420.00
= $248,600 additional net income to the creamery.

SENATE BILL NO. 155
Proposes the splitting and combining of agricultural parcels

This change is necessary for the following reasons.

1. By consolidating parcels the total capital required per cow is substantially less. In our case, consolidation reduced capital investment per cow by 32%. This creates more competitive fixed cost and lowers debt requirement per cow. Boyd Buxton, noted dairy authority who has done work for the Department of Agriculture, states

"The investment per cow in dairy buildings and equipment is substantially less on larger than on smaller dairies regardless of region." (See Exhibit C, Page 14 "Economic Policy and Technology Factors Affecting Herd Size and Regional Location of U.S. Milk Production").

2. The operating costs, including interest expense per cwt of milk produced, are lower on larger dairies than on smaller dairies because of the principle of economies of scale. The Tucker dairy operating costs per cwt of milk produced are 26% lower on one large dairy than they would be on four smaller dairies. Boyd Buxton states "Based on whole farm budgets, the larger dairies with 500 cows or more are more profitable than smaller dairies." (See Exhibit C, Page 27).

3. Most of the Point MacKenzie parcel owners have little or no experience in the dairy industry. Therefore, it is imperative that the dairies hire competent dairy managers to insure a successful and well managed farm. Consolidation makes this financially possible.

4. Currently many dairies have already joined together in cooperative efforts as follows:

Dairy West joined two borough parcels together
Tucker Dairy joined four separate parcels together
Wright Dairy joined two parcel together
James Dairy joined two parcels together
Shoone Dairy joined two parcels together

These joint efforts have been necessitated due to the simple economics of the dairy industry. The dairy industry needs Senate Bill 155. Not passing Senate Bill 155 would place a definite hardship on these dairies and could result in their bankruptcy and thus the industry as well.

5. The consolidation of dairies is in compliance with the intent of the initial sales brochure dated September 11, 1982 (see Exhibit D) which states "The major objectives are to stimulate in-state milk production, to provide milk to Alaska consumers at a <u>competitive market price</u>, and to assist in gaining agricultural self-sufficiency for the State of Alaska." Only through consolidation can we be competitive.

6. The consolidation of parcels will eliminate unnecessary duplication of buildings and machinery. This will substantially reduce the borrowing required from the ARLF. There is currently not enough money in the ARLF to develop all the remaining parcels and the reduced capital needs resulting from consolidation will help lessen the demands on ARLF funds. In our case, the ARLF has only $1,000,000 invested in one 485-cow facility instead of a possible $4,000,000 in four 120-cow dairies.

I have also enclosed earlier correspondence related to Point MacKenzie that you might find helpful. They are:

Exhibit E	1/1/84 Jalmar Kerttula
Exhibit F	6/22/84 Bob Heath
Exhibit G	9/14/84 Dean Brown
Exhibit H	1/17/84 James K. Barnett

The passage of Senate Bills 110 and 155 are mandatory if we are going to work toward a successful, profitable and financially strong dairy industry that will produce dairy products for Alaskans at a competitive price.

Thank you for your attention to this very important matter. If I can be of any further assistance, please do not hesitate to give me a call.

