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FARMING IN ALASKA



Winter's snow briefly covers the Matanuska Experiment Station farm. These fields are usually blown free of snow by early February, exposing perennial crops to severe winter-killing conditions. Chugach mountains in the back-ground mark the east and south boundaries of the Matanuska Valley, widely known for its colonization in the 1930's.

ALASKA AGRICULTURAL EXPERIMENT STATION
PALMER, ALASKA
ALLAN H. MICK, ACTING DIRECTOR
IN COOPERATION WITH THE
UNITED STATES DEPARTMENT OF AGRICULTURE

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Preface

Growing food is an important industry in Alaska. In 1954 the farm value of food produced in the Territory was \$2,877,952. By national standards the retail value of this farm-grown food was about \$5½ million. Home gardeners raised another \$2,000,000 worth for home consumption. Food production now contributes at least \$7 million a year to the Territory's economy. Most of these dollars stay in Alaska where they create other jobs, build new capital improvements and swell the demand for trades and services.

Farming provides a good living for many families. The crops they grow feed many other people and help restrain spiralling living costs by keeping down prices of imported foodstuffs through competition. Services and supplies purchased by farm families create markets and jobs. The wealth Alaska's farmers reap from the land—new wealth—turns over time after time in the Territory's economy where it pays interest, salaries, rents, taxes, generates new credit, and helps support other Alaskan industries.

Although skillful farmers with adequate resources earn good incomes, generalizations are often depressed by a preponderance of records from under-developed places and from homesteads only a few years old. It

must be borne in mind that the good earnings of Alaska's productive farms are sometimes overshadowed by the struggles of homesteaders. Many low income farms pay poorly because of their extreme youth. During their early stages of growth, they are actually developed by their owner's off-farm earnings. On many homesteads off-farm income is the family's only cash resource. Other sources of farm financing have been extremely scarce in Alaska. But because this is a farm production study, off-farm earnings are not included in the interpretations.

Many farms yielding low returns were only a few years out of the wilderness. Some can scarcely be called farms in the modern sense. For four or five years they yield no income at all. For ten to fifteen years, their owners depend chiefly on off-farm income for both living and capital to clear land, buy machinery and erect buildings. That most homesteaders are not only willing to endure this ordeal, but that they enjoy their way of life and gain immeasurable satisfaction in creating their farms is a tribute to their courage and hardihood. These people, struggling under handicaps inconceivable to their urban neighbors, are the Territory's least appreciated asset.

ALLAN H. MICK
Acting Director

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An analysis of commercial farming in Alaska has long been needed. This report may supply helpful information. It spans the years from 1949 to 1954, a time of rapid development and growth. The study analyzes detailed information supplied by 75 to 85 farmers in the Matanuska Valley and by 15 to 30 others in the Tanana Valley. In 1952, records were also obtained from 19 farmers in the Kenai Peninsula. These records are estimated to cover about 60 per cent of all commercial farming activity in these particular areas during the period.

Information on farming in areas outside the Kenai Peninsula and the Railbelt was gathered from mailed questionnaires supplemented by personal observations. Data for 1949 and 1950 were collected by Clarence A. Moore and were first summarized in his Mimeographed Circular 1, Alaska Farms: Organization and

Practices in 1949, and Bulletin 14, Farming in the Matanuska and Tanana Valleys of Alaska, both published by the Alaska Agricultural Experiment Station. The authors are grateful to the farmers, agencies and others whose help made this work possible.

Richard Andrews was formerly an agricultural economist working under the supervision of Hugh Johnson. Mr. Johnson headed up the economics research program of the Alaska Agricultural Experiment Station until his resignation in 1955 to accept a fellowship at Harvard University. Their report has been edited by Lenore Hedla and Allan H. Mick. The editors assume responsibility for certain sections as indicated and for many interpretive comments.

FARMING IN ALASKA

RICHARD A. ANDREWS AND HUGH A. JOHNSON

OVER 400 commercial farms have been hewed from Alaska's wilderness in areas stretching from the southern tip of the Panhandle to the Arctic Circle and out to the western tip of the Aleutian Islands. Many new homesteaders hope to build their holdings into modern farms. Their hopes glow undimmed by their minority position in present day society and by their general lack of resources other than an unbounded freedom to pursue their way of life on Alaska's frontiers.

Agriculture in Alaska is something of a paradox. The number of people engaged in farming in the United States has steadily declined since the onset of the industrial revolution 80 to 90 years ago. Fewer and fewer people have been able to grow more and more food. During the past two decades this movement has picked up momentum. Modern food production is based on highly organized land use, involving somewhat less than 13 percent of the nation's population. Farm production depends on a high degree of mechanization and large capital investments.

While it is true that the sub-Arctic is capable of growing much food and must somehow contrive to exploit this potential if a stable economy is to develop, the historical processes of developing new frontier farms have long been outdated. Nothing in the nation's modern economy favors new farm developments. On the contrary, modern political, economic and social patterns—conservation philosophies, price supports, marketing organization, financing devices—conservatively help maintain the status quo, the security of our established farm society. In this modern day the homesteader's motivations, his dreams, his goals are not widely understood. Understanding, where it professes to exist, is generally in terms of what happened in grandfather's day and not within the framework of modern living standards, modern equipment and modern financing.

Although some farming has been practiced in Alaska for more than two-thirds of a century, the first surge in modern farm settlement followed the gold rush at the turn of the century when many adventurers found their mining claims unprofitable and turned to growing food for a living. A second surge accompanied railroad construction in the early 1920's. After nearly two decades of subsistence agricultural activity, World War II and post-war defense expenditures paved the way for current agricultural expansion within Alaska's economy. From 1942 through 1953, the farm value of agricultural production increased from a half million to almost \$3 million. Characteristic of Alaskan agriculture has been its floods and ebbs of activity.

Few studies concerning the economics of farming in Alaska have been made. The Alaska Railroad made a general survey in the early 1930's. In 1939 the land utilization section of the then Bureau of Agricultural Economics made a survey of land use problems. In

1948 the Alaska Agricultural Experiment Station entered the field with a preliminary farm management study in the Matanuska and Tanana Valleys and on the Kenai Peninsula.

This report continues these early efforts. It carries the record through six years from 1949 to 1954. It describes production costs and returns from farming, factors that influence farm income, and levels of production that yield maximum net farm income. It describes agricultural trends and provides statistical information for farmers and others who buy or sell home-grown food or whose businesses or interests are in any way related to the scope and progress of commercial food growing in Alaska.

AGRICULTURAL AREAS OF ALASKA

Between one and three million acres of Alaska's 571,000 square miles of land are suitable for cultivation. Another three to five million acres are suitable for limited grazing. By 1954 approximately 13,200 acres had been cleared. Crops were harvested from about 12,000 of these cleared acres.

There are six major food growing areas in Alaska. These are listed and statistically defined in Tables 1, 2 and 3*. The Matanuska Valley, favored by farm credit stemming from its well-publicized colonization of the mid-1930's, now grows over half of all farm products raised in the Territory. No other area in Alaska has enjoyed this kind of credit. As a consequence, no other farming area is as fully or efficiently developed. Although the Matanuska Valley depends on the Anchorage market, its activities are centered on Palmer, an incorporated city of about 1,000 population, the only true "farm" community in the Territory.

Farm income is derived primarily from six commodities. Of these, milk sales are by far the largest. In 1954 almost 11½ million pounds were sold, compared to 9½ in 1953. Dairying is therefore a rapidly growing business. Of the total milk sales, 67 per cent were in the Matanuska Valley, 16 in Southeastern Alaska, 7 per cent in the Tanana Valley, and 10 per cent in all other areas.

*Alaska Agricultural Experiment Station and Alaska Department of Agriculture Mimeo statistical report, April 1955, Agricultural Production in Alaska for 1954.

Table 1.—Commercial farm income (and value of products used at home) in Alaska during 1954.

Source of Income	TOTAL	Tanana Valley	Matanuska Valley	Anchorage Area	Kenai Peninsula	Kodiak & Aleutians	Southeastern Alaska
Dairy products	\$1,257,906	\$93,500	\$337,644	\$26,935	\$64,777	\$35,000	\$200,000
Beef	57,121	1,400	24,036	1,000	7,685	18,000	5,000
Lamb	1,050	—	—	—	—	1,050	—
Pork	28,940	1,800	300	26,600	240	—	—
Wool	30,056	—	56	—	—	30,000	—
Eggs	348,450	9,900	135,550	33,000	60,000	10,000	100,000
Poultry Meat	63,390	3,375	12,825	32,000	2,590	600	12,000
Potatoes	618,025	205,420	321,725	67,780	15,600	—	7,500
Cabbage	38,578	12,180	18,298	8,100	—	—	—
Lettuce	57,470	9,600	46,515	1,355	—	—	—
Carrots	33,122	4,600	26,900	1,622	—	—	—
Other produce	69,662	10,600	33,080	8,467	5,015	2,500	10,000
Fur farm products	61,000	—	—	—	—	—	61,000
TOTAL commercial sales	2,664,770	352,375	1,456,929	206,909	155,907	97,150	395,500
Farm use*	213,182	28,190	116,554	16,553	12,473	7,772	31,640
TOTAL farm production	\$2,877,952	\$380,565	\$1,573,483	\$223,462	\$168,380	\$104,922	\$427,140
Per cent	100	13	55	8	6	3	15

*Estimated at 8 per cent of commercial sales

Table 2.—Volume of major commodities grown on commercial farms in Alaska during 1954, by areas.

Commodity	TOTAL	Tanana Valley	Matanuska Valley	Anchorage Area	Kenai Peninsula	Kodiak & Aleutians	Southeastern Alaska
Milk	thousand lbs 12,156*	850	7,616	249	539	175	2,000
Beef	pounds 206,914*	3,500	62,510	2,000	15,370	45,000	10,000
Pork	pounds 110,335*	3,000	500	92,000	400	—	—
Lamb	pounds 4,250*	—	—	—	—	1,750	—
Wool	pounds 60,115	—	115	—	—	60,000	—
Eggs	dozens 388,867*	9,000	148,340	30,000	60,000	10,000	100,000
Poultry meat	pounds 97,140*	4,500	24,710	40,000	3,700	1,200	16,000
Potatoes	tons 6,431	1,684	3,785	757	130	—	75
Cabbage	tons 282	87	130	65	—	—	—
Lettuce	tons 325	127	190	8	—	—	—
Carrots	tons 211	20	180	11	—	—	—

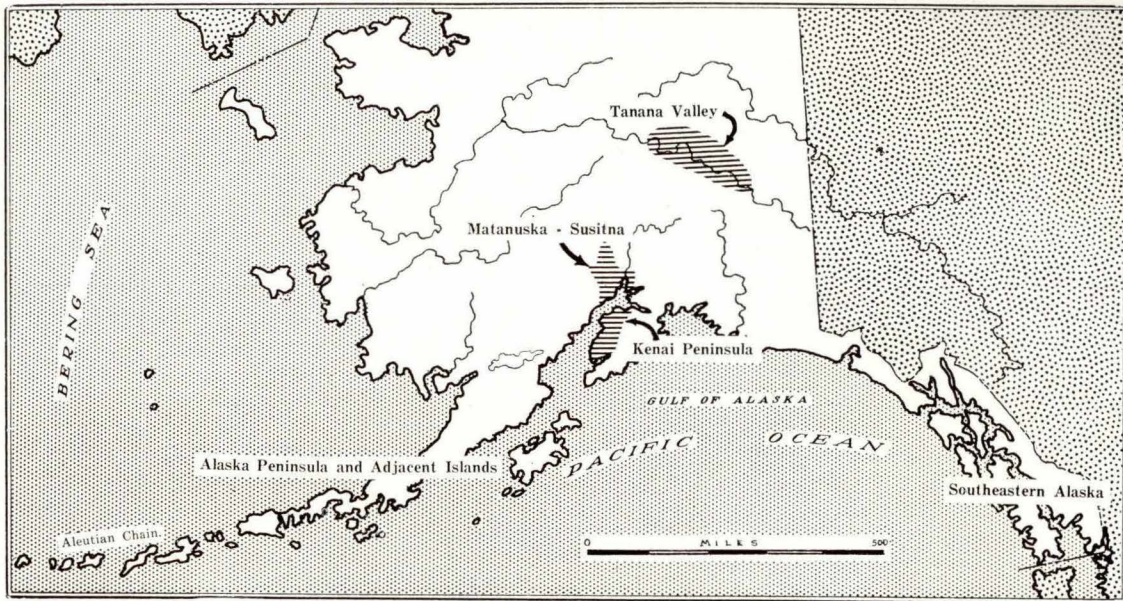
*Including estimates of commodities used at home.

Table 3.—Livestock on Alaskan farms, acres in specified crops, and total cropland in Alaska during 1954.

Kind	TOTAL	Tanana Valley	Matanuska Valley	Anchorage Area	Kenai Peninsula	Kodiak & Aleutians	Southeastern Alaska
Milk cows	number 1,628	138	1,000	55	100	45	290
Heifers	number 545	20	340	30	30	15	110
Heifer calves	number 442	50	295	20	35	12	30
Dairy bulls	number 67	14	30	—	3	2	18
Beef animals	number 3,075	60	195	35	155	2,600	30
Hens	number 32,200	1,000	13,900	3,800	5,000	1,000	7,500
Chickens	number 10,820	120	2,900	5,000	800	—	2,000
Hogs and pigs	number 1,062	125	90	820	7	20	—
Sheep	number 9,110	20	10	—	80	9,000	—
Potatoes	acres 1,160	475	560	85	25	**	15
Vegetables	acres 305	60	185	30	20	**	10
Other crops*	acres 11,750	1,965	8,070	635	680	**	400
TOTAL cropland	acres 13,215	2,500	8,815	750	725	**	425
Clearing in 1955	acres 1,035	350	445	90	150	**	—

*Grain, oat-pea forage mixtures, bromegrass and pastures account for over 90 percent of this acreage. About 1,200 acres were either planted or not harvested or remained idle in 1954.

**Not reported



Prospective settlers are usually interested in the Tanana Valley, the Matanuska Valley or the Kenai Peninsula.

Potatoes are the next most important source of farm income, accounting for 23 per cent of farm sales in 1954. Although fewer acres were planted in 1954 and lower yields reduced the harvested crop by about a third from 1953 production, actual sales fell off only about 10 per cent. Improved storage management and more stringent disease control channelled a larger portion of the 1954 crop to consumers.

Ranking third as a source of farm income were poultry and eggs which accounted for 15 per cent of all farm sales in 1954. Low egg prices in the States forced down prices in the Territory, with severe competition developing in late 1954 and carrying forward into 1955. But despite lower prices, egg production jumped 25 per cent over 1953. At the same time broiler and fryer production declined.

Although there was no reduction in total quantities of vegetables grown in the Territory, lower prices in 1954 reduced income from this source by 13 per cent. In 1954 vegetable sales brought in 8 per cent of all farm income.

Livestock products including fur (but excluding the reindeer industry which is still not considered a commercial farming business) brought in 7 per cent of all farm income in 1954.

Although important beef and sheep spreads were located in what are generally considered rather inaccessible areas, they were primarily based on grazing lands. Most cleared land was located within 50 miles of main market outlets which were the cities of Anchorage, Fairbanks, Juneau, Kodiak and several smaller settlements. Large areas of land suitable for fairly intensive cultivation are still available in all farming regions. Even in the Matanuska Valley, more than a third of the useable acres on existing farms

still remains in forest. Until these lands are put to use, it is unlikely that more inaccessible places will attract more than occasional interest. Commercial food growing flourishes only where efficient communication and transportation links farms to adequate markets.

The Tanana Valley

Commercial agriculture in the Tanana Valley reached a peak in the 1920's when 107 farmers were reported to have cropped 1,764 acres. At that time, railroad construction and gold mining created large, temporary outlets for home-grown food. Fifteen years later not more than ten farmers remained.

World War II and a post-war construction boom brought new agricultural settlement, spearheaded by veterans and their families. About 30 of them reported growing and selling crops in 1949. Six years later well over 50 families grew food commercially. By 1954 Tanana Valley farmers received almost a half million dollars for their products. Potatoes were the leading cash crop although two commercial dairy farms and two poultry farms were important in the local farm economy. The Tanana Valley's chief markets were the city of Fairbanks and nearby military installations. Much more home-grown food could have been sold than was raised.

Expansion of Tanana Valley farms has been hampered by a scarcity of loan capital for agricultural needs, inadequate buildings and poor domestic water supplies. Struggling homesteaders were encouraged by hopes of improvement in these serious handicaps. Great gains were made in marketing although there was still plenty of room for improved methods of getting produce from the farm into the consumer's hands.



Planting potatoes in the Matanuska Valley

On the average small commercial farm, the chief cash crop was potatoes. This study included only these small farms, for which 30 representative enterprise records were available in 1953. These 30 farms were estimated to have grown about 85 per cent of all potatoes and vegetables marketed in the Tanana Valley during the years between 1949 and 1950. Excluded from the study were two large commercial dairies and one or two large vegetable enterprises which, while outstanding and of great significance, departed so far from the average as to be considered unique. By 1953 there were some 24 or 25 homesteads about to enter production but these places were excluded also because they could not yet be considered commercial farms.

