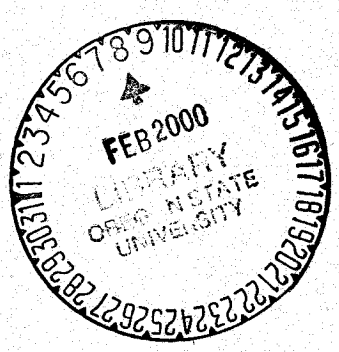
Special Report 1010
February 2000

A Quarter Century of Dryland Wheat Production and Marketing— Changes and Trends in Oregon's Columbia Plateau



OREGON STATE UNIVERSITY
EXTENSION SERVICE

For additional copies of this publication, write:

Mary Corp
OSU Extension Service
Umatilla County Office
721 SE Third St., Suite 3
Pendleton, OR 97801-3056

Oregon State University Extension Service
Special Report 1010
February 2000

A Quarter Century of Dryland Wheat Production and Marketing—Changes and Trends in Oregon's Columbia Plateau

Sandy Macnab
Extension agent, Wasco and Sherman counties
Oregon State University
and
Gordon Cook
Extension agent, Union County
Oregon State University
and
Mary K. Corp
Extension agent, Umatilla County
Oregon State University

A QUARTER CENTURY OF DRYLAND WHEAT PRODUCTION AND MARKETING – CHANGES AND TRENDS IN OREGON'S COLUMBIA PLATEAU

Sandy Macnab, Gordon Cook, and Mary K. Corp

Introduction

A cost-of-production and marketing study of dryland wheat production was initiated by the Oregon State University Extension Service with the cooperation of local growers in 1974. This study has been updated each year for the past 25 years. The study reflects the changing practices and input costs seen over the period in Oregon's Columbia Plateau's 9- to 13-inch rainfall areas.

Oregon's Columbia Plateau is a dryland wheat-producing region lying south of the Columbia River. It accounts for about 75% of Oregon's grain production. It spans from the eastern slopes of Mt. Hood to the foothills of the Blue Mountains. Historically the region has utilized a summer-fallow production system, with a crop produced every other year. Soil depth varies over this area and can be a limiting factor to production. Most of the wheat produced is soft white, and 85% is exported through ports along the Columbia River.

The study was started in order to address the question, "How much does it cost to produce a bushel of wheat?" This project answered that question and started growers reviewing their own costs. The study looked at both the cost of production and marketing.

Cash flow projections and partial budgets have resulted from this research project. The authors have compared enterprise budgets of different tillage practices. Each year's report provided a column for the farmer to input his own costs. It is critical that farmers know their cost of production and marketing. This provides farmers with a framework to make decisions about their own operations.

While these reports have been developed primarily for farmers, other parties in the industry have utilized them—agricultural lenders, landowners, lawyers, farm policy specialists, and agribusiness support industries. Examples of uses are leasing negotiations, termination settlements, land transfers, risk management, insurance settlements, estate settlements, loan discussions, other economic studies, and comparison and evaluation of farm policy impacts.

A quarter century of continuous data from one area offers a unique opportunity to analyze trends and changes in the wheat industry. This update of the study will look at a 25-year follow-up survey, current cost of production figures, alternative crops, farm leases, and government policies.

Cost of Production and Marketing

Wheat production and marketing costs have increased dramatically over the past 25 years (Figure 1). Increasing machinery expenses make up a large portion of these higher costs (Figures 2 and 3).

The machinery used has changed. A standard new combine in 1974 had an 18-foot header (the cutting section at the front of the harvester), and a farmer could purchase one for the equivalent of 8,750

bushels of wheat or 26.5 % of annual production. A new combine in 1999 comes standard with a 30-foot header and new technology that improves speed and harvesting efficiency. A new combine may replace several older, smaller machines. Still, at today's wheat prices, a new combine will cost the farmer nearly 73,000 bushels of wheat or 130% of annual production. Larger, faster equipment has been purchased not only at the expense of hired labor, but has been justified by increasing the acres per farm (Figure 4).

Production input cash costs have risen from $44.26 per acre in 1974 to $96.26 per acre in 1999 (Table 1) for reasons discussed in this report.

A review of the 25-year study documents other changes. In 1974, the study began with a 2,000-acre farm using a crop-fallow rotation, meaning that 1,000 acres were cropped each year while the other half remained free of crop (fallow) in order to capture and store moisture for the seedbed. The average yield was assumed to be 32 bushels per acre. These figures, while not "average," were typical of farms in the five-county study region.