Sincerely,

Joseph Patrick Cange

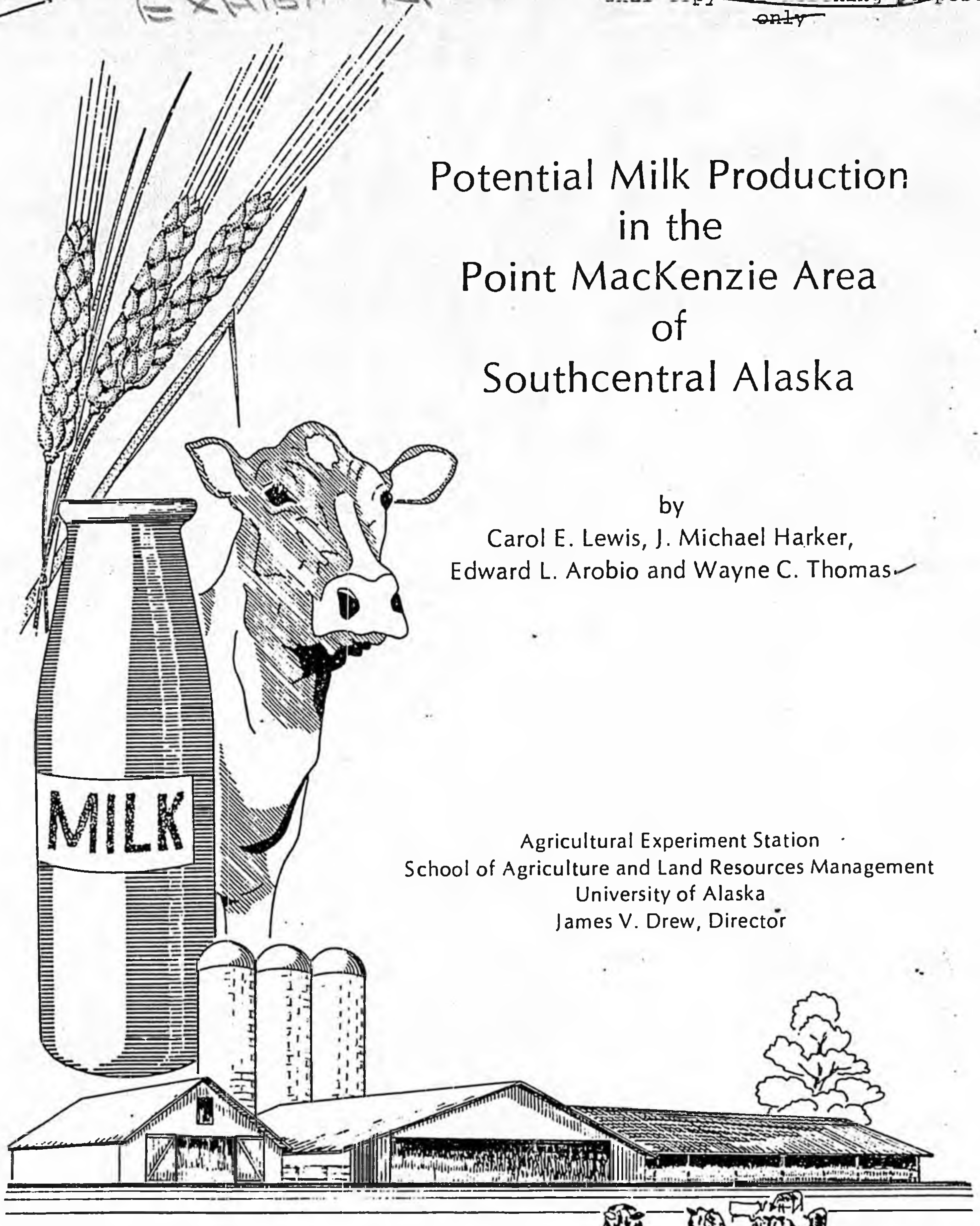
:p

cc: Esther Wunnicke
James K. Barnett
Mike Szymanski
Jan Faiks
Jalmar Kerttula
Bill Heim

EXHIBIT A

This copy for xeroxing purposes only

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

Agricultural Experiment Station
School of Agriculture and Land Resources Management
University of Alaska
James V. Drew, Director

Bulletin 58

September 1980

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

Facility Size	Space Per Cow			Number of Cows Housed[a]				Total Space (ft^2)	Building Size	Total Cost $
	0-2 mo.	2-12 mo.	12-24 mo. & dry cows[b]	0-2 mo.	2-12 mo.	12-24 mo.	dry cows			
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	$[illegible]10,400	$ 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

| PER COW INVESTMENT BY JRC | $9,851 | $9,053 | $9,217 | $8,278 |

EXHIBIT B

Matanuska Maid, Inc.

814 W. Northern Lights Blvd.
Anchorage, Alaska 99503
(907) 561-5223

December 4, 1984

Mr. Joseph P. Cange
P.O. Box 4-647
Anchorage, Ak. 99509

Dear Mr. Cange:

You asked us two questions. Your questions and our best judgment answers are:

1. The question: What is the economic value to the Matanuska Maid Creamery of each new producing cow brought on stream in the Palmer/Pt. MacKenzie Area?

   Our Answer: Our projections indicate that an increase of 1075 producing cows (the number required to bring total production up to our single shift processing capacity) will generate a monthly operating cash flow increase of approx. $37,500. Based on that, the value of each new local producing cow to the Creamery is $35.00 per month.

2. The question: How much milk can Matanuska Maid sell without depressing the market?

   Our Answer: We believe it would be unrealistic to think local milk could acquire over one half the rail belt market without depressing prices. At Mid-Summer 1934, Matanuska Maid was supplying about 27% of a 64,000 CWT monthly market.

   We anticipate the market growing to about 71,000 CWT per month by Mid-1986 and believe up to 35-36,000 CWT can be processed locally without depressing prices. That quantity would require about 3,000 producing cows.

Very truly yours,

J L Seawell

John L. Seawell

EXHIBIT G For review only

Economic, Policy and Technology Factors Affecting Herd Size and Regional Location of U.S. Milk Production

Boyd M. Buxton

A paper prepared for

Congressional Office of Technology Assessment
October, 1984

United States Department of Agriculture

Economic Research Service

NED, University of Minnesota
217 Cla Off Bldg, 1994 Buford Ave.
St. Paul, Minnesota 55108

November 28, 1984

Mr. Joseph Patrick Cange
Certified Public Accountant
Box 4-647
Anchorage, Alaska 99509

Dear Mr. Cange:

In response to your letter of October 31, 1984, I have enclosed a preliminary draft report recently completed. The capital costs estimated for twenty-two dairy operations in the lower 48 states are summarized in Table 4, page 15. The budget information is for "whole" farm situations and include some operations that produce most of the feed within the farm. By looking at alternative size herds within each state, some idea of how capital costs per cow change on alternative size farms can be evaluated. Table 4 breaks capital costs down into six categories such as dairy buidlings and equipment. This may help you pick the most relevant figures for your purposes.

