

OREGON AGRICULTURAL COLLEGE

Extension Service

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Director

Reports of the
Clackamas County
Agricultural Economic Conference

OREGON CITY, OREGON
Jan. 27-28, 1925

SUGGESTING AN

AGRICULTURAL PROGRAM
for
CLACKAMAS COUNTY

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TABLE OF CONTENTS

	Page
Foreword	2
Report of the Farm Crops Group	3
Report of the Dairy Group	20
Report of the Horticultural Group	24
Report of the Livestock Group	28
Report of the Poultry Group	30
Report of the Vegetable Crops Group	34
Report of the Club Work Committee	36
Development of Clackamas County Agriculture.....	41
Climate of Clackamas County	47

FOREWORD

This bulletin contains the findings and recommendations of the agricultural economic conference held at Oregon City January 27 and 28, 1925, and is published by request of the conference.

This conference was the thirteenth of its kind held since the state agricultural economic conference at Corvallis in January 1924. The purpose of the local conference was to study the recommendations of the state conference, adapt them to conditions here, and prepare reports designed to point the way to better development of the county's main sources of agricultural income. Farm, town and college cooperated in the undertaking. Committees of farmers gave thought and time to preparation; local merchants, railroads, dairy manufacturers, feed dealers and others cooperated in furnishing information helpful to the conference. The extension service of the state agricultural college supplied specialists who brought to the conference the latest information on trends of production and marketing in the state, the nation and the world (insofar as they were related to local agriculture) and assisted the conference groups in making their reports.

The conference was organized along commodity lines, including the following groups:

Farm Crops
Dairy
Poultry
Livestock

Horticulture (including tree
and small fruits)
Vegetable Crops.

Special committees were named for soils and boys' and girls' club work.

Each group met separately, considered its individual problems and prepared a statement and set of recommendations for consideration of the general conference. These reports were adopted by the conference the second day.

The total attendance the first day was about 150. This increased to about 265 the second day. Every part of the county and every agricultural organization was represented.

The conference was only the beginning. The extent to which it may be of value depends largely on the use made of its recommendations by the communities and individual producers in the county. It is recognized that these recommendations are not final and fixed forever. They must be re-considered as new conditions arise and new information develops.

These reports are especially commended to the attention of local farmers. It is hoped that individually and through their organizations farmers will study them and use them as a guide to more profitable agriculture—a system of agriculture that will take into account first, what this county can successfully produce in competition with other areas that may produce the same things and second, what the available markets require as to kind, quantity and quality of agricultural products.

Report of the Farm Crops Group

POTATOES

I. THE SITUATION.

1.—Acreage Stationary for Last 15 Years.

The acreage of potatoes in Clackamas County has remained practically stationary for about 15 years, barring temporary fluctuations from year to year. The acreage expanded rapidly until about 1909. Development of the potato acreage is shown below (U. S. census and estimates by F. L. Kent, U. S. Dept. of Agriculture):

Year	Acres
1889	2,330
1899	4,865
1909	7,468
1919	6,658
1920	6,553
1921	6,500
1922	6,750
1923	6,000

2.—Place of Potatoes in the County.

The average production of potatoes in the county is about 600,000 bushels of which approximately 350,000 are sold out of the county. This represents an average yearly income of \$300,000. The income varies greatly from year to year.

This county has the largest acreage of any county in the state, and usually the largest total production. In some years the production is excelled by Malheur County with only one-half the acreage there is here.

All of the counties in the state grow some potatoes, but this county raises on the average 15 per cent of the state's entire crop.

3.—Yield Per Acre Is Below State Average.

The average yields for the county vary from 80 to 125 bushels per acre, depending upon weather conditions. The yields compare with the United States averages and Oregon averages as follows:

	Average Yield
Clackamas County	94.5 bushels
Oregon	105.0 bushels
United States	97.0 bushels

The yields here are greatly excelled by the competing potato growing sections of Yakima, California, and Idaho. The average yield for the entire state of Idaho, which grows about three times as many potatoes as Oregon, is 183 bushels. The state average of Washington is 145 bushels and California 142 bushels.

4.—Many Varieties Are Grown.

The following varieties are grown here commercially: Burbank, Garnet Chile, American Wonder, Netted Gem, Pride of Multnomah, Earliest of All, British Queen, and several other miscellaneous varieties.

5.—Average Prices for Last 10 Years.

The averages prices paid to growers over a series of years are not available. The average prices paid to jobbers by Portland retailers for the last ten years are as follows:

Month	Price Per 100 lbs.
July	\$3.38
August	2.46
September	2.02
October	1.95
November	1.95
December	1.94
January	2.06
February	2.24
March	2.18
April	2.61
May	2.71
June	2.90

The prices to farmers run from 40 to 80 cents lower than these, showing that potato prices over a series of years average higher than \$1.00 per hundred. As with all perishable products the price fluctuates widely from year to year depending upon the crop.

In general when the production of potatoes in the United States is less than 3.2 bushels per capita the price rises more or less steadily from fall to spring but when the United States crop averages over 3.8 bushels per capita the price usually drops, so that those who hold until spring receive less than those who sell in the fall. This rule does not work every year because in some years, as in 1924, there is a very large crop the country over, but a short crop in the West.

5.—Markets Limited to Portland and California.

The only markets in the ordinary year are Portland and California. Yakima is rapidly capturing the Portland market. For example in 1924 the state of Washington shipped to Portland 669 carloads, most of which were from Yakima. Oregon shipped 105 carloads. Those potatoes trucked into Portland are not counted in the above figures.

The following markets are available for Clackamas County potatoes:

1. Table market for all varieties in Portland and vicinity.
2. Seed market for Garnet Chile in California.
3. Seed market for Burbanks in California.
4. Market for table stock in California.
5. Local and state market for high class seed.

In a normal year enough Garnet Chile are being grown to supply the California trade. Any additional acreage would demoralize the market. A good opportunity exists for individual growers to supply the local seed market, but this at best is open to only a few men who are making a speciality of it.

The market for table stock in Portland is more or less constant and growers here are favorably situated to take advantage of it, particularly in the late winter and spring months. Yakima sells early as rule, so under normal conditions Oregon growers will find it hard to compete with this district in October and November.

The Yakima freight rate is such that with dollar potatoes they have to grow only 6 sacks more per acre to overcome the freight differential.

It costs them about 20 cents per 100 pounds to market them in Portland, and growers here pay from 6 to 11 cents to ship by rail.

California is virtually the only outside state to which potatoes can be sent from here. Freight rates will average \$1.00 a hundred to all other potato consuming points. The California market demands Burbanks. They want smooth, uniform potatoes of average size or larger. Burbanks, if graded, sell at a premium over Gems from either Yakima or Idaho. This is a fairly steady market. The potato acreage in California is decreasing, being crowded out of many counties by fruit and truck crops. California cities are growing rapidly and this market is therefore expanding.

In addition there is the Burbank seed trade in California. California cities are growing rapidly and the market is therefore expanding.

In addition there is the Burbank seed trade in California. California can use a limited quantity of other varieties, such as American Wonder, Netted Gem, early varieties, etc., but the big demand is for Burbanks. Most of the late potatoes of California are grown in the so-called Delta section around Stockton. This one area grows 27,000 acres, and produces over one-half the crop of the state.

Of this 27,000 acres 7,000 were planted, in 1924, to Burbanks, mostly Oregon and Washington seed, and 20,000 to Pride of Wisconsin. The seed of the latter variety is grown in the middle west and the freight to California is \$22.00 per ton. This is a variety inferior to Burbanks and the main reason for growing it is because reliable Burbanks are not always available. All of the record yields in California have been made with Burbanks.

This acreage would require about 900 carloads of seed if it were all bought in the north. They prefer northern grown seed, and would buy it if they could get it year after year from the same source, and of guaranteed quality.

So far as Clackamas County is concerned this market for Burbank is therefore unlimited. In order to build it up it will be necessary to send a carload or two of good seed there, put it out through a good reliable dealer and check it up through the growing season in comparison with other seed. Any one of several dealers could easily handle all of this business that this county would be likely to supply.

7.—Freight Rates.

The freight rates from all shipping points in this county to California are practically the same as from Oregon City. They are as follows:

Oregon City to Portland.....	.07c
Oregon City to Sacramento .....	.35½c
Oregon City to San Francisco .....	.35½c
Oregon City to Stockton .....	.35½c
Oregon City to Los Angeles .....	.56½c
Oregon City to San Francisco	
(rail to Portland and boat to San Francisco) .....	.27c

8.—Cost of Production per Acre.

No cost of production figures can be given which will fit all farms. The following were supplied by three growers in different parts of the county and are based upon charging 30 cents an hour for man labor and 15 cents an hour for horse labor.

There is no exact cost of production, as the cost differs on every farm. These figures may be interesting for the purpose of comparing them with the reader's own condition.

COST OF PRODUCING POTATOES IN CLACKAMAS COUNTY.

Investment:	Farm No. 1	No. 2	No. 3
Interest on land @ 5 per cent	\$12.50	\$10.00	\$10.00
Depreciation on equipment	2.16	5.64	2.50
Interest on equipment	1.10	1.58	1.25
Taxes	1.80	1.80	1.75
	<hr/>		
	17.56		
Labor (Man and Horse):			
Plowing	1.14	2.56	2.40
	1.11		3.60
Harrowing .....	.87	.63	
	.87	.96	3.55
Rolling .....	.24	.88	
	.24		
Planting .....	.48	.48	.90
	.48	.49	.90
Treating Seed .....	.78	.07	.90
Cutting Seed .....	.96	.90	.90
Cultivating	1.68	.45	.45
	1.20	.31	.39
Hoeing .....	.72	.66	
Digging .....	.63	1.05	
	1.27	1.59	5.40
Picking Up	7.50	8.75	7.50
Hauling to Bin .....	.96	.78	.90
Sacking and Sorting	7.20	7.20	5.40
Hauling to Market	1.44	1.75	1.20
Total Labor	\$35.29		
Materials:			
Corrosive sublimate .....	.16	.15	.16
Seed potatoes	7.00	15.00	12.00
Sacks 75 (2 bu.) @ 8c.....	6.00	5.28	7.50
	<hr/>		
Total Materials	\$13.16		
		<hr/>	
Total Cost of Production.....	\$66.01	\$69.75	\$71.56

Note:

- Farm No. 2 plowed 2 times with tractor.
- Farm No. 2 harrowed 2 times.
- Farm No. 2 planted 15 bushels. to the acre.
- Farm No. 2 disked instead of rolling.

9.—Yield Necessary to Pay Cost of Production.

The yield necessary to pay cost of production of course varies greatly with the price and the costs on individual farms. Taking \$70.00 as the average cost, and the average prices paid to farmers over a period of years potatoes compare with other crops in this county as follows:

Crop	Average Price	Cost of Production per acre	Yield Necessary to Pay Cost in this Co.	Average Yield Clackamas County
Potatoes	\$ 1.20 per cwt.	\$70.00'	97 bushels	94.5 bushels
Winter Wheat	1.16 per bu.	22.15	19 bushels	26.6 bushels
Oats	32.39 per ton	21.50	42 bushels	37.8 bushels
Barley	32.15 per ton	22.50	29 bushels	36.0 bushels
Clover Hay (baled) ..	14.00 per ton	28.80	1.8 tons	2.1 tons
Clover Seed .....	.17½ per lb.	17.35	1.65 bushels	2.0 bushels
Spring Wheat	1.16 per bu.	21.00	18.1 bushels	19.2 bushels

It is seen from the above that the average potato grower is just about breaking even in the average year. It must be remembered, however, that of this cost of production of about \$70 per acre, only about 45 per cent is cash. The balance is what the grower pays himself for his own labor and interest on his investment.

