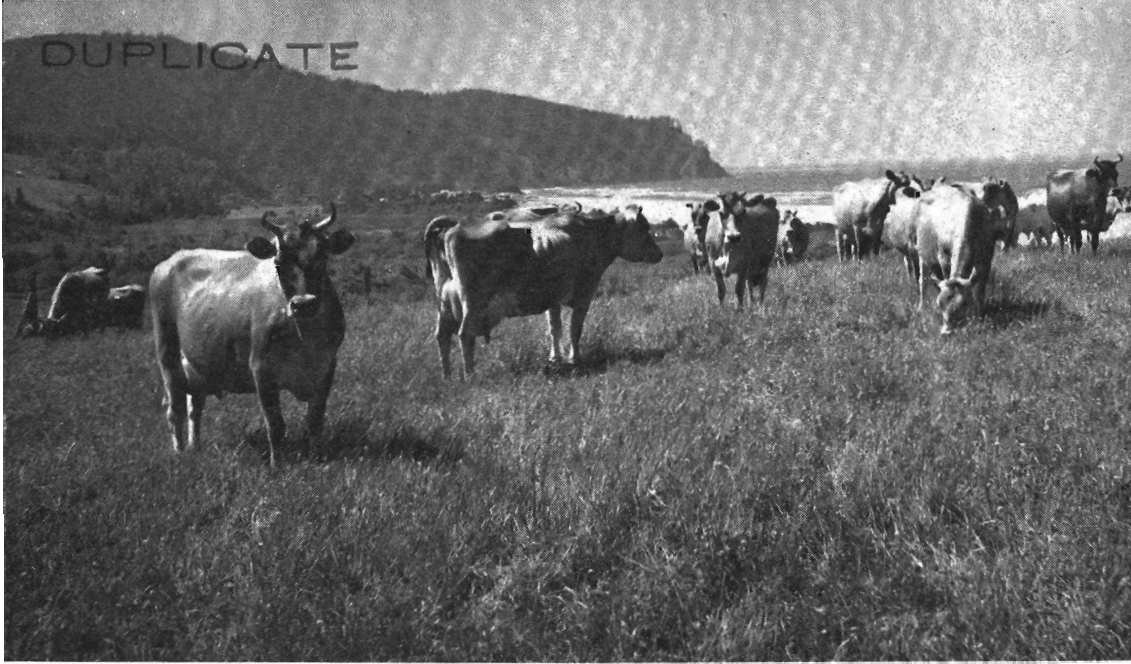


DUPLICATE



Dairy Farm Earnings

In Tillamook County, Oregon

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Summary

Size of farms

- ▶ The average size of the 10 farms in this study for the seven-year period 1940-1946 inclusive, was 115 acres, of which 29 acres were mainly in hay and silage, and 50 acres were in tillable pasture.
- ▶ The average number of cows on the farms studied in Tillamook County was 37 head per farm.
- ▶ According to the farmers' own estimates the total value of all farm capital was \$29,672 per farm, of which \$23,177 was for land and buildings, \$2,909 was for the cows, and \$2,089 was for machinery and equipment.

Financial returns

- ▶ Income from the sale of dairy products and dairy cattle amounted to 96.5 per cent of the total receipts on the farms studied.
- ▶ Total farm receipts over the seven-year period averaged \$9,582 per year; farm expenses averaged \$6,754; thus leaving a net farm income of \$3,029 after allowing for an average annual increase in inventory of \$201.
- ▶ The average rate of interest earned on the total investment for the seven-year period was 7.1 per cent varying all the way from 2.8 per cent in 1940 to 11.6 per cent in 1946.
- ▶ Profit per cow (net return above all costs) averaged \$27 per year for the seven-year period but ranged from a minus \$10 per cow in 1940 to a plus figure of \$65 per cow in 1946.
- ▶ Profit per pound of butterfat (net return above all costs) averaged 8¢ per pound for the seven-year period but varied from a minus 3¢ in 1940 to a plus figure of 20¢ per pound in 1946.

Most profitable farms

- ▶ The most profitable group of farms were more successful financially than the least profitable farms because of the following factors:
 - (a) Larger number of cows.
 - (b) Larger amount of capital to work with.
 - (c) Enough work for two full-time men, whereas least profitable farms had too much work for one man but not enough for two men.
 - (d) Larger gross sales with less actual expense per farm.
 - (e) Larger acreages of crops.
 - (f) Higher carrying capacity of pastures.
 - (g) Purchased less feed per farm and per cow because of greater dependence upon home grown feeds.

Principles of management

- ▶ The results of this study emphasized the importance of such factors as a large size of business consistent with the efficient use of land, labor, and capital in the successful operation of farms in Oregon.