THE FARMER AND HIS FAMILY.—Most farmers were newcomers who were nearly all veterans of World War II. Over half came to the Valley after 1949. Only a sixth of all farmers had been on their places since 1938. Most were either young or past middle age. Almost two-thirds were under forty and the others were fifty or older. Three-fourths were married and most of them had children—some old enough to help with farm work. Family life and building up family holdings were major goals of most farmers. Although the desire to farm was strong, their non-farm work often returned more than could be earned on the farm.

THE FARM AND LAND USE.—Although farm holdings were fairly large—160 acres or more—the average commercial farmer had less than a quarter of his land available for growing crops. In no year did the average farm planting exceed 40 acres. On every farm there were many acres of good land suitable for cropping but still not cleared (see Table 4).

Tanana Valley farmers cleared about five acres per farm per year during the six years between 1949 and 1954. The gain in tilled cropland per farm was less than this figure because some land reverted to brush while other clearings were used for housing and industrial development.

Most farmers intended to clear more land as soon as they accumulated money to hire necessary heavy equipment. Before 1952 credit for clearing land was extremely tight and most clearing was paid for from earnings. Cost sharing under the Agricultural Conservation program provided only token assistance because of limited funds. Homesteaders were hampered in negotiations for loans because their major security was their land for which they usually had not yet received title. The nearly complete lack of agency and private loan funds (Farmers Home Administration program, Federal land-bank, local banks and so forth) was generating a growing demand for the Territory itself to ease the situation by establishing a revolving loan fund for farm development and short-term crop loans which are a vital part of the highly organized agricultural industry in the States. In 1953 the Territorial Legislature responded by establishing a farm loan fund and appropriating \$200,000 which was later augmented to \$350,000.

Table 4—Average land use on potato farms in the Tanana Valley by selected years.

Item	1949	1953
Number of potato farms	10	27
Land use	Acres per farm	
Potatoes	13	16
Vegetables and fruit	1	1
Small grain	—	2
Hay and silage	3	1
Green manure	2	6
Fallow and idle	12	10
Seeded pasture	3	1
Total cropland	34	37
Native and woods pasture	—	4
Woods not pastured	—	137
Other	134	16
Total land in farms	168	194

Because most of these farms grew only potatoes as a source of farm income, it was important to use what were locally called "green manures". These crops helped improve the tilth of their peculiar loessial soil materials. Where peas were used for this purpose, they contributed to soil fertility and assisted in controlling serious weeds, chiefly lambsquarter, spurrey and chickweed. Although the acreage devoted to this practice was small, it promised to increase as the available cropland enlarged.

A local reason for idle cleared land is a soil condition known as permafrost, which impedes vertical drainage. Many sites otherwise suitable for cropping are underlaid by permafrost. When first cleared, these sites were too wet for cropping although they usually were reported as "cropland". Such fields are commonly allowed to remain unused for perhaps five years or until the soil dries out and warms up sufficiently to be worked. Because permafrost is a rather widespread phenomenon in the Tanana Valley, this practice is common and accounts for a large share of the fallow cleared land on farms in that region.

Table 5. — Yields on farms reporting specified crops in the Tanana Valley during selected years.

Crop	1949	1950	1952	1953
Potato	Average yield per acre			
Total tons	4.2	6.9	4.4	6.5
US No. 1 tons	3.3	5.2	3.5	3.4
Grain				
Oats bushels	—	—	40.0	36.5
Wheat bushels	—	—	36.0	24.0
Barley bushels	—	—	29.0	30.5
Oat-barley bushels	—	—	60.0	50.0
Oat-pea hay tons	1.2	1.4	1.6	1.7
Vegetables				
Cabbage tons	8.0	7.6	4.8	7.8
Turnip tons	—	5.0	3.4	1.5
Lettuce tons	—	4.8	1.4	2.1

The pattern of land use on potato farms remained fairly steady. Additional cleared acres were planted mostly to oats, barley and green manures. A start in the long-anticipated movement toward dairying was seen in the use of some uncleared land for pasture.

Additional clearings over and above the needs of a potato farm also heralded the approach of dairying which would relieve many dangers inherent in a potato-growing industry. There appeared to be only one way to utilize any large increases in cleared land and that was to grow feed for a fluid milk industry. This conclusion, together with the stated intentions of many farmers, make the emergence of a dairy industry fairly certain within the next decade.

CROP YIELDS.—Vegetable and potato yields (Table 5) varied considerably from year to year, chiefly because of weather conditions. Low areas are susceptible to frost in August. Spring droughts are often followed by rains in summer and during harvest. Scab, growth cracks, harvest injury, knobby tubers and ring rot cut profits on many farms and contribute to risks facing many unskilled growers.

Because average potato yields are weighted downward by low yields of many small farms, they fail to indicate the potential of the region. Skillful farmers always harvested more than these averages. In 1953, for example, several farmers grew over 15 tons of potatoes per acre. A theoretical ceiling without supplemental irrigation is estimated at 18 tons of US No. 1 tubers per acre.

BUILDINGS AND EQUIPMENT.—Building costs have posed special problems to Tanana Valley farmers, most of whom began on homesteads equipped only with a cabin or wanigan. Lack of buildings kept many interested persons from establishing dairy farms. Water is scarce and well drilling is expensive. Domestic wells often freeze in winter and spring. Despite these obstacles, progress in farm development was evident. More barns and poultry houses were reported in 1954 but many were still too small to house more than a few cattle or chickens. There were almost twice as many root cellars as barns in 1954.

In 1949 many farmers owned specialized potato equipment such as potato planters and diggers. They increased their inventories of such machinery during the next six years. Some farmers over-invested in machines and a few obtained pieces they did not need. Very few had fertilizer or manure spreaders or silo fillers. Little or no increase in equipment usually associated with livestock farming was noted during the study period. No source of used equipment existed and, until 1952, no specialized equipment dealers were in the area.

Average investments (again excluding the two large dairy farms) in service buildings and equipment reflected increases as follows:

Year	Equipment	Buildings
1950	\$3,717	\$2,180
1952	4,726	4,225
1953	5,099	3,390

Much of the capital used to purchase machinery and to construct buildings came from non-farm work. Few sources of borrowed capital were available for farm development although prospects for credit and financing were improving.

The Matanuska Valley

The Matanuska Valley raised over half of Alaska's total farm income in 1954. Although Valley products were shipped by rail, truck, air and even by boat, as far away as the Canadian Pacific Coast, its principal market was in Anchorage. Some shipments were frequently made to Fairbanks. As in other parts of Alaska's Railbelt, World War II and later defense spending paved the way for expanding farm sales. Increases in food production were rapid but did not keep pace with an expanding market. Certain crops like lettuce and potatoes were grown in large quantities so that temporary gluts, caused by difficulties in distribution and marketing, sometimes occurred during harvest seasons.

Agricultural activity in the Valley began about 1900 on a subsistence level. During the late 1920's and early 1930's, the Alaska Railroad promoted additional settlement. Several oldtimers who came to the Territory then have since developed their holdings into efficient family-sized farms.

A major impetus came in 1935 with the Matanuska Valley colonization which had its roots in the great depression of the 1930's. At that time, some 202 new families entered the Valley. The Colony was backed by nearly \$5,400,000 worth of credit. This spurred land-clearing, and the building of houses, barns and storages. Only a few of the original colonists stayed on their places, which were generally laid out as 40-acre subsistence farms. Their improvements and the transfer of credit privileges to their successors made the Valley what it is today.

The important thing about the Colony was its credit features. Never before had credit been available for farming in Alaska. No other farm region in the Territory has enjoyed comparable assistance. Out of this Colony arose a farm community large enough to support its own services. Crops were harvested in sufficient volume to permit fairly effective marketing.

Table 6. — Land use by type of farm in the Matanuska Valley during the years 1949 to 1954. Values are averages for the farms participating in the study.

Land use	Dairy farms						Potato farms						All farms					
	1949	1950	1951	1952	1953	1954	1949	1950	1951	1952	1953	1954	1949	1950	1951	1952	1953	1954
Number of farms	27	33	31	38	39	28	20	23	15	24	23	12	77	79	46	81	76	40
	Average acres per farm																	
Potatoes	2	1	1	1	2	2	10	6	7	11	12	12	5	3	3	4	5	5
Vegetables & fruit	1	*	*	*	*	*	1	1	*	2	1	1	1	1	*	1	1	*
Small grain	10	12	10	7	8	12	7	4	8	6	4	6	6	8	10	6	6	11
Hay	25	23	23	25	34	35	9	10	13	8	6	10	15	14	20	16	21	28
Silage	20	22	25	28	30	29	1	2	1	2	1	1	8	10	17	15	16	20
Fallow & idle**	1	*	*	3	2	1	4	4	5	5	10	8	4	3	1	3	5	3
Seeded pasture	14	17	12	21	27	21	3	4	10	8	2	2	8	9	11	13	15	15
Total cropland	73	75	71	85	104	100	35	31	44	42	36	40	47	48	62	58	69	82
Native & woods pasture	—	—	38	40	50	49	—	—	35	6	2	22	—	—	38	23	27	41
Woods not pastured	—	—	85	97	117	119	—	—	89	107	105	83	—	—	86	97	110	108
Other	156	139	7	17	17	20	150	138	10	20	7	5	139	121	7	16	12	16
Total land in farms	229	214	201	239	288	288	185	169	178	175	150	150	184	169	193	194	218	247

*Half acre or less. **Potato farms often reported an acre or so in green manure which is lumped in this category.

This nucleus of productive farms emerged shortly before World War II. Following a great expansion of market opportunities created by the construction of huge defense installations in the vicinity of Anchorage, the Matanuska Valley burgeoned as the major food producing area in Alaska. Without this market development, the Valley might have remained in a state of slow stagnation—a collection of low income subsistence farms. And without the Colony and its long term credit, farming could not have grown, as it later did, in response to market demands. The Colony thus provided a firm base for Alaska's present day farm industry.

Clearing within the Colony area increased cropland acres from 600 in 1935 to more than 10,000 in 1953. Over three-fourths of the 54 farms selling Grade A milk were once Colony tracts. Many of the original Colony farms have since been enlarged through purchase of adjoining holdings. Commercial food growing in the Matanuska Valley has expanded mostly through this enlargement of the original Colony places. Productive farms now usually contain the equivalent of two or three of the original 40-acre tracts. On several farms, two Colony barns have been moved together to provide more storage space. Houses from original tracts later incorporated into larger farms were moved to new sites, modernized, and now serve as rural residences.

The Colony was established on the best soil resources of the Valley. It was centered generally on the town of Palmer which is the Territory's only true farm community, depending almost entirely on agricultural business. Since 1935 Palmer has grown from merely a post-office to an incorporated city of some 1,000 inhabitants. New schools, churches, business houses, roads, a water system and numerous other improvements have been built in a short span of 20 years.

Within the near future most cropland expansion will occur within the old Colony area. There still remains much good land still in timber on existing holdings. These farms will become more efficient and productive as their feed base is enlarged by additional clearing. These changes will be reflected in a larger, more efficient dairy industry.

The Matanuska Valley has also expanded through new farms coming into production to the west and north of the Colony area. By 1954 most potentially

good farm land lying west of Wasilla was already in homesteads, some of which were growing commercial crops. Although new homesteaders will undoubtedly enter the remaining lands, the areas available for entry are relatively far from markets and their soil and site resources are somewhat inferior to places already claimed. The Matanuska Valley has limitations from the standpoint of additional new farms that can be brought into production. A much larger potential for agricultural expansion lies in the Tanana Valley.

Much land suitable for farming in the Matanuska Valley is held by absentee owners. This is especially true in areas outside of incorporated school districts. No legal device exists at this time for getting these places, some of them apparently abandoned, back into use. This situation prohibits full land development and increases the cost of vital transportation and communications. While not as much of a handicap in the Matanuska Valley as in the Kenai Peninsula or the Tanana Valley, absentee ownership detracts from efficient land use. A nominal land tax covering areas outside incorporated districts might assist in returning this land to useful purposes through tax sales. A land reform tax law has not met with general public acceptance in Alaska because it threatens the mining and fishing industries with additional expenses.

THE FARMER AND HIS FAMILY.—Farm ownership and occupancy in the Matanuska Valley has been changing rapidly. The lure of high paying jobs created by defense construction has attracted many talented people who might otherwise have made good farmers. A rapidly rising population has created temporary booms in land values that have encouraged land sales. Together with the extreme immaturity of the Matanuska Valley's agricultural industry, these factors make for a rapid turnover in occupancy. New farmers, rather than old farmers, are the rule in Alaska. Only a few farms have been retained through the second generation of a single family.

By 1953, for example, only some 30 of the Colonists still remained on the land. Of 76 farmers who contributed to this study, only 21 had farmed their places for more than twelve years, while 46 had been on their places less than six years. Of 93 farmers interviewed at the beginning of this study, 49 farmed the same places throughout the six-year period. Sixteen sold out and 22 stopped farming. Among the reasons given for these changes were (1) better opportunities elsewhere, (2) farm too small, (3) lack of interest or failure to adapt, and (4) poor health or advancing age. While many occupants managed to improve their farms, the industry as a whole suffered from lack of long range planning. These rapid changes hindered overall long term planning on farms and detracted from group decisions so necessary in an agricultural community.

By 1954 there appeared to be a trend toward more stable ownership. Large farms were yielding fair to good incomes. Their improved living standards were goals toward which families on less well developed places strived. Off-farm opportunities were not as plentiful. Speculative possibilities were tapering off.

Even though many farmers were new to their farms, most planned to make permanent homes in Alaska. The farm family is more significant than the farmer himself in creating stability. As transportation, communications and schools improved, and as improved living quarters bettered the housewife's situation, turnover in ownership on large income farms slowed down.

Most farmers were rather young, 60 per cent falling in the 30's and 40's. Another 22 per cent were in their 50's. Three-quarters of the farm families had children. Only three bachelors were listed in this study.

THE FARM, TENURE AND LAND USE.—Farmers increased their average holdings from 184 acres in 1949 to 247 in 1954 (Table 6). By purchase, land clearing and, most of all, field rental they increased their cropland from 47 to 82 acres. Cropland acres for four major kinds of farms and the relative size of these kinds of farms are shown in Table 7.

In 1953, seventeen per cent of the average farm was rented land, mostly used for tilled crops with a small proportion of native or woods pasture rented for grazing. Dairymen rented more land than others because many of their farms were still too small for an adequate feed base. Other farmers rented land to allow better crop rotations or to plant crops on soil better than their own. Fields usually were rented from rural residents who had no use for the farm land they were occupying, or occasionally from farmers with land surplus to their needs. A potato grower having extra cropland often let someone use his otherwise idle fields with the stipulation that the land be used for grain or roughage.

Rental agreements usually ranged from free use to \$35 per acre. A common cash rental in 1953 was \$10 per acre, up about \$2 from 1950. Non-cash agreements included (1) free use of breaking bulldozed

Table 7. — Distribution of Matanuska Valley farms by acreage in cropland in 1954, including only those farms cooperating in the study.

Cropland per farm	Small dairies	Large dairies	Dairy-potato	Potato only	Total
	Number of farms				
5-34 acres	—	—	—	5	5
35-64 acres	5	—	2	6	13
65-94 acres	2	5	2	—	9
95-124 acres	1	2	1	1	5
Over 125 acres	1	5	2	—	8
Total farms	9	12	7	12	40
Average acres	74	124	92	40	82

field, (2) share of the crop or traded work and machinery, (3) exchange for part of another crop, and (4) exchange to allow for better crop rotations.

A total of 250 to 350 acres was cleared every year by the farmers cooperating in this study. Their clearing activities were tempered by current income from the farm, availability of loan monies and other needs for money. Many farmers could not afford to clear land. A shortage of cash at reasonable interest rates (the local commercial rate was 8 percent) and the high cost of clearing land were great obstacles. After 1952 most land clearing took place on expanding farms. This was in contrast to the beginning of the period when much clearing was done by homesteaders trying to secure patents. In recent years most newly cleared land has been planted to forage and pasture rather than potatoes.

“What hinders the expansion of cropland acreages on farms? A few operators have cleared and are using all potential cropland on their farms; there is little possibility that they can purchase an additional acreage near enough to farm economically. Most farmers, however, have some potential cropland still in timber or brush. The most important factor that prevents an increase in cropland acreages is therefore not a limited land supply but the high cost of clearing and improving it. For example, 22 farmers who cleared fields in 1950 reported dozing costs that averaged \$75* an acre; some of this land has been previously slashed. Moreover, dozing is only one step in creating productive cropland. Initial preparation includes heavy breaking, together with picking up sticks and stumps and hauling them off the land. In addition, most fields need heavy applications of fertilizer the first year. To convert raw timberland into cropland is both an expensive and time-consuming task. . . . About half of the farmers visited in 1950 had cleared a total of 259 acres.”**

Greater specialization is reflected in the fact that 75 per cent of all farmers interviewed in 1949 grew potatoes. At the end of the period 61 per cent grew potatoes. In a similar manner, farmers growing vegetables dropped from 52 per cent in 1949 to 20 per cent in 1953.