The results do indicate lower investment on larger farms than on smaller farms especially up to the 500 or 600 cow herd sizes. Perhaps the New York farms would be most relevant to the Point MacKenzie project as those farms use free stall housing, produce most of the forage requirement and 52-, 200-, and 600-cow operations are considered.

I enjoyed meeting with the group representing the Point MacKenzie area and also wish we had had more time to discuss the farm issues.

Sincerely,

Boyd M. Buxton

Boyd M. Buxton
Agricultural Economist

BMB/dmm

Enclosure

Table of Contents

INTRODUCTION

During the 1970's, milk production increased 41 percent in the Southwest region of the United States and 33 percent in the Northwest while total U.S. milk production increased only 11 percent (figure 1). Much of the expansion has been on dairies with more than 500 cows, with 1500 to 2000-cow herds being common. Although 303,710 farms in the U.S. reported having milk cows in 1983, less than 5,000 well managed dairies with 1500-cows each could have produced all the milk sold commerically that year.

This report examines important economic factors that will effect the trend to fewer and larger dairies and the regional shift in milk production.

The first part of the study estimates the relative long-term profitability of milk production for medium, large and extra large dairy operations in five major U.S. dairy areas. These comparisons provide an indication of the most competitive farm sizes and regions. They are based on returns to investment after all costs are paid including the required replacement of depreciable assets needed to maintain the long-term productive capacity and viability of the farm.

The second part of the study develops a beginning financial situation for eight dairy operations in three regions. Their ability to remain solvent and increase net worth over a ten-year planning horizon is simulated under conditions of risk and under alternative policy and technology scenarios. These results provide an indication of how alternative policies effect individual dairy farm operations. The impact of alternative policies on high debt and new entrant dairies is also examined.

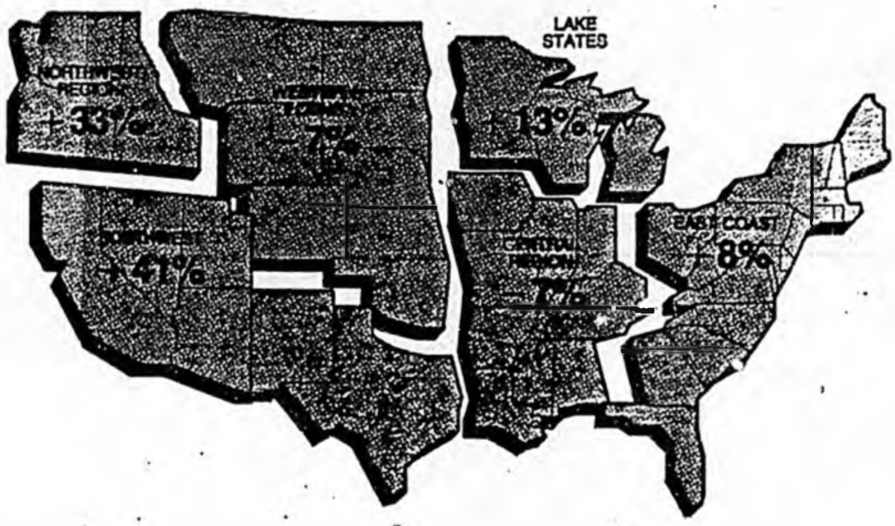


Figure 1. **How the Dairying Picture Has Changed**

(Percent change in milk production in various regions from 1970-71 to 1980-81).

METHODOLOGY

A three step procedure was employed in this study. The first was to use federal milk marketing order data to identify medium, large and extra-large dairy operations in each of five major dairy areas. State of the arts technologies and practices used on these well managed dairies were then identified from secondary sources and visits with dairy producers, university and government employees and building and equipment representatives.

The second step was to develop investment (replacement) cost requirements for new dairy operations of the selected sizes using an economic-engineering procedure. Based on this information and information from secondary sources, long-term average annual cost and return budgets were prepared and an expected rate of return to investment in milk production calculated.

The third step was to obtain information on long- and intermediate-term debts, net worth and equity to asset positions of dairy farms using the U.S. Department of Agricultures' 1979 Agricultural Finance Survey. The financial chracteristics were combined with the whole farm budgets developed in step-two to provide a beginning 1983 situation for selected size dairies in three regions. Then the FLIPSIM V model at Texas A&M University was used to simulate the economic viability and performance of each dairy under selected policy and technology scenarios.

LONG-TERM PROFITABILITY

Dairy Operations Considered

Herd size, technologies employed and practices used in milk production vary considerably across the United States. In May 1983 the average herd size for 120,655 producers selling milk to plants regulated by federal milk marketing orders was 63 cows per farm (Table 1).[1/] However, the average herd size varied from 49 cows in Pennsylvania to 532 cows in Florida.

The variation in herd size within each state was even more dramatic. Although the average herd size in Florida was 532 cows, the average herd size for the largest ten percent of the herds in that state was 1,861 cows (Table 1). For the largest ten percent the average herd size varied from about 1,800 cows in Florida and 1,700 cows in the Southwest to about 125 cows in the Lake States region. Generally dairy herds are much larger in the Southwest, Southeast, and Northwest regions than in the Lake States and Northeast regions.