Dairy Farm Earnings In Tillamook County, Oregon *

by

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and

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Introduction

This report is a brief analysis of data taken from individual farm account books kept from 1940 through 1946 on an average of seven selected farms in Tillamook County by farmers cooperating in the TVA Project.¹

All of the farms included in this study were dairy farms, each of which was large enough to be classed as an economic unit. There were wide differences in financial returns on individual farms. Therefore, for purposes of analysis, they were divided into two groups; namely, the "most profitable" and the "least profitable" farms for the three-year period 1944-1946.²

Farmers in the most profitable group made more than twice as much money as the other group during the three years 1944-1946.

The following pages present a detailed discussion of the farms studied. They are analyzed from the standpoint of farm receipts, farm expenses, net returns, and the factors affecting their variations—such as efficiency of operation, quality and size of business.

Description of the General Area

Types of farming

Tillamook County lies along the coast. Its agriculture is predominantly dairying. Major land use is for the production of hay and pasture for dairy cattle. Some grass silage and root crops are

*ACKNOWLEDGMENT: The authors express their appreciation to the individual farmer cooperators in Tillamook County and to Howard G. Smith, County Agricultural Agent, also to L. E. Francis, farm representative of the First National Bank of Portland, Tillamook Branch, for assistance in taking the pictures.

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¹Tillamook is one of several counties in Oregon where farmers are cooperating with the Agricultural Extension Service and Experiment Station of Oregon State College, and the Tennessee Valley Authority in Farm-Unit-Test-Demonstrations involving the use of phosphate fertilizers.

²For a detailed analysis of these farms for the four-year period, 1940-43, see Station Circular of Information No. 377, issued in April, 1946.

used for succulent feeds. Generally the land is plowed only when the perennial grass meadows require reseeding. Supplemental irrigation of pasture is increasing gradually.

Size of farms

The 1945 census reports 927 farms in Tillamook County. In 1944 these farms averaged 88 acres in size. Cropland averaged 13 acres per farm, pasture 39 acres, and woodland not pastured 20 acres. The remainder of the land included farmsteads, roads, and waste.

The value of land and buildings on farms of 30 acres or over averaged \$16,538. The value of machinery averaged \$1,278 per farm reporting this item.

The Farms Studied

The average size of the 10 cooperating farms in this study for the seven-year period was 115 acres, of which 29 acres were mainly in hay and silage crops, and 50 acres were in tillable pasture (Table 1). None of the land was rented.

Table 1. USE OF LAND AND AMOUNT OF LIVESTOCK FOUND ON THE 10 COOPERATING FARMS, TILLAMOOK COUNTY, 1940-1946.

Item	Average amount	Percentage of total	Your farm
<i>Acres per farm</i>			
Hay and miscellaneous crops	29	25	.....
Improved pasture	50	44	.....
Other land	36	31	.....
TOTAL LAND	115	100	.....
<i>Livestock per farm</i>			
Dairy cows	37	80	.....
Other livestock (animal units*)	9	20	.....
TOTAL LIVESTOCK	46	100	.....

* An animal unit refers to one cow or its equivalent; namely, 2 young cattle, or 5 sheep and goats or sows, or 10 hogs other than sows, or 10 lambs, or 100 chickens.

The number of dairy cows on hand at inventory time averaged 37 head per farm or 80 per cent of the total animal units kept. The other livestock comprised, for the most part, dairy heifers and calves kept for replacement.

During the seven years of the study the value of land and buildings as estimated by the farmers themselves averaged \$23,177 per farm or 78% of the total farm capital (Table 2). Total farm

capital averaged \$29,672 per farm or \$260 per acre operated. Dairy cows were conservatively valued at \$2,909 per herd, an average of \$79 per cow. The inventory value of machinery, motor vehicles, milking equipment, and small tools averaged \$2,089 per farm, and feeds and supplies \$729.

Farm receipts

Total farm receipts over the seven-year period averaged \$9,582 per farm per year or about twice as much as in 1940 (Table 3). The dairy enterprise accounted for about 96 per cent of the total farm receipts from these farms. Hogs, chickens, and sheep were of minor importance.

Farm expenses

Cash outlays for feed averaged \$2,299 per year and for hired labor \$1,212. Together these two items comprised over half of all farm expenditures (Table 3). Other important items were property taxes, and the maintenance and replacement of equipment and livestock. Farm expenditures increased greatly during the seven years, the average per year being double the amount spent in 1940.