*By 1955 better estimates of land-clearing were available. These placed to cash cost of clearing somewhere between \$100 and \$200 an acre depending on the cover and many other factors.—Editor
**Moore Bulletin 14. Alaska Agricultural Experiment Station

In 1949 farmers used 66 per cent of their acreage for hay, silage, and seeded pasture. Five years later they used 76 per cent for these crops. The basic movement was thus toward the evolution of specialized dairy farms with potato and vegetable sales supplementing milk checks during their early phases of development.

CROP YIELDS.—Crop yields were influenced by seasonal growing conditions, levels of fertilization, seeding rates and other management practices. Vegetable yields were also affected by market conditions since minor crops were not harvested if there was no prospect of selling them. Growing conditions were favorable in 1953 and 1954 and yields of many crops were well above average.

Table 8.—Average yields on farms reporting specified crops in the Matanuska Valley in selected years.

Crop	1949	1951	1953	1954
Potatoes				
Average yield per acre				
Total tons	7.3	6.6 ¹	10.1	9.3
US No. 1 tons	5.3	5.3 ¹	7.8	7.4
Grains				
Oats bushels	37.0	35.0	39.8	46.6
Wheat bushels	25.0	16.0	20.0	—
Barley bushels	21.0	35.0	27.7	39.9
Barley & oats bushels	—	44.0	28.0	—
Oat-pea hay tons	1.5	1.4	1.4	1.6
Grass hay ² tons	—	1.4	1.1	1.9
Oat-pea silage tons	4.6	4.1	4.5	4.7
Vegetables ³				
Carrot tons	6.5	—	10.3	—
Cabbage tons	7.3	—	9.1	—
Lettuce tons	5.0	—	3.5	—
Celery tons	16.0	—	21.2	—

¹Potatoes on several farms froze, cutting yields on planted acreages. Yield on harvested acreages was 7.7 tons of which 6.6 were US No. 1's.
²Yield of one cutting. Second cuttings were pastured or used for silage.
³Reported on only small acreages and listed as yields on planted acres.

Widespread use of fertilizers and improved seeding rates raised average potato yields in 1953 about 25 per cent above the next highest year of 1950. But because of disease, rough handling and storage problems, only 4.5 tons of US No. 1 potatoes were sold from a possible 7.8 tons per acre stored by the average grower (Table 8). The 1954 crop year was even more favorable. Potato growers planted fewer acres but obtained about the same high yields as they did in 1953. The crop was marketed efficiently and with little difficulty although some disease and handling problems arose in individual cases. Most growers recovered some losses suffered the previous year.

Nearly 20 per cent of the 1951 potato crop was ruined before harvest by an early freeze in late September. The average yield on planted acreages that year was 6.6 tons of which 5.3 were US No. 1, while the yield on harvested acreages was 7.7 tons of which 6.6 tons were US No. 1's. Although a slight increase in average yields during the six years was apparent, the most noticeable trend was toward a higher percentage of US No. 1's.

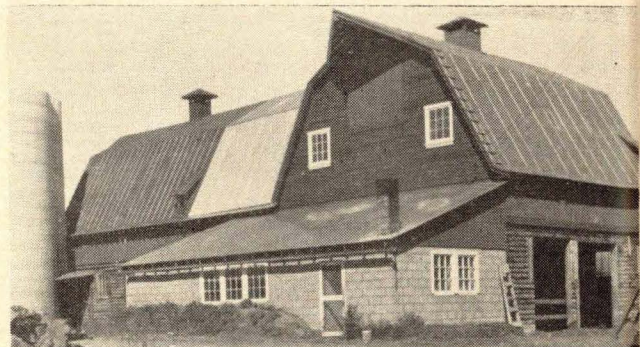
Vegetable yields fluctuated widely with no evident trend. Average yields of lettuce varied from 3.2 to 6.2 tons per acre. Several fields yielded much more. Lettuce in general was very susceptible to "slime" and "tipburn". Some fields were not closely harvested because of diseased heads or glutted markets. The 1953 carrot yield of 10.3 tons per acre was the greatest of the five years reported. Cabbage and celery yields of 9.1 tons and 21.2 tons, respectively, were greater in 1953 than for any other year.

Oats and barley yields increased during the six-year period. The average oat yield in 1949 and 1950 was 35 bushels as compared to 43 bushels for the years 1953 and 1954. Better oat yields are attributed to improved practices such as earlier plantings, increased rates of fertilization, and plantings on "older soils". Similarly, barley yields went up from 23 to 34 bushels, largely due to a shift in varieties from 19-B to Edda. Wheat was used only as a livestock and poultry feed and was not a popular grain.

Because dairy farming was expanding, more acres were planted to oat-pea mixtures and to perennial brome-grass. Oat-pea hay yields were remarkably steady over the six-year period.

Brome-grass forage was becoming more popular by the end of the study period. This perennial crop promised considerable labor and cash savings over oat-pea mixtures. Average yields were a little over a ton of hay per acre, with individual fields yielding up to two tons of good quality hay. In late August and early September, a second cutting of silage was obtained. A few farmers grazed off this late growth. More farmers were turning to field balers for making brome-grass hay.

BUILDINGS AND EQUIPMENT.—This was a period of adjustment in the Matanuska Valley. Farmers changed, added, and expanded enterprises and these activities were reflected in their equipment and building inventories. They bought larger labor-saving machines. For example, in 1949 no field hay balers or field choppers were reported while in 1953 four field balers and nine field choppers were owned by Matanuska Valley farmers. Other equipment bought

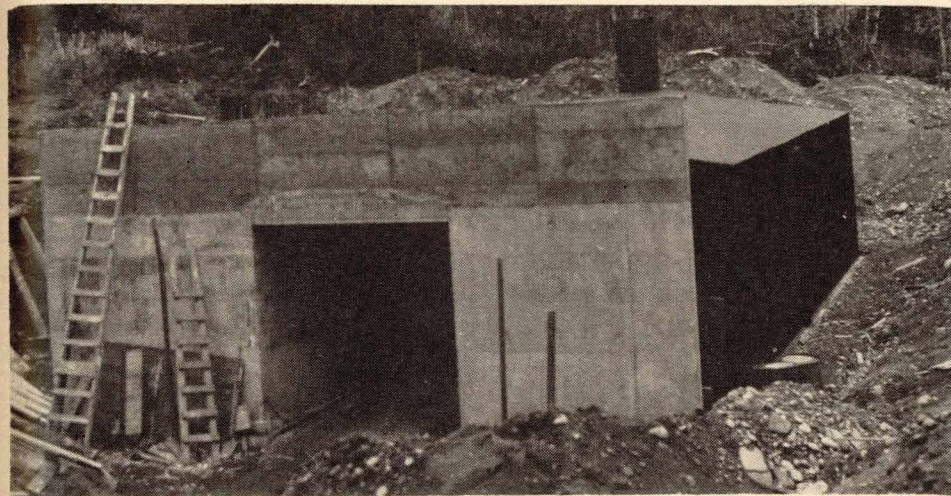


Two Colony barns, one moved from another tract, make up this structure. Silo and milk house were added later.

during the period included trucks, track-type tractors, grain drills, harrows, grain binders, threshing machines, potato picker-uppers, fertilizer spreaders, buzz saws, wagons and trailers, milking machines and garden planters. Cultivators were relatively scarce because fewer farmers grew row crops in 1954 than in 1949. Slightly fewer silo fillers were reported because more trench silos were in use by 1954 and silo fillers were not needed to fill trenches.

Inadequate buildings still posed serious problems on many farms. Only one out of ten had special machine sheds and the few garages, sheds and granaries reported were inadequate for farm storage. Much re-

Although most potato cellars are rather simple some farmers are constructing more elaborate buildings. This concrete farm storage will later be completely covered with earth.



modeling and new construction remained to be done. Dairymen with Colony barns wondered how to re-arrange and expand their 32 x 32-foot structures to house more cows and reduce chores. High construction costs, other demands on the farmer's capital and the newness of many enterprises held up construction of adequate buildings.

The Anchorage Area

Anchorage farmers are usually included with the Matanuska Valley when discussing agricultural regions of Alaska. Major differences in farming concern land values and distance from market. Land was more valuable near Anchorage due to a growing demand for house lots and industrial sites.

Anchorage farmers received almost eight per cent of Alaska's farm income in 1953. Over half of this was from potato and vegetable sales. Egg and poultry sales were second as sources of income. Several hog ranches were based on a garbage feeding program utilizing waste from nearby military mess-halls: In 1953 farmers in the vicinity of Anchorage sold more pork than all other farmers in the Territory combined.

The Kenai Peninsula

Persistent interest in farming was noteworthy among people living south of Anchorage in Alaska's Kenai Peninsula. Most farms were still too small for efficient operation. Homesteaders were hampered by (1) laws and regulations unsuited to the area, (2) limited sources of development and operating capital, (3) sparse settlement arising from absentee ownership of many abandoned tracts and, most important, (4) lack of adequate markets and marketing facilities.

Three major areas of agricultural activity were found on the Kenai Peninsula. These were (1) between Homer and Ninilchik where beef was raised, (2) around Kasilof where part-time retirement farms were common, and (3) the Sodontna-Kenai neighborhood comprised mostly of new homesteads taken up by veterans since the last war.

Most foods grown on the Kenai Peninsula were marketed locally or consumed locally at home. Seward was an important market. Some eggs and beef reached Anchorage. New defense construction near Kenai promised additional market opportunities.

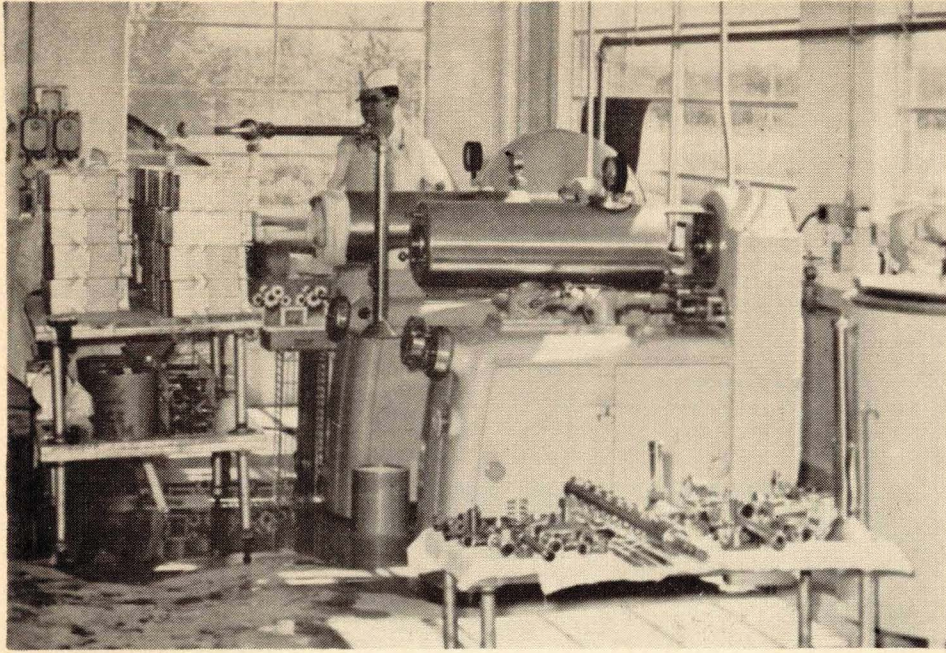
Of 47 homesteading families who had exhibited an interest in farming in 1950, nineteen still were growing crops on either a part-time or a full-time basis three years later.* Twelve had sold out or moved away and 16 were not farming for

other reasons. Only seven families still farming in 1953 had lived on their places more than six years. Several families had moved into the area after 1950 to farm new homesteads or to take land previously homesteaded. Despite these changes there was little gain in numbers of farms.

There was a wide disparity in the age of farmers in the Kenai Peninsula. Eight were between 30 and 40 years old and nine were 50 or older. Over half of the farmers were married and had one or more children at home.

LAND USE AND CROP YIELDS.—In 1952 farm management information was obtained from 16 commercial farms in the Kenai Peninsula. These contained an average of 139 acres ranging in size from 26 to 230 acres. All together they had a total of 312 acres of cropland. Of this total 12 acres were in potatoes, two in vegetables, one in small grain, 139 in hay, 78 in silage, and 66 in seeded pasture while 14 cleared acres remained idle. A total of 60 acres of native hay was

*McCurdy, R. E. and H. A. Johnson, Agricultural Possibilities of Alaska's Kenai Peninsula, Alaska Agricultural Experiment Station, Bulletin 13.



Alaska's modern milk processing plants are well equipped. This continuous flow ice-cream machine is found in a farmer's cooperative creamery.

The average yield of potatoes was 6.3 tons per acre. Most growers reported usual yields as six tons of US No. 1's, but one farmer raised ten tons of US No. 1's per acre in 1951 under favorable conditions. Cabbage yields of eight tons per acre, rutabaga yields of ten tons and carrot yields of 6.6 tons were reported in 1952.

Income from beef was fourth in importance. Four farmers had beef herds based on eight or nine brood cows.

found on seven farms. Eleven farms used 594 acres of native and woods pasture. Yields of native grass decreased each year of use and usually its decline was greatest during the first three years. No fertilizers were used on native grasses.

An average bromegrass silage yield was three tons per acre and oat-pea silage 3.5 tons. Oat-pea hay yielded 1.2 tons per acre, tame grass hay two tons and native hay 1.2 tons.

Although there were few dairy farmers, milk sales were the greatest single source of farm income in 1952. More farm families sold eggs, the second most important source of farm earnings. By 1953 poultry and egg sales amounting to \$63,960 exceeded milk sales by \$10,000. Seven of 19 farmers interviewed had flocks of more than 50 birds. The largest had 1,000 hens and the next two largest flocks were of 430 and 250 hens. Four had 100 hens or less. One farmer raised about 5,000 broilers, fryers, and roasters. The poultry industry expanded because of good market demand. Although a poultry industry is no better suited to the Kenai Peninsula than to any other area, eggs and dressed chickens are easily shipped and they gave Peninsula farmers a way to compete on the Anchorage market.

Potato and vegetable sales were a third source of farm earnings. Vegetables other than potatoes usually took up less than an acre per farm. Twelve of 19 farmers interviewed in 1953 grew potatoes. Only four of these had grown an acre or more in 1952 when a number of potato growers had been unable to sell their entire crop. Lack of marketing facilities contributed to poor sales. One store manager on the Peninsula unsuccessfully sought local potatoes for resale at the same time several growers could find no market.

BUILDINGS AND EQUIPMENT.—Most farmers were fairly well equipped for livestock but were poorly equipped for potato and vegetable production. On all farms there was found at least one wheel or track-type tractor. All farms had plows, 14 had harrows, 12 had mowers, nine had rakes, and one in the Homer area had a field chopper. Hay hoists were reported by most farmers having cattle. No grain drills were found on farms but one small four-foot drill was available for rental in the Homer area. Only one farmer owned a potato digger and no one reported owning a planter although a planter and another digger could be rented. Most farmers planted and dug their potatoes by hand. Four had garden planters and three garden tractors were listed.

Farm buildings generally were inadequate, especially on livestock farms. Additional buildings, requiring generous financing, were necessary for satisfactory growth of most farms in the area.

Other Areas

Many parts of Alaska can be reached only by air or water. Agricultural activity in these isolated places usually consists of home gardens, family cows or milk goats, small flocks of chickens, and such crops as tomatoes, cucumbers and greens raised in small greenhouses for family consumption. Although not contributing a great deal to the internal economy of the Territory, home-grown foodstuff plays an important role in the homelife of families living in semi-isolation. Home gardens are found all over Alaska. Even at Point Barrow, a family sometimes reports growing radishes or lettuce.

Sometimes a local, temporary market creates a flurry of agricultural activity but for the most part these endeavors are largely subsistence or recreational

in nature. Far removed from metropolitan centers, hampered by poor communications and difficult transportation, even areas possessing considerable potential such as Unalakleet have had little opportunity to exploit commercial farming as an integral part of their total economy.

In addition to the areas already described are three centers of production of great local importance and interest. These are found in Southeastern Alaska, on the Aleutian Chain, and on Kodiak and neighboring islands.

ALEUTIAN CHAIN AND KODIAK ISLAND.—Scattered sites favored by grass cover and fair accessibility supported beef and sheep enterprises. Some 9,000 head of sheep and 2,500 head of beef cattle were reported on these ranches in December of 1953. At several ranches sheep and cattle are able to graze all year. Most ranchers put up some wild hay or silage to carry their stock through occasional severe winters. Others buy some corn or concentrated feeds to supplement grass or for emergency needs. Transportation is difficult, most sites being serviced by non-scheduled air carriers or boats.