COST OF PRODUCING POTATOES IN CLACKAMAS COUNTY

Item	Clackamas	Clackamas	Benton
Interest on Land @ 5%—\$250-\$200-\$125	\$12.50	\$10.00	\$ 6.25
Depreciation on equipment—Value \$22-\$25-\$50.....	2.16	2.50	5.00
Interest on Equipment—Value \$22-\$25-\$50.....	1.10	1.25	
Taxes	1.80	1.75	1.00
Total Overhead Expense.....	\$17.56	\$15.50	\$12.25
Labor—(Including both man and horse labor)			
Plowing	2.25	6.00	3.00
Disking	3.12		3.00
Harrowing	1.74	6.90	2.40
Rolling .....	.48		
Planting .....	.96	1.80	1.80
Treating Seed.....	.78	.90	.40
Cutting .....	.96	.90	.60
Cultivation	2.88	.75	3.00
Hoeing .....	.72		
Digging	1.90	5.40	2.40
Picking Up.....	7.50	7.50	10.00
Hauling to Bin.....	1.92	1.80	1.20
Sacking and Grading.....	7.20	5.40	8.00
Hauling to Market.....	2.88	2.40	7.20
Total Labor Cost.....	\$35.29	\$39.75	\$43.60
Materials			
Corrosive Sublimate .....	.16	.16	.32
Seed	7.00	12.00	10.00
Sacks	6.00	7.50	8.00
Total Materials	\$13.16	\$19.66	\$18.62
TOTAL COST PER ACRE	\$66.01	\$74.91	\$74.17

30c per hour man labor.
15c per hour horse labor.

HAY CROPS

I. THE SITUATION.

1.—Hay Acreage in County Large.

The total hay acreage in the county is now 27,500. At the time of the 1920 census it was 30,385. In that year the acreage was divided among the different hay crops as follows:

Kind of Hay	Acres	Yield Per Acre Tons
Grain hay	11,646	1.9
Clover	5,945	2.1
Timothy and Clover	4,039	1.8
Grasses other than timothy	2,113	2.0
Timothy	1,368	1.9
Wild Grass	794	1.5
Vetch	613	2.1

2.—County Imports and Exports Hay.

About the same amount of hay is shipped out of the county as is brought in. Some sections produce a surplus, others do not have enough for their needs. About 100 carloads are shipped in, mostly alfalfa from Eastern Oregon and Washington.

3.—Interest in Alfalfa Increasing.

Many dairy farmers would be glad to have some alfalfa for their cows and interest in this crop is increasing. There have been many trials of this crop in the past which resulted in failure. The principle causes for these many failures have been due to one or a combination of several of the following reasons:

- (a)—Seeding on poorly drained land.
- (b)—Failure to inoculate seed before planting.
- (c)—The use of common instead of Grimm alfalfa.
- (d)—Seeding on land needing lime.
- (e)—Seeding on a loose seed bed.
- (f)—Failure to get rid of grass and weeds before seeding.
- (g)—Poor preparation of the land.
- (h)—Seeding at the wrong time.

All of these causes for failure must be avoided in order to succeed in growing alfalfa.

4.—Alfalfa the Highest Price Hay.

The prices paid to farmers for various kinds of hay of course vary widely from year to year. The five year average prices (1919 to 1924) are as follows:

Kind of Hay	Average Price Per Ton
Alfalfa	\$18.50
Timothy	18.00
Vetch and Oats	16.50
Oat	16.00
Cheat	12.00
Clover	14.80

5.—Income Per Acre from Hay.

Based upon the census report of 1919 and the above five year average prices, the income per acre from the various hay crops would average as follows. The average yield of alfalfa is conservatively estimated at 3½ tons.

Kind of Hay	Tons Per Acre	Value Per Acre
Alfalfa	3.5	\$64.75
Vetch and Oats	2.4	36.60
Timothy	1.9	34.20
Oats	1.9	30.40
Clover	2.1	31.08
Cheat	1.5	18.00

6.—Cost of Production.

Based upon figures from several Clackamas County farms, the cost of production of the various hay crops are given. These costs differ on every farm and these figures are given for the purpose of comparison only, as they will fit no one farm.

	Vetch and Oats	Clover	Alfalfa
Interest on land at land at 5 per cent.....	\$7.50	\$7.50	\$7.50
Interest and Depreciation on Equipment...	1.50	1.50	1.50
Taxes	2.00	2.00	2.00
Seed	3.00	2.00	.50
Land preparation:			
Plowing	3.00	1.50	.30
Cultivating	1.20	.60	.60
Seeding .....	.60	.30	.10
Haying:			
Cutting .....	.75	.75	.75
Raking .....	.30	.30	.30
Shocking .....	.75	.75	1.25
Hauling to Barn	1.50	1.20	2.75
General Farm Overhead	1.00	1.00	1.00
Land Plaster	1.00	1.00	1.00
	<u>\$24.10</u>	<u>\$20.40</u>	<u>\$19.55</u>

In the above clover cost figures, half the cost of plowing the land is assumed against the clover and half against the grain as the land is usually plowed only once in two years. In the case of the alfalfa, it is assumed that the crop will be left for 10 years.

7.—Cost Per Ton of Growing Alfalfa Relatively Low.

The above figures are the cost per acre. Assuming average yields the cost per ton is also given.

Kind of Hay	Cost per Acre	Average Yield Tons	Cost per Ton
Vetch and Oats	\$24.10	2.4	\$10.04
Clover	20.40	2.1	9.71
Alfalfa	19.55	3.5	5.60

These figures do not include baling. If the hay is baled, the baling charge per ton or per acre must be added. If the hay is sold off from the farm, the cost of hauling to the shipping point should be added.

8.—Yields Necessary to Pay Cost of Production.

Using the average prices as given above and the average costs of production, the yields necessary to pay the cost of production are given below. It is seen that these figures again favor the growing of alfalfa wherever possible.

Kind or Hay	Cost per Acre (Including Baling and Hauling)	Average Price Price per Ton	Yield Per Acre Necessary to Pay Cost
Vetch and Oats	\$33.70	\$16.50	2.05 tons
Clover	28.80	14.80	1.95 tons
Alfalfa	33.55	18.50	1.8 tons

A yield of 1.8 tons of alfalfa per year is much more certain wherever the crop will grow than a yield of two tons of either clover or vetch.

Higher priced land than the average or larger yields per acre will run up the cost of production per acre which in turn will make it necessary to get large yields in order to pay the production costs.

II. HAY RECOMMENDATIONS.

1. Results on a few farms in this county and other Willamette Valley counties prove conclusively that alfalfa can be grown here. Alfalfa is not only the highest yielding hay crop, but it is the most permanent and has the highest feeding value. It is also easily cured and so has all of the qualities of the ideal hay.

It is recommended that all farmers having a naturally well drained land give alfalfa a thorough trial.

2. Grimm alfalfa only should be used. The seed must be inoculated, and the land should be limed in most cases.

3. Small trial plots of alfalfa should be put out first in order to avoid mistakes on larger acreages.

4. Wherever clover will grow it will be found the second best hay possible. The cost of production is on the average \$3.00 per acre lower for clover than for vetch and oats.

5. Grain hay should be grown only as a substitute in case the clover or vetch kills out.

6. Growing hay for selling off from the farm is not apt to prove profitable because of the cost of baling and hauling. The only exception to this rule is in the case of farmers who get an alfalfa acreage large enough to supply neighbors with alfalfa hay. Yields of alfalfa can be secured which are large enough to make hay selling profitable. We believe more net profit is possible from a clover seed crop than a clover hay crop if the hay must be sold off the farm.

CEREAL CROPS

I. THE SITUATION

1.—Grain Is Important Part of County's Income.

In summing up the products sold off the farms it is seen that the grain crop furnishes a larger percent of the income of Clackamas County farms than any other farm product. Grain crops make up about one-third of the entire farm income according to the 1920 census. In 1919 grains brought in \$1,965,000 and dairy products were second in importance with a total of \$915,343.

2.—Oats Lead in Acreage.

Of the grains, oats occupy the most acres. Acreages of the various grain crops in 1923 were:

Kind of Grain	No. of Acres	No of Bushels
Oats	25,500	1,060,000
Winter Wheat	21,000	588,000
Spring Wheat	3,750	75,000
Barley	800	32,000
Corn	4,500	153,000
Rye	450	8,100

3.—Existing Markets for Grain Crops.

About 75 per cent of the wheat crop is sent out of the county, or a total of about 375,000 bushels. Information is lacking as to the amount of oats sold for export from the county, but it is certain that the percentage of this crop which moves out is much smaller than of wheat, because on many farms the entire at crop is used for feed.

Barley and corn are shipped into the county. In 1923, about 60 carloads of corn were imported and in addition large amounts of corn were included in prepared feeds. It would take about 2,500 acres to grow this amount of corn in this county.

Portland is now the leading wheat exporting port in the United States and is a milling center also. Wheat growers in this county therefore have as good a market for wheat as any growers in the United States.

Portland also uses a large amount of oats for milling purposes and gray winter oats suitable for milling sell from \$1.00 to \$4.00 per ton over ordinary oats. Portland dealers also have requests for these oats from eastern mills; more requests as a rule than they are able to satisfy. A good market therefore usually exists for Number 1 and Number 2 Gray Winter oats, but most of the oats grown here will not grade as high as that due to buck cheat, wild oats, etc.

The barley price is ordinarily about the same as the price of oats. Sometimes one is a dollar or two higher per ton, sometimes the other. Barley is imported in large amounts into western Oregon. There would be an export market for Hannchen barley for foreign trade if enough of it were grown.

The price per ton for corn is usually higher than for either barley or oats. About 2,000 carloads of corn are brought into the Pacific northwest every year.

4.—Average Prices Paid for Grain.

The average fall and winter prices for the past four years have been as follows:

Grain	Price per Ton	Per Bushel
Wheat	\$38.66	\$1.16
Oats	32.29	0.517
Barley	32.15	0.77
Corn	34.62	0.97

5.—Average Returns Highest for Winter Wheat.

Based upon the five year average yields and the above average prices the various grain crops have returned the following amounts per acre in the county:

Kind of Grain	Acres Grown	Bus. per Acre	Pounds per Acre	Acre Value
Winter Wheat	18,869	26.6	1,596	\$30.80
Spring Wheat	3,192	19.2	1,152	22.27
Barley	692	36	1,728	27.64
Oats	26,366	37.8	1,209	19.46
Corn	3,403	26.6	1,489	27.25

6.—Many Varieties of Wheat Grown.

Many varieties of wheat are grown in the county. Some of the leading varieties are:

Eaton	White Winter
Kinney	Foise
Rink	Prohibition
Huston	Defiance
Marquis	Jenkins Club
Burbank	

The growing of such a large number of varieties is bound to lead to mixtures through volunteer seed, threshing machines, warehouses, the use of old sacks, wheat hay, etc. These mixtures reduce yields and cause price reduction because of a lower value for milling.

The white wheats for the past five years have averaged 4.6 cents per bushel higher than the red wheats. The presence of red wheat as a mixture in white wheat subjects 50 per cent of the wheat in the county to a reduction in price.

Of the wheat shipped out the total is divided between varieties about as follows:

Eaton	45%
Kinney	35%
Miscellaneous Winter Wheats	10%
Miscellaneous Spring Wheats	10%

Kinney has a higher average test weight than White Winter, but a lower acreage yield and a lower price. The growing of Kinney also causes losses because of getting it mixed with the other white wheats.

7.—Cost of Production Averages Over \$20 per Acre for Grain.

Figures gathered from about 15 typical farms and averaged show the cost of production as given below. These figures will fit no one farm and are given for the purpose of comparison only.

Overhead:	
Interest on land at 5 per cent..	\$6.20
Interest, depreciation and re- pairs on machinery.....	1.00
Taxes	2.00
General farm overhead fences, etc.	1.00
Total Overhead	\$10.20
Labor (Horse and Man):	
Plowing	2.50
Harrowing (twice) .....	.60
Drilling .....	.60
Binding .....	.75
Shocking .....	.40
Threshing	3.50
Total labor	8.35
Materials:	
Twine .....	.40
Seed	2.00
Sacks	1.20
Total for materials.....	3.60
Grand Total	\$22.15

The above figures for labor are based on charging 30 cents an hour for man labor and 15 cents an hour for horse labor.