Table 2. THE AVERAGE INVENTORY VALUE OF FARM CAPITAL AND ITS DISTRIBUTION ON THE 10 COOPERATING FARMS, TILLAMOOK COUNTY, OREGON, 1940-1946¹

Item	Average capital per farm	Percentage of capital	Your farm
<i>Real estate</i> ²			
Land	\$17,683	59.6	.....
Dwelling	1,833	6.2	.....
Other buildings	3,661	12.3	.....
TOTAL REAL ESTATE PER FARM	\$23,177	78.1	.....
<i>Livestock</i>			
Dairy cows	\$ 2,909	9.8	.....
Other dairy animals	668	2.2	.....
Horses	70	.2	.....
Other livestock	30	.1	.....
TOTAL LIVESTOCK	\$ 3,677	12.3	.....
Machinery and equipment	\$ 2,089	7.1	.....
Feeds and supplies	729	2.5	.....
TOTAL FARM CAPITAL	\$29,672	100.0	.....
Capital per animal unit kept ³	\$ 645	.....	.....
Capital per acre of farm operated	260	.....	.....
Value of buildings and land per acre	203	.....	.....

¹Five of the cooperators remained in the project the entire seven years; three dropped out; and two were added to replace them.

²The basis of valuation of land and other farm assets was not changed in the farm account book to reflect the rise in prices of farm property during the period. The inventory of buildings and machinery reflects the depreciation allowed less cost of improvements added.

³See footnote, Table 1.

Table 3. FINANCIAL SUMMARY SHOWING THE AVERAGE ANNUAL GROSS FARM RECEIPTS AND EXPENSES (INCLUDING INVENTORY CHANGES) PER FARM COOPERATING; 48 RECORD-YEARS, TILLAMOOK COUNTY, OREGON, 1940-1946.

Item	Average per farm								Percentage of average
	1940	1941	1942	1943	1944	1945	1946	Average	
<i>Receipts</i>									
Dairy products	\$4,287	\$5,902	\$7,645	\$ 9,885	\$ 9,857	\$11,189	\$13,168	\$8,848	92.4
Dairy cattle	251	219	290	524	400	482	616	397	4.1
Other livestock	73	155	83	106	49	7	.....	66	.7
Off-farm work	133	148	24	49	50	418	299	161	1.7
Miscellaneous	84	148	65	66	181	91	132	110	1.1
TOTAL RECEIPTS	\$4,828	\$6,572	\$8,107	\$10,630	\$10,537	\$12,187	\$14,215	\$9,582	100.0
<i>Expenses</i>									
Feed purchased	\$ 892	\$1,304	\$1,933	\$ 2,502	\$ 2,854	\$ 3,453	\$ 3,153	\$2,299	34.0
Hired labor	615	745	1,146	1,517	1,484	1,350	1,623	1,212	17.9
Property taxes	270	285	450	396	282	394	348	346	5.1
Livestock purchased	86	161	307	426	547	560	765	407	6.0
New equipment	489	771	332	242	885	1,055	285	580	8.6
Repairs, motor fuel, etc.	331	711	931	864	1,116	1,273	1,544	967	14.3
Miscellaneous	492	528	471	545	663	560	704	566	8.4
Unpaid family labor	139	103	120	103	429	886	857	377	5.7
TOTAL EXPENSES	\$3,314	\$4,609	\$5,690	\$ 6,595	\$ 8,260	\$ 9,531	\$ 9,279	\$6,754	100.0
Receipts less expenses	\$1,514	\$1,963	\$2,417	\$ 4,035	\$ 2,277	\$ 2,656	\$ 4,936	\$2,828	.....
Net inventory change ¹	-55	509	254	-353	614	456	-20	201	.....
NET FARM INCOME ²	\$1,459	\$2,472	\$2,671	\$ 3,682	\$ 2,891	\$ 3,112	\$ 4,916	\$3,029	.....
Interest on investment at 4 per cent ³ ..	\$ 993	\$1,024	\$1,140	\$ 1,257	\$ 1,180	\$ 1,350	\$ 1,365	\$1,187	.....
LABOR INCOME ⁴	\$ 466	\$1,448	\$1,531	\$ 2,425	\$ 1,711	\$ 1,762	\$ 3,551	\$1,842	.....
Value of operator's time ⁵	\$ 771	\$ 771	\$ 750	\$ 814	\$ 866	\$ 952	\$ 952	\$ 839	.....
RETURN ON INVESTMENT	\$ 688	\$1,701	\$1,921	\$ 2,868	\$ 2,025	\$ 2,160	\$ 3,964	\$2,190	.....
PER CENT RETURN	2.8	6.6	6.7	9.1	6.9	6.4	11.6	7.1	.....

¹Average amount by which the value of the closing inventory differs from the value of the opening inventory.

²Difference between total farm receipts and total farm expenses including any net change in inventory for the year. Net Farm Income is the return on the farm operator's work and the total farm capital.

³A conservative charge made for the use of capital employed.

⁴Return to the operator for his labor after deducting the interest on the capital from the Net Farm Income.

⁵A conservative wage charged for the work of the operator.