Although disposal of large quantities of fresh meat might pose a serious problem, local production on Kodiak Island has not exceeded what can be sold on the local market. In future years other markets and economical ways of transporting meat may be devised, a possibility that might encourage an expansion of this kind of enterprise. Efficient slaughter

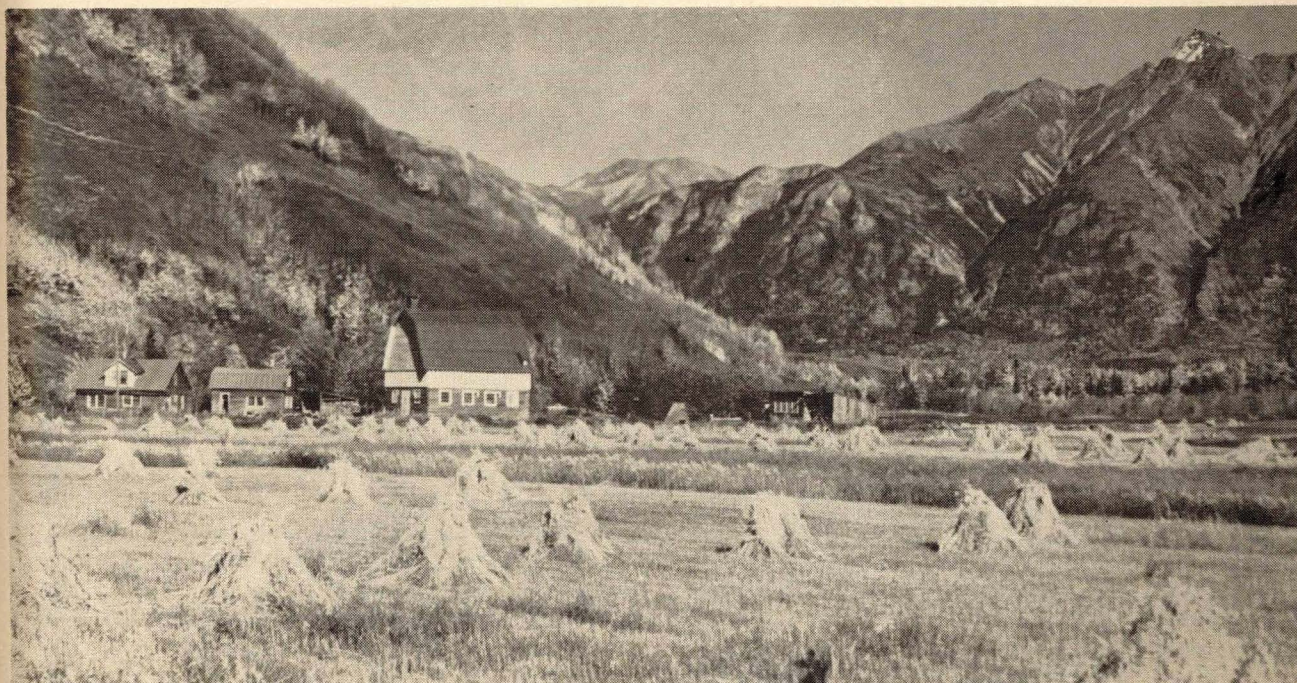
houses are non-existent and certain by-products of a beef carcass which normally are utilized at Stateside slaughtering plants are now sacrificed.

The sheep industry is favored by the moist cool climate and absence of trash in the wool. The small proportion of shrinkage is advantageous in shipping wool back to processing plants.

SOUTHEASTERN ALASKA.—Most foodstuff was grown near populated areas, especially north of Juneau. In order of importance these were milk, eggs and poultry, beef, potatoes and other vegetables. High rainfall and generally wet conditions favor cool season vegetables. The little cropland in Southeastern was used mostly for potatoes, vegetables, pasture and roughage. Native hay from tide flats was cut for dairy cattle feed. A few beef farmers fed native grass almost entirely. Dairymen preserved available roughage as silage. They did not depend on local grains which mature and ripen very slowly. Many dairy farms lacked cropland so that some roughage had to be imported as well as their grains. Both Canadian and Stateside milk offer severe competition.

Vegetable sales increased from 1949 to 1954 while dairy sales were barely maintained. Dairymen who farmed during the entire period increased production. Their gains were offset by two dairymen who quit farming. One major dairyman sold his cows and turned to reconstituting powdered whole milk as a more profitable and realistic business. Poultry and egg sales increased. Poultrymen planned still greater gains in the immediate future.

A typical Colony farmstead in the Matanuska Valley. By buying and renting additional acres, some of these places are now producing milk. Oat-pea mixtures for silage and oats for grain (shocked in foreground) are major feed crops. These fairly level fields are very productive when well managed.



TYPES OF FARMING

Commercial food production in Alaska was found to be based on four major types of farming—dairy, potato, poultry and vegetable. Beef, sheep and swine raising were minor types of farming. Outside the Kenai Peninsula, Kodiak and Chirikof Islands and the Aleutian Chain, beef and sheep enterprises were small and chiefly for home use. Beef production in the Matanuska Valley and Southeastern Alaska was usually associated with the dairy industry. Outside the Anchorage area, pork production was for home use. Little information has been gathered on returns from beef, sheep or swine enterprises because of few operators in these businesses.

Most commercial food growing was in the Railbelt area, with the greatest concentration in the Matanuska Valley. Although commercial farming was important elsewhere in Alaska, it was concentrated in the hands of a few growers who developed their businesses within the framework of local markets and local economics. Only in the Matanuska and Tanana Valleys was there a sufficient number of farms to illustrate organizational trends and patterns. Fortunately this is where markets are potentially large enough to accommodate future developments. Generalizations concerning types of farming are useful in these areas and may be extended to other parts of the Territory.

The trend in individual farm organization within major farm types was toward specialization in one or two large enterprises. In the Matanuska Valley a decided shift from potato and vegetable growing to dairying was encouraged by favorable milk prices, a rapidly expanding milk market, and the promise of a more stable year-round income. The trend in vegetable production was toward fewer farmers on larger farms. New vegetable growers and increased production by the remaining potato and vegetable farmers maintained the supply of vegetables and potatoes despite the shift to dairying.

In the Tanana Valley, most small farmers were interested in developing livestock enterprises. Only one had realized his ambition by 1953. The remaining

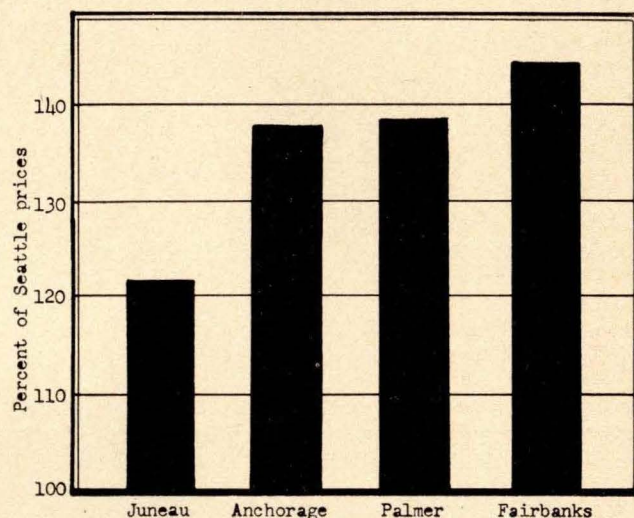
Table 9. — Prices paid farmers by a local marketing organization for produce grown in the Matanuska Valley for selected years.

Commodity	1950	1951	1952	1953
Milk* cwt	\$9.93	\$10.32	\$10.17	\$10.86
Potatoes cwt	5.10	4.15	5.65	2.75
Oats cwt	6.00	7.40	—	6.00
Eggs doz	0.977	0.962	0.974	0.938
Carrots lb	0.067	0.070	0.082	0.077
Cabbage lb	0.072	0.065	0.069	0.054
Lettuce lb	0.110	0.120	0.124	0.115

*Not including end-of-year overage. Since 1950, prices have been pegged at \$11.50 per cwt for 4 percent butterfat milk, with a fat differential of 10c per point.

commercial farmers still specialized in potato growing. Most farmers wanted to develop their places sufficiently to support a rural family.

Some idea of the economy in which Alaska's farmers do business is reflected in what they must pay for goods and what they receive for things they sell. While prices that farmers received for their crops were high, their operating costs were also high. Prices in the Territory are generally based on Seattle prices plus freight and other factors involved in Alaska's high-cost economy. Charges for selected items that farmers buy and sell are listed in Tables 9 and 10. Relative costs of selected grocery items in several Alaskan cities are compared with Seattle costs in the chart below.



Alaskans find living costs are much higher than in the States. This chart is based on the relative cost of 25 standard grocery items.

Dairy Farming in the Matanuska Valley

Alaska's dairy industry was favored by a large, growing market for fresh milk. By 1954 Matanuska Valley dairymen were supplying perhaps 40 per cent of the market demand in Anchorage, where their milk retailed at 40c a quart. Although some fresh milk was shipped in from the States and much canned milk was used, these were considered only substitutes by most consumers. Powdered milk preparations were depended on by many families who could not afford fresh milk. Nearby military installations were using reconstituted milk because a sufficient supply of local fresh milk was still unavailable. Costs of shipping fresh milk from Canada and the States, together with the delay in reaching Anchorage consumers, supplied a temporary barrier behind which Alaska's dairymen advanced toward more efficient production and lower consumer prices.

A farmers' cooperative organization in Palmer maintained a milk processing plant and a distribution system through which an estimated 60 per cent of the Valley's milk was channeled. The remainder went through a commercial plant in Anchorage. Competitive market opportunities were thus available to the dairymen and this freedom of choice encouraged efficiency throughout the marketing process. Out of every consumer dollar spent for fresh fluid milk, the dairyman received from 54c to 58c mostly in the form of monthly milk checks with perhaps two or three cents being distributed in the form of end-of-year profits returned to participating members. Most milk was sold and consumed in the fresh fluid form. During short periods of peak production some cream was separated and sold for special uses or diverted into ice cream mix.

By 1953 two-thirds of Alaska's fresh milk was produced on 54 Matanuska Valley dairy farms which had grown out of Colony tracts. The number of dairy farms had swelled by 25 per cent since 1950. As their herds grew, farmers acquired more land and enlarged their buildings. Almost a third of the dairies had over 20 milk cows by 1953. Others were operated by beginning dairymen, almost half of whom had less than 13 cows.

Although development of a commercial dairy farm was the ambition of many farmers, only 15 achieved their goal during the period under study. Management changes occurred frequently on older dairy farms. One dairyman changed to growing potatoes. Three dairymen stopped farming due to poor health and inefficient size of operation. Another died. Their cows were absorbed into other herds. Two dairy farms were consolidated. Other changes in management included seven farms sold with the buyer continuing operation of the dairy enterprise. Three dairy farms were leased for one or two years. Another operator changed farms. Only 15 dairy farms operated throughout the period without major changes in management or changes in the major enterprise. Of these 15 stable farms, ten were enlarged through increases in size of herd and better production per cow. The remaining five maintained about the same production throughout the period.

LAND USE.—The average dairy farm increased from 229 acres in 1949 to 388 acres in 1954 (Table 6). Rented land was very important to dairy farmers. By 1953, 35 of 39 dairymen who cooperated in this study rented land for their own use. The average dairy farm owner depended on 48 acres of rented land in addition to his own cleared fields. Most rented fields were already cleared and were used for growing feed crops or potatoes. Some rentals were of nearby native and woods pasture. From 38 to 50 acres of native and woods pasture were utilized per farm. Grazing land of this kind was usually of low carrying capacity and was used to maintain dry stock and herd replacements during the summer. Expansion of dairying is reflected in a steady growth of land used to grow roughage.

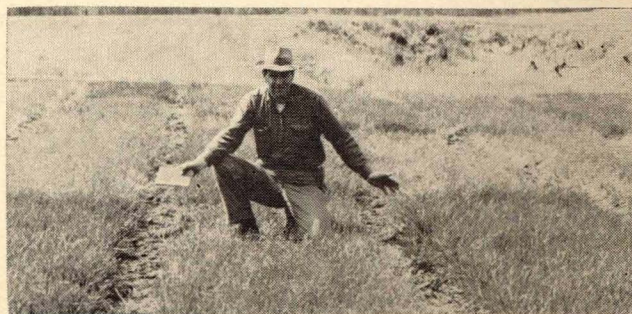
Table 10. — Prices for labor and for supplies bought in the Matanuska Valley by selected years.

Commodity	1950	1953
Fertilizer		
Ammonium phosphate cwt	\$6.65	\$7.85
Potash cwt	4.65	6.00
Sodium nitrate cwt	5.50	5.85
Treble superphosphate cwt	6.25	7.40
Ammonium nitrate cwt	7.15	8.35
Seed		
Peas cwt	9.05	11.75
Vetch cwt	12.95	12.30
Barley cwt	11.50	8.30
Wheat cwt	8.00	9.60
Oats cwt	6.75	8.30
Brome cwt	75.00	35.00
Timothy cwt	50.00	32.00
Alsike cwt	60.00	75.00
Feed		
Dairy cwt	7.00	7.30
Milk-flo cwt	6.75	7.25
Egg mash cwt	7.25	8.00
Chick starter cwt	7.75	8.40
Scratch cwt	7.00	7.50
Alfalfa hay ton	90.00	100.00
Other		
Potato sack each	0.20	0.22
Cabbage sack each		0.30
Binder twine bale	16.50	18.80
Farm labor hour	1.50	2.00

By rental, purchase of cleared land, or land clearing, the average dairy farm's total cropland grew from 73 acres in 1949 to 100 acres by 1954. Land clearing progressed at the rate of about five acres per farm per year. These additional cropland acres were used to grow more hay, silage and seeded pasture. Gains in roughage-growing capacity enabled these dairy farms to become more efficient family units by increasing the number of milk cows they supported.

Early upward trends in acreage devoted to forage crops were matched by declines in plantings of potatoes, vegetables and small grains. Although dairymen planted 19 per cent of their cleared land to these crops in 1949 they were using only 5 per cent for other than dairy feed crops in 1954. Favorable markets dur-

An agronomist here compares two good bromegrass strains with another that failed to live through the winter. Because their seed requirements are not large Alaska's farmers encounter difficulty in obtaining seed of many well adapted varieties not commonly grown elsewhere.



ing 1951 and 1952 encouraged some to enlarge their potato ventures in 1953 and 1954. The proportion of dairymen growing cereals dropped during the period because many of them needed their cropland to grow more forage. Cereals were planted on many farms for bedding straw rather than for feed grain.

In recent years dairymen have harvested about four acres of roughage for each cow. A definite trend toward preservation of winter roughage as silage rather than hay was ascribed to seasonal weather conditions. Seeded pastures increased from 19 to 26 per cent of the cropland used on dairy farms. In addition some farmers pastured second-growth brome grass. An average of 2.3 acres of native and woods pasture per cow was used on all dairy farms.

SIZE OF HERD.—The average dairy herd grew from 13 milk cows in 1949 to 16 in 1954 (Table 11). Fifteen farms not participating in the study were thought to have herds of the same average size. This growth occurred even though at least too small herds entered the field each year. That most dairy farms were still relatively small is shown in the following tabulation. These were the milking herds found on 39 cooperating farms on December 31, 1953:

- 12 farms had 20 or more cows
- 5 farms had 17 to 19 cows
- 5 farms had 14 to 16 cows
- 8 farms had 10 to 13 cows
- 9 farms had less than 10 cows

Many farmers were raising their own herd replacements and additions. Several also purchased cows from the States to improve their breeding stock and to expedite herd growth. Numbers of young stock remained fairly constant during the six-year period.

Most dairymen bred their cows artificially through the Matanuska Valley Breeders Association. Stud bulls of the Association were maintained at the Matanuska Experiment Farm of the Alaska Agricultural Experiment Station. Privately-owned bulls were kept on some farms as "cow fresheners" but their offspring usually were not saved for milk production.

By 1954 about 40 per cent of all dairy farms were growing beef animals as compared to only 11 per cent in 1949. Greater availability of dairy beef was making small inroads on local meat purchasing habits marking the start of a dairy beef industry.

Table 11.—Average numbers of livestock per dairy farm in the Matanuska Valley as of December 31 for years specified.

Item	1949	1950	1951	1952	1953	1954
Number of farms ..	27	33	29	36	39	28
	Average number per farm					
Milk cows	13	14	12*	14	17	16
Dairy heifers	4	4	4	5	5	5
Dairy calves	3	5	5	4	5	4
Poultry	49	30	31	30	32	33

*At least one dairyman sold his herd during the year. These transactions account for minor discrepancies in inventories at the time of the interview.

PRODUCTION PER COW.—Milk production per cow rose from 7,200 pounds in 1949 to 8,970 pounds in 1951. But in 1952 and 1953, this average declined to 8,870 and 8,240 pounds respectively. Two major factors were responsible for this downward trend. A large number of first-calf heifers were milked during 1952 and 1953, which temporarily lowered average production figures. In addition, nearly all dairymen re-scheduled freshening dates in their herds so that many cows had long lactations while others had long dry periods. A year later these changes had been pretty well worked out and production was again swinging upward. Average annual production per cow on 28 farms was up to 8,940 pounds in 1954. The table below shows the distribution of herds by average milk yield per cow:

Milk production per cow	1952	1953	1954
Farms reporting	32	37	28
	Number of herds		
Under 7,000 pounds	6	8	5
7,000 to 8,999 pounds	11	18	7
9,000 to 10,999 pounds	10	7	12
11,000 and more pounds	5	4	4

In Alaska, an efficient family-size farm must produce at least 150,000 pounds of milk. This volume requires 22 cows giving 7,000 pounds of milk each year, or seventeen 9,000-pound cows. Because animal housing and cropland were inadequate on many family dairy farms, high producing milk cows meant the difference between good profits and a bare living. Economic pressures were forcing dairymen to cull out poor milkers and replace them with better cows.