From the herd size information in Table 1, twenty-two dairies were selected to represent existing herd sizes in five major dairy areas (Table 2). The 200-cow Pennsylvania and 600-cow New York dairies exceed the average size of the largest ten percent of dairies in those states. However, these larger sized dairies exits in these States

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1/ Buxton, Boyd M. and John P. Rourke. Size Distribution of Dairy Farms Marketing Milk Under Federal Milk Orders. Unpublished report. Economic Research Service, U.S. Department of Agriculture. April 1984. Note - the 120,655 farms accounted for about 69 percent of all milk produced in May 1983, but excluded most farms in California and other states where there is no federal milk order.

Table 1. Total producers and size distribution of herds selling milk to plants regulated by federal milk marketing orders, May 1983.

Region (State)	Total Producers	All Farms	Largest Ten Percent	89-70 Percentile	69-40 Percentile	Smallest forty Percent
		Average Herd Size for				
	number	milk cows				
Lake States						
Minnesota	9,968	53	116	74	49	30
Wisconsin	24,400	54	133	68	52	28
Northeast						
Pennsylvania	12,928	49	127	66	44	25
New York	13,374	59	162	81	53	27
Southeast						
Georgia	962	127	343	181	117	54
Florida	352	532	1,861	931	355	133
Southwest						
New Mexico	176	333	1,832	433	169	32
Arizona	160	510	1,733	714	433	160
California	13	400	1,640	580	253	110
Northwest						
Idaho	574	135	607	169	90	34
Washington	1,647	127	418	171	108	46
United States	120,655	63	202	82	54	26

le 2. Representative dairies selected for preparation of whole farm budgets, by region and herd size.

ion/State	Herd Size	Crop-land	Housing Facilities[a/]	Sun Shades	Feed Produced	Silage Storage	Total Labor
	(cows)	(acres)	(type)			(type)	(W/e)[b/]
:e States							
Minnesota	52	188	Stanchion	No	Most	Upright	2.03
Minnesota	125	449	Free Stall	No	Most	Upright	3.30
·theast							
Pennsylvania	52	156	Stanchion	No	Forage	Trench	2.2
Pennsylvania	125	375	Free Stall	No	Forage	Trench	3.8
Pennsylvania	200	600	Free Stall	No	Forage	Trench	5.54
New York	52	156	Stanchion	No	Forage	Trench	2.21
New York	200	600	Free Stall	No	Forage	Trench	5.54
New York	600	1800	Free Stall	No	Forage	Trench	14.36
ıtheast							
Georgia	200	400	Free Stall	Yes	Forage	Trench	4.5
Georgia	350	700	Free Stall	Yes	Forage	Trench	7.84
Florida	350	0	Open Field	Yes	None	NA	7
Florida	600	0	Open Field	Yes	None	NA	11
Florida	1436	0	Open Field	Yes	None	NA	18
ıthwest							
New Mexico	900	0	Corrall	Yes	None	NA	13
Arizona	359	0	Corrall	Yes	None	NA	7
Arizona	834	0	Corrall	Yes	None	NA	12
Arizona	1436	0	Corrall	Yes	None	NA	16
California	550	0	Corrall	Yes	None	NA	9
California	1436	0	Corrall	Yes	None	NA	16
rthwest							
Washington	140	51	Free Stall	No	Silage	Trench	2.96
Idaho	200	400	Corrall	No	Most	Trench	5.0
Idaho	550	0	Corrall	No	None	NA	10.5

Housing types are:
Stanchion - A conventional barn with locking stanchions in which cows are milked and fed.
Free Stall - A covered barn with individual stalls in which cows can free enter and exit.
Open Field - A field where cows are kept that is large enough to maintain plant cover.
Corral - A drylot open pen where cows are kept and fed at a fenceline feeder.

Labor in worker equivalents of 2,500 hours annually.

ι = not applicable.

and likely will become more prevalent in the future.[2/]

Technologies and Practices

The technologies and practices assumed for each of the 22 dairy operations were based on discussions with dairy producers, university and government employees and equipment representatives. The objective of these discussions was to describe an "efficiently" organized dairy operation using proven technologies and practices for each specified herd size. Therefore, the dairy operations in this study are not average of what now exists but rather approximate modern sizes and types of operations.

The 52-cow dairies in Minnesota, Pennsylvania, and New York use the conventional stanchion barns for housing and milking cows (Table 2). For larger herds in the Lakes States, Northeast, Washington, and Georgia, free stall housing and milking parlors are assumed.

Cows are kept in open corrals throughout the Southwest and on larger Idaho dairies. Sun shades in the corrals are assumed in New Mexico, Arizona, and California (Southwest) but not in Idaho. Cows are milked twice a day in milking parlors and fed at fenceline bunks from a feed wagon or truck.

Open fields with sun shades are assumed in Florida. One-half acre per cow is provided allowing fields to remain plant covered in

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2/ Based on discussions with Bill Grizzly at Penn State University and Robert Milligan and Wayne Knoblauch at Cornell University. However, the author takes responsibility for actual development of budgets for these size dairies.

order to minimize mud problems. Cows are milked twice a day in a milking parlor. After leaving the milking parlor, cows are fed concentrates in a feed barn before being released back to the field. Roughage is fed loose in the open fields.