Net returns for the year

NET FARM INCOME (the return both to the operator and to the total farm capital) averaged \$3,029 per year during this seven-year period, or approximately twice as much as in 1940.

The average LABOR INCOME for the seven years was \$1,842 per year or four times as large as in 1940. Average labor income for 1946 was \$3,551, or more than seven times the 1940 figure. A rate of 4 per cent interest was charged against the farm business for the use of farm capital. This interest or rental charge was deducted from the net farm income to arrive at the labor income of the operator.

The average RATE EARNED ON CAPITAL was 7.1 per cent or 2½ times that earned in 1940. A normal wage for the work of the operator was deducted from net farm income to arrive at the return on investment or farm capital. Any major changes in the total capital investment were due to a shift whereby one farm was withdrawn from the project and another added.

Some factors affecting income

Profitable farming tends to be associated with certain factors which affect net income. Especially in periods of favorable farm prices, the net income derived from farming usually varies directly with the size or volume of the business operated. This factor of size of business has been expressed in a number of different ways such as by the total acreage in the farm, the number of acres in cropland, the number of animal units, the cost of labor expended, the total capital invested, and by the annual gross receipts per farm. In this study the number of cows per farm is a good measure of the size of business.

Quality of business is another factor affecting net income. Quality is expressed in terms of yield as, for example, in this study the production of butterfat per farm and per cow (Table 4). The average yearly production of butterfat for the seven-year period was 11,654 pounds per herd (37 cows) and 316 pounds per cow. Variations in yields from year to year were slight, indicating a high degree of stability in the production phase of this major enterprise.

The price received for butterfat and the expenditures made for feed and labor used in production were important factors in determining net income or profit (Table 4). The farm records showed that over the seven years, 1940-1946, these dairymen had an average profit of \$1,003 per year above all costs as indicated in Table 4. In 1940, however, they lacked \$305 of fully earning all costs or failed to that extent of earning the average wages (\$771) allotted to themselves for that year. The profit margin improved for the next two

Table 4. AMOUNT OF BUTTERFAT PRODUCTION PER FARM AND PER COW, AND THE PROFIT AND LOSS SHOWN PER FARM, PER COW, AND PER POUND OF BUTTERFAT PRODUCED; BY YEARS, TILLAMOOK COUNTY, 1940-1946.*

Item	1940	1941	1942	1943	1944	1945	1946	Average
Pounds of butterfat per farm	10,653	11,311	11,645	11,862	10,754	12,579	12,773	11,654
Pounds of butterfat per cow	333	337	315	303	306	307	311	316
Profit per farm	\$-305	\$677	\$781	\$1,611	\$845	\$810	\$2,599	\$1,003
Profit per cow	- 10	20	21	41	24	20	65	27
Receipts per pound of butterfat	\$.45	\$.58	\$.70	\$.90	\$.98	\$.97	\$ 1.11	\$.82
Expenses per pound of butterfat .....	.48	.52	.63	.77	.90	.91	.91	.74
PROFIT PER POUND OF BUTTERFAT	\$-.03	\$.06	\$.07	\$.13	\$.08	\$.06	\$.20	\$.08

* Profit is the net return after all costs, including interest on capital and farm wages for work done by the operator, have been deducted from gross receipts. Profit represents the return to risk-bearing and management.

years, doubled for 1943, decreased to the previous level in 1944 and 1945 as costs climbed, and then trebled to \$2,599 in 1946 as price controls on dairy products were discontinued.

The same data are expressed as profit per cow. The annual profit per cow averaged \$27 per year, and ranged from a loss of \$10 per head in 1940 to a gain of \$65 per head in 1946.

Total farm receipts in terms of butterfat production averaged 82¢ per pound, and ranged from the low figure of 45¢ in 1940 to the high figure of \$1.11 per pound of butterfat produced in 1946. Expenses actually exceeded receipts by three cents per pound of butterfat in 1940. Expenses increased steadily from year to year during this period, reaching 91¢ per pound of butterfat produced in 1946, and averaging 74¢ for the seven years of the study. Prices increased sufficiently after 1940 to produce an average profit of 8¢ per pound of butterfat for the whole period of years, 1940-1946. It so happens that the average of the low year 1940 and the high year 1946 is almost equal to the seven-year average profit of 8¢.

Least Profitable and Most Profitable Farms

Comparison of the results obtained on the most profitable farms with those obtained on the least profitable farms focuses attention on some of the major factors responsible for the differences in net earnings between the two groups of farm operators represented during the three-year period 1944-1946.

Size of business

Farms in the most profitable or high-income group excelled in the high volume of gross receipts obtained per year (Table 5). They utilized more total labor than the low-income group, and they had considerably more total farm capital to work with. They also had more cows in their herds, and slightly more acreage in their farms (Table 6).