Large herds and good milkers resulted in large volume sales on many family-sized farms. Almost half of the reporting farms sold more than 125,000 pounds of milk in 1953 and 1954 while five sold over 200,000 pounds:

Milk sold per farm	1943	1954
Farms reporting	37	28
	Number of farms	
Under 100,000 pounds	16	9
100,000 to 120,000 pounds	4	6
125,001 to 150,000 pounds	8	4
150,001 to 175,000 pounds	1	2
175,001 to 200,000 pounds	3	2
Over 200,000 pounds	5	5

CAPITAL INVESTMENTS.—Although dairy farm ownership was marked by many changes, average capital investments per farm in power and equipment rose steadily (Table 12). Although the smallest reported investment on any farm remained at about \$1,500, the largest almost doubled. Purchases of field balers, field choppers and large or additional tractors accounted for a large part of the gains in equipment.

Table 12.—Total investments in dairy farm equipment and service buildings, excluding depreciation, in the Matanuska Valley on December 31 of each year indicated. Dwellings are not included.

POWER AND EQUIPMENT (average life, 10 years)				
Item	1949	1950	1952	1953
Highest	\$7,797	\$7,772	\$14,811	\$14,858
Lowest	1,592	1,022	1,782	1,411
Average	3,804	3,749	5,296	5,811
SERVICE BUILDINGS (average life, 16 years)				
Highest	\$19,300	\$19,373	\$23,719	\$22,639
Lowest	3,100	3,680	3,588	3,151
Average	9,090	8,881	8,587	8,066

Investments in buildings went down somewhat during the period. No larger new buildings were constructed on dairy farms participating in this study. Few improvements were made in existing buildings. Owners of Colony barns hesitated to spend money for improving them because they expected to build completely new barns in the future. Average investments in buildings ranged from \$3,100 on small farms to over \$2,300 on large farms. Service building and equipment valuations were greater for dairy than for any other type of farm.

EXPENSES AND INCOME.—The ultimate success or failure of a business is commonly judged on how good a living it provides. Farming, like all other businesses, is difficult to assess on the basis of dollar values alone. This is especially true for Alaska where many rural satisfactions are provided in addition to a relatively stable dairy farm income.

Many living values are extremely intangible and cannot be expressed in terms of dollars and cents. On the other hand, standard accounting procedures can be applied to assess valuations of real estate and other property. Cash income and cash outlays can be recorded and examined for what they are worth. What do Matanuska Valley dairy enterprises reveal when these yardsticks are applied? What is their measurable value in terms of accepted dollar economies? Briefly stated, more than two-thirds of the farmers who participated in this study enjoyed annual net incomes from their farms in excess of \$3,000. Over a third had \$6,000 or more. The greatest annual loss reported was \$7,000. At the other extreme was a farm that for several years provided a net return of over \$14,000. A more comprehensive picture of returns from dairy farming is revealed in the following tabulation:

Size of net income	1950	1953	1954
Farms reporting	30	38	21
	Number of farms		
Loss	2	5	1
None to \$2,999	5	8	7
\$3,000 to \$5,999	13	10	4
Over \$6,000	10	15	9
Average net return	\$5,147	\$4,843	\$5,428

What does "net farm return" mean? The figures listed above were calculated by first estimating total farm receipts which included:

1. Cash receipts from selling milk, by far the major source of income on dairy farms.
2. Other receipts, generally in the form of cash, which came from—
Sales of other crops (potatoes, vegetables, fruits, eggs, poultry, grain, hay, timber, livestock).
Income from other activities (ACP payments, custom work for others, co-op overage and dividend, and rental of land, equipment and buildings), but excluding off-farm labor.
3. Value of game and food grown on the farm for home use.
4. Non-cash gains derived from inventory additions of livestock, buildings and equipment.

From these total farm receipts were deducted cash purchases and other expenditures including:

1. Cash outlays for feed, fertilizer, seed, labor and livestock purchases.
2. Capital improvement expenditures (new machinery, new buildings).
3. Other expenditures (taxes, interest, rent, repairs, electricity, fuel and oil, insurance, license fees, veterinary services, miscellaneous).

The difference in these two values gives a general idea of the efficiency of a particular enterprise—and for some farms, the economic worth of the business. The "net return" for an individual farm reflects its status of development and provides guides and goals for further growth within the industry as a whole. As far as the farmer is concerned this "net farm return" includes both his wages for farming and the interest on his farm investment. If family labor is involved, this net return includes their wages. Studied within this framework of understanding, the comparisons set forth in Table 13 illustrate that during this period:

1. The Matanuska Valley dairy industry was growing. Not only were dairy farms becoming more numerous, but individual farms were growing larger and producing more milk.
2. On these sampled farms, total cash farm receipts went up from an average of about \$10,000 to nearly \$17,000 despite many changes in operators.
3. Dairymen sold more milk every year—their efforts to improve their dairy enterprises paid off in the form of bigger milk checks. Cash receipts from selling farm products other than milk remained fairly steady although marked by wide yearly fluctuations.
4. The dollar value of food consumed at home went up faster than the rise in living costs.

Table 13.—Average net returns, receipts and expenditures on dairy farms in the Matanuska Valley during the period 1949 to 1954.

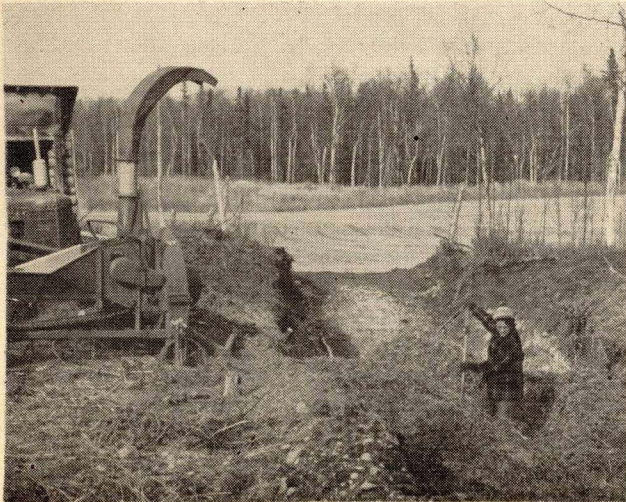
Item	1949	1950	1951	1952	1953	1954
Farms reporting	27	33	29	36	39	28
AVERAGE INCOME						
Milk sales	\$7,912	\$10,568	\$9,764	\$11,261	\$13,353	\$14,502
Other receipts	2,002	1,853	1,930	3,051	2,827	2,441
Total cash receipts	9,914	12,421	11,694	14,312	16,180	16,943
Products used at home	565	650	978	797	901	972
Inventory additions	1,426	1,129	610	1,166	1,249	808
Total farm income	\$11,905	\$14,200	\$13,282	\$16,275	\$18,330	\$18,723
AVERAGE EXPENSE						
Capital improvements	\$ 542	\$1,251	\$1,388	\$1,906	\$1,717	\$1,880
Livestock purchases	1,326	1,069	351	1,247	791	303
Feed purchases	1,969	2,196	2,191	3,380	3,317	3,549
Hired labor	744	979	331	919	1,217	841
Fertilizer purchases	263	387	423	601	855	1,112
Other expenditures*	3,340	3,171	3,264	4,490	5,590	5,258
Total farm expense	\$8,184	\$9,053	\$7,898	\$12,543	\$13,487	\$12,943
AVERAGE NET RETURN	\$3,721	\$5,147	\$5,384	\$3,732	\$4,843	\$5,780

*A breakdown of the \$5,258 expended in 1954 includes: Seed \$666, custom work \$659, gas and oil \$636 machinery repairs \$585, miscellaneous supplies \$526, interest \$513, electricity \$270, hauling \$267, auto upkeep \$231, rent \$207, taxes and licenses \$184, insurance \$146, breeding fees \$127, building and fence repair \$116, veterinary and medicine \$102 and other minor items \$23. All of these are more or less fixed costs not susceptible to reduction on most farms.

5. The value of inventory additions continued fairly steady throughout the six years. In 1954 the average dairymen was still intent on improving his herd and physical plant.

6. Out of his total income the average dairyman spent a fairly fixed sum every year to buy livestock and to enlarge his capital improvements. During the period there was a trend toward smaller livestock outlays and larger outlays for plant additions.

Oat-pea mixtures are usually made into silage. Elaborate structures are not necessary. This silo is a trench cut in a well-drained knoll.



7. Cash expenses went up nearly as rapidly as cash farm receipts. Because the entire scope of dairying operations had grown greater, more concentrates were needed to feed more animals, more fertilizer was required to grow more roughage, more labor was hired to help harvest more acres, more power and fuel had to be bought, and more capital outlays were needed to increase efficiency.

During the six years covered by this study, net returns from dairying showed an upward trend. Although the average dairyman had more cash to handle in the course of his annual operations, he had to spend more for his operating expense. Whenever possible, he plowed back his farm earning to improve his farm. In a measure, net returns were controlled by what the dairyman's family thought they needed for living and by what they were determined to spend for further improvements on their farm.

COST OF MILK.—During the last three years of this study the average cost of milk on some 25 dairy farms was about \$7.80 per hundredweight not including the farmer's wages nor interest on his investment. A breakdown of major cost items is listed in Table 14. The largest cash outlays were for feed concentrates. Including purchased hay, feed costs of \$2.50 were nearly a third of the total cost of 100 pounds of milk. Efforts to reduce this cost were seen in a downward trend in cash outlays for feed as farmers cleared more land and improved overall management.

The most efficient farms produced milk for about \$4 per hundred pounds. One out of four or five farms managed to keep their costs below \$6 a hundred but on others it sometimes exceeded \$11. The maximum cost approached \$13. Since milk sold for about \$10.50 a hundred, some farms lost money. Costs of \$6 to \$7 a hundred yielded fairly good wages, providing total yield per farm was up around 150,000 pounds or more per year. Those who kept their costs down to \$5 earned a good return on labor and investment.

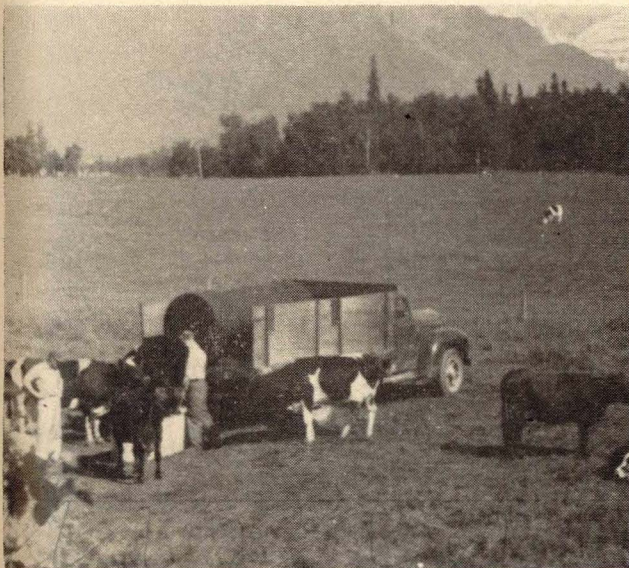
Other farms did not do as well. Failures were traced to a variety of factors. Some of these causes were a lack of cropland, too few cows, poor cows, poor harvest, and general poor management.

Table 14.—Average cost of producing 100 pounds of milk on some 25 dairy farms in the Matanuska Valley during the three years of 1952, 1953, and 1954, excluding the farmer's wages and interest on investment in the farm.

Item	Cost
Feed concentrates	\$2.26
Hay (local and imported)	0.24
Fertilizer and seed	1.07
Hired labor, custom work, hauling	1.07
Land rented	0.32
Fuel, oil and electricity	0.63
Interest, taxes, licenses, insurance	0.68
Veterinary and breeding service	0.17
Machine repairs and miscellaneous	0.90
TOTAL CASH OUTLAY	\$7.34
Hidden costs (machinery and buildings) ...	0.85
Less livestock gains	0.38
TOTAL COST	\$7.81

KINDS OF DAIRY FARMS.—In the Matanuska Valley, potatoes have been an important cash crop, especially on small farms and on new fields. But because dairying has offered more promise of stability, there has been a shift from potatoes to milk as a major cash crop. Some farmers abruptly abandoned potatoes because of marketing difficulties and switched to dairying even though their physical plants were not adequate. Others continued growing potatoes as a supplemental cash crop, or occasionally re-entered the potato business to take advantage of favorable market conditions. Three kinds of dairy farms were thus found during the course of this study, as listed in Table 15.

Domestic water for livestock is scarce in some parts of Alaska. Because funds are often short, some farmers haul water over long distances. Here a farmer waters cattle in a Matanuska Valley pasture.



EDITOR'S NOTE—The relationship between milk costs, production per cow and net returns is shown in the table below. Here are listed essential expenses and incomes for two farms that failed to yield a profit in 1954, compared with two that had reached a sound level of development. These four farms had nearly the same feed base and physical facilities and they supported about the same number of milk cows. The high income farmers spent more money for feed, hired labor and fertilizer but they spent less on seed, new machinery and other operational costs.

During 1954, the two high income farms produced over 10,000 pounds of milk per cow. The low income farms produced less than 7,500 pounds per cow. In a year's time this difference in milk production per cow meant the difference between an operating loss and a net farm return (for wages and interest on investment) of nearly \$8,000. Good cows and good management practices gave a good return for the farmer's labor and investment.

Comparison of two high and two low income dairy farms in the Matanuska Valley during 1954. All values are averages for the two farms in each group.

Comparison	Low income farms	High income farms
Farms reporting	2	2
Cropland	111	128
Milking herd	20	21
Income items		
Milk sales	\$16,238	\$24,130
Other	692	1,654
Expense items		
Feed purchased	3,576	4,971
Hired labor & custom work	1,520	3,972
Fertilizer purchased	1,069	2,106
Seed purchased	1,231	557
Machinery & equipment	1,827	1,405
Other cash expenses	7,836	5,365
Inventory change	-216	-44
Net return*	\$ -345	\$7,364
*	*	*
Milk per cow	7,416	10,303
Cost of milk	10.46	7.31
Purchased feed per cwt milk	\$2.18	\$2.21
Milk sales per cow	\$812	\$1,149
Expense per cow	\$864	\$877

*Wages and interest on investment

The cost of keeping a good cow was only a little more than for a poor cow. On these four farms, 8,200 pounds of milk had to be sold at \$10.50 per hundred weight in order to pay the cost of keeping the animal for a year. On the low income farms, the herds failed to produce this much milk. On the high income farms the extra 2,000 pounds per cow paid the operator's wages and interest on his investment.

These are, of course, average values. Some farmers did much better. For example in 1954 one farm produced milk for \$5.16 per hundred weight. The yearly cost per cow in this herd was \$419.30. Although the herd was rather small the farm returned \$9,500 for interest and wages. Milk cost on another farm was \$6.32 a hundred, for a yearly cost of \$672.91 per cow. Supporting a large herd, this farm yielded a net return of \$14,132. — Allan H. Mick.

A dairyman with only 14 cows can expect great gains in labor efficiency by adding more cows to his milking string. Farmers with large herds received nearly twice as much from sales although their expenses were only two-thirds again as much as for farmers with small herds. While the average dairyman with 14 cows can hope to do little more than break even on his milk enterprise, a good dairyman milking 21 good cows can collect interest on a large investment and still make good wages.

In 1954, small dairies with no potatoes yielded small cash returns. Potato-dairy farms, although supporting an average milking herd of only 14 cows on 92 cropland acres, gave nearly as much net income as large dairy farms of 124 cropland acres and 21 cows. Small dairies were forced to purchase considerable feed. Their average milk sale per dollar spent on feed was only \$3.57, much lower than on the other two kinds of dairy farms. The average potato-dairy farm had six cropland acres planted to potatoes which brought in cash returns of \$3,500 in 1954.

There were no significant differences in the average efficiency of these three kinds of dairy farms with respect to herd production. Milk yields per cow were essentially the same for all. Poor return of small farms was attributed to small herd size and inefficient use of the owner's labor.

Table 15.—Kinds of dairy farms: comparison of organization, costs and incomes in the Matanuska Valley, 1954.

Comparison	Potato-dairy	Small dairy	Large dairy
Farms reporting number	7	9	12
Average cropland acres	92	74	124
Milking herd number	14	11	21
Dairy heifers number	3	5	6
Feed crop per cow acres	4.7	4.9	4.6
Gross returns*	\$19,283	\$12,530	\$23,042
Farm expenses	\$12,447	\$9,299	\$15,966
Net returns	\$6,836	\$3,231	\$7,076
Milk sold per farm pounds	110,765	92,735	179,007
Average yield per cow pounds	8,970	9,007	8,902
Milk per acre of feed crop pounds	1,303	1,254	1,374
Milk sales per dollar spent on purchased feed	\$4.91	\$3.57	\$4.07

*Including value of products used at home

This point is generally well appreciated and is a major consideration in the goals most beginning dairy-men set up for themselves. Small herds were usually on less mature farms still being developed toward large herd goals. Big herds of more than 20 cows were generally on farms of more advanced development. A herd of 20 to 22 cows was probably the optimum for a family unit under existing conditions. Larger herds usually could not be housed on small farms without great outlays for new buildings. They also required more acres of cropland and hired labor to help with routine chores. Several farmers were, however, working towards milking herds of 40 or more.