The source of feed follows the common practice existing in the various states. Most feed is purchased from off the dairy operation in New Mexico, Arizona, California, and Florida. The same is assumed for the 550-cow Idaho dairy. Dairy operations in Pennsylvania, New York, and Georgia, purchases most of the concentrates but produce most of the forage used by the dairy herd. All feed is assumed to be produced on the Minnesota and the 200-cow Idaho dairies. A relatively small quantity of silage is raised on the Washington dairy which purchases all concentrates and alfalfa hay from off the farm.

Except for Minnesota, silage produced on the dairy operation is stored in trench silos. In Minnesota vertical upright concrete-stave silos are assumed for storaging silage, haylage and high moisture corn.

A detailed list of dairy buildings and equipment, tractors and vehicles and field machinery for each of the 22 dairy operations are shown in Appendix A.

Profitabifity Measure

A simple average annual rate of return to total investment is used to measure profitability and to compare returns on the twenty-two dairy operations. The measure is:

$$r = \frac{R - OC - OS}{1}$$

where: r = the average annual rate of return,

R = total annual revenue from all sales, including milk, dairy replacements, cull cows, and bull calves,

OC = total annual operating costs for the entire dairy, including wages of hired labor and an allowance for the owner-operator's labor and management,

OS = total annual ownership costs including depreciation but excluding interest costs, and

I = total investment outlay for the entire dairy operation.

The measure of profitability is pre-income tax. Therefore, no explicit consideration is given to possible investment incentives created for specific individuals through tax regulations, such as expensing, rapid depreciation and investment credits. This limits the conclusions of the study but avoids the need for assumptions about each investor's own financial situation. For example, a tax liability may be calculated strictly on the income from the dairy operation itself or including nondairy income or business(es) for which the dairy would be just a part of a much bigger tax liability picture.

The debt/asset ratio, liquidity, and solvency measures vary for each person who might set up one of the dairies. Although these measures affect an individual's success and long-term viability in milk production, they are ignored here. Over time, dairy owners supported by adequate financial backing and favorable net worths would be attracted if the rate of return on total investment (profitability) was high enough.

In the long-term, the profit opportunities in dairy will affect milk production more than net worth, liquidity, or solvency positions of specific individuals. Some of these questions are considered in a later part of this report.

The calculations for total revenue above all costs and costs per hundredweight (cwt) of milk cover payments for all factors, including the owner labor and management and a real interest charge on the average annual investment. The cost per cwt of milk was adjusted because sales, though dairy-related, include more than milk.

Annual Costs

Annual costs reflect the assumptions used to calculate depreciation, property taxes, insurance, and interest costs. The following calculations are used in this study:

Depreciation

$$\text{Annual Depreciation} = \frac{PC - (SV)\ (PC)}{UL}$$

where:

PC = purchase cost,

SV = salvage value expressed as a percentage of purchase cost, and

UL = useful life in years.

Property tax--Annual property taxes for depreciable assets are calculated as a proportion of the assets' average annual value over its useful life. The average annual value over its useful life. The average annual value is calculated as:

$$AAV = \frac{PC + (SV)\ (PC) + \frac{(PC + (SV)\ (PC))}{UL}}{2}$$

where:

PC, SV, and UL are as described before.

The dollars of tax per $100 of average annual value reflects property tax by using percentages of market value (Appendix A).

Insurance--Insurance costs for depreciable assets are based on a rate per $100 of annual average value. Annual average value is calculated the same as in the property tax computation (Appendix A).

Insurance costs include coverage on one-half the value of hay inventory but no coverage on livestock, silage, or concentrates.

Interest--Interest costs for depreciable assets are based on the real interest rate multiplied by the annual average value.

Costs and Returns

The specialized dairy operations considered in this report receive all revenue from the dairy enterprise. Milk sales are the single largest source of revenue, but the sale of cull cows, bull calves, and replacement heifers beyond those needed for herd replacement are also important. Price changes for any of these items would greatly affect total revenue generated by the dairy operation and, therefore, the rate of return to total investment.

Revenue

Revenue from milk sales depends on milk produced and the price received for milk sold. Prices received for milk delivered to plants vary from one state to another, largely reflecting the classified pricing policy of federal and state milk orders and the proportion of milk used as fluid in the various states.

The level of milk production per cow used is the same as the average achieved by herds in the 1982 Dairy Herd Improvement Association (DHIA) program in the respective states.

Costs

The average annual cost is divided into operating and ownership costs. Operating costs include purchased feed and a wide range of expenses such as farm repairs, hired and operator labor, utilities and fuel for the dairy herd, and veterinary and breeding fees. Operating costs also include seed, fertilizer, fuel, and other annual expenses associated with feed production on Minnesota and Washington dairies.

Annual ownership costs include depreciation, property taxes and insurance premiums. Annual depreciation was calculated for durable assets including buildings and dairy equipment, tractors, vehicles, and field equipment. Property taxes and insurance premiums were based on annual dollars paid per $100 of average annual value (Appendix A).

All interest charges, except interest on operating costs, were excluded to calculate the average annual rate of return to total investment.

Labor is paid before calculating the rate of return to total investment. If the calculated rate of return (r) is greater than the interest rate, then retained earnings are positive.