The most profitable farms had enough cows and farm work to utilize two full-time men. The least profitable farms had more cows and work than one man could handle, but not enough work for two full-time men.

Machinery and equipment required to operate a 60-cow dairy is only slightly greater than that required to operate a 35-cow dairy. Larger herds, therefore, have less machinery and building maintenance cost per cow than smaller herds. The result is higher net profit per cow and more total net income.

Table 5. SUMMARY SHOWING THE AVERAGE FARM RECEIPTS AND EXPENSES ON THE MOST PROFITABLE, THE LEAST PROFITABLE, AND ALL COOPERATING FARMS; TILLAMOOK COUNTY, OREGON, 1944-1946.

Item	Average per year			
	Least profitable ¹	Most profitable ¹	All farms ¹	Your farm
<i>Receipts</i>				
Dairy products	\$10,699	\$14,561	\$11,405	.....
Dairy cattle	260	355	499	.....
Other livestock	10	.....	18	.....
Off-farm work .....	.....	186	256	.....
Miscellaneous	74	168	135	.....
TOTAL RECEIPTS	\$11,043	\$15,770	\$12,313	.....
<i>Expenses</i>				
Feed purchased	\$ 3,789	\$ 3,018	\$ 3,153	.....
Hired labor	1,157	2,199	1,486	.....
Property taxes	324	439	341	.....
Livestock purchased	516	907	624	.....
New equipment	1,153	547	742	.....
Repairs, motor fuel, etc.	1,552	1,347	1,311	.....
Miscellaneous	688	635	642	.....
Unpaid family labor	889	900	724	.....
TOTAL EXPENSES	\$10,068	\$ 9,992	\$ 9,023	.....
Receipts less expenses	\$ 977	\$ 5,778	\$ 3,290	.....
Net inventory change	1,165	-236	350	.....
NET FARM INCOME	\$ 2,142	\$ 5,542	\$ 3,640	.....
Interest on investment at 4 per cent	\$ 1,149	\$ 1,754	\$ 1,299	.....
LABOR INCOME	\$ 993	\$ 3,788	\$ 2,341	.....
Value of operator's time	\$ 720	\$ 1,012	\$ 924	.....
RETURN ON INVESTMENT	\$ 1,422	\$ 4,530	\$ 2,716	.....
PER CENT RETURN	4.8	10.6	8.4	.....
Total investment per farm	\$28,737	\$43,854	\$32,462	.....

¹Least profitable represents nine, and most profitable represents eight, out of a total of twenty-one farm record-years.

Table 6. FACTORS AFFECTING ANNUAL FARM EARNINGS, TILLAMOOK COUNTY, OREGON, 1944-1946

Item	Least profitable farms	Most profitable farms	All farms	Your farm
Number of annual records	9	8	20	.....
Acres per farm	108	120	106	.....
Acres tillable pasture	60	57	53	.....
Acres in other crops	25	38	29	.....
Cows per farm	35	51	39	.....
Animal units of other livestock ¹	9	10	9	.....
Animal units per acre tillable pasture	0.7	1.1	0.9	.....
Pounds of butterfat per cow	326	293	308	.....
Gross receipts per animal unit	\$250	\$255	\$257	.....
Feed purchased per animal unit	\$ 86	\$ 49	\$ 66	.....
Total labor used per animal unit	\$ 62	\$ 66	\$ 65	.....
Hired labor used per animal unit	\$ 26	\$ 45	\$ 31	.....
Return above purchased feed and total labor costs, per animal unit	\$102	\$140	\$126	.....

¹An animal unit refers to one cow or its equivalent; namely, 2 young cattle, or 5 sheep, goats, or sows, or 10 hogs other than sows, or 10 lambs, or 100 chickens.

Efficiency of operation

The high-income farms obtained their high gross receipts with cash expenditures no larger than the low-income farms. They purchased less feed both per farm and per animal unit kept on the farm. They produced larger acreages of crops and their pastures had more livestock carrying capacity per acre than the low-income farms.

Thus in terms of livestock kept the return above purchased feeds and total labor costs averaged \$140 per animal unit (cow equivalent) on the high-income farms as compared to only \$102 return on the low-income farms. This difference in earnings is attributed largely to more efficient feeding and to the larger number of cows in the herds.

The high-income dairymen spent \$37 less per animal unit for purchased feed, yet they received \$5 more gross receipts per animal unit kept on the farm. The high-income farms not only had lower costs for purchased feed per animal unit, but they also had lower total costs for feed purchased even though they had milking herds averaging 16 cows more per farm. This indicates a greater dependence upon home-grown forage.

Quality of business

The high-income farms, despite 33 pounds less butterfat production per cow, apparently obtained more economical production than the low-income group. The high-income farms had an average of 16 cows more per herd, yet had less total cash expenses than did the least profitable farms. The high-income farms excelled in producing good yields of hay, silage, and pasture.