Potato Farms

Every farmer or homesteader in Alaska who has a few cleared acres is a potential potato grower. Potatoes at one time were a chief source of farm cash income in the Territory. In recent years, since the emergence of dairying, they rank second to milk. Because most work is needed in the spring and fall, potato production is well adapted to part-time farming. The potato growers' summer is free for off-farm employment. Potatoes may be graded and marketed during the winter, thus distributing the grower's labor through months when other kinds of employment are scarce.

A second advantage of growing potatoes is found in the kind of market they command. During and since the war years, military establishments in Alaska have contracted for potatoes. Bids are usually let before the growing season so that potato growers have been able to raise their crops with assurance of a firm market. Since the early 1940's they have grown most of their crop under contract and have not had to face the expense or uncertainties of selling to competitive civilian outlets. Market opportunities have been fairly good. Even a small crop usually brought in some net gain despite rudimentary equipment and facilities on many homesteads. In recent years, leading growers have again successfully sold to civilian consumers.

A third advantage of a potato enterprise is that unlike many other crops they do not need a fine seed bed. Potatoes can be grown on newly cleared rough land. Beginning farmers were able to find storage on neighboring places or in cooperative cellars. They could usually borrow some equipment during the first two or three years. No great cash outlays for buildings and equipment were required. The crop is thus remarkably adapted to the homesteader's needs being well-suited to his new fields, requiring a minimum of attention during the summer "work" season when off-farm employment is plentiful, and assuring some cash income with little initial capital investment. For these

reasons growing potatoes has been very popular, attracting 125 to 200 farmers each year.

The Matanuska Valley has seen a great turnover among potato farmers. From 1948 to 1954 only a third of all growers retained potatoes as a major enterprise. Another third turned to dairying. The rest quit farming entirely or reduced their operations to a subsistence level supplementing non-farm income. Other new potato growers took their places. A ready market for used equipment encouraged farmers to enter or leave potato production without too much financial loss. This turnover indicated that the industry as a whole probably was hampered by poor production skills and

inexperienced farm management. Successful management of experienced growers was usually offset by many homesteaders entering the business each year. Homestead enterprises were often very risky because of unknown site characteristics, inadequate machinery and storage facilities and finally because of their relatively uncertain position with respect to selling a crop. These were obstacles that only experience and accumulated capital could overcome.

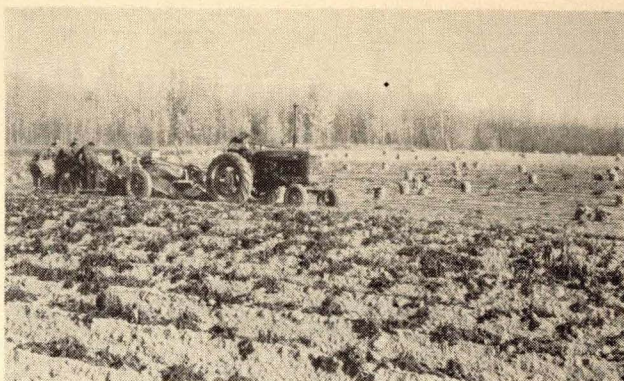
In the Tanana Valley a somewhat different situation prevailed. Although several farmers planned livestock enterprises, only one successfully made the transition to dairying. Specialized potato growing based on demands of local military populations continued a major farm industry. Outstanding efforts to capture civilian outlets proved profitable for one or two farmers near Fairbanks.

LAND USE.—Growing potatoes as a stepping-stone to dairying by Matanuska Valley farmers was reflected by the way they used their cropland. Land use patterns on many potato farms were influenced by plans to enter dairy farming in the near future. Potato acreage on the average farm dropped from ten in 1949 to six in 1950 as older farmers turned to dairying. By 1952 more new farmers started growing potatoes and the overall average planted to potatoes went up to 11 acres, where it remained fairly steady for the next two years (See Table 6). Most potato farmers had a small cropland acreage. In 1954 over half of all farms depending on potatoes as a major source of cash income contained less than 35 cropland acres.

Tanana Valley potato growers increased their planted acres to 16 in 1952 and 1953. Because they had little use for land not planted to potatoes, over a third of their cropland was in green manure or idle each year. Less than a fifth was in hay, silage and pasture.

MINOR ENTERPRISES.—Minor enterprises were important on potato farms. Grains and roughages raised in rotation with potatoes were used for feeding poultry or livestock. Vegetable growing supplemented potatoes on many farms. The same machinery was used and labor requirements were adjusted by varying planting and harvesting dates to avoid conflicts in management needs.

Of six farmers in the Matanuska Valley who raised potatoes throughout the period, five had sizeable minor enterprises, either poultry or vegetables or both. All six had non-farm sources of income for at least one of the five years. Nineteen of 20 potato farmers interviewed in the Matanuska Valley in 1952 had minor enterprises of some kind. Some had small poultry flocks or beef animals. Others grew vegetables. Minor enterprises brought in over 18 per cent of average cash returns on all potato farms. Of these, incomes from egg and vegetable sales were outstanding, comprising a fourth of potato farm earnings in 1954.



Potatoes are an important cash crop throughout the Territory. They are dug, field-graded, and sacked with combination diggers and elevators.

In the Tanana Valley vegetables were the main source of other farm income. Sales other than potatoes and vegetables were small and relatively insignificant.

CAPITAL INVESTMENTS.—Many changes in Matanuska Valley potato farms caused fluctuations in capital investments. In general, annual investments in power and equipment went up. At the beginning of the study, when many farms were relatively new, average investments in power and equipment were around \$2,800 (See Table 16). By 1953 the average on specialized potato farms was over \$4,000. Purchase

Table 16.—Average investments in potato farm equipment and service buildings in the Matanuska Valley, December 31, for the years indicated.

Item	1949	1950	1952	1953
POWER AND EQUIPMENT (average life, 10 years)				
Highest	\$5,860	\$6,149	\$8,896	\$8,790
Lowest	650	940	1,610	859
Average	2,757	2,837	4,147	4,047
SERVICE BUILDINGS (average life, 16 years)				
Highest	\$13,864	\$13,239	\$17,261	\$8,007
Lowest	500	956	75	103
Average	4,389	5,023	4,522	3,232

of tractors, planters, harvesting and grading equipment accounted for most of this increase. New storages were constructed but in general they were not elaborate. Economic pressures kept these structures simple and modest.

EXPENSES AND INCOME.—The 1953 season will be long remembered by Matanuska Valley potato growers. Favorable prices in previous years had encouraged farmers to step up plantings. They planted more acres to potatoes and, thanks to a favorable season and good growing management, harvested larger yields than usual. A record crop glutted an underdeveloped civilian market for Alaskan potatoes. Serious distress selling began at digging time and continued until spring. Disease, deterioration from poor harvest-

ing practices and poor storage conditions resulting from over-filled structures and growth cracks ruined many tons. For the first time in five years, potato growers as a group suffered a net loss (Table 17) despite a bumper crop. Similar experiences may be expected again in this easily expandable industry.

Labor costs per farm rose from \$461 in 1949 to \$1,945 in 1953, reflecting general wage increases from \$1.50 per hour to \$2.00, use of less family labor, and larger individual potato enterprises. A major rise of almost \$900 in 1953 was attributed to hiring more hands needed for the large crop. A significant expense item on potato farms was for fertilizer, which more than

Table 17.—Average net returns, receipts and expenditures on selected potato farms in the Matanuska Valley for years indicated.

Item	1949	1950	1951	1952	1953	1954
Number of farms reporting	20	23	15	24	23	12
AVERAGE INCOME						
Potato sales	\$4,996	\$3,233	\$4,248	\$6,660	\$3,351	\$7,501
Other farm receipts	1,141	1,189	1,682	1,777	1,680	2,778
Total cash receipts*	6,137	4,422	4,930	8,437	5,031	10,279
Products used at home	707	650	1,270	780	550	863
Inventory additions	-131	1,328	1,174	2,223	363	1,061
Total farm income	\$6,713	\$6,400	\$7,374	\$11,440	\$5,944	\$12,203
AVERAGE EXPENSE						
For capital improvements	\$ 580	\$ 931	\$1,416	\$2,512	\$ 957	\$1,888
Fertilizer purchases	407	325	579	800	899	1,054
Hired labor	461	419	570	1,067	1,945	1,535
Other expenditures	1,169	2,327	2,555	3,615	2,912	3,498
Total farm expenses	\$2,617	\$4,002	\$5,120	\$7,994	\$6,713	\$7,975
AVERAGE NET RETURN	\$4,096	\$2,398	\$2,254	\$3,446	\$ -769	\$4,228

*This is the sum of the two cash income items shown above.

doubled during the

period. Farmers with good growing skills, with adequate family labor, with good machinery, with good storage and with experience or knowledge of how to market their crop usually made their potato enterprises pay off handsomely. Although weather, disease, and competition for military contracts or for the open market required a high development of special skills, many farmers were able to make good profits. Marketing problems were fairly successfully resolved through group action. Cooperative marketing organizations existed in both the Matanuska and Tanana valleys.

Although some farmers were very successful in growing potatoes, their profits were often masked by failures within the group as a whole. In seeking reasons for the rather low average return from growing pota-

Table 18.—Average net returns, receipts and expenditures on selected potato farms in the Tanana Valley for the years indicated.

Item	1950	1952	1953
Number of farms reporting	9	13	27
AVERAGE INCOME			
Potato sales	\$4,307	\$7,888	\$6,976
Other farm receipts	546	2,580	938
Total cash receipts*	4,853	10,468	7,914
Products used at home	262	378	599
Inventory additions	643	3,739	1,425
Total farm income	\$5,760	\$14,585	\$9,938
AVERAGE EXPENSE			
For capital improvements	\$1,311	\$4,764	\$1,972
Fertilizer purchases	463	1,105	690
Hired labor	864	1,890	1,238
Other expenditures	1,367	2,807	2,353
Total farm expenses	\$4,005	\$10,566	\$6,253
AVERAGE NET RETURN	\$1,753	\$4,019	\$3,685

*This is the sum of the two cash income items shown above.

atoes reflected in Tables 18 and 19, it became apparent that poor production and harvesting skills were handicaps, especially among newcomers to the business.

For example, the 1952 crop season was very profitable for some farmers in the Matanuska Valley—so profitable that many others were encouraged to grow potatoes the next season. This same year, however, was disastrous for others. When the 24 farms (cooperating in the 1952 study) were grouped according to income, the top 12 showed an average net return of \$5,641 as compared to only \$1,247 for the bottom 12. "Low-income" farmers raised 11 acres of potatoes while the "high-income" farmers grew only ten acres. But from this greater acreage, the "low-income" farmers harvested only 4.4 tons of US No. 1 tubers per acre, while the "high-income" group harvested 6.8 tons per acre.

The "low income" group was either hampered by a lack of family labor or by trouble in getting their work done on time and had to resort to expensive,

Table 19.—Comparison of experience, use of family labor, yields and average income by income group on 22 Tanana Valley farms during 1953.

Item	Low	Medium	High
Farms reporting	7	8	7
Potatoes planted	17	12	14
Potatoes harvested			
Total yield	5.7	7.0	8.7
US No. 1	1.6	2.9	6.9
Grade-out of culls	72	59	30
Use of family labor on farms			
"None"	2	3	0
"Some"	4	4	3
"Much"	1	1	4
Cost of hired labor per ton of US No. 1 tubers	\$61	\$36	\$9
Years on farm	4	10	6
AVERAGE NET RETURN	\$-594	\$2,339	\$9,495

poorly trained hired crews. Another significant difference was found in cash outlays for labor. As a result the "high-income" group spent only \$482 for hired labor while the others spent an average of \$1,643 for labor. Also notable is the fact that the "high-income" potato farmers showed smaller expenditures for fertilizer, seed and machine operations. All these point to greater skill in production and harvesting by "high-income" potato growers.

Fairly detailed records were collected for the 1953 crop season in the Tanana Valley. A total of 22 records were divided into three income groups—low, medium and high. Comparisons for these three groups are shown in Table 19. Again it is seen that production skills and use of family labor were of paramount importance in determining final profits. An average net return of nearly \$9,500 for seven successful farmers was outstanding. In addition to what was earned off their farms, these individuals were conspicuously successful.

POTATO PRODUCTION.—Arctic Seedling was a leading variety in the Matanuska Valley. Others included Green Mountain, Knik, White Bliss, and Kennebec. A popular variety in the Tanana Valley was Teton, followed by White Bliss, Arctic Seedling, Green Mountain, Knik, Chippewa, and Canus. Arctic Seedling was considered a high yielding, good quality variety and was an old favorite offering no problem in seed supply. Other varieties were planted in an effort to offer special qualities or to avoid disease losses. Ring rot and blackleg were especially troublesome.

Very little difference in production practices was observed between the Matanuska and the Tanana Valleys. Matanuska Valley farmers used more seed and fertilizer than most Tanana Valley farmers. Tanana Valley growers could plow in the fall, which was not feasible in the Matanuska Valley where severe winter winds erode barren potato fields.

Tanana Valley farmers used commercial fertilizer at an average rate of 702 pounds per acre in 1952 and 648 in 1953, ranging from 200 to 1,200 pounds on individual farms. They planted an average of 753 pounds of seed per acre in 1952 and 718 in 1953. Seeding rates ranged from 500 to 1,000 pounds.

Alaska's farmers were planting about 20 per cent more seed and using about 33 per cent more fertilizer in 1953 than they did in 1949. The following tabulation shows how rates of seeding and fertilizing went up during the five-year period:

Year	Seeding rate	Fertilizing rate
	Lbs/acre	Lbs/acre
1949	766	517
1950	752	630
1951	831	699
1952	916	774
1953	945	764

These changes were due to planting rows closer together and to planting seed pieces closer within the rows. Where rows were formerly spaced 44 to 48 inches and seed pieces were 18 to 24 inches apart in the rows, by 1953 few rows were spaced more than 44 inches apart and plants within rows were less than 16 inches apart. Closer spacing and heavier fertilizer applications were increasing yields of US No. 1 tubers and cutting down losses due to hollow heart.

By 1953 more attention was being given to other improved practices that might reduce labor and make for better yields. Chemical weed killers were, for example, being adopted by some progressive growers.

Table 20.—Labor and tractor hours required to grow and sell an acre of potatoes in the Matanuska Valley. Values are averages for the five years 1949 through 1953.

Operation	Man hours	Tractor hours
Land preparation		
Plowing	1.4	1.4
Disking	0.6	0.6
Harrowing	0.6	0.6
Other	0.3	0.1
Total	2.9	2.7
Culture		
Cutting and treating seed	7.0	—
Planting and fertilizing	4.4	2.1
Harrowing	0.6	0.6
Cultivating and hilling	4.4	4.0
Weeding and hoeing	5.1	—
Other	0.3	0.3
Total	21.8	7.0
Harvest		
Beating down vines	0.2	0.2
Digging and sacking	37.6	3.2
Hauling*	7.9	—
Total	45.7	3.4
Grading	22.0	—
Total time for one acre	92.4	13.1

*Average truck time was 3.1 hours per acre

Chickweed, lambsquarter, spurry and mustard, offering severe competition in many fields, can be wholly or partially eliminated by herbicides. Several farmers had discovered that chemical sprays correctly used were time and labor savers. Training field crews at harvest time was also shown to be profitable in reducing mechanical damage and subsequent tuber deterioration in storage. Other farmers were studying ways of selling their crop early in the fall to avoid storage costs. Some were active in promoting a crop improvement association to sponsor disease-free seed which would also reduce storage losses of table-stock.

Averages of 92.4 hours of labor and 13.1 hours of tractor time were required to grow, harvest and grade an acre of potatoes in the Matanuska Valley (Table 20). Harvest was the most critical period for potato growers because almost half of the labor was needed at this time and most of it was hired. Planning and

good management paid well during harvest. The second most time-consuming job was grading. Over a fifth of the total labor went for grading the crop for market. Grading was often done by hired labor. Other jobs, spread out over longer periods, were not so critical and were usually done by the farmer and his family.

Tractor use was evenly distributed throughout the growing season. Although some special equipment such as planters, diggers and picker-uppers were needed for only a few hours or days, many farmers found it necessary to own them. Otherwise they had to hire expensive labor or take the chance of not getting their crop out of the ground before freeze-up or to market in time for delivery contracts.

Table 21.—Cost of growing and selling an acre of potatoes in the Matanuska Valley. Values are averages for the five years 1949 through 1953.

Expense item	Unit cost	Acre cost
Cash outlay		
Fertilizer, 6.77 cwt per acre	\$6.10	\$40.30
Seeds ¹ , 8.42 cwt per acre	5.50	46.31
Seed dip, half pound per acre	2.25	1.12
Sacks ²		
For harvesting, 75 per acre	0.15	11.25
For marketing, 120 per acre	0.25	30.00
Labor		
For harvesting, 37.6 hours per acre .	1.75	65.80
For grading, 22.0 hours per acre	1.75	38.50
Total cash outlay		\$233.28
Non-cash expenses		
Labor, 32.8 hours per acre	\$1.75	\$57.40
Power		
Tractor, 13.1 hours per acre	2.50	32.75
Truck, 5.0 hours per acre	2.50	12.50
Total non-cash outlay		\$102.65
Total cash and non-cash costs		\$335.93
Overhead costs³		\$ 64.69
Total cost for an acre of potatoes		\$400.62
Total cost per cwt of potatoes		\$ 3.34

¹Although most farmers used home-grown seed it is here shown as a cash item.