It must be realized that these are not all cash costs. If the cash costs alone were figured, the average expense would be about 60 per cent of the total, or about \$13.00. This would include taxes, machinery costs, threshing bills, seed, sacks, etc. and interest on borrowed money in some cases.

8.—Yield Necessary to Pay Cost of Production.

Applying the above figures as representing an average farm to the average prices as given above, it is found that the yields necessary to pay cost of production are as follows:

Winter wheat	19 bushels per acre
Oats.....	42 bushels per acre
Barley.....	29 bushels per acre

It must again be remembered that these are only averages and will apply in no one year to any one farm. In a year like 1924, for example, with higher grain prices, the yield necessary to pay cost of production is naturally lower and in years of very low prices must be higher to come out even.

II. GRAIN RECOMMENDATIONS

1. An increase of the barley acreage in the county is justified at the expense of spring wheat and spring oat acreage. Many failures with barley in the past have been due to the use of low-yielding varieties.

Portland imports large quantities of barley from California for making dairy feeds. Another market which could be built up is an export market for Hannchen barley for foreign markets. This demand has never been met and it could take care of the product of thousands of acres.

2. No increase is recommended in oat acreage and in some cases a decrease is justified. However, a good market exists most years, for a high-grade Grey Winter oat. These are used for milling both here and in the east, and dealers are willing to pay a premium of usually about \$3.00 per ton provided they can secure a good quality of Grey Winter oat free from mixture and buck cheat. Oat growers can profitably consider this market.

3. Grain should be grown only in rotation with a legume, and a cultivated crop. The cultivated crop and the legume are needed to keep grain yields high.

4. A large increase is justified in the corn acreage grown for grain. Corn will be found a better paying crop on the average than spring wheat or oats.

5. On farms of less than 40 acres grain growing is a doubtful practice unless it is grown for seed or unless exceptionally large yields can be secured. The margin of profit on the average grain crop is small, and grain growing on a small farm will be a losing venture with ordinary yields. Such a farm can make more profit growing potatoes, corn, hay, etc.

6. It pays to get good seed and keep it pure. Mixtures reduce yields and cause price discounts. Mixtures in this way cause an annual loss in the county of at least \$15,000. The use of certified seed is recommended.

7. Standard varieties only are recommended. Growers usually lose money by experimenting with little known and untried grain varieties, no matter how highly advertised they are. For winter wheat, White Winter and Eaton are recommended. Huston is recommended for spring wheat although spring wheat is advised only when a winter crop cannot be grown. Hannchen barley is recommended for spring planting and where a fall barley can be grown, O. A. C. No. 7 for fall planting. Grey Winter is the standard variety of oats for the county.

8. The use of copper carbonate is recommended for treating wheat for smut. It does not damage the seed in any way and by using it the rate of seeding can be cut down 25%. Treating machines of some sort are necessary if this material is used. Some farmers are using concrete mixers and others have home made mixing machines which serve the purpose. Several good commercial mixing machines are on the market. Farm organizations or communities are urged to consider buying one of these machines for use by the members. They cost from \$40 to \$65 and the purchase price can be saved through the resulting saving in seed on 200 acres of wheat. In addition to this advantage, better stands are secured with copper carbonate and the grain grows faster from the first two weeks after it comes up.

CORN

I. THE SITUATION

1.—Acreage of Corn Increasing.

The corn acreage has doubled in the last five years and is now ahead of spring wheat in acreage. Every year sees a small increase over the year previous. This is partly due to the coming of silos, and partly to the use of better varieties and home grown, acclimated seed.

2.—Cash Cost of Producing an Acre of Corn Lower than for Other Grains.

Due to the lower cost of seed, the elimination of threshing bills, and the smaller amount of machinery required, corn costs less cash per acre to grow than wheat, oats or barley. If the labor is counted however, the costs are about the same.

3.—Corn is Needed in This County.

About 2000 carloads of corn come into the Pacific Northwest every year from the middle west. The price of corn is thus based upon the eastern price plus the freight while the price of wheat is usually based upon the foreign price less the freight. Corn is greatly needed in the county to provide a cultivated crop in a crop rotation plan. No other cultivated crop could be greatly extended in acreage at present. Such a crop is needed to clear the lands of weeds, put it in better condition for grain crops and distribute the farm work better.

4.—Difficulty of Drying Hindering Expansion of Corn Acreage.

Many farmers would like to grow more corn, but hesitate to do so because of the difficulty of drying the crop. It can be satisfactorily dried in a hop or prune dryer and then stored in cribs as in the middle west. Much of the difficulty with keeping corn here has been due to trying to keep it in a closed building or a barn or granary.

Some Willamette Valley farmers are successfully cribbing corn. Many more growers could do so, especially if the crib were supplied with an inexpensive drying device such as many middle western growers are using in years when the crop is soft.

5.—Corn Yields Are Fairly Satisfactory Here.

The average yields of corn in bushels per acre in Clackamas County and in some of the middle western corn states are as follows:

	Bushels Per Acre.
Clackamas County	26.6
Iowa	38.5
Kansas	16.2
Nebraska	25.3
Minnesota	35.7

II. CORN RECOMMENDATIONS.

1. Because of large corn imports into this county and other Oregon counties the corn acreage could be profitably trebled. In Clackamas County a cultivated crop is badly needed in rotations, so part of the profit from a corn crop can be harvested in succeeding crops.

2. Local acclimated seed should be used. The practice of buying seed of unknown origin often leads to poor stands and immature corn of little value.

3. Succulent feed is needed for the most economical production of milk. Figures submitted by the dairy group show that most of the dairy herds of this county are so small that the owners cannot profitably use silage. In these cases, root crops should be grown for winter feed to supplement kale, when the latter freezes out. Roots can be put in pits and kept until spring.

CLOVER SEED

I. THE SITUATION.

1.—Good Market Usually Exists for Clover Seed:

The United States imports an average of 12,000,000 pounds of clover seed each year. There is thus little danger of oversupplying the market with any amount which this county could produce.

2.—Price Averages \$10.50 per Bushel.

The prices paid to farmers for the past 10 years, not counting the excessively high prices during two of the war years, average 17½ cents per pound or \$10.50 per bushel.

3.—Cost of Production Less than For Grain.

Due to eliminating costs of plowing and land preparation, the cost of growing an acre of clover seed is about \$5.00 or \$6.00 less than for grain. It is thus possible to make a profit from a lower return per acre than from grain.

4.—Poor Seed Makes Good Seed Growing Impossible.

Much poor seed is planted. If very weedy seed is used the resulting seed crop is apt to have little value.

5.—More Clover Needed.

A crop of clover cuts down the cost of production of other crops by making plowing unnecessary every year, by distributing the farm work better and by increasing the yield of grain crops. Clover fits especially well into rotations on farms with small flocks of sheep as it makes good sheep pasture in the spring and fall and the straw from a seed crop has considerable feeding value.

II. CLOVER SEED RECOMMENDATIONS.

1. The cost of producing clover seed per acre is much less than the cost of a grain and in many cases the net return will be larger. We recommend a substantial increase in the acreage of clover for seed.

FLAX

I. THE SITUATION.

1.—Imports of Both Fiber and Seed Flax Large.

The United States imports both fiber and seed flax and products made from them. The tariff on flax fiber is \$20 per ton, on dressed flax \$40 per ton, on flax seed 40 cents a bushel, and on linseed oil 3 3-10 cents a pound. Imports of these products have been as follows:

	1920-21	1921-22	1922-23
Fiber Flax	\$ 3,406,000	\$ 2,906,000	\$ 4,300,000
Flax seed and Linseed oil	41,997,000	37,997,000	55,409,000

It is probable that imports of seed flax were smaller in 1924 due to the much larger United States crop last year.

2.—Different Varieties Used for Fiber and Seed.

Different varieties of flax are used for fiber and seed. They are planted at different rates of seeding per acre and harvested differently.

3.—A Market in Portland for Seed Flax.

A mill in Portland uses annually from 350,000 to 500,000 bushels of seed flax in the manufacture of oil. It would require from 20,000 to 30,000 acres in the Willamette Valley to grow this amount. At present it is all imported from the middle west and foreign countries.

4.—Fiber Flax Growing Dependent Upon Linen Mills.

The growth of a fiber flax industry depends entirely upon the coming of linen mills. Fiber flax offers some promise if mills are built. It is usually impractical to ship fiber flax very far, as it is a bulky product. The linen mills must therefore be fairly close to the grower.

A linen milling industry would be worth while in Oregon because the finished product can be shipped long distances at a comparatively low freight rate and because it is an industry which employs a large number of people. At present the state penitentiary is successfully operating a plant and another plant is in process of construction at Salem.

II. FLAX RECOMMENDATIONS.

1. We recommend small trial planting of flax for fiber merely to obtain knowledge of the crop under conditions here, in order that it could be grown without mistakes if a linen mill should ever build near here.

2. Flax for seed requires different varieties than flax for fiber. The seed flax is a proven success in western Oregon. We recommend that grain farmers carefully consider the possibilities of growing seed flax for a large market which already exists.

GRASS PASTURES

I. RECOMMENDATIONS.

1. Very low yielding land can be pastured to better advantage than farmed. The costs of plowing, seeding, harvesting, and threshing are too heavy to carry on low yielding land. Although the gross return per acre from pastures is sometimes lower than from grain, the net return is often larger.

2. An increase in acreage of grass pastures is recommended, especially on low yielding land.

3. It will pay better to buy the grasses desired and mix them on the farm, than to buy the so-called pasture mixtures from seed companies. These pasture mixtures often carry a heavy percentage of trash, weed seeds, and seed low in germination.

4. Trials of Reed Canary grass are recommended for farmers owning rather wet or poorly drained land.

5. Alfalfa is not a particularly good pasture crop except for hogs, because of the danger of bloat to dairy cows and sheep.

Report of the Dairy Group

The dairy group of the Clackamas County Economic Conference recognizing the importance of the dairy in the agriculture of the county wishes to call attention to the following facts relative to the industry. On these facts our recommendations are based.

Manufacture of Cheese Not Advisable.

The present price of dairy products and prices of feed makes marketing a matter of chief concern to all dairymen in the county. This has caused some agitation for other manufacturing plants, particularly cheese factories, in the hope that better prices might be obtained. An investigation of this phase of the problem shows that the present price of cheese does not warrant a change to this form of product, and unless it would be possible for factories of the county to join with a large organization of factories, which could extensively advertise, it will be a questionable policy. The small average size herds in the county would also be a further limiting factor.

Whole Milk vs Butterfat.

Average prices of whole milk and of cream for the past year raises the question as to which product brings the higher return to the dairyman. In selling whole milk there is a large amount of fertility sold from the farm as compared to almost a negligible quantity when cream is sold. The skim milk also has a feeding value of 50 cents per hundred (present prices considered) for hog feeding, and may even be greater for poultry feeding. After transportation costs are deducted for both products, a price of 10 cents more per pound butterfat must be secured when selling whole milk than when selling cream to balance the feed value of the skim milk alone.

Quality is of Great Importance.

The lack in the state of a uniform system of cream grading and payment on grade is seriously affecting the market for the butter of the state and is resulting in a lower average price of butterfat to the dairyman. The state as a whole is producing a surplus of dairy products. California is one of the principal markets. This market demands a high quality and much of the product of the state does not come up to that standard. Without a high quality of cream high quality butter cannot be made. Without grading and payment on grade, uniformly high quality cream is not obtained because dairymen see no advantage in going to extra time and expense to produce a better article if there is no price advantage. Creamerymen of the county report that grading attempts have been made for the past 25 years, but these attempts have usually degenerated into a method of competition, and have, therefore, failed. It begins to appear that some compulsory system must be devised.