The yield was increased to 33 bushels (1976), 34 bushels (1980), and 45 bushels per acre (1989). This reflected improved varieties with higher yields and pest resistance, and the impact of the Conservation Reserve Program (CRP), which encouraged the retirement from production of thousands of acres of lower yielding farmlands.

Similarly, the size of the study farm has increased. It has increased from 2,000 acres in 1974 to 2,500 acres in 1981, and finally to 3,000 acres in 1996. Throughout the quarter century, the study has maintained half the acres in production annually, with half in fallow.

Another key change has been in modification of the "conventional" tillage practice. For many years, conventional tillage employed the moldboard plow. While the moldboard plow helped reduce the risk of certain crop diseases and assisted in management of weeds, it was also a practice that exposed soil to an increased risk of erosion. Conscientious farmers began switching to a more conservation-oriented tillage practice, one that left more soil-protecting residue on the surface, but also increased disease and weed risks. Nearly all farmers in the region adopted an approved "Conservation Farm Plan" with technical assistance from the USDA's Natural Resources Conservation Service. Most of these plans include a provision for a "clean tillage" (moldboard plowing) 1 year in 3. The combination of conservation and clean tillage practices is reflected in annual studies since 1996.

A subtle change is reflected in the fertilizer expense over the years (Table 1). Originally, the study included only an annual application of nitrogen fertilizer. Due to higher yielding varieties, it now is common practice to apply nitrogen on an annual basis (part in the summer fallow and part in the crop year) and sulfur at least once every 3 years and every year over much of the region.

Inflation is reflected in the study in the rising production costs (Table 3). Another way to look at the effects of inflation is by converting the price of wheat to 1998 dollars. By using 1998 dollars as the base, the cash price of wheat in 1999 is $3.02 per bushel, while in 1974, it was $10.86 per bushel.

The combination of increased costs and reduced prices has driven the profit out of farming. The impacts are felt throughout rural communities where wheat is produced, as reflected in the survey of current farm conditions.

Survey of Current Farm Conditions

The annual cost of production study does not reflect all changes taking place on the farm. A follow-up survey was used to quantify these underlying changes.

The survey was conducted in September 1999. One-third of the farms represented on the Sherman County Extension newsletter mailing list were selected randomly, contacted, and interviewed. The numbers surveyed are comparable to a similar survey conducted on the same percentage of Sherman County farms in 1973.

Comparison of Survey Results

	1973	1999
No. of farmers interviewed	49	31
No. of operators per farm	1.3	1.61
Total farm size	3,527 ac	4,450 ac
Average harvested acres	1,006 ac	1,755 ac
Farms with livestock	68%	51%
Average $ wheat, Portland	$4.69	$3.02

This comparison mirrors many of the significant changes observed by the authors over the years. There are fewer farms, but they are larger and have more annually harvested acres (Figure 1). In the 1999 survey, 48% reported that their farm was larger than 10 years ago, while only 6% reported a decrease in farm size. The remaining 45% of farms were approximately the same size as 10 years ago.

Land uses have also changed, as 55% reported they had tried to change or were changing their cropping system or rotation, and 65% had retired some lands from crop production into the Conservation Reserve Program (CRP). Changes in crop rotations (39%) dominated the list of expected changes for the next 5 years.

The number of operators per farm increased in the past 25 years (1.3 to 1.6 operators per farm). Farms with multiple operators utilized some form of family partnership or corporation. Of the farms surveyed in 1999, 45% had an individual operator.

Despite the increase in farm size, 48% reported less hired labor than 10 years ago, while only 10% reported an increase. The remaining 42% had no change in hired labor. Increased numbers of family operators to share in the labor and larger machinery with greater efficiency were cited as justifications for using less hired labor. Also, reduction in livestock production has meant less demand for extra labor.

Another increase in management efficiency can be tied to the operator's adoption of office technology. Respondents have adopted the cellular phone (90%) and fax machine (65%) as common tools in their management toolbox. The personal computer was also a popular tool (74%), although a much smaller portion (58%) used the Internet or e-mail as part of their business. Data Transmission Network (a satellite dish-based market information system) was used by 28% to follow current market information. No respondents had used a personal hand-held data recorder.