²Harvest sacks last about two years. Their number was based on average field yields. Market sacks are based on average yield of U.S. No. 1 tubers.

³Breakdown of overhead includes \$25.36 for buildings, \$29.33 for machinery and \$10 for land.

A five-year average cost of growing an acre of potatoes in the Matanuska Valley was \$400 (Table 21). Based on the average yield of US No. 1 tubers for the same five years, this cost amounts to \$3.34 per hundredweight. Seed was usually home-grown and for this reason many growers did not consider this a cash outlay. If seed costs are subtracted there remains a total cash outlay of about \$187 which many farmers claimed was a fair estimate for growing and selling an acre of potatoes. But other costs such as machinery depreciation, building upkeep, and family wages are real, even though they require no cash out of pocket. If not covered, these accounting deficiencies are felt in a few years.

Assuming a selling price of \$80 per ton for US No. 1's and \$20 for grade-outs, average gross sales per acre were about \$510 (average yields were six tons of US No. 1's and 1½ tons of culls). Based on these prices an annual average cash return was about \$109 per acre.

Growing an acre of potatoes in the Tanana Valley cost about the same. Costs per hundredweight were estimated to be somewhat higher because the average yields of marketable tubers were lower than in the Matanuska Valley.

Poultry Farms

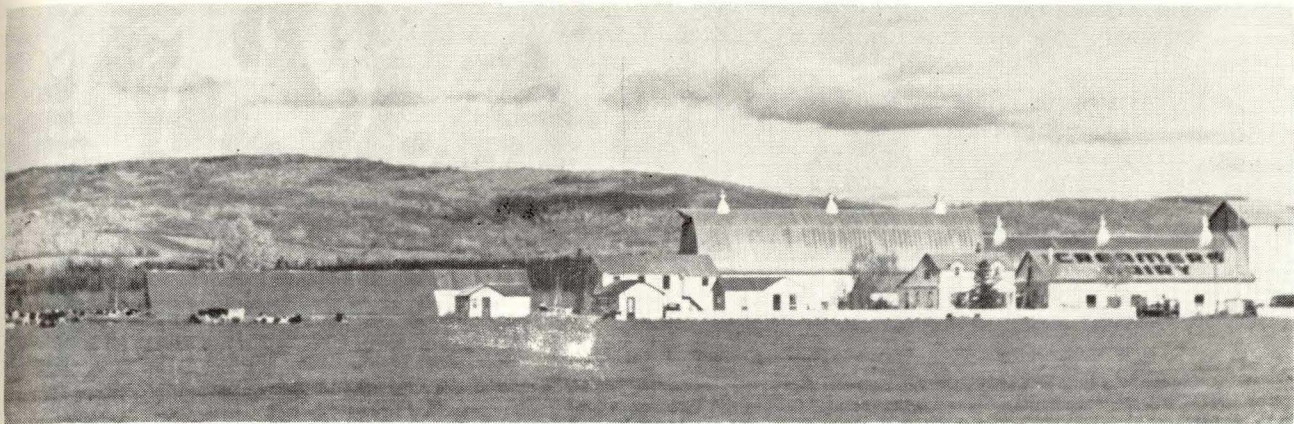
Raising eggs and dressed poultry was a small but expanding business in the Territory. Although about half of all farms studied kept chickens, most flocks were for home use and were less than 100 birds in size. In both the Matanuska and Tanana Valleys, there were a few large flocks on specialized poultry farms which depended heavily on imported feed. One or two outstanding poultry farms were found in the Kenai Peninsula and north of Juneau. These enterprises also imported most or all of their feed.

When the egg-feed price ratio was favorable, egg production was very profitable for a few experienced farmers. Although premium prices were generally received for local eggs because of their freshness, this advantage was largely offset by the high cost of maintaining an egg-laying flock in the Territory. Market opportunities were curbed by Stateside prices. Disastrously low egg prices in the States in 1954 brought prices down in Alaska, too. But despite this unfavorable market trend, 1954 production of local eggs went up 25 per cent over 1953. Poultrymen were seeking improved marketing practices and were exploring grading and educational programs to help meet the threat of imported eggs which often deteriorated in shipment.

Poultry farmers enjoyed a good distribution of labor throughout the year and an even and consistent flow of income. They were hampered by inadequate physical facilities and inability to obtain capital for expansion at reasonable interest rates. Many poultry farmers did not have large enough flocks for a family enterprise. Others lacked knowledge and could not find a specialized advisory service* in the Territory. For these reasons, there occurred a fairly rapid turnover in the industry, especially among small enterprises where off-farm employment played an important role in keeping the family on the farm.

Of eleven specialized poultry farms found in the Matanuska Valley in 1949, four were still operating in 1954 although two had changed hands. One farm growing poultry in 1949 had changed over to dairying by 1954. Another had switched to growing potatoes. The remaining five farmers had abandoned chickens in favor of off-farm employment. All had originally maintained laying flocks of 300 to 650 birds.

*The Alaska Agricultural Experiment Station and Extension Service have not been able to support special production work on poultry.



Farmstead of one of Alaska's largest dairy farms located near Fairbanks. Grade A milk is produced and processed on this place. Rolling hills in the distance are typical of much landscape in the Tanana Valley which possesses a large agricultural potential.

Poultry farms were generally not highly developed. Although they ranged in size from 93 to 142 acres, less than 30 acres had been cleared and was available for growing feed, even on the best farms. But other obstacles prevented them from growing much of their own feed. From 8 to 33 per cent of their cleared acres remained idle each year. Only a fifth to a half of their cleared acres were planted to feed crops. Better grain varieties were urgently needed.

Purchased feed ranged from half to two-thirds of all costs and was the largest single expenditure on poultry farms. In 1952 the average poultry farmer bought 66 cents worth of feed for each dozen eggs (or \$8.08 per bird). In 1953 average feed purchased amounted to 57 cents per dozen eggs (or \$8.50 per bird). Total cash expenditures on poultry farms were \$13.58 per bird or 92 cents per dozen eggs in 1953. Increases in inventories accounted for 12 cents per dozen eggs or \$1.79 per bird. For those two years an average cost for a dozen eggs was about 80 cents.

The average gross income from poultry farming ranged from \$7,216 in 1949 to \$9,319 in 1952 (Table 22) Egg sales accounted for about 70 per cent of this income. Only in 1953 did egg sales exceed farm expenditures. Growing potatoes was an important minor enterprise on poultry farms and potato sales largely determined the profit on these farms. Net returns ranged from \$1,683 in 1952 to \$3,742 in 1949. For every dollar received during the period, poultrymen realized about 30 cents for family labor and interest on their capital investment.

PRODUCTION PRACTICES.—Besides being hampered by the lack of a high yielding wheat for feed, and by a total lack of a local feed processing industry, Alaska's poultrymen generally were handicapped by

poor physical facilities. Few had buildings especially designed for laying flocks. Many depended on remodelled Colony barns. Some housed their flocks in several miscellaneous buildings originally built for other purposes. Ventilation was sometimes unsatisfactory, particularly during excessively cold spells. Litter often became damp from condensation when temperatures were rapidly rising. Although good laying records were obtained in insulated chicken houses

Table 22.—Income and expenses on selected poultry farms in the Matanuska Valley for the years indicated.

Item	1949	1950	1952	1953
Farms reporting	8	9	7	5
Income from egg sales	\$4,360	\$4,266	\$7,156	\$8,360
Gross income	7,216	8,796	9,319	8,903
Expenditures	4,788	6,774	8,445	7,665
AVERAGE NET RETURNS	\$3,742	\$2,022	\$1,683	\$2,911
<small>(For wages and interest)</small>				

without supplemental heat, a small space heater was valuable in keeping litter dry during winter and spring.

Most poultrymen housed their flocks in loose pens providing two to three square feet of floor space per bird on built-up litter. Straw was popular although some preferred sawdust and used it alone or mixed with straw. There was no attempt to utilize native peat for litter despite large acreages existing in the Territory. Although bedding supplies were often short, there was not a sufficient volume required to justify a peat processing plant.

All poultrymen used supplemental lights in their chickenhouses to make at least a 12-hour day. A few lighted their laying flocks for 16 to 24 hours. A usual practice involved not more than 60 watts per hundred birds. One or two used nearly 100 watts per 100 birds.

Although no automatic watering systems were reported, several farms could pump water into their poultry houses during warm weather. Hauling winter

water to the chickens was a cold, back-breaking task for many. Seven poultrymen heated drinking water in cold weather.

In the Matanuska Valley, white Leghorns were a common breed, followed by Rhode Island Reds and hybrids. Some poultrymen carried birds over for a second laying year. Others replaced their entire flocks every year. Most poultrymen purchased only sexed chicks or replacements while a few bought both sexed and straight-run chicks. Although several raised their replacements on range, only a few used range or outdoor pens for their laying flocks.

Blowouts (prolapsis), pickouts and leukosis were leading killers in laying flocks but losses from disease were not serious. Coccidiosis caused deaths in replacement chicks. Predatory animals and birds in some sections of the Valley caused large losses.

An average laying rate on ten poultry farms during 1952 and 1953 was about 167 eggs per hen per year. Good management practices gave much better yields, but the averages were brought down by several inefficiently managed farms that did not survive for more than three years.

VEGETABLE FARMS

Alaska's reputation for growing succulent salad greens and tremendous cabbages is legendary. Its flavorful strawberries and raspberries are no less well known. Cool moist summers are ideal for broccoli, cabbage, cauliflower, brussels sprouts and other cabbage-type vegetables. Celuce, leaf and head lettuce, kale, chard, spinach, celery and similar salad greens thrive beyond the home gardener's wildest fancy. Peas do remarkably well. Red beets, rutabagas, turnips, radishes, kohlrabi and similar roots can be grown with little effort. In the Tanana and Yukon Valleys squash, cucumbers and tomatoes can be raised outdoors. Short nights and low respiration levels lead to an accumulation of sugars and starches that produce premium quality and flavor. Root maggots and cutworms, both easily controlled by insecticides, are the only serious insect pests. Except for slime and shot-hole in lettuce, diseases are nearly unknown and sprays to control common Stateside pathogens are not yet needed.

Despite these advantages, a vegetable processing industry has not developed in Alaska. There is a large demand in both military and civilian market for frozen peas, broccoli, chard and other vegetables, not to mention berries. This demand has been completely supplied by imports from the States. Although there is both a market and a production potential for an estimated \$1 million worth of vegetables, the farm value of those (excluding potatoes) grown in 1954 was less than \$200,000. Commercial berry growing is so entirely neglected that no estimate of the crop's annual value is available.

Despite large consumer demands, the biggest problem faced by vegetable growers was selling their crops. Because there were no processing plants in the Territory and because facilities for holding and handling perishable truck were nearly non-existent, the farmer generally dealt directly with his consumers or directly with retail outlets. Moreover his market was strictly limited to the short growing season, extending at most over only an eight week period. In the Matanuska Valley some fresh vegetables were sold through a farmers' cooperative. A few tons of carrots were usually stored. But for the most part, the grower of salad greens or cabbage had to peddle them himself—a job usually considered an integral part of the harvest process.

Another big problem was the cost of harvest labor. There was no cheap seasonal labor in Alaska. Vegetable growers' peak labor requirements coincided with the peak summer construction season so that short term labor was unobtainable. Harvesting therefore depended on family labor. A few specialized growers occasionally managed to employ high school children but poor transportation and communications made the use of transient labor very difficult.

Hired labor was the greatest expense item on vegetable farms. Labor ranged from 25 per cent of total expenses in 1949 to almost 50 per cent in 1953. This increase was due to greater specialization and increased size of operations. Where in 1949 many farms were small and family labor did most of the work, by 1953 the farms were much larger and less family labor was available.

Some homesteaders with little cleared land, family labor and a few capital assets have grown and sold vegetables successfully and profitably. Several experienced specialized farmers have consistently made a good living by growing and selling truck crops. Special production and marketing skills are needed. Above all, careful planning with a view toward market opportunities is essential. Starting with a few acres of cleared land, some farmers have grown vegetables or potatoes until they acquired more cleared land, buildings and machinery.

Alaska's vegetable industry has grown pretty much on a hit-and-miss basis. Only a few growers have specialized in particular crops and have continued growing vegetables year after year. For example, only 12 of 77 selected farmers interviewed in the Matanuska Valley in 1949 had vegetable-potato enterprises. By 1953 all had changed to some other enterprise or occupation. One had rented his place out and his tenant continued raising vegetables. Two changed over to potato-dairy combinations while another two changed to potatoes. The others either quit or curtailed their farm activities. Only two commercial vegetable farms were found in the Tanana Valley in 1953.

Fewer farmers, particularly in the Matanuska Valley, were growing vegetables in 1954 than in 1949. Of all farmers interviewed in 1949 about half grew vegetables as compared with only a quarter in 1953. The trend in vegetable production was thus toward specialization, with fewer farmers growing more vegetables. Beginning and part-time farmers still grew some, but by 1953 vegetable production was uncommon on farms with more than 50 acres of cropland.

Greater specialization brought more income from vegetable farming. The average net income for potato-vegetable farms in the Matanuska Valley in 1949 was \$4,433. It jumped to \$8,297 in 1952 and \$10,516

in 1953. These figures are from a small sampling of successful farmers and therefore do not reflect the near-failures of small enterprises.

Organization of specialized vegetable farms varied greatly. Most farmers needed vegetable storage and labor saving equipment. Their capital investments were generally smaller than for other types of farms.

Cabbage, lettuce and carrots were the three most important vegetable crops in recent years. Together with beets, turnips, celery and radishes they made up most vegetable sales. Small plantings of other crops partially supplied the summer demands.

GROWING GRAIN

Grain for cereal and straw is important in Alaska's agricultural economy. Some 79 farmers grew about 620 acres of grain in the Matanuska Valley in 1950. Over half of this acreage was in oats, about 23 per cent in wheat, 4 per cent in barley, and 15 per cent in mixed plantings. Over half of the oat acreage was seeded to the variety Victory, about 40 per cent to Swedish Select and 7 per cent to Gopher. Khogot was the leading wheat. Nearly two-thirds of the barley acreage was seeded to Trapmar, a hooded, hullless variety that was popular for chicken feed and hay. Olli and Markhinetz were other common barleys.

standbys—Victory and Swedish Select—remained popular, possibly because their seed was cheaper and more plentiful.

Grain production records accumulated in the Matanuska Valley during five growing seasons revealed that an average of 9.4 hours of labor was required to grow and harvest an acre of grain (Table 24). Of this, 2.3 hours were needed in the spring for preparing seedbeds and for planting. Another 3.3 hours were used in the fall for binding and shocking. Grain was usually threshed in October or later in the winter and required an average of 3.8 man-hours per acre.

Table 23.—Relative importance of small grains in the Matanuska Valley as indicated by the per cent of grain land planted to each kind during the years indicated.

Grain	1949	1950	1951	1952	1953
Percent planted to each variety					
Oats	65	58	50	65	53
Barley	9	4	13	27	24
Wheat	19	23	15	—	4
Mixed grains	7	15	22	8	19

In an attempt to meet demands for better adapted cereals, the Alaska Agricultural Experiment Station had developed and released two new grains by 1952. Edda barley, a two-row, bearded type proved to be a high yielding cereal, making excellent malt. Golden Rain oats was found to be a good feed grain where earliness is essential. A big problem was encountered in developing seed sources for these outstanding grains. Small demands for seed did not justify large plantings. To handle this and similar problems a crop improvement association was organized. By 1954 these new grains were promising more efficient feed production practices. For example, in 1949, 19 per cent of the small grain acreage was in wheat and 9 per cent in barley. Five years later 24 per cent of all small grain acreage was in barley (mostly planted to Edda) while only 4 per cent was in wheat (Table 23). Farmers had abandoned a poor wheat for a good feed barley. Although Golden Rain oats filled a real need, the old

Table 24.—Labor and tractor time required to grow and harvest an acre of grain in the Matanuska Valley. Values are averages for the years 1949 through 1953.

Operation	Man hours	Tractor hours
Planting		
Plowing	0.9	0.9
Disking & harrowing	0.8	0.8
Seeding & packing*	0.6	0.5
Total	2.3	2.2
Harvesting		
Binding	1.5	0.9
Shocking	1.8	—
Threshing	3.8	0.5
Total	7.1	1.4
GRAND TOTAL	9.4	3.6

*Fertilizing is included in this operation

Although there were no combines in the Matanuska Valley many farmers thought that combines might reduce labor and make for more efficient feed growing. Others pointed out that because of short bedding supplies, their straw crop was nearly as valuable as the grain. They felt that turning to combines might cut labor costs in growing feed, but that these savings would be lost through the additional expense of collecting straw. There was also doubt that grain would dry sufficiently when standing to permit combine harvest without resorting to bin drying. Shocking followed by stacking before snowfall was advantageous

in allowing the grain to "sweat" dry before threshing. Those who followed this practice encountered little trouble in storing their grain or in saving their bedding straw.