Herds Are Too Small.

Another factor which is affecting both quality and price is the smallness of the average herd. Almost two-thirds of the product of the county is produced from herds of less than seven cows. These small herds cannot be considered a commercial unit, but are just a side line. Their smallness too often causes contempt by the owners themselves, who frequently do not consider the product of sufficient importance to give it the care essential to high quality. Costs of production in such herds are just as often disregarded, for the labor is performed as a recreation after the days work is

done and as an appetizer before breakfast. The price therefore received is of secondary consideration, as evidenced by the fact that even at lowest prices there is an adequate supply, and when conditions warrant a better price. These small dairies near the market receive less price than the larger dairies 40 to 50 miles further away.

Dairy Substitutes Handicap Local Dairymen.

The continued sale of dairy products substitutes, which place dairymen of this county in direct competition with the South Sea Islanders having a lower standard of living, is a matter of grave concern not only to dairy interests but to all interests of our nation. This industry upon which much of our health and wealth depends is shaken at its very foundation by a competition so unfair as to be disastrous. It is gratifying to know that the recent campaign for legislation in this state affecting dairy substitutes, while unsuccessful, has been of educational value to the extent that decreases in sales of that product are reported on every hand. Continued efforts along this line will eventually bring the desired results.

Production Per Cow Is Too Low.

Aside from these factors affecting price, there are a number of factors affecting costs of production, which are equally important. The one factor most affecting production cost is the productive ability of each dairy cow. Lower costs are effected by higher production per cow. Previous cost studies indicate that 240 pounds of fat per cow is the point above and below which profits are made or losses sustained. The average for the county is 180 pounds, and is increasing. This is above the state average, but is below that of several counties. This average is too low and steps to increase it should be made by systematically culling low producers, and by breeding up through the exclusive use of high-class, pure-bred sires. A herd standard of 300 pounds of butterfat per cow is a reasonable one which, when attained, can be advanced.

Many Grade and Scrub Sires in Use.

One hundred or more of grade and scrub sires are still in use in the county. Considering the value of purity of breeding in herd building and present prices of pure bred sires, this is entirely too many inferior animals to be kept in use, and the campaigns for their elimination are well worth while. The production standard above named may never be obtained if grade and scrub sires be kept in use in so high a proportion.

Legume Hays Are Best.

Feeds given dairy cows affect production and consequently production costs. Legume hays are much superior to grain and grass hays. Consequently as far as possible only legume hays should be raised and fed. At least two tons per cow should be provided.

Succulent Feeds Are Necessary.

When not on pasture succulent feeds are very essential to profitable production. Silage and kale are profitable for larger herds, root crops and kale for the smaller ones, and green feeding crops as a supplement may profitably be used for short periods. No less than 25 pounds daily per cow should be provided when the animals are not in pasture. Possibilities of permanent pastures should receive greater consideration by dairymen having moist lands or soils that can be economically irrigated.

Many Dairymen Sell Grain in Fall and Buy it Back Later.

Most of the dairy farms produce some of the grains commonly used in dairy cattle feeding. Reports of dealers indicate that many dairymen sell much of their grain in the fall and later have to buy to supply the needs of their cows. This would be false economy even though bought back at selling price, for the cost of hauling to and from market would be more than the saving in interest and shortage.

In most cases, especially when the farms are sufficiently large to make grain growing profitable, feeds necessary for balancing rations are all that need be purchased.

Large Herds Reduce Overhead.

Size of herds again receives consideration, this time, as it affects economy of production. Usually the labor and overhead required for six cows would take care of ten. With equally good herds, therefore, the cost per unit of production is less in the larger ones.

Health Conditions Fairly Good.

Health conditions in cattle of the county are fairly satisfactory. A complete test for tuberculosis has been made and another test is planned. It is further desired to place the county on the tuberculosis free-area list. To accomplish this all animals must be tested and quarantine restriction placed on the entry of cattle into the county.

Decrease Noted in the Industry.

While dairying has increased in the county since 1919 some decreases have been noticed during the past year. This may be due to prices of both feed and dairy products, and may be considered as temporary. There are 12,000 producing cows in the county, which bring a revenue of almost one million dollars annually. With its natural advantages and marketing facilities dairying will continue to be an important industry of the county.

DAIRY RECOMMENDATIONS.

In view of the foregoing facts these recommendations are made:

1. That with marketing conditions favoring butter manufacture, cheese factories for this county be discouraged.
2. That dairymen should recognize that 10 cents per pound more for fat must be received when the product is sold as whole milk than when sold as cream.
3. That we continue to support legislation which will effect the restricting of the manufacture and sale of milk products substitutes.
4. That all dairy interests of the state co-operate in the formation of a plan of cream grading and payment on grade, and that such a plan be made compulsory by appropriate legislation.
5. That for economical production ten cows be recognized as the minimum for a commercial dairy unit.
6. That to insure a profit from dairying we set a production standard of 300 pounds of butterfat per cow.

7. That the stability of dairying is dependent in a measure on the purity of breeding of the dairy animals, but in building pure-bred herds the process should be gradual.

8. That the scrub and inferior dairy sires be eliminated from the county and to that end the county pure-bred sire campaign be given our united support.

9. That every dairyman strive to raise an adequate amount of legume hay for his dairy cattle and that this should amount to at least two tons per cow.

10. That dairymen of the county give greater consideration to succulent feeds such as silage, kale, root crops, and green feeding crops, and at least 25 pounds daily be provided for each cow in milk when not in pasture.

11. That as far as their facilities and size of farm will permit all dairymen strive to raise grains required for the adequate feeding of their cows so that only the purchase of feeds for balancing of rations will be required.

12. That testing of all cattle for tuberculosis be made compulsory; that funds for payment of same, be budgeted by the county, and further, that we support the proposed law making tuberculosis testing compulsory in all counties west of the Cascades.

13. That all agencies of the county, agricultural and commercial, assist in raising a budget for the publishing of a monthly news letter on agricultural conditions, relative to markets, production, statistics, etc., to be edited by the county agricultural agent.

Report of the Horticultural Group

1. THE SITUATION.

Clackamas County is ideally adapted to the production of a wide range of horticultural crops. Tree fruits, especially the Italian prune, sweet cherry, pear, apples and peach do remarkably well. Small fruits, such as the strawberry, raspberry, loganberry, evergreen blackberry, gooseberry and currant thrive as well here as anywhere else. English walnuts and filberts are perfectly at home in our soils and climate.

Our markets for most of these crops are ample. Portland consumes large quantities of our fruits and nuts in the natural state. Three canning plants within the county and as many more just outside the county are calling for more of many of these tree and small fruits than we are producing. As an example one of the county plants is receiving only 5 per cent of the pears, 7½ per cent of the blackberries, 33 per cent of the red raspberries, 33 per cent of the strawberries and 50 per cent of the sweet cherries for which they have the capacity and desire to can or barrel.

Horticultural production of the county has been developed to fit the momentary fancy of growers. Not only have we over-developed some crops and under-developed others, but in many cases we used very poor judgment in selecting our varieties. We are all too prone to take a chance upon some new variety than select one which has proven its worth in the community.

The diversified horticultural farm usually outlives the one crop farm. It has usually been the more profitable of the two and is always the safer venture to undertake. We can handle a larger acreage with the same equipment and help if the harvest and other peak seasons are distributed throughout the season. We can make more effective use of our income if distributed over the entire growing season instead of coming in one lump sum. We may often combine our horticulture with some form of animal husbandry or farm crop farming. Poultry fit in very nicely with fruit and nut crops. Potatoes and many of the vegetables find these crops congenial companions in bringing up the farm income.

The consumption of fruits in the United States has about reached the saturation point. Increased consumption of our fruits will be at the expense of some other food stuff. We may expect this increased demand for our fruits and fruit products in proportion to their availability to the consuming public in uniform and reliable quality and at comparatively moderate prices. Our production must be standardized and balanced to fit the needs of the consumer. Our yields per acre must be increased, as this is our only effective way of decreasing the cost of production. Our quality must be raised sufficiently to successfully meet the competition of competing products.

II. HORTICULTURAL RECOMMENDATIONS.

Our crop and production recommendations are as follows:

Prunes.

The Clackamas County prune acreage is approximately 1100 acres. This is sufficient to meet all demands for the time being. It is out of proportion to the acreage of many of our other horticultural crops and should be held stationary until a proper balance is reached.

The average yield of our prunes is not more than 1000 pounds of dried fruit per acre. This small yield is due partly to the extreme young age of many of our orchards and partly to our inferior methods of production. Our yields can be and should be doubled by improving our soils and by doing more systematic and regular pruning. Yields of 1500 pounds per acre are necessary to meet the cost of production.

The size and quality of the average Clackamas County prune is something to be ashamed of. Nothing but perfect mature fruit should ever go into our driers. None of our fruit should run smaller than 60s or 70's. Fruit carrying too high moisture is not suitable for packing and should be redried or kept off the market. A concerted effort on the part of all growers is urged for improving the quality and size of our prune.

Red Raspberries.

The Cuthbert red raspberry is one of the fruits admirably adapted to our condition. Our average yield is double that of the country as a whole and equal to that of any part of it. The quality of the fruit where well grown is second to none. The county acreage is surprisingly small and should be materially increased at once. Yields of two tons per acre will probably return some profit and nothing smaller than this as an average should be continued.

Large, firm, high quality raspberries are produced only where the soil is kept in a high state of fertility and intensive care is given. The demand for such fruit is almost unlimited. Our horticultural production will be much better balanced when the acreage of this fruit is equal to that of the prune.

Strawberries.

An increased acreage of strawberries is needed in our balanced program. Oregons, Marshalls, and Etterburg 80's are varieties of proven worth and may be safely planted. They are all excellent varieties for the fresh fruit and barrelling trade. The Oregon and Marshall are also fair canning berries and will find a market as such. Two varieties which should be tried out in an experimental way as possible canning berries for this county are the Etterburg 121 and the Johnson. They are both good canning berries and are being grown successfully in some parts of the Willamette Valley.

New plantings should be made only on land free of weevil. Nothing but inspected plants should be used. Growers are urged not to sell, give away, or plant strawberry plants which have not been first inspected and certified as free of weevil and other injurious pests. Such services may be secured through the county agent's office.

A plant industry of \$100,000 is already established in this county and with proper precautions this industry may be increased to two or three times this figure. Weevil free plants are in great demand. This industry should be given all protection against this threatening menace.

Blackberries.

One cannery reports an ample supply received from the wild patches in the Columbia section. Another reports receipts equal to only 5 per cent of its capacity. Texas, a competing blackberry growing district, is rapidly developing her Evergreen acreage. The plantings in western Oregon and Washington are increasing slowly. We are convinced the acreage in this county should be increased.

The quality of the cultivated Evergreen blackberry is superior to that of the wild berry for canning purposes, due to its uniform ripeness and cleanliness when picked. Yields as high as nine tons per acre are reported. Two and one-half tons yield will meet the cost of production.

Loganberries.

No increased planting of this berry is needed in our balanced program. Like the prune acreage our present acreage of loganberries is out of proportion to some of the other horticultural crops just as successfully grown in this county and at present in greater demand. Our present acreage should be held stationary until these other crops have been increased to the right proportion and the demand for loganberries has improved.

The present plantings should be better cared for and all efforts made to produce fruit of larger size and better quality. Soil fertility and cultural practices may be greatly improved. Better training and pruning methods should be worked out.

Yields of 2½ tons per acre are required to meet the cost of production. All fields which cannot be made to produce this tonnage as an average should be grubbed out.

Blackcap Raspberries.

The immediate demand for this berry is good. This is due largely to the destruction of plantings in the eastern states by contagious virus diseases. These same diseases are gaining a foot-hold in our state and should be guarded against. Efforts are being made at the present time to produce resistant varieties as well as to work out control measures for these diseases by the state experiment station and those of many other states.