These data indicate that efficiency of operation is largely dependent on having a large size of business combined with good yields from the land and the productive livestock kept on the farm.

Farm-furnished living

The value of farm-furnished living, although not customarily recorded as part of the farm business, is a significant contribution made by the farm to the operator and his household. Even when computed at farm prices for the milk, meat, eggs, vegetables, fruits, and wood used by the farm family, and a nominal rental for the home, the total value of these items obtained by farm families such as these usually ranges from \$300 to \$500 or more per family each year.

Efficient production a goal

Efficient production is often as important as high production in securing the highest net farm income, particularly if the extra pounds of butterfat are produced at a feed cost which is more than the extra butterfat is worth.

This does not mean that dairymen should not strive for high production per cow.

Dairymen should use the best breeding stock available in order to secure the highest possible production at the lowest feed cost per cow.

Dairymen should utilize the maximum amount of good pasture and grass silage in the dairy ration, feeding enough grain to make the ration adequate.

Good management determines profit

In summary, the most profitable operators were by far the best farm managers. They produced, stored and fed large amounts of high quality forage; they utilized their labor and equipment most effectively; they received slightly higher prices for their milk; they kept down their cash expenses; and, very important, they maintained herds large enough to utilize fully all the forage produced on their farms. They still can improve the quality of their herds and the effectiveness of their labor.

Profitable Practices

Progress on cooperating farms 1940-1946

Since 1940 cooperating farmers have been increasing the cow-carrying capacity of their farms in amounts varying from 10 to 50 per cent. This increase in carrying capacity from 1940 to 1946 has been accompanied by an average increase per farm of more than 2,000 pounds of butterfat.

A substantial part of the increase in net income per farm, as pointed out in Table 4, has been a result of this increased annual production of dairy products.

Farm practices contributing to increased production

Cooperators have adopted these improved farming practices to increase dairy production:

- (a) Use of liquid manure and superphosphate together.
- (b) Use of grass silage.
- (c) Sowing improved grasses and clovers in place of native pastures.
- (d) Rotation of pastures.
- (e) Sprinkler irrigation.
- (f) Use of agricultural limestone.

Some cooperators have put all of these practices into use; some have only used a few of them. THE COMBINATION OF ALL PRACTICES HAS RESULTED IN THE GREATEST INCREASE IN DAIRY PRODUCTION.

No attempt has been made to assign a value to each practice since the degree of use and value will vary for individual farms. All practices are important and each has its own part to play in increasing total production.

Use of Manure and Superphosphate

Value of manure

Cooperating farmers recognize that the conservation and effective application of manure are profitable practices. All but two of them utilize liquid-manure tanks to save all of the liquid manure produced on the farm.

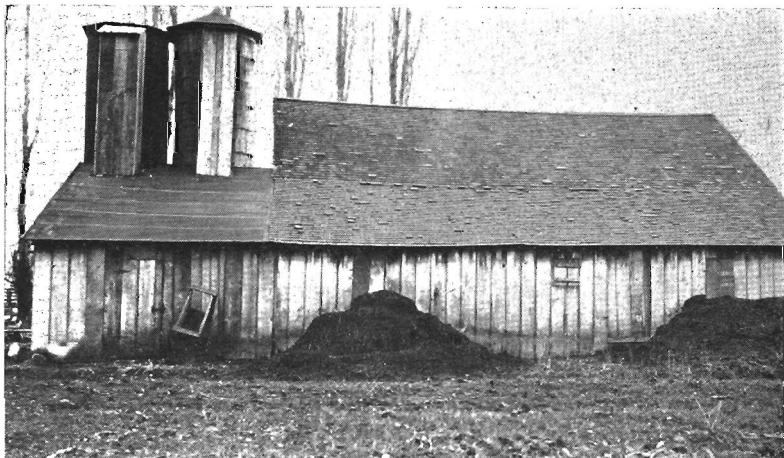


Figure 1. The owner of this dairy farm lost at least \$300 worth of plant food elements because of manure pile leaching.*

Manure from dairy cattle contains the following amounts of soil building elements per ton: 11.4 pounds of nitrogen; 4.58 pounds phosphoric acid; and 12.5 pounds potash. Most of the nitrogen, which represents approximately 59 per cent of the value of manure,

* Figured on the basis of a 30-cow herd producing seven tons of manure per cow in the barn during the year. Leaching was calculated at 50 per cent of the value of the manure (Morrison, "Feeds and Feeding," page 419). Value of plant food elements was figured on the basis of assumed 1946 retail prices for fertilizer as follows: ammonium sulphate containing 20 per cent nitrogen \$60 per ton; 20 per cent superphosphate, \$32 per ton; 60 per cent potash, \$78 per ton.

is in the urine. This liquid is largely lost unless a liquid-manure tank is utilized to hold it. Dairy cows of 1,000 pounds liveweight produce approximately 15 tons of manure per year (including bedding). Approximately 7 tons of this manure is produced in the barn and the rest on the pastures.* Unless pastures are harrowed every year the manure droppings are not fully utilized.