In 1999, 23% of the farms reported operator income from off-farm activities, while two-thirds of the spouses worked to support the family. Although only 58% of the working spouses had full-time employment, 64% had some benefits from work. Spouses had been working off-farm for an average of nearly 11 years, while operators averaged only 7.3 years.

Table 1. Dryland wheat production and marketing costs per acre, 1974-1999

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
VARIABLE COSTS													
Fertilizer	6.30	6.00	5.55	5.10	5.10	5.10	6.00	6.60	6.75	6.90	6.90	7.20	6.15
Wheat Seed	5.66	5.36	4.13	3.80	4.95	6.16	6.16	6.05	6.22	6.10	5.50	5.50	4.54
Herbicide	6.35	6.85	6.31	6.13	5.81	5.84	6.74	7.02	8.73	8.81	10.18	9.19	9.44
Fuel	3.12	3.51	3.55	3.77	4.03	6.84	8.18	8.35	7.97	7.19	6.81	6.79	4.33
Machinery Repairs	5.43	6.00	5.71	6.07	6.58	7.37	8.11	8.03	8.09	8.09	8.08	7.71	8.51
Marketing	8.80	8.96	9.57	10.56	11.22	13.20	15.30	16.32	17.00	16.66	16.66	16.32	16.32
Operating Interest	1.74	2.00	1.60	2.35	2.78	3.61	4.20	4.60	4.50	3.60	4.26	3.07	2.33
Hired Labor	1.47	1.89	1.88	1.97	2.07	2.23	2.47	2.15	2.95	3.15	3.15	2.16	2.15
Other	5.39	5.33	5.32	5.42	6.05	5.97	6.05	6.36	6.37	6.47	6.47	6.39	6.11
TOTAL Variable Costs	44.26	45.90	43.62	45.17	48.59	56.32	63.21	65.48	68.58	66.97	68.01	64.33	59.88
FIXED COSTS													
Insurance	5.54	4.27	4.38	4.08	4.54	4.58	5.11	5.07	6.16	5.65	5.77	3.29	3.44
Land Charge	40.45	50.16	50.54	49.20	52.34	65.04	81.90	50.00	50.00	50.00	50.00	50.00	43.00
Machinery Interest	9.97	10.05	10.19	10.90	13.16	18.98	24.25	27.22	27.57	23.78	27.23	22.35	19.63
Machinery Depreciation	10.44	11.01	11.81	12.59	13.39	14.42	16.06	14.44	15.84	16.51	16.97	17.05	15.45
Operator Labor	11.47	12.37	12.50	12.87	13.73	15.08	16.58	15.16	15.21	15.21	15.22	15.21	15.21
TOTAL Fixed Cost	77.87	87.86	89.42	89.64	97.16	118.1	143.9	111.89	114.78	111.15	115.19	107.90	96.73
TOTAL Cost per Acre	122.13	133.76	133.04	134.81	145.75	174.42	207.11	177.37	183.36	178.12	183.20	172.23	156.61
Break-even Price/Bushel	$ 3.82	$ 4.18	$ 4.03	$ 4.09	$ 4.42	$ 5.29	$ 6.09	$ 5.22	$ 5.39	$ 5.24	$ 5.39	$ 5.07	$ 4.61
Yield assumed Bu/Acre	32.0	32.0	33.0	33.0	33.0	33.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Ave. Market Price/Bu at Portland, Ore. (Soft White Wheat) Market year June-May	$ 4.47	$ 3.91	$ 3.10	$ 3.09	$ 3.73	$ 4.23	$ 4.36	$ 4.20	$ 4.39	$ 3.95	$ 3.83	$ 3.72	$ 2.90

Table 1. Dryland wheat production and marketing costs per acre, 1974-1999

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
VARIABLE COSTS													
Fertilizer	5.70	6.00	8.55	8.69	9.27	8.33	8.33	12.60	12.60	13.83	13.32	14.70	12.62
Wheat seed	4.81	6.60	6.90	6.27	9.49	9.83	7.65	10.13	8.78	8.78	9.75	9.75	8.48
Herbicide	9.50	10.50	7.00	9.00	9.00	8.10	8.47	9.01	9.10	13.53	13.67	13.67	14.40
Fuel	5.66	5.67	6.31	7.33	6.45	6.75	6.95	5.26	5.26	5.45	5.86	5.25	5.87
Mach. Repairs	8.51	8.93	9.38	14.67	13.43	18.08	18.44	12.08	11.88	13.79	14.38	13.47	14.07
Marketing	16.32	16.66	20.58	20.79	22.50	22.50	23.63	25.20	25.20	25.20	25.20	25.65	25.65
Operating Int.	2.77	3.44	3.69	1.95	1.62	1.43	1.45	1.25	1.57	1.58	1.73	1.74	1.73
Hired Labor	2.36	2.36	2.46	2.25	1.60	1.60	1.60	1.62	1.62	1.62	1.62	1.62	2.03
Other	6.13	6.37	9.89	11.98	14.15	19.47	21.50	9.50	9.50	9.50	9.60	9.60	11.41
TOTAL Variable Cost	61.76	66.53	74.76	82.93	87.51	96.09	98.02	86.65	85.51	93.28	95.13	95.45	96.26
FIXED COSTS													
Insurance	3.43	4.23	4.70	4.46	4.86	4.74	5.40	8.55	8.55	8.19	6.87	6.92	7.12
Land Charge	45.00	48.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Mach. Interest	21.84	23.71	27.22	12.81	14.07	16.07	17.02	19.57	26.91	20.51	24.97	25.37	26.53
Mach. Depreciation	16.22	17.92	19.38	13.34	15.08	21.50	19.55	27.02	27.02	24.16	25.71	26.07	27.03
Operator Labor	15.21	15.21	15.21	16.59	16.82	18.55	17.56	9.38	9.38	9.38	9.38	9.38	11.47
TOTAL Fixed Cost	101.70	109.07	116.51	97.20	100.83	110.86	109.53	114.52	121.86	112.24	116.93	117.74	122.15
TOTAL Cost/Acre	163.46	175.60	191.27	180.13	188.34	206.95	207.55	201.17	207.37	205.52	212.06	213.19	218.41
Break-even Price/Bushel	$ 4.81	$ 5.16	$ 4.25	$ 4.00	$ 4.19	$ 4.60	$ 4.61	$ 4.47	$ 4.61	$ 4.57	$ 4.71	$ 4.74	$ 4.85
Yield assumed Bu/Acre	34.0	34.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Ave. Market Price/Bu.	$ 3.06	$ 4.52	$ 4.28	$ 3.17	$ 4.10	$ 4.11	$ 3.52	$ 4.16	$ 5.27	$ 4.54	$ 3.78	$ 3.02	$ 3.16*

At Portland, Ore. (Soft White Wheat)
Market Year: June - May
* 1999 reflects only June through Nov. averages prices.

Livestock production as a second enterprise had declined (68% to 51%). However, two of the farms surveyed in 1999 reported value-added businesses on the farm. These additional enterprises were added in the past 5 years with plans for expansion.

The final survey question dealt with the long-term future of the farm. Despite the current tough economic conditions, 65% of the 1999 operators surveyed reported that passing the farm operation on to a family member or partner was their first option. Many respondents questioned whether their children would be interested in continuing the operation. Another 19% would lease the land to a neighbor, 6% would sell what they owned, and 10% had no say as they farmed only leased land.

Alternative Crop Potential

The 1996 Farm Act has allowed greater experimentation with annual cropping and several alternative crops, particularly canola and mustard. However, while interest in new crops is strong, their questionable profitability represents a strong deterrent.

Oregon State University canola and mustard enterprise budgets demonstrate the difficulty of earning profitable returns on these crops. Canola at a 2,000 lb yield and a $0.09/lb price would cover cash costs but not fixed expenses (Figure 5). Total costs, both cash and fixed, would be met with a yield of 2,700 lb assuming a $0.09/lb price (Figure 6).

Mustard, a spring-planted crop, will cover cash costs with yields of 700 lb or greater at a price of $0.11/lb (Figure 7). Total costs, both cash and fixed, would be met with a yield of 1,200 lb, assuming the $0.11/lb price (Figure 8). Neither crop is currently profitable from a net return standpoint.

Anecdotal information indicates that growers receive benefits to their wheat crops following mustard and canola. Benefits reported include increases in wheat yields and reduced weed control problems. These benefits have not been quantified, but do explain the continued interest in these crops.

Farm Lease Impacts

Farm leases in the Columbia Plateau have historically been based on a "one-third/two-third" crop share lease, have been "sixty-forty" or "fifty-fifty" with many variations on who shares in what expenses. In many cases, the annual wheat cost study has been used as the example for establishing leases based on expenses and income for a "typical" farm.

The 1996 Farm Act gave farmers greater flexibility to explore changing crops or tillage practices to develop a system that would allow greater economic and ecological sustainability. This means varying from the traditional wheat-fallow rotations of the area that the farm leases had been based upon. Farmers discovered as practices changed that traditional leases based on wheat-fallow did not satisfy the equity of risk or sharing of input costs. For example, some of the new crops require an establishment period of more than 1 year. Others are marketed differently than cash wheat. Also, alternative crops often have higher production risks than wheat. The new production systems often increase farmer risk while leaving the landowner's risk unchanged.

A computer lease program designed by Oregon State University has been used to help demonstrate an alternative method of sharing risk and long-term returns between the operator and landowner. Farmers have been using the leasing program to re-negotiate their leases. Lease-holders are

changing percentages, some even to an 80% lessee-to-20% landowner split, with the landowner sharing a proportional share of many of the production input costs. A key variable is whether the farm does more annual cropping. A small number of farms have changed to a straight cash lease, with no sharing of input expenses or risk.

Agricultural Policies

Agricultural policies over the years have played a key role in the economic fate of the family farm. While government acreage controls and regulations were often seen as interfering with markets and profitability, in some years, government farm program payments provided over 55% of net farm income.

Before 1996, farm program payments were based on a "deficiency" payment. The deficiency was the difference between an average marketing year price and an arbitrarily set target price. In exchange, the farmer had to agree to certain acreage limits on an assigned "base" acreage for elected crops. Because of the cropping system in this low rainfall area, the farm program essentially limited the possible rotations of both crops and tillage practices. In addition, payment limitations further restricted the benefit many farmers received even though they still had to meet acreage and production controls for their whole farm.

The 1996 Farm Act sought to phase out farm payments and allowed farmers to experiment with new crop alternatives and systems without government program penalties. Most farmers signed Production Flexibility Contracts, which provided set annual payments, based on the pre-existing base acres and yields, no matter what crop was produced or what tillage practice was employed. These payments were to help reduce the risk of exploring new crops and tillage practices through 2002, at which point they would be phased out completely. Production Flexibility Payments started at $0.87 per bushel in 1996 and are scheduled to decrease to $0.45 per bushel by 2002. An additional payment was made to farmers of about one-half the regular payment and equal to the 1999 regular payment in 1998 due to depressed economic conditions. There are no farm payments scheduled beyond 2002.

Government farm payments have been important in helping farmers meet expenses over the years. Table 1 illustrates that in only 3 years out of 25 did the average crop-year price of soft white wheat at Portland exceed the cost of producing and marketing wheat.

Conclusions

Based on comparisons of data from the 25-year cost of production and marketing study, USDA Census of Agriculture data, and interviews conducted with Sherman County wheat farmers in 1973 and 1999, the following major trends surface:

- Production input costs per acre and per bushel have increased. Higher yields have tempered the change in per-bushel cost of production but have not kept pace with rising expenses.
- While acreage was stable, the number of farms in Sherman County declined nearly 40% over the period.
- The number of operators per farm has increased slightly.
- Use of hired labor has decreased.
- Livestock production as a second enterprise has declined.

- A limited number of value-added businesses have been established.

- Farmers are adopting technology to improve their management efficiency.

- The Conservation Reserve Program had been utilized by 65% of the farms as of 1999.

- Off-farm income by either the operator or spouse has increased. Twenty-three percent of operators and 66% of spouses had off-farm income in 1999. Benefits, especially health care, were viewed as nearly as important as salary for the family.

Conclusions of the authors based on the study's results and authors' observations are:

- Government payments over the years, and to this day, play a key role in the economic sustainability of the family farm in the region.

- Interest in new crops is strong. Questions about profitability and production techniques remain major deterrents to increased production.

- Renegotiating of farm leases so that they maintain equitability for all parties based on investment and risk is a key need.

- As farms become less economically sustainable, increase in size, and require less total labor, rural communities and the quality of life in those communities is impacted.

Table 3. Index of dryland wheat production and marketing costs per acre, 1974-1999
(1974=100%)

	1974	1979	1984	1989	1994	1999
			Percentages			
VARIABLE COSTS						
Fertilizer	