The yield of the blackcap raspberry is only about one-half of that of the red raspberry. The cost of production is not so great. One ton per acre is sufficient to meet it. Outside the absence of these virus diseases we have no advantage over the eastern states in producing this fruit. Other parts of this state and Washington are materially increasing their acreage of the blackcap. Therefore it is the opinion of this group that no increased planting of this variety of fruit is justified.

Gooseberries.

Our acreage of gooseberries is sufficient to meet our demand. No further planting is recommended. Not only has the acreage of this fruit materially increased in western Oregon and Washington but other states as well. Colorado in particular, is rapidly increasing its acreage.

There is need for better control measures for the gooseberry maggot, and root borer. Therefore, the Oregon Agricultural College experiment station is urged to devote as much time as possible to these two destructive insect pests.

Apples.

No increased acreage of this fruit is needed in our balanced program for the county. Our present apple orchards and trees should be sprayed and otherwise cared for or removed. Old, uncared for apple trees are a menace to the apple and pear industry of the county.

Yields of mature orchards should average at least 250 boxes per acre.

Nuts.

There are now planted in the United States about 115,000 acres of walnuts, 90,000 acres of almonds, and 200,000 acres of pecans. The walnuts are producing at about 37 per cent capacity and giving 50,000,000 pounds per year. The walnut acreage could produce 140,000,000 to 150,000,000 pounds of nuts. The almonds and pecans are producing at somewhat less rate than the walnuts.

The United States used last year about 345,000,000 pounds of nuts exclusive of peanuts. The acreage in the United States now planted should produce at least this amount. In addition, we have yearly plantings that are heavy, as illustrated by 6,000 acres each of walnuts and almonds being planted each year in California.

These plantings now planted and soon to come into bearing are making money and will for some years to come. The acreage now being planted and the younger acreage will show a decided loss, from the statistics now

available. In view of this loss that will occur in the future and the favorable conditions in this section a moderate planting of walnuts and filberts can be recommended. Indiscriminate plantings should be avoided by the consideration of the following points.

1st. Soils and Location.

Walnuts should be placed on elevations from 50 to 100 feet above the surrounding territory, thus providing good air and water drainage. The soil should be not less than five to six feet deep. The Olympic and Melbourne soils in general are the types best adapted to walnuts.

Filberts can be put on soils four feet deep or deeper that are well drained.

2nd. Varieties.

The Franquette walnut grafted on the northern California black root stock and grown locally is undoubtedly the best variety at the present time.

The Barcelona filbert with proper pollinizers should make up the filbert plantings.

Nursery stock should be bought only from reliable and proven sources.

3rd. Harvesting and Marketing.

In view of our climatic conditions, prompt harvesting and drying are necessary to produce first class nuts.

Walnuts and filberts should be marketed according to the state grade.

4th. Information.

We urge prospective planters to seek information through the county agent and successful growers.

Report of the Livestock Group

The livestock group in consideration of the present status of this industry in Clackamas County has taken into account the following facts:

1. There is little opportunity for expansion in the world's supply of sheep in a large way, due to the fact that all of the available cheap range has been taken up. The expansion possible is therefore limited to farm flocks. In view of the fact that the demand for wool is increasing with the increased population, the market outlook for sheep and wool in the future looks more stable than has been true in the past.

2. Production costs for farm sheep in Oregon are at present about \$9.84 per ewe while the possible return from the sale of wool and mutton is about \$10.25 per ewe. These are average figures.

3. Clackamas County carries 16,180 sheep and 6,274 goats and there are still available for sheep production lands not now used.

4. A serious menace and a retarding factor in sheep production in the county is a prevalence of coyotes and sheep killing dogs.

5. Experience of local sheep owners show that the native farm pastures together with a little hay and grain during lambing and cold weather, will be sufficient to carry a farm flock throughout the year.

6. There is room for improvement in the preparation of lambs for market, especially in castrating and docking.

7. Hog production in Oregon and the Pacific coast is about 50 per cent of the needs of that territory.

8. Feed grain production in Oregon is at present less than needed to finish the hogs for market, making necessary grain shipments from the east under a high freight rate.

9. Clackamas County produces a few less hogs than enough to supply the needs of the county. In 1923 there were 16,000 hogs, and the county needs were for 18,800.

10. Past experience of the Clackamas County growers is that it does not pay them to produce hogs on the grain alone basis and that when there is not waste available they find it wise as a general rule to discontinue production.

11. There are a few good stallions left in the county for breeding purposes. A large percentage of the draft horses now on hand are nearly past their useful age. From all indications and the best judgment of those attending the livestock group, it appears that the farmers not only of Clackamas County, but the state of Oregon will soon experience a shortage in good draft horses. The report of the stallion registration board shows that the number of pure bred stallions registered for service in Oregon has decreased from 617 to 417 since 1912. There were in 1923 a total of 13 stallions in Clackamas County. Of this number, 11 are listed as over ten years old.

In view of these facts the livestock group has drawn up the following recommendations:

LIVESTOCK RECOMMENDATIONS.

Sheep.

1. The livestock group recommends that sheep be kept on all farms of Clackamas County, as a side line, where conditions are such as to provide suitable feed. It is further recommended that the beginner start with a small number and be careful not to overstock. He should keep the number of sheep always within the feed supply. It is recommended that the farmers

engaged in the sheep business stay with it permanently and that they do not go in and out of the business under the influence of temporary price fluctuations.

2. We recommend that the chairman of the economic conference appoint a committee of five stockmen to look into the feasibility of getting action on the extermination of coyotes in Clackamas County, and that this committee be instructed to interview the United States Biological Survey at Portland to determine possibility of securing government aid. It is further recommended that this committee determine action necessary to secure better protection to sheepmen from sheep-killing dogs.

3. It is recommended that lambs be sold on the early market for the best results, and that the 60 to 80 pound lambs are the most profitable. It is further recommended that all lambs intended for market be properly docked and castrated.

4. We endorse the Pacific Co-operative Wool Grower's Association.

5. We recommend the use of good bucks for best returns.

6. We recommend dipping goats and sheep for ticks as a means of securing greater returns from the business.

Hogs.

1. We recommend hogs on farms as a means of utilizing farm wastes, and that where there are not waste products available hog production be not considered.

2. It is recommended that farmers consider home curing of pork on the farm.

Beef Cattle.

1. It is the feeling of the livestock group that conditions in the county do not justify any expansion in beef production here.

Goats.

1. It is recommended that goats be kept on the brush lands because producers in the past have shown that goats properly managed offer a very satisfactory return to those engaged in their production.

Horses.

1. The livestock group wishes to call attention to the fact that under present conditions horses are not being produced in the county to insure a sufficient supply of good work horses in the future. Of the horses now on hand a high percentage are old, with a diminishing supply of good young horses. Reference is made to this condition in order to cause farmers to consider the danger of a serious shortage in the very near future.

Report of the Poultry Group

I. THE SITUATION

Business interests and farmers not directly interested in poultry keeping overlook the present value and future possibilities of the poultry industry of Clackamas County. According to census of 1919, the value of poultry and eggs produced in the county was \$761,464.00. Clackamas County ranks second in the state in value of poultry sold. Receipts from the sale of poultry and eggs in 1919 was over one-half million dollars, or \$503,990. Four per cent of the total cash farm income was derived from this industry.

Since 1919 the poultry industry has had a normal increase in size of flocks and in number of new flocks. There has been a rapid increase in breeding farms, new hatcheries and in the number of day old chicks produced for sale. The above census figures are not comparable with present day values and are given only to show the general magnitude and trend of the industry.

Poultry keeping when intelligently managed, has proved a profitable crop during each of the post war years of deflation. This fact caused many to rush into the poultry business without knowledge of the problems involved. As might be expected, many of this number failed.

Poultry keeping, whether a specialized business or an important sideline of four or five hundred hens is a technical business. It requires more detailed management than the average person can or will give. It is not a business for which every one is adapted. Hence there is no reason to assume that any higher percentage of persons will succeed in the poultry business than in any other line of endeavor.

More people would succeed in poultry keeping if the principles of management were available. It has been the intent of the poultry group to study the poultry industry from many angles; to incorporate in this report the possibilities of expanding the industry; and give methods of management which will make this expansion safe and profitable over a period of years.

II. MARKET POSSIBILITIES OF CLACKAMAS COUNTY POULTRY PRODUCERS.

About 60 per cent of the eggs produced in the county must be marketed elsewhere. Oregon as a whole produces an exportable surplus of approximately 200 carloads of eggs. These overproduced conditions have existed for several years. Each producer must realize that his flock is producing eggs for a home market which already has a surplus.

Clackamas County cannot be considered as an independent unit. Its poultry industry must be considered in relation to the status of the industry of the state and nation. It would make little difference in the national poultry situation if Clackamas County discontinued the poultry industry or doubled its present volume.

The fact of vital interest is that a strong, outside buying demand exists for the surplus eggs of high quality, which Oregon can produce.

The present co-operative marketing agency known as "The Pacific Cooperative Poultry Producer's Association" is a vital factor in stabilizing the market and in marketing the surplus eggs. It benefits both members and non-members. Its expansion should be encouraged and supported by poultry producers generally.

A survey of the national poultry situation does not show any cause for alarm. No difficulty is foreseen at this time in marketing the surplus egg of quality, or a reasonable increase in volume.

III. RECOMMENDATIONS OF THE POULTRY GROUP.

1.—Increases in Poultry is Justified.

Climatic conditions, availability of high producing stock and abundance of green food are factors quite favorable for poultry production in the county. The present marketing agency is in successful operation. The county produces a surplus of some grains used in poultry feedings. Rail and highway conditions are favorable transportation agencies. Soils used for vegetables, small fruits and other crops would be enriched by the fertilizer value of poultry manure. Many of the smaller farms have some surplus labor to invest.

It is recommended that poultry keeping be increased in the county, provided such increase be guided by the principles of management and marketing as outlined in this report.

2.—Farm Flocks of at Least 400 Hens and Pullets.

Many farm flocks are too small to command respect and good care. During the flush season a great volume of inferior eggs is "dumped" on the over-produced markets. Poor quality undermines the entire poultry industry to the extent that inferior eggs are permitted to reach the consumer.

On farms where labor is available each day of the year, where green feed can be provided at all seasons, and where capital is available for necessary outlay, it is recommended that a flock of not less than 400 hens and pullets be established, as a side-line issue, as soon as experience warrants.

3.—An "Incidental" Flock to Supply Home Needs.

On farms that are not interested in poultry and where other farm work does not provide surplus labor it is recommended that such flocks as are now carried be reduced to the small number necessary to supply only the need of the home table.

4.—At Least 1000 Hens and Pullets for a Commercial Flock.

As a major activity or specialized business, where one man expects to derive his major income from poultry, it is recommended that, as soon as experience warrants, a minimum unit of 1,000 hens and pullets be established. In commercial egg farming the percentage of the flock each year should consist of from 60 to 70 per cent pullets and not more than 30 to 40 per cent hold over hens.

5.—Buy Chicks Early.

The producers of commercial eggs must have the benefit of fall and winter prices to get a higher average price for the year, and they must get the fall and winter production in order to get the longest period of lay before the natural molting time.

It is strongly recommended that producers secure the chicks early enough in the spring to be old enough to come into flock production by October. Late February, March and April is suggested as the most suitable period of time to secure chicks.

6.—Buy All Chicks at One Time.

It is false economy to attempt to brood and range together chicks of different ages. It is better business, for example, to secure 1,000 day old

chicks at one time where approximately 400 pullets are desired than it would be to attempt to secure this number from several hatchings of small capacity incubators.

It is recommended that producers secure all chicks at one time where only one range and one brooder equipment are available.

7.—At Least 10 Acres for Each 1000 Hens.

Many poultry enterprises, successful for a time, have been compelled to quit business because of soil contamination. This results when the same area is used over and over again by large numbers of fowls. One, two and three acre tracts, devoted to poultry keeping on a large scale, is a hazardous and short-lived enterprise. Real estate agencies should not exploit such small tracts for intensive poultry farms.

It is recommended that commercial poultry keeping should not be attempted on less than 10 acres of tillable soil for each unit of 1,000 hens, where the young stock is to be reared on the farm each year. A system of field alternation must be worked out on this area to make poultry keeping a success, and the investment safe over a period of years. A lack of acreage is the chief factor in poultry farm failures. A greater acreage is needed when logged off areas are used.

8.—Use a Portable Brooder House.

Poultry producers will succeed according to their foresight and ability to rear pullets to maturity that are vigorous and free of intestinal parasites and inflammation. Clean soil for brooding and ranging growing stock must be provided.

The portable brooder house is recommended as the safest system of brooding chicks and providing clean soil.

It is recommended that a portable brooder house 10'x12' be used for not to exceed 500 day old chicks. The cockerels will have to be separated at an early age to prevent crowded conditions. As soon as the pullets are old enough to roost and do without artificial heat they should be moved out on free range. (Reference: Experiment Station Circular 52).

9.—Rotate Yards When Permanent Brooder House Is Necessary.

On farms where a permanent brooder house is desired or made necessary because of hill land, it is recommended that it be located in the center of a given area so that two or more yards may be provided. Under this system it is understood that only one yard is to be used each year in its logical turn. As soon as the pullets are old enough they should be removed from the brooder house and brooder yard and moved out on free range.

10.—Follow O. A. C. Plans in Building Range Houses.

Pullets should not be crowded or suffer from lack of ventilation on the range. Brooder houses used for range houses soon become crowded. It is recommended that producers guide their construction of range houses by the plans for "The Open Air Range House" (Experiment Station Circular 54).

11.—Pattern Laying Houses After Proven Types.

Too many laying houses are constructed according to some untried hobby rather than to use as a pattern some type of house that has proven satisfactory under Clackamas County climatic conditions. Good poultry houses are necessary for the permanent home of the pullets when they are ready to move in off the range.

It is recommended that, producers desiring to construct new laying houses be guided by the plans set forth in Experiment Station Circular 51. (All poultry bulletins mentioned may be secured from the office of the county agent, W. A. Holt.)

12.—Green Feed is Most Important.

Green feed is one of the four major classes of poultry feeds necessary for growth and production. Green feed is the most important item in the ration of growing stock. It increases the efficiency of all other feeds fed; supplies vitamins; adds bulk to the ration and should be fed liberally. Kale does not always live through the winter; hence root crops, alfalfa hay, cabbage, etc., should be used each year as an emergency winter feed. Kale is the leading supply of green feed for the county, but in some sections alfalfa can be grown to advantage for a dry weather supply of greens.

13.—Considerable Capital is Necessary.

Poultry propaganda is misleading and too little has been said relative to the necessary experience and capital. It has been exploited as an easy business; requiring but small capital and little experience.

The poultry group desires to present the following facts, in order to promote a common understanding.

The development of a commercial flock should be made gradually. Without previous experience, brooding 500 chicks will be found a sufficient experiment. The approximately 200 pullets secured, will provide plenty of expense and experience for the beginner's first year. This infers that the man should hold his position or stay with his major crop until he is justified in devoting full time to a special poultry enterprise.

Where the farm and home are owned and a poultry unit is to be established it will require an approximate outlay of cash of \$3.00 per pullet (the first year) before she starts to produce eggs. This expenditure is pro-rated as follows:

Brooder house, brooder, fuel supplies..	\$0.20
Feed, litter, cost of chicks, mortality losses to six months of age	1.30
Permanent laying house, material, labor, equipment, fencing, etc.....	1.50
(Reference: Cost of Rearing Pullets to Six Months of Age) Extension Bulletin No. 379).	

Under present prices it will cost approximately \$3.00 per pullet to provide the necessary feeds and litter for one year following her age at six months.

The above statements show an approximate overhead and the need of following a system of poultry farm management that will not place this investment in jeopardy.

14.—Appropriation Needed for Study of Diseases.

The poultry industry of Oregon was valued in excess of \$10,000,000 for the year 1923. One of the serious, limiting factors of poultry production in the county is the increase of poultry diseases.

The rapid development of intensified farms; high production; confinement of birds in small quarters; concentrated rations and other factors are constantly producing heavy losses to the individuals, the county and the state.

An industry of this magnitude and an industry which has returned a profit during the deflation period should warrant, at least, one man's study of its disease and nutrition problems.

It is recommended by the poultry group that this conference endorse the bill now introduced in the state legislature, to secure a small appropriation to carry on this work. This bill is sponsored by the Oregon Poultrymen's Association and the Pacific Co-operative Producer's Association.

Report of the Vegetable Crops Group

Your committee of growers appointed to investigate and report on vegetable crops of the county, hereby offer the following report.

1.—Rhubarb.

Clackamas County by virtue of soil conditions and general location is one of the best rhubarb growing areas of the state. This crop should be one of the primary vegetable projects of the county. There are possibilities to increase the present output by shipping early rhubarb to southern and northern markets in carload lots. Enough acreage should be grown so that this early shipping business might be developed. There is also a growing rhubarb business in marketing to the cannery. On the less expensive lands rhubarb growing for the cannery can be made to be a profitable business, while on higher priced, intensive vegetable land early rhubarb production and car shipping offer favorable returns to the grower. The average tonnage per acre is 10 tons of "barb" and the average price on the local (Portland) market averages between $3\frac{1}{2}$ and 4 cents per pound. Twenty dollars per ton is the average cannery price.

2.—Asparagus.

As indicated by reports there are some 50 to 60 acres of bearing asparagus plantations. There are opportunities for this vegetable to be increased in acreage to supply expanding markets and to include this crop in mixed car lot shipments of early vegetables such as rhubarb, spinach, green onions, etc. In an intensified farming project asparagus combines well with poultry as there are three benefits of the combination: first, the asparagus beetles which are ruinous to the crop are controlled by the chickens; second, the asparagus soil is fertilized by the chickens and the asparagus also acts as a useful chicken run. The average yield of asparagus in the producing section is 110-125 crates of 3 dozen bunches to the acre. Prices prevailing in past years vary or range from \$7 to \$3 per crate. We recommend the use of large, well grown one year old plants of Washington for new plantations or failing to obtain this variety, Argenteuil or Palmetto.

3.—Celery.

An estimate of the acreage planted during recent years to celery approximates 75 of which a goodly portion is not in the hands of white growers. Until such organization is formed to take care of car lot shippings we do not recommend any material increase in the acreage. Growers of celery report very fair returns in the intensive culture of this crop with average prices approximately 60-65 cents per dozen. Diseases attacking celery make it not only desirable but necessary that this crop be sprayed or dusted with a standard fungicide, Golden Plume and Golden Self Blanching of select strains are the best varieties.

4.—Cabbage.

At the present time the average annual cabbage acreage in the county is sufficient to supply local demands except where there are opportunities for car lot shipments or the possibilities for artificial storage for winter marketing. Cabbage keeps well in storage and this phase of cabbage marketing should be investigated. Cost of control of the cabbage maggot reacts against profitable cabbage growing where the price is \$20 per ton or lower.

The present yields per acre as are now reported to be generally obtained are far below a profitable figure. Unless the grower can grow ten tons per acre or more there is little money to be made with this crop at the average market price. Better late cabbage seed strains should be used, the seed tested a year ahead of planting, greater acre yields, maggot control, and the possibilities of storage are considerations which are pertinent to the cabbage growing business.

5.—Broccoli.

Severe losses have been sustained by growers during the past few years in growing broccoli, due to the cold weather. This committee has no definite recommendations to make in view of past conditions. Some former growers will no doubt continue to attempt to grow this crop under the most favored and protected conditions possible, but it is evident that the fate of the crop is entirely in the hands of the weather man and his associates.

6.—Cauliflower.

This vegetable can be grown to excellent advantage in the county. Since the improvements in cauliflower and broccoli shipping with top icing of the load in the car it is now possible to put this vegetable into distant markets in first class condition. We recommend that the car lot production of cauliflower for outside markets be developed consistent with a marketing organization that will function in investigating and developing markets for cauliflower. Seed strains of cauliflower should be tested out for crop purity on a small scale before planting widely on a crop basis. Good land is needed for this vegetable with the best of farming methods of soil moisture conservation and fertilization.

7.—Sweet Corn.

The county produces some of the earliest and best sweet corn produced in the state. High priced, intensive vegetable land demands that corn growers get a higher value for the product than ordinarily prevails on the local markets. For this reason we recommend a thorough investigation of the opportunities for marketing corn outside of the state where this vegetable is less abundant and more valuable. All sweet corn should be planted in such a way as to grow the greatest number of first grade ears per hill. This can only be done by planting thinly at a recommended distance of 3½ feet by 4 feet, two stalks to the hill or in rows 3½ feet by 24 inches. Suckering is generally recommended. Earworms which menace the crop can be successfully treated by the use of poison dusting powder.

8.—Marketing Packages and Labelling.

We generally favor the use of standard vegetable containers for marketing vegetables such as asparagus, rhubarb, cauliflower, celery, etc.

We also favor a trade-mark brand or label for outside shipping, cooperative marketing to distant markets, etc. Because of the misuse by indiscriminate growers in local markets who take second hand boxes of a

superior brand or trade-mark and use them again for marketing inferior produce under the said well known brand, we discourage the use of stencilled or labelled containers for general local marketing, as well as absolutely condemning such malicious and false representation on the part of said parties.

Report of the Club Work Committee

We, your committee on boys and girls' club work, wish to submit the following report:

I. THE SITUATION

Boys' and girls' club work is a part of the regular extension work conducted by the Extension Service of the Oregon Agricultural College, the United States Department of Agriculture and the State Department of Education, co-operating.

The objects of club work are to give practical instruction in agricultural, livestock, and homemaking projects to the boys and girls enrolled in these clubs, to teach the boys and girls, by demonstration, the latest methods in these projects, to create in these club members the desire for ownership; to train these young people to be real leaders in their communities.

The enrollment in club work in the United States for the year 1924 was over 650,000. This work was conducted in every state in the Union. The enrollment for Oregon was 6,047 and for Clackamas County 182 who began work. One hundred and thirty of these completed their work and filed their final reports with the county agricultural agent, with 10 of the clubs of the county finishing as 100 per cent clubs.

The 130 club members who reported gave a valuation of \$6,103.79 at a cost of \$4,207.37, thus leaving a profit of \$1,896.52.

The club members won in prizes at the county and state fairs, and the Pacific International Livestock Exposition over \$1,000.00, which would give a total to club members of nearly \$3,000.00 clear.

We wish to impress upon this conference that the \$3,000.00 in money was not the real value of club work to these young people, but that the educational training they received in doing this work was the greatest value earned.

Since Clackamas County does not, at this time, have a county club agent, club work has been largely conducted by the county agricultural agent, Mr. W. A. Holt, with the assistance of local leaders of the different clubs.

II. CLUB RECOMMENDATIONS.

Believing that club work should correlate closely with the work of the adults, we recommend that the club program for the county coincide with the program recommended by this economic conference so far as practical.

As club work has been making a steady growth both in Clackamas county and the state, we recommend that the club membership for next year be not less than 250 members completing.

Since the local club leader is important in the success of any club we recommend that those of this conference who are interested in the welfare of the boys and girls of their respective community, and who are also interested in club work will offer to assume the leadership of a club, and if asked to lead a club will do so.

We also recommend that the breed associations of the county be responsible for local club leaders for clubs of their respective breeds.

Since the dairy industry is one of the most important in the county, we recommend that more dairy calf clubs be organized and that club members be encouraged to continue in the work for three or more years in order to secure the greatest value in the work.

As a survey of the county indicates a need for more sheep and as the sheep club project has proven a profitable one for club work, we recommend that more sheep clubs be organized in the county. As many club members in the past have not been able to secure calves or sheep in order to start club work, we recommend that breeders having either calves or sheep for sale, which are suitable for club work, get in touch with the county agent in order that such animals may be placed with club members.

Since Clackamas County is situated close to the Pacific International Livestock Exposition and pig club members have the opportunity to exhibit at the exposition and to compete for the Union Stock yards special prize in club work, and then to sell their pigs at the club sale, during the exposition; and as pig club members exhibiting at the exposition in the past have been very successful, we recommend that more pig clubs be organized and more members keep in mind the Stock-yard's special and the club sale of fat stock.

We believe that boys and girls will derive much from the poultry club work and therefore, we recommend that more poultry clubs be organized, and that men and women who know the poultry business be local leaders of these clubs.

The survey for this county showed that corn could be grown successfully here and that there was a need for more corn. Since there will be special prizes at the Pacific International Livestock Exposition this year for corn club members, we recommend that corn clubs be organized and that each member handle not less than one acre.

We also recommend that potato and garden clubs be organized.

Realizing the importance of all projects in girls work, such a sewing, cookery, canning and homemaking, we recommend that clubs in these projects be organized wherever possible and that women of the different communities, where clubs are organized, offer their services as local club leaders. Your committee also recommends that the cookery club be stressed.

Since the majority of county fairs of the state, and the state fair permit club members to compete in the open classes, we recommend that the Clackamas County Fair Board permit club members to compete in open classes, by paying the regular entry fee. Many club members will not be able to secure purebred calves. We recommend that in case the enrollment shows a good percentage of grade calves a separate classification for grade calves be arranged for the county fair.

Realizing the encouragement that a get-together meeting would be to club members and local leaders, we recommend that a country-wide club and local club leaders must have the support and co-operation of the parents picnic be held during the summer months.

In order that club work may be successful the county agricultural agent and local club leaders must have the support and cooperation of parents of the club members. Therefore we recommend that each and every parent give his or her best support to those leaders and encourage the club members in every way.

Report of the Soils Committee

In preparing this report the soils committee has kept in mind those factors which are fundamental in farming and has not attempted to cover the subject as related to some of the special lines of farming. In such a manner this report is related to every farming enterprise in Clackamas County, for the building up of the old cropped soils and maintaining fertility of the now productive soils is absolutely necessary if Clackamas County is to hold its present position in agricultural importance in the state and advance as it should.

Use of Lime.

In-as-much as all of the soils of western Oregon are more or less acid the use of ground limestone is beneficial to the soil and the crop. Consideration of the lime question lies principally with the value of the increase crop yield in comparison with the very high price of lime in Clackamas County. The committee believes that lime will benefit most of the soils of the county but does not contend that in all cases this benefit will be sufficient to show a profit under these high lime costs. However, on those soils where clover cannot be successfully raised and where the soil is found to be decidedly acid, we believe lime is a controlling factor and that it can be profitably applied at the rate of at least one ton per acre if the drainage is satisfactory. The first step in developing wet land is drainage.

In making this recommendation the committee has taken into consideration the fact that lime is costing \$7.20 f. o. b. Oregon City in sacks. This means \$8.00 to \$10.00 at the farm. It is the belief of this committee that the benefit of the lime will be spread over a period of five to seven years and the cost per acre, per year, of \$1.25 to \$2.00 can profitably be paid. Greater benefit from the lime will be secured if manure is applied before the fall plowing, when the clover is to be seeded in February or March on winter grain and the lime is applied after the plowing in the fall. This is especially recommended in cases where it has been very difficult or impossible to get a stand of clover in years of average moisture. In very dry years such as the past summer we do not expect these recommendations to assure a clover stand.

The farm crops committee has found that it is costing the farmer \$3.00 per acre more to grow a crop of vetch and oats than clover, figuring the crops at equal yields.

Three clover crops will pay the cost of a ton per acre of lime in saving of farming costs, on this basis:

Crop Rotation.

The soils committee believes that crop rotation is absolutely necessary for the maintenance of soil fertility and crop yields. The farm crops report points out the necessity of greater yields per acre to meet the overhead of high land values. Better seed and standard varieties will aid in this direction but crop rotation including legume crops of vetch and clover is fundamental in keeping up the soil fertility.

The average yield of winter wheat in Clackamas County is 25 bushels per acre. The cost of production of wheat as shown by estimates of members of the farm crops committee is \$22.00 per acre covering interest depreciation, etc. If wheat prices to the farmer would be \$1.10 per bushel this would just cover his expense. Many farms are producing 40 to 50 bushels of wheat per acre and can therefore show a margin of profit. Many other farms are producing less than 20 bushels per acre. The farms using legumes and crop rotation are consistently with the higher producers per acre.

The crops committee is recommending a greater corn acreage. This fits perfectly into the recommendation of the soils committee for more crop rotation, because a good rotation requires a cultivated crop to rid the land of weeds.

A crop rotation for Clackamas County should include a legume and a cultivated crop. A suggested rotation is potatoes and corn followed by a grain crop (wheat or barley, preferably fall sown) with clover seeded on the fall grain in February. This will make a three-year rotation unless timothy is seeded with the clover and is held over for a fourth year of clover-timothy mixture. The only objection to this is in some cases this clover timothy yield is rather low. By having corn and potatoes to alternate on the land allotted to cultivated crops this will permit a six or eight year interval between crops of potatoes on the same ground, which is important in disease control. Other rotations can be worked out, but will be a variation of the one suggested.

Fertilizers.

Superphosphate is consistently giving good results on corn on all of the soil types and especially so on the red hill soils. The benefit is very noticeable also on the wheat and clover that follows. The committee believes the use of superphosphate at 250 to 300 pounds per acre under these conditions is decidedly profitable.

The committee has no definite data on the results from fertilizing potatoes in the county. Very profitable increases are reported from other districts of somewhat similar conditions and in view of this the soils committee recommends that some potato fertilizer trials be conducted in the county as a part of the program of work of the county agricultural agent.

The committee recognizes that there is a large field for fertilizers in various lines of horticulture but is not attempting to cover the situation in the report as horticulture is not duly represented on this committee.

Straw.

Inasmuch as cereals are the leading farm income producers in Clackamas County there is a large tonnage of straw to be disposed of each year. It is valuable as a soil builder in supplying organic matter and plant food. The following recommendations are made:

1. It is profitable to spread straw.
2. No straw should be burned.
3. More can be used with manure.
4. The practice of using lounging sheds for stock and hauling out the straw and manure in the spring and fall is the most efficient method to use both straw and manure.
5. Where the large quantity of straw offers a problem in spreading we call attention to the use of a regular straw spreader attachment for the strawrack which will cost \$75 to \$100 or a straw spreader attachment for any manure spreader which will cost \$40 to \$50. Straw from 30 acres was spread in two days by one man and a boy using a straw spreader on a Willamette Valley farm this fall.

Manure Storage.

The value of manure as a fertilizer is well recognized by all farmers, but the average storage methods on our farms cause great loss. The loss of liquid manure alone means a loss of over 50 per cent of the total nitrogen and 85 per cent of the total potash of the manure.

Since Clackamas County has 12,000 dairy cattle this loss of liquid manure and losses due to leaching from winter rains may undoubtedly be very great. This loss occurs principally in a period of about seven months when the cows are kept in most of the time. The loss in nitrogen in liquid manure over this period would amount to \$8.00 per cow figuring nitrogen

as it costs in commercial fertilizers at 20 cents a pound. The potash lost would amount to \$3.25 figuring potash at five cents a pound. On those farms where the liquid manure from 10 cows is lost for seven months the total loss is \$11.25 if this is figured at the above rates of commercial fertilizers.

Therefore we recommend that this valuable fertilizer be conserved by the use of manure pits, liquid tanks, or lounging sheds.

Drainage.

Drainage is considered by the committee as fundamental in land development. Many of the farms of Clackamas County have wet areas or meandering wet draws that reflect seriously upon the value of the entire farm. These wet areas make farming more expensive and delay farm operations.

Tile drainage of the wet areas is considered an absolutely sound investment and will pay not only by bringing new land into production but will make possible the growing of more fall crops and legumes which will mean better yields. Spring operations will be earlier and the cost of plowing, etc., will be reduced as these wet spots can be handled right along with the rest of the farm. The cost of drainage is very often paid for by increased yields in two or three years.

We recommend that tile drainage of wet areas proceed as fast as the finances of the farm will permit.

The committee wishes to point out that O. A. C. Extension Service through the county agent is ready and willing to assist in planning drainage systems.

Irrigation.

Although the practice of irrigating is not expected to become general the committee recognizes that there are many Willamette Valley farmers who are irrigating small fruits, vegetables, pasture lands, and some general crops such as corn, potatoes, and alfalfa at a good profit.

Where these crops are grown and there is a stream or reliable well for a water supply the advisability of irrigation depends upon the costs as compared to the benefits. Every farm must be considered according to its problems.

Assistance in irrigation can be secured from the O. A. C. Extension Service through the county agent.

Development of Clackamas County Agriculture

Clackamas county was organized July 5, 1843. The oldest city in Oregon and many of the earliest settlements in the Willamette Valley are included within its boundaries. At the present time it has an area of 1,195,120 acres or 2,993 square miles, of which 556,410 acres are in national forests. It has always been primarily an agricultural county. That industry dates from about 1837 in which year a herd of cattle was driven into the Willamette Valley—an event which marked the real beginning of agricultural development in this section.

Development of agriculture in this county, as in others of the state, went steadily forward. Livestock production predominated in early agricultural activities. The plains and valleys of the county were covered with luxuriant pastures. Only those crops were grown that were needed for home consumption and local markets. As the county settled up and transportation facilities improved, new markets were opened up. As a consequence livestock were pushed back into the hills and production of cereals, fruits, vegetables, potatoes and other crops increased. Interpretation of the U. S. census records for this county indicate that while agricultural development has gone steadily forward, the decade between 1870 and 1880 showed relatively the greatest development of any 10-year period before or since.

Some indication of the tremendous development in this county in the relatively short period of 70 years between 1850 and 1920 is to be had from the U. S. census. The figures follow:

	1850	1920
Population	1859	37,698
General farm data:		
Number farms	150	3,836
Acres in farms	118,598	285,910
Percent farm land improved.....	30.6	41.5
Average acres per farm.....	790.6	74.5
Value of all farm property.....	\$866,225	\$40,281,098
Average value per farm, all farm property	5,775	10,500
Livestock:		
Value of livestock	\$253,464	\$2,720,218
	(in 1860)	
Number horses	579	8,943
Number beef cattle (in 1860).....	3,183	3,178
Number dairy cattle (in 1860).....	2,124	16,290
Number sheep	59	16,780
Number swine	2,603	20,291
Number goats		6,274
Poultry:		
Number hens (in 1880).....	27,453	230,801

Detailed reports on farm crops were not made by the census until 1870. Comparisons between the 1870 and 1920 census figures follow:

Farm Crops:	1870	1920
Bushels of wheat	58,650	659,932
Bushels of oats	58,017	1,041,489
Bushels of barley	1,255	22,003
Tons of hay	2,716	72,120
Bushels of potatoes	34,613	554,649

Development of the fruit industry has not been so marked:

Orchard fruits:	1890	1920
Bushels of apples	46,128	106,143
Bushels of peaches	1,541	16,202
Bushels of pears	3,959	6,805
Bushels of plums and prunes.....	6,582	28,471
Bushels of cherries	1,233	6,376

Examination of the earliest and latest available census figures do not tell all the story. In most cases the intervening census periods show that development has been continuous. In others the rise and fall of certain agricultural enterprises are noted.

Population Has Steadily Increased.

The consistent growth in population of this county is indicated in table No. 1. A slowing down in the percentage of increase is noted between 1910 and 1920. In the latter year the total is given as 37,698, of which 84.9 per cent is rural and 15.1 per cent is urban.

Increase in number of farms, variations in number of acres in farms, decrease in the size of the average farm and tendency in recent years to increase the percentage of farm land that is improved are indicated in table No. 2.

Farm Property Values Show Big Increase

Farm property values have shown a consistent increase with each census, with the exception of the period between 1850 and 1860. The figures given in Table No. 3 indicate that the two periods of greatest increase are 1870 to 1880 and 1900 to 1910.

Table No. 1

POPULATION STATISTICS—CLACKAMAS COUNTY
(U. S. Census)

Compiled by O. A. C. Extension Service

Census Year	TOTAL			DISTRIBUTION					
	Per Sq. Mile	Number	Percent Increase	Rural	Percent Of total	Percent Increase	Urban	Percent Of total	Percent Increase
1850		1,859							
1860		3,466	86.5						
1870		5,993	73.1						
1880		9,260	54.6						
1890		15,233	64.6						
1900	10.6	19,658	29.0	16,164	82.2		3,494	17.8	
1910	16.1	29,931	52.3	25,644	85.7	58.6	4,287	14.3	22.7
1920	20.2	37,698	25.9	32,012	84.9	24.8	5,686	15.1	32.6
State 1920	8.2								

Population per square mile, 1920: Total, 20.2
Rural, 17.1

Changes in boundaries: Part annexed to Marion in 1911; part annexed to Multnomah and part of Hood River annexed since 1910.

Table No. 2

NUMBER OF FARMS, LAND AREA, ETC.—CLACKAMAS COUNTY
(U. S Census)

Compiled by O. A. C. Extension Service

Census Year	Number Farms	Acres in Farms			Percent land area in farms	Percent farm land improved	Average acreage per farm	Average im- proved acres per farm	Total land area in county	% total area improved
		Improved	Unimproved	Total						
1850	150	36,210	82,388	118,598		30.6	790.6	241.4		
1860	376	15,051	115,901	130,952		11.5	348.3	40.0		
1870	537	23,520	128,236	151,756		15.5	282.6	43.8		
1880	1,385	70,674	175,606	246,280		28.8	178.0	51.0		
1890	1,771	91,458	169,532	260,990		35.1	147.0	51.6		
1900	2,568	90,061	208,430	298,491	25.0	30.1	116.2	35.1	1,191,040	7.6
1910	3,646	103,371	197,638	301,009	25.2	34.3	82.6	28.4	1,192,960	8.7
1920	3,836	118,658	167,252	285,910	23.9	41.5	74.5	30.9	1,195,520	9.1

Table No. 3

FARM PROPERTY VALUES—CLACKAMAS COUNTY
(U. S. Census)

Compiled by O. A. C. Extension Service

Census Year	Number Farms	TOTAL FARM VALUES					AVERAGE VALUES PER FARM					
		All Farm Property	% Increase	Land	Buildings	Imp. and Mach'y	Live- stock	All Property	Land and Bldgs.	Land Alone (Acre)	Imp. and Mach'y	Live- stock
1850	150	*\$ 866,225						\$ 5,775				
1860	376	817,090	-5.7	\$ 521,436		\$ 42,190	\$ 253,464	2,173	\$1,387		\$112	\$674
1870	537	1,143,900	40.0	869,079		32,285	242,536	2,130	1,618		60	452
1880	1,385	3,556,587	210.5	3,004,996		151,490	400,101	2,568	2,169		109	290
1890	1,771	6,825,210	92.0	5,975,400		208,150	641,660	3,854	3,374		118	362
1900	2,568	9,251,479	35.6	6,664,350	1,303,620	337,630	945,879	3,602	3,103	\$ 22.33	131	368
1910	3,646	29,725,795	221.3	23,564,509	3,404,895	813,434	1,942,957	8,153	7,397	78.29	223	533
1920	3,836	40,281,098	35.9	28,788,788	6,203,227	2,263,491	3,025,592	10,500	9,122	100.69	590	789

*Livestock values not included.

Rapid Development Between 1870 and 1880.

Up to the year 1870 the agriculture of the county was devoted largely to livestock and the production of cereal crops. Cereal production increased tremendously in the next decade, during which period the acres in farms almost doubled and the number of improved acres more than tripled. In 1880 the census credited the county with 70,000 improved acres. Of that total, 22,028 acres, or almost 30 percent were devoted to oats and wheat. A total of 450,440 bushels of these two crops were produced in 1879 as compared with 116,667 bushels in 1869. Cereals, principally wheat and oats, have continued to be the leading source of agricultural income down to the present time.

In this same period, 1870-1880, potato production reached considerable proportions and the fruit industry began to assert itself. The 1880 census credits the county with 220,382 bushels of potatoes. The value of orchard crops was given as \$60,238. The number of sheep reached 13,391 and the number of hogs jumped from 3,017 to 10,754.

Between 1880 and 1890 production of wheat, oats and hay made big gains. Potatoes and fruits just about held their own. Hops made their appearance and vegetable growing increased. The number of sheep and hogs continued to gain.

Dairy Development Began About 1890.

Beginning in 1890 the dairy industry came into prominence. Vetch and clover were introduced about this time and these two crops had a marked beneficial effect on the county's agriculture because of their use in crop rotations, their ability to build up soil fertility and their value as dairy feed. The sheep and hog enterprises reached their peaks by 1900, the census of that year showing 17,965 sheep and 17,616 hogs. Beef cattle showed a falling off.

By 1900 the county's dairy income reached \$100,000. Production of hay increased considerably, as did also the cereal acreage. The potato acreage doubled between 1890 and 1900. Hops reached their peak about 1889. The census for that year reported 1650 acres in hops.

Between 1900 and 1910 the dairy industry developed rapidly, the income from this enterprise being quoted at \$289,364 by the 1910 census. Hay and forage crops likewise increased considerably. Potato production reached its peak with 7,468 acres and 842,921 bushels. Production of tree fruits reached 111,452 bushels and small fruit rose from 245 acres to 567 acres. Vegetable production increased considerably. Hops were beginning to lose ground, 1472 acres being reported in 1909. The poultry industry showed big gains, value of poultry products being quoted at \$102,249 in 1909 as compared with \$46,551 in 1899. All livestock except dairy cattle and goats showed a decrease. The number of goats jumped from 5,002 to 10,351 in this decade.

The years 1910 to 1920 showed continued increases in dairying, cereals, hay crops, tree fruits, poultry raising, sheep and hogs. Small fruits, potatoes and goats showed a slight falling off. The hop acreage dropped to 141 in 1919. The 1920 census gave the total farm income for 1919 at \$6,002,363. This was divided as shown in table No. 4. Only Umatilla, Marion, Washington and Linn counties exceeded Clackamas in total agricultural income in 1919.

Table No. 4

INCOME FROM SALES OF FARM PRODUCTS—CLACKAMAS COUNTY
Year of 1919

Compiled by O. A. C. Extension Service

Product	Income	Percent of Total Income
Cereals	\$1,965,000	32.7
Dairy products	915,343	15.3
Vegetables (potatoes incl.).....	800,000	13.3
Livestock and meats	775,000	12.9
Fruits and nuts	610,000	10.2
Poultry products	305,990	8.4
Hay and forage	135,000	2.4
Wool and mohair	65,000	1.1
All other crops	233,000	3.9
Totals	\$6,002,363	100.2

Climate of Clackamas County

The region along the Willamette River and extending west to the county boundary and east to the low foothills of the Cascade range is characterized by moist, mild winters and dry, cool summers. Farther east the high ridges of the Cascades are encountered. Precipitation is heavier in that region and temperatures show greater extremes.

In view of the variations in topography the U. S. Weather Bureau records kept at Cazadero, Government Camp, Welches, Headworks, Miramonte Farm, Oregon City and Stafford are shown in this bulletin. Table No. 5 shows the average annual and monthly precipitation at these stations. It will be noted that in the region bordering on the Willamette River the precipitation averages around 45 inches per year. Farther east it ranges from 57.21 inches at Cazadero to 77.59 inches at Government Camp. At each station the period of greatest rainfall is from October to May. June, July and August are relatively dry months.

Table No. 5

CLACKAMAS COUNTY

Precipitation
 Monthly and Annual Averages
 (U. S. D. A. Weather Bureau)

Compiled by O. A. C. Extension Service

Station	Cazadero	Government Camp	Headworks	Miramonte Farm
Elevation	503 feet	3,879 feet	719 feet	195 feet
Years of Record..	1909-1922 14 years	1895-1922 27 years	1899-1922 24 years	1892-1922 31 years
Months				
January	8.37	11.69	10.31	6.45
February	6.16	10.47	8.26	5.02
March	6.00	9.70	8.48	4.59
April	4.72	6.17	6.27	3.20
May	3.64	5.18	5.31	2.59
June	2.35	3.27	3.67	1.67
July .....	.99	1.58	1.55	.56
August .....	.81	1.94	1.60	.57
September	3.02	4.36	4.16	2.44
October	4.21	6.31	5.90	3.08
November	9.07	13.95	11.23	7.31
December	7.87	12.55	10.85	6.26
Annual	57.21	87.17	77.59	43.74
RANGE				
Highest:				
Inches	66.11	124.35	91.95	55.64
Date	1909	1896 & 1899	1921	1894
Lowest:				
Inches	46.97	65.41	61.10	32.14
Date	1918	1905	1905	1908

*Records for 1914 not available.

Table No. 5—Continued
PRECIPITATION

Station	Oregon City	Stafford	Welches
Elevation	200 feet	400 feet	1,435 feet
Years of Record.....	1851-1894* 7 years	1896	1908-1922** 14 years
Months			
January	7.27	7.37	10.82
February	4.76	5.83	7.39
March	6.82	4.80	8.29
April	3.91	3.46	6.33
May	2.87	2.77	5.04
June	1.83	1.94	3.45
July .....	.32	.72	1.40
August .....	.48	.82	1.47
September	2.52	2.44	3.87
October	4.55	3.45	6.28
November	5.90	8.77	12.70
December	7.04	6.99	10.45
Annual	48.27	49.36	77.49
RANGE			
Highest			
Inches	59.09	58.78	92.13
Date	1894	1897	1921
Lowest			
Inches	33.53	32.72	56.23
Date	1892	1918	1922

*From records of 1851, 1857-58-59, and 1892-93-94, only.

**No record for 1919 available.

Mild temperatures and long growing seasons are the rule in the valley floors of the county. Shorter growing seasons, more severe temperatures and greater fluctuations in temperature occur among the foothills and main ridges of the Cascade mountains. Frost data for several points in the county are given in table No. 6.

Table No. 6

CLACKAMAS COUNTY FROST DATA
(U. S. D. A. Weather Bureau)

Compiled by O. A. C. Extension Service

Station	Years of records	Elevation (feet)	Date of last killing frost in spring	Date of first killing frost in fall	Average date last killing frost in spring	Average date first killing frost in fall	Average length of growing season	Shortest growing season		Longest growing season	
								Length Days	Year	Length Days	Year
* Cazadero	1909-1922 14 years	503	April 29	Sept. 13	April 13	Oct. 23	193	146	1913 & 1919	241	1915
** Government Camp	** 1895-1920 23 years	3,879	**May 30	**Sept. 8	May 12	Oct. 19	170	113	1896	206	1900
*** Headworks	1899-1922 24 years	719	May 21	Sept. 18	April 17	Oct. 31	199	145	1916 & 1918	264	1921
**** Miramonte Farm	1892-1922 31 years	195	May 24	Sept. 21	April 21	Oct. 30	192	135	1895	251	1921
***** Stafford	1896-1919 24 years	400	May 21	Sept. 24	April 13	Nov. 2	203	149	1908	226	1904

*P. O. Address, Estacada.

**P. O. Address, Rhododendron; records for 1912 to 1915, incl., not available. Freezing temperatures occurred every month in 1919 and 1920.

***P. O. Address, Boring.

****P. O. Address, Aurora.

*****P. O. Address, Sherwood.