Feed Requirements--Feed is the most important cost of producing milk, whether purchased outright or raised on the dairy farm. Differences in feed assumptions can make a significant difference in the relative rate of return to investment in the various states. The ration composition differs from state to state. However, it was assumed that a milk cow of a given weight and breed and producing the same amount of milk would require the same dry matter intake, regardless of location. Variations in regional forage quality can be partly offset by changing the composition of the concentrates and by adding supplements so as to yield a balanaced ration. To the extent it cannot, milk production per cow would be lower.

Data show the average annual pounds of dry matter intake per day per 100 pounds of body weight to be 2.326 plus 0.004824 multiplied by the hundred weights of milk produced by the cow per year.[3/] Feed fed by state and milk per cow are shown in Table 3.

The proportion of dry matter from concentrates in the various states was estimated from the pounds of grain fed to a milk cow as reported by the U.S. Department of Agriculture's Statistical Reporting Service.[4/] It was assumed that forages constituted the remaining dry matter requirement.

Producers are assumed to feed 11,877 pounds of hay, 627 pounds of grain, 52 pounds of calf starter, and 40 pounds of milk replacer to a dairy heifer replacement to reach 1,250 pounds body weight in 26 months. A dairy bull that weighs 2,000 pounds is assumed to require 4,056 pounds of grain and 7,300 pounds of hay per year.

3/ Data are from Minnesota Dairy Herd Improvement Association summaries

4/ U.S. Department of Agriculture, Milk Production, Statistical Reporting Service, July 16, 1982, p. 6.

Table 3. Annual feed requirements for adult milk cows and annual milk production per cow.

State	Annual Feed Fed[a/]				Annual Milk/Cow
	Hay	Silage	Haylage	Concentrate	
	pounds				
Minnesota	3,639	9,703	7,116	4,816	14,764
Pennsylvania	5,301	7,068	5,183	5,200	15,260
New York	5,820	7,761	5,691	4,350	15,540
Washington	8,171	5,447	0	5,930	16,954
Idaho	10,375	0	0	5,180	15,170
Georgia	4,235	12,848	0	6,080	13,149
Florida	4,235	0	0	10,320	13,149
New Mexico	9,244	0	0	6,410	16,135
Arizona	8,733	0	0	6,970	16,570
California	8,871	0	0	6,800	16,371

a/ Weights are as fed. Dry matter content of feed varies some by state but is approximately 89 percent for alfalfa, 33 percent for silage, 45 percent for haylage and 90 percent for concentrate.

Total hired labor ranges from 1.03 worker equivalents (2,575 hours) of part-time hourly labor on the 52-cow Minnesota dairy to 18 full-time workers on the 1,436-cow Florida dairy. Some of the part-time labor hired in Minnesota, Pennsylvania, New York and Washington is seasonal and associated with crop production (Table 2).

Investment Requirements

The estimated new (replacement) cost per cow for assets required on the twenty-two dairies are summarized in Table 4. Replacement or new costs are used so that the average annual costs of ownership will reflect an amount sufficient to replace worn out assets when needed. Costs then reflect an amount needed to maintain the long-term viability of the operation.

On dairies without cropland for feed production, the total investment per cow ranges from $3,372 on the 1,436-cow Florida dairy to $5,053 for the 359-cow Arizona dairy. Including land and field machinery to produce feed, the Minnesota 52-cow dairy has a total replacement value of assets of more than $15,000 per cow. The difference between herd sizes and regions are best reflected in comparing investment per cow in dairy buildings and equipment. Here the range is from $749 on the 1,436-cow Florida dairy to $4,871 for the 52-cow Minnesota dairy (Figure 2). The investment per cow in dairy buildings and equipment is substantially less on larger than on smaller dairies regardless of region. For typical herd sizes, the investment per cow is substantially less in Southeast and Southwest regions than in other regions. However, the 600-cow New York and 550-cow Idaho dairy

Table 4. Summary of replacment investment cost per cow for dairy operation.

Region/State	Herd Size	Dairy Builing and Equip.	Tractor and Vehicles	Field Machinery	Cattle	Land	Milk Base	Total	Total Farm ($1000)
	number	dollars							
Lake States									
Minnesota	52	4,871	1,764	1,503	1,800	5,517	0	15,455	804
Minnesota	125	4,172	1,015	575	1,800	5,481	0	13,043	1,630
Northeast									
Pennsylvania	52	4,094	1,771	1,488	1,800	4,595	0	13,749	715
Pennsylvania	125	3,683	833	640	1,800	4,555	0	11,511	1,439
Pennsylvania	200	2,770	753	400	1,800	4,536	0	10,259	2,052
New York	52	4,094	1,771	1,445	1,800	4,673	0	13,784	717
New York	200	2,748	749	389	1,800	4,613	0	10,299	2,060
New York	600	1,506	338	192	1,800	4,600	0	8,436	5,062
Southeast									
Georgia	200	2,262	539	278	1,800	3,113	0	7,990	1,598
Georgia	350	1,667	308	159	1,810	3,086	0	7,029	2,460
Florida	350	1,240	168	20	1,811	750	0	3,989	1,396
Florida	600	1,026	141	16	1,810	750	0	3,744	2,246
Florida	1,436	749	59	7	1,807	750	0	3,372	4,842
Southwest									
New Mexico	900	1,353	63	0	1,810	261	0	3,487	3,138
Arizona	359	1,789	125	0	1,811	110	1,218	5,053	1,814
Arizona	834	1,414	68	0	1,811	109	1,218	4,620	3,853
Arizona	1,436	1,161	50	0	1,811	107	1,218	4,346	6,241
California	550	1,797	81	0	1,810	291	805	4,784	2,631
California	1,436	1,385	50	0	1,810	217	805	4,267	6,127
Northwest									
Washington	140	2,504	519	363	1,800	1,714	88	6,989	978
Idaho	200	2,337	444	474	1,800	3,113	0	8,168	1,634
Idaho	550	1,474	111	0	1,810	109	0	3,504	1,927