Table 25.—Average cost of growing and harvesting an acre of grain (excluding depreciation and other farm overhead) in the Matanuska Valley. Values are averages for years 1949 through 1953.

Expense items	Cost per acre
Supplies and materials	
Fertilizer, 105 lbs @ \$6.75 per cwt	\$ 7.09
Seed, 100 lbs @ \$7.75 per cwt	7.75
Twine, 2.5 lbs @ \$0.40	1.00
Total	\$15.84
Labor & equipment	
Labor, 9.4 hrs. @ \$1.75	\$16.45
Grain drill, 0.5 hrs @ \$4.00	2.00
Binder, 0.9 hrs. @ \$4.50	4.05
Thresher, 0.5 hrs @ \$9.00	4.50
Tractor, 3.6 hrs @ 2.50	9.00
Truck, 1.1 hrs @ \$2.50	2.75
Other equipment, 1.7 hrs @ \$2.00	3.40
Total	\$42.15
TOTAL COST PER ACRE	\$57.99

Combine harvesting at the Fairbanks Experiment Station confirmed the belief that while initial harvesting costs for the grain alone were somewhat reduced, combined grain generally had to be dried before storage. Moreover, risks of losing the straw were

great. For these reasons, and also because grain fields were usually not uniform with respect to soil and drainage so that uneven ripening occurred, combines have not been recommended in Alaska.

Seeding rates averaged about 100 pounds per acre. They ranged from 80 to 150 pounds, depending upon germination and type of grain. About 100 pounds of fertilizer or its equivalent in manure was used on each acre. Applications varied, according to farms and fields, from none to 400 pounds. Average rates of fertilization increased from 73 pounds per acre in 1951 to 128 in 1953. More farmers began using mixed fertilizer and others stepped up fertilizer applications in response to research findings. An application of 200 or 300 pounds of 10-20-10 was recommended by the Extension Service.

During the five years of 1949 through 1953, the average cost (excluding overhead and depreciation) of producing an acre of grain was about \$58 (Table 25). Of this cost 25 per cent went for supplies and material, 25 per cent was for labor and the remaining half was for operating machinery. Average yields during the five years was 37 bushels of oats and 29 bushels of barley. Thus an average cost per hundredweight of oats was \$4.93 and of barley, \$4.17. Grain sold during these years for about \$6 per hundredweight. An average acre value was therefore about \$70 for oats and \$83 for barley. Assuming a yield of \$40 worth (one ton) of straw, the gross value per acre of cereal ranged from \$110 for oats to \$123 for barley. Subtracting production costs from this gross value left \$52 for oats and \$65 for barley to cover overhead and profit.

GROWING HAY AND SILAGE

Dairying provides a stable basis for the expansion of Alaska's agriculture. Both climate and market conditions favor milk production. Feeding problems are a major handicap. Alaskan dairymen know that imported feed is expensive and hard to get. Imported hay costs from \$90 to \$105 a ton. Their locally grown roughage consists mostly of oat-pea mixture which probably will remain an important forage. A great disadvantage of this crop is encountered during harvest when wet weather usually prevents satisfactory hay curing. A much cheaper and more convenient method of preserving oat-pea mixtures is to make them into silage.

A second important trend in roughage production was seen in increased planting of perennial grass. Because of climatic factors (of which long days during the growing season appears to be more significant than low winter temperatures) no dependable perennial legume forages are yet at hand.* Thus Alaska's dairymen have turned to bromegrass, although a new timothy, soon to be released by the Experiment Station, may provide more flexibility in forage programs within the next three years.

Smooth bromegrass is well adapted to the Tanana and Matanuska Valley and to the Kenai Peninsula. Its perennial nature gives it a great advantage over oats-and-peas, which must be planted each season. Bromegrass usually is not damaged by cutworms after the first year—another advantage over oats-and-peas. It starts early in the spring and grows rapidly. Fertilized bromegrass produces good hay by late June or early July. At this time of year, a farmer has a fair chance of field-curing it in windrows. Second-cuttings made during the rainy season can be ensiled.

Bromegrass has not been popular because it will not produce good yields unless fertilized. Many farmers tried bromegrass without fertilizer and, in an attempt to get big yields, let their crops grow too long. Bromegrass must be cut early because its palatability and protein content decrease rapidly after the panicles emerge. Increases in yield after one-tenth of the field has headed out are made only by sacrificing quality. When cut before it fully heads, fertilized

*Alsike and sweetclovers can be utilized as annual forages in some sites. Yellow alfalfa (*Medicago falcata*) shows some promise as a perennial but requires skillful management.

bromegrass produces good hay or silage with less labor and expense than any other Alaska forage. As dairymen became familiar with bromegrass, they quickly saw its advantages. By 1953, over 40 per cent of their hayland was in bromegrass as compared to only 20 per cent in 1951. No farms reported using grass hay until 1950.

Despite additional acres cleared and planted to forage crops, dairymen were still unable to grow all of their roughage. In 1953 over half of the dairymen in the Matanuska Valley imported hay from the States. Others were forced to reduce their roughage feeding in order to winter their herds without purchasing hay.

By using more fertilizer, some farmers were improving their situation. In 1952, those who applied 100 pounds or more of 16-20-0 fertilizer per acre harvested 1.6 tons of oat-pea hay and 5.6 tons of oat-pea silage. Those who used less fertilizer averaged only 1.3 tons of oat-pea hay and 3.7 tons of oat-pea silage per acre. Although the Extension Service recommended 400 pounds of 10-20-10 or its equivalent, the usual fertilizer application was about 100 pounds per acre.

Swedish Select and Victory oats were popular forage varieties used in hay and silage mixtures. Many farmers planted some vetch and a few planted barley, buckwheat or millet with oats and peas. Canadian field peas and common vetch were the usual legume varieties. Average seeding rates, around 125 pounds per acre, varied little from 1949 through 1953. In 1953, it was 127 pounds of which 95 were oats, 26 were peas, five were vetch and one was barley, millet or buckwheat.

Most farmers prepared their land in late May or early June. Oats-and-peas for hay were usually seeded earlier than for silage. Usually oat-pea mixtures



Silage is now commonly harvested with field choppers. Because of wet weather in August and September, it is impractical to put up hay in autumn. Some hay can be made in late June and early July.

were grown in much the same way for both hay and silage. Some of this crop originally planted for roughage was often threshed for grain. Planting labor averaged 2.2 hours per acre (Table 26).

Harvesting methods changed during the period. For example, in 1949 no field choppers were in use but by 1953 much silage was harvested by this method. Similarly no field hay balers were in operation in 1949, but by 1953 much hay was baled in the field. An average of 6.9 hours was needed to harvest an acre of hay, compared with 7.8 hours for silage harvested by the binder method and 5.4 hours for silage harvested with the field chopper.

Harvesting silage with a binder needed a little more labor and machinery time than cutting hay. Silage harvested with a field chopper required less

EDITOR'S NOTE — Some early farmers mowed their oats-and-peas and stacked the green forage on stakes to dry. Others cut oats-and-peas with a binder as though it were grain, leaving the shocks in the field until they were fed. These shocks often "froze dry", but sometimes they molded because of rainy weather during harvest. Left in the field, shocks were generally covered by heavy winter snow. Axes and bulldozers were occasionally needed to loosen frozen shocks before they could be moved.

Some farmers said that making silage was a lot of work. Because forage is handled when succulent, they pointed out that more materials must be hauled to the barn than when it is left in the field to dry. The Experiment Station concluded from studies, initiated in 1949 to answer these questions, that of three methods of preserving forage — field-curing as hay, barn-drying or processing it as silage—making silage is cheapest. Even when picked up with a hayloader, silage was least expensive because field-staking, hand-forking, and artificial drying costs were avoided. Field chopping into self-dumping trucks and unloading onto a blower-elevator further reduced labor costs in making silage.

Silage at \$15 a ton seemed to be a better bargain than hay at \$40 to \$100 a ton. Other research studies revealed that 2¼ tons of silage produced just as much milk as a ton of field-cured hay. In terms of dollars and cents, \$10.20 worth of silage gave as much milk as \$16.90 worth of field-cured hay. In another year \$7.16 worth of silage was just as good as \$18.34 worth of hay.

For these reasons many dairymen changed from hay to silage. In 1947 less than half of all dairy farms were feeding silage. By 1951 nearly all were feeding silage, and a few had switched entirely to silage without feeding any supplemental hay*. During this period, silo construction was conspicuous on Matanuska Valley dairy farms. By the same token, there was no perceptible swing to mow-dryers. It is not expected that barn-dryers to promote hay storage will be widely adopted until cheap fuel and electricity is available in Alaska. A power rate of one cent per kilowatt hour might make barn-drying economical.—Allan H. Mick

*Andrews, R. A., H. A. Johnson and P. F. Martin, Dairy and Potato Farms in the Matanuska and Tanana Valleys, 1951, Alaska Agricultural Experiment Station, Mimeograph Circular 3, 1953.

labor but more equipment than either of the other two methods. Oat-pea hay required a total of 9.1 hours of labor and 3.0 tractor hours. Oat-pea silage cut with a binder required 10.0 hours of labor and 4.4 hours of tractor time. Silage harvested with a field chopper required 7.6 hours of labor and 4.4 hours of tractor time per acre.

Table 26.—Labor and tractor time required to grow and harvest an acre of oat-pea hay or silage in the Matanuska Valley. Values are averages for the years 1949 through 1953.

Operations	Man hours	Tractor hours
Planting		
Plowing	0.9	0.9
Disking & harrowing	0.6	0.6
Seeding & packing ¹	0.7	0.6
Total	2.2	2.1
Harvesting		
Binding hay	1.6	0.9
Shocking hay	2.0	—
Storing hay	3.3	2
Binding silage	1.7	0.9
Storing silage ²	6.1	1.4
Field chopping silage ³	5.4	2.3
Total for harvest		
Hay cut with binder	6.9	0.9
Silage cut with binder	7.8	2.3
Silage chopped in field	5.4	2.3

¹ Fertilizing is included in this operation

² Truck time for hauling was 1.4 hours.

³ Truck time for hauling was 1.7 hours, stationary chopper time was 1.0 hour.

⁴ Truck time for hauling was 2.1 hours, field chopper time was 1.4 hours, and blower time was 1.0 hours.

The average cost (excluding depreciation and farm overhead) of producing an acre of oat-pea hay was about \$54. Silage cost about \$61 an acre (Table 27). Less than 10 per cent of this expense was for fertilizer. Labor and equipment costs averaged 70 per cent of the total for oat-pea hay and about 74 per cent for silage. Assuming a hay yield of 1.4 tons per acre, the average cost per ton was \$38. A silage crop yielding 4.4 tons per acre cost about \$14 a ton.

Production research in Alaska shows that good oat-pea silage yields should be around eight or nine tons per acre. A good hay yield should be close to 2½ or three tons per acre in the Matanuska Valley. A labor and machinery cost goal for dairymen to work toward is about \$7 or \$8 a ton for silage and \$20 to \$25 for hay. These estimates do not include fixed overhead farm costs such as interest on investments or building depreciation.

These forage management studies demonstrate how Alaska's dairymen can increase their net profits by better management of adapted crops. General conclusions and recommendations arising from the experience of farmers include the following points:

(1) Oats-and-peas should be preserved as silage. The mixture should contain plenty of peas—a bushel of peas to a bushel of oats is a good rule to follow.

Field-cured oats-and-peas make expensive forage, especially if left in the field during the winter.

(2) Wet harvest seasons are no obstacle to making silage. Good inexpensive silage can be made from oats-and-peas, from bromegrass, and from annual legumes.

(3) Forage production should be diversified to include bromegrass and annual legumes. First-cuttings of bromegrass make good, inexpensive hay.

(4) Commercial fertilizers are essential. Bromegrass can be expected to yield large returns on money invested in fertilizer.

(5) Modern machinery will save labor and money. Field-choppers are efficient where large volumes of forages can be handled.

Table 27.—Average cost of growing and harvesting an acre of oat-pea hay or silage (excluding depreciation and other farm overhead) in the Matanuska Valley. Values are averages for the years 1949 through 1953.

Expense items	Cost per acre
Supplies & materials	
Fertilizer, 75 lbs. @ \$6.75 per cwt.	\$ 5.06
Seed, 125 lbs @ \$8.25 per cwt	10.32
Binder twine, 3.2 lbs @ \$0.40	1.28
TOTAL	\$16.66
Labor & equipment	
Hay (harvested with binder)	
Seeder, 0.6 hours @ \$4.00	\$ 2.40
Other equipment, 1.5 hours @ \$2.00	3.00
Labor, 9.1 hours @ \$1.75	\$15.92
Tractor, 3.0 hours @ \$2.50*	7.50
Truck, 1.7 hours @ \$2.50*	4.25
Binder, 0.9 hours @ \$4.50*	4.05
TOTAL	\$37.12
Silage (harvested with binder)	
Seeder & other equipment	\$ 5.40
Labor, 10 hours @ \$1.75	17.50
Tractor, 4.4 hours @ \$2.50*	11.00
Truck, 1.7 hours @ \$2.50*	4.25
Binder, 0.9 hours @ \$4.50*	4.05
Stationary chopper, 1.0 hour @ \$2.00* ..	2.00
TOTAL	\$44.20
Silage (harvested with chopper)	
Seeder & other equipment	5.40
Labor, 7.6 hours @ \$1.75	13.30
Tractor, 4.4 hours @ \$2.50*	11.00
Truck, 2.1 hours @ \$2.50*	5.25
Field Chopper, 1.4 hours @ \$6.50*	9.10
Blower, 1.0 hours @ \$2.00*	2.00
TOTAL	\$46.05
TOTAL COST OF PRODUCTION	
Hay cut with binder	\$53.78
Silage harvested with binder	60.86
Silage harvested with chopper**	61.43

* Unit cost based on custom rate.

**Does not include \$1.28 for binder twine.



Looking northeast over Fairbanks, Alaska's second largest city. Defense and construction activities supplied through this modern population center provide markets for Alaska's farmers.

This is a publication of the
ALASKA AGRICULTURAL EXPERIMENT STATION

Summary

Alaska's agricultural output almost doubled between 1949 and 1954. It was out-paced by a fast-growing population, yet was plagued by temporary surpluses, the fault of an under-developed marketing system. Most crops did not supply market demands.

Milk led in dollar volume, followed by potatoes, poultry, and vegetables. Their producers clustered along transportation arteries close to markets. Scattered beef and sheep spreads dotted the Aleutian Chain. Wool was the only farm product successfully exported to the States.

THE KENAI PENINSULA, hampered by many obstacles, made little progress toward agricultural development. Most food was consumed locally although a new highway to Anchorage gave promise of better market opportunities.

THE MATANUSKA VALLEY was the leading farm region in Alaska. Changes in operators occurred on almost half of its farms as many farmers shifted to new enterprises or other occupations. Yet this valley was further along in agricultural development than any other Alaskan area. About half of the food-stuff grown in the Territory was raised there. Its farmers owned more cleared acres, more buildings and more equipment than farmers in other areas. Agriculture in the Matanuska Valley was marked by (1) many part-time farms and home-

steads (2) many small farms together with a few conspicuously large dairy farms (3) many management changes as newcomers took over old farms and as small farms expanded and (4) a movement away from self-sufficiency and diversification toward specialized commercial dairying.

THE TANANA VALLEY was the northernmost agricultural region. More and larger farms marked its development during the six years. Turnover among farm families was not as great as in other areas. Potatoes were the leading crop on small farms. Although there was much interest in producing fluid milk for the Fairbanks market, lack of capital, buildings and dependable home water supplies prevented most farmers from acquiring dairy herds.

DAIRY FARMING in the Matanuska Valley expanded in response to growing markets. Dairy herds grew larger while production per cow went up and cropland holdings were enlarged. Field rentals played an important role in the growth of dairying on some farms.

Dairying is the goal of many Alaskan farmers. Although demanding larger capital outlays than other kinds of farming, a steady monthly milk check offers considerable security and stability. It promises good returns for investments and labor—by 1954 annual net farm returns of over \$10,000 were enjoyed by several highly successful dairymen. An average dairy farm was producing milk for about

\$8 per hundred-weight. The difference between this cost and the average selling price of \$10.86 per hundred paid the wages of the farmer and his family plus interest on his investment. Better farmers raised their wages by attaining greater efficiency. Major factors contributing to better efficiency were large herds, high producing cows, and growing most of their own roughage. Most increases in income were spent for farm improvements

POTATO FARMING in the Matanuska Valley was a transition activity for many families who gradually turned to dairying as a more stable business. About a third of all potato growers continued raising potatoes as a major enterprise. Efficient growers earned a good living. Over half the hired labor required to grow and grade an acre of potatoes was used at harvest time.

POULTRY FARMING provided a good income and a good annual distribution of labor for a few families in the Matanuska Valley. Flocks were small—800 birds or less—and non-farm work was important to the family's welfare. The cost of growing eggs on five farms in 1953 was about 80c per dozen.

VEGETABLE FARMS yielded high returns but involved rather large risks. Skillful truck growers enjoyed good returns for their labor, especially where they did a good marketing job. By 1954 most vegetables were grown on a few specialized farms.

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