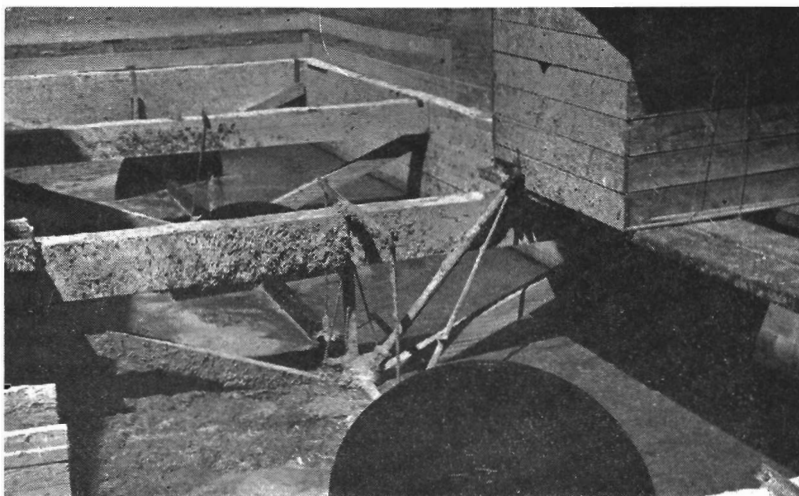


Figure 2. An old automobile rear end and drive shaft deliver power to the agitator in this liquid manure tank. Power is supplied by an electric motor housed in the small shelter on the edge of the tank. Liquid manure tanks like this one save valuable plant food elements and make it possible to clean cow barns without back-breaking labor. Manure is simply flushed into the tank along with chopped bedding. The farmer pumps the liquid into a tank wagon for distribution of manure on his fields.

Efficient manure equipment

The manure equipment pictured in Figure 2 is homemade and could be duplicated by any farmer. The agitator is operated by means of an old automobile rear end assembly and powered by an electric motor. A reverse gear enables the agitator to turn in either direction. Bedding is chopped short and ample water is used to flush the bedding and manure into the tank. This farmer's liquid-manure tank wagon is equipped with an agitator to keep the bedding and solids in suspension while the manure is being spread.

* "Feeds and Feeding," by Morrison, page 417.

A liquid-manure tank and proper management save labor

In addition to saving valuable fertilizer, liquid manure eliminates a lot of heavy labor. The only hand labor necessary consists of scraping all manure into the barn-floor gutter and dislodging it so it can be flushed into the tank. It can be pumped into a tank wagon and spread on the land without any heavy work being involved.

The old fashioned method of manure handling involves lifting the manure into a wheelbarrow and wheeling the load out to the manure pile. Then the manure is lifted again when it is loaded into the spreader. All of this back-breaking work is eliminated by use of the liquid-manure tank method.

Applying phosphate with manure

In the early years of the TVA program, phosphate was spread separately on the land by means of a fertilizer spreader. Cooperators have learned by experience that the best results are obtained from phosphate when it is spread in combination with manure.



Figure 3. A cooperator spreading superphosphate in his cow barn. This practice helps keep the barn dry, balances the nitrogen in the manure, and checks the escape of nitrogen as ammonia gases into the air.

Superphosphate with manure improves quality of forage

Manure is high in nitrogen and low in phosphorus. Adding phosphate to manure helps to balance it as a fertilizer. Some co-operators have experienced as much as a 40 per cent increase in clover in their pastures from the use of the manure-phosphate combination. Clover increases the quality and palatability of the forage.

Methods of combining manure and superphosphate

Cooperators are using several methods of mixing phosphate and manure, depending on their manure equipment. Some farmers mix phosphate with the manure as each load is hauled to the field. Others use phosphate in the barn in place of hydrated lime.

Whether manure is stored or hauled directly to the field, superphosphate should be applied to conserve the nitrogen content. Superphosphate checks the escape of ammonia gases into the air. Hydrated lime actually produces a chemical reaction in the manure that causes nitrogen-bearing ammonia gas to escape into the atmosphere.

Rate of application of phosphate

By calculating the number of loads of manure he spreads on an acre, a farmer is able to determine how much phosphate to combine with the manure.

Cooperators have been applying 200 to 300 pounds of 48 per cent superphosphate per acre, depending on the fertility level of their soil. The heaviest response to phosphate has been received on well-drained soils. On some fields of fertile bottom land seeded to straight grass such as alta fescue, the response to phosphate has been light. Application of manure and phosphate in the fall gives forage an early spring start and so far has given the best results.