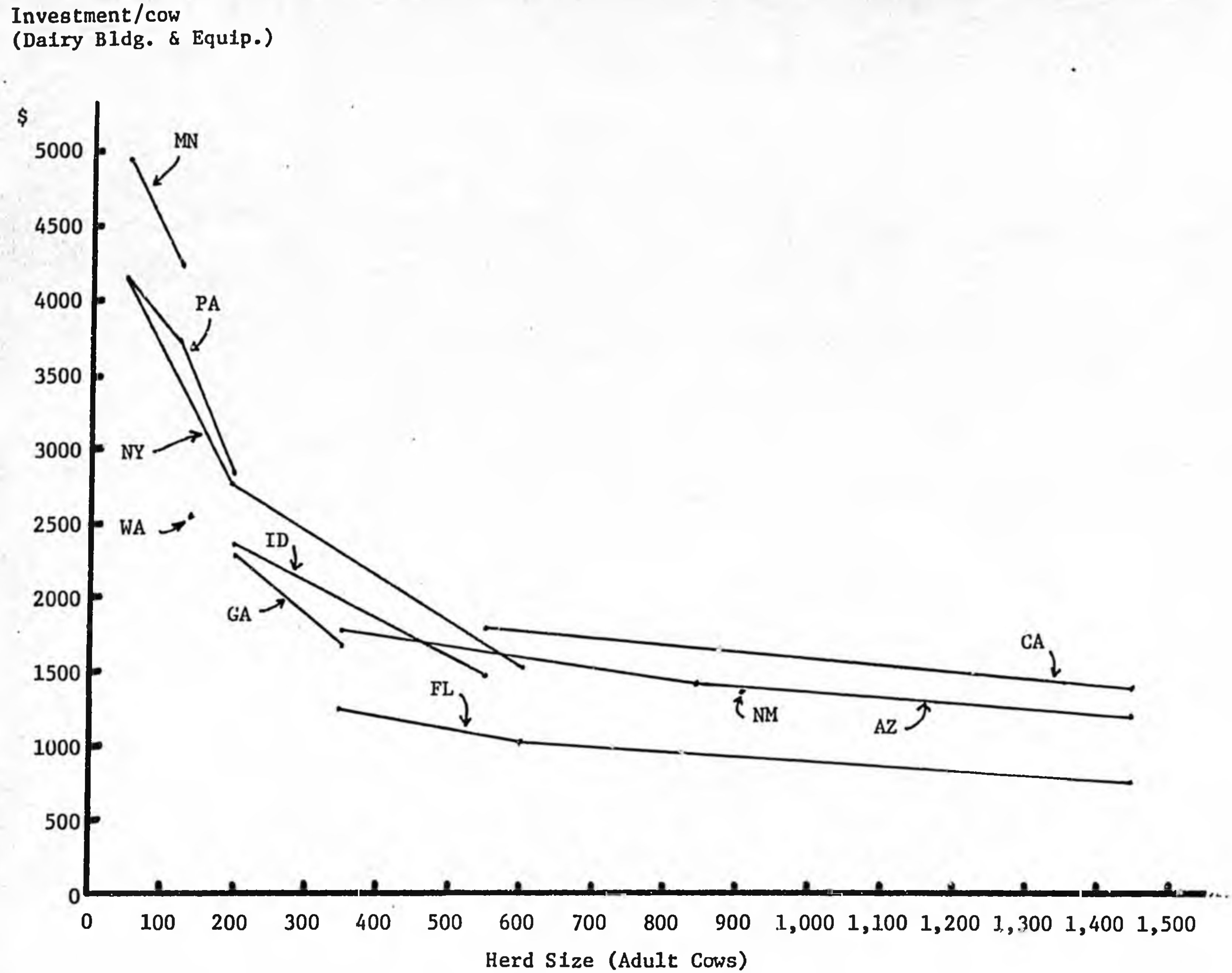

Figure 2. Replacement investment per cow in dairy building and equipment by herd size and state.

have investment requirements for dairy buildings and equipment quite comparable to large dairies in other regions.

Policy Scenarios

The base scenario assumes the "all" milk prices received by dairy producers in 1982 (Table 5). The price varies from $12.70 cents per cwt in Idaho to $16.40 in Florida. The difference in price between states is due in large part to pricing policies under federal and state milk marketing orders. States with relatively high prices are areas where milk used as a fluid beverage (1) is priced relatively high and (2) is a relatively large share of total sales. The corresponding U.S. manufacturing price of $12.60 per cwt was equivalent to about 67 percent of the full parity price.[5/]

These prices are relatively low as the support price for milk has been set between 75 and 90 percent of parity from 1949 until the recent legislation. The 75 to 90 percent of parity range has fairly accurately reflected the long-term market clearing milk price that would bring supply and demand into balance. Because the parity price does not fully account for productivity gains in milk production, it would be expected that the long-term market clearing milk price would be, over time, equal to a lower percentage of the full parity price. For purposes of this analysis, 70 percent of parity is used as an approximation of the long-term market clearing milk price.

5/ The parity price at any time is the price that would give 100 pounds of milk the same purchasing power it had during the 1910-14 period.

Table 5. Milk price under 1982 base and alternative scenarios.

State	1982 Base	I	II	III	IV
	dollars/cwt				
Minnesota	12.98	13.49	13.11	12.56	12.98
Pennsylvania	14.00	14.51	13.11	13.58	14.00
New York	13.70	14.21	13.11	13.28	13.70
Washington	13.30	13.81	13.11	12.88	13.30
Idaho	12.70	13.21	13.11	12.28	12.70
Georgia	14.40	14.71	13.11	13.98	14.40
Florida	16.40	16.91	14.71	15.98	16.40
New Mexico	14.15	14.56	13.11	13.73	14.15
Arizona	13.90	14.41	1 .11	13.48	13.90
California	13.21	13.63	13.11	12.70	13.12
U.S. Manufacturing (support)	12.60	13.11	13.11	12.18	12.60

Scenarios are:

- 1982 Base - 1982 prices and conditions (67 percent of parity milk price).
- I - Higher support price equal to estimated long-run market clearing price of 70 percent of parity.
- II - No classified pricing for fluid milk but continuation of federal order program and a 70 percent of parity long-run equilibrium price.
- III - Lower long-term market clearing price equal to 65 percent of parity.
- IV - 1982 base price but with milk per cow equal to top 20 percent of producers using Dairy Herd Improvements in 1982.

Total hired labor ranges from 1.03 worker equivalents (2,575 hours) of part-time hourly labor on the 52-cow Minnesota dairy to 18 full-time workers on the 1,436-cow Florida dairy. Some of the part-time labor hired in Minnesota, Pennsylvania, New York and Washington is seasonal and associated with crop production (Table 2).

Investment Requirements

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EXHIBIT B-2

Adjusted cost per cwt

A cost per cwt of milk (adjusted for sales other than milk) tended to be lower on large than on small dairies in all states (Figure 4). Also costs were lower on the very large dairies in California, New Mexico, Arizona, and Idaho than on smaller dairies in Minnesota, Pennsylvania, and New York. However, the 600-cow New York dairy had comparable costs to herds of about that size in other states.

The major exception was the relatively high cost for Florida dairies. Floridas' high costs are in part offset by relatively high milk prices resulting in the competitive rate of return on investment discussed in the previous section and illustrated in Figure 3.

The cost per cwt of milk is nearly the same for alternative price support or federal order policy scenarios. However, costs per cwt drop dramatically for producers achieving milk production per cow equal to the top 20 percent of producers using DHIA tests compared to a producer achieving the average of all producers using DHIA tests (Table 8).

Conclusions of long-term analysis

A rate of return to investment is calculated for twenty-two dairy farms after all operating costs are paid and sufficient money withheld to maintain the long-term viability by replacing worn out equipment and facilities. The major findings of the analysis include the following:

1. Investment per cow in dairy buildings and equipment is less on larger than on smaller dairies.

2. For the herd sizes that characterizes dairy farming in each region, investment per cow is less for the large dairy operations in the Southwest, Northwest and Southeast than for the Lake State and Northeast regions.

EXHIBIT B-3

3. Based on whole farm budgets, the larger dairies with 500 cows or more are more profitable than smaller dairies. Considering the long-term, effeciently operated dairies in New Mexico, Arizona and Florida are more profitable than their counterparts in California, Idaho, Minnesota and the Northeast. This result is the bottom line after reflecting regional difference in costs and milk prices received.

4. Although costs per cwt of milk are highest in Florida, the relative high price received for milk provides a competitive return. The profitability of California and Idaho dairies is adversely affected by lower milk prices compared to New Mexico, Arizona and Florida dairies.

5. Strong economic pressure exists for farms to get larger in all regions. This will continue the trend to fewer and larger dairies.

6. The relatively favorable profit potential (rate of return) of large scale dairy farming in the Southwest, Southeast and Northwest regions will likely result, over the long term, in a continued shift in milk production to those areas. Those areas will likely increase their relative share of total U.S. milk production, placing increased competitive pressure on the traditional Lake States and Northeast dairy areas.

7. The profitability of dairy farming is greatly improved in all regions when management achieves production per cow levels equal to the top 20 percent of the farmers using Dairy Herd Improvement Testing programs (Scenario V). Achieving these performance levels tends to improve the profitability of large more than small dairies, adding more economic incentive for large scale dairying.

EXHIBIT B-4