Use of agricultural limestone

Experiments have shown that Tillamook soils generally show an acid reaction, and therefore need lime. Lack of transportation and the high cost of limestone have prevented its adequate use on farms in this county. All but two cooperating farmers in this study, however, have used some agricultural limestone on their farms since 1940. Two cooperators have limed all of their best pasture land. The application of lime aids the growth of clovers.

Use of commercial nitrogen

The majority of dairymen in Tillamook County have enough manure available, IF IT IS FULLY UTILIZED, to make it unnecessary to buy very much commercial nitrogen. Commercial nitrogen may prove profitable in addition to the use of manure by starting pasture growth earlier in the spring and by continuing the pasture season later in the fall. Cooperators have used small amounts of commercial nitrogen fertilizer with good results.



Figure 4. Both of these photographs were taken on May 6. Seedings are of alta fescue, ryegrass, red clover, and white clover. Note that in lower picture growth is all of six inches higher than field above. Although phosphate was applied in both cases, it was applied at the time of fall seeding on the field in the lower picture.

The Use of Grass Silage

Seven of the eight cooperators are using silos to store grass silage in order to supply at least a part of their winter forage. Some of the farmers have no irrigation facilities and use grass silage during the dry summer months when pastures get dry and short. Three cooperators are planning to build new silos in the near future. Tillamook farmers put up poor quality hay because of the frequent rains during the haying season. Grass silage would give them palatable, high quality forage. The use of grass silage has played a substantial part in the increased milk production on the cooperator's farms.

Silos for grass silage have made it possible to store and maintain increased forage production at a higher level of quality than is possible under the old methods of hay making.*



Figure 5. Demonstrating the use of a field chopper on a cooperator's farm. This outfit eliminates almost all hand labor and allows an operator to do his own work without hiring extra help. In some cases groups of neighboring farmers have purchased field choppers and shared the cost.

Improved pasture mixtures

All cooperating farmers have replaced the majority of their native pastures with new seedings of improved pasture mixtures. This has increased both the yield and quality of forage.

Alta fescue, red creeping fescue, common and English ryegrass, orchard grass, meadow foxtail, white clover, red clover, subclover, and lotus are all forage crops used in varying combinations, depending on the type and fertility of the soil to be reseeded. Recommended pasture mixtures are available from any county agent.

One cooperator has established a seeding of lotus major that is growing up through tussocks on lowland pasture.

* See Oregon Extension Bulletin 669 "Making and Feeding Grass and Legume Silage in Western Oregon" for detailed information about putting up silage.

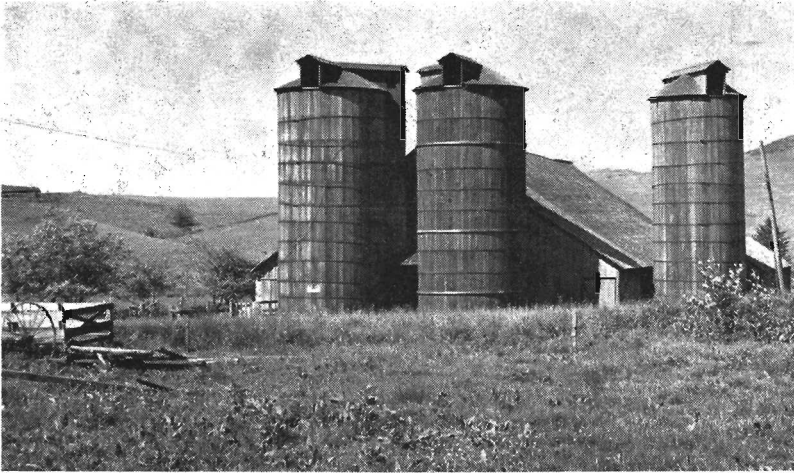


Figure 6. The farmer who owns these silos put up 300 tons of silage and 20 tons of hay last year. In 1940 his fields produced only 45 tons of hay.

Rotation of pasture

All cooperators have practiced rotation of pastures to some extent but in varying degrees. Rotation of pastures serves two purposes. First, it keeps forage young and tender, high in protein content and more palatable to the cows. Second, it works in with a system of sprinkler irrigation.

Sprinkler irrigation

Only two of the eight cooperators are using sprinkler irrigation. Others would use it if water were available. Irrigation, by supplying adequate moisture in the summer months, doubles forage production. Furthermore, irrigation increases the return from other pasture practices such as the application of manure, phosphate, lime, drainage, and improved grass seedings.

Although sprinkler irrigation may be equally profitable on both large and small farm units in Tillamook County, it is particularly desirable on small farms, because the investment in buildings and equipment per acre is so heavy that intensive production and maximum yields of forage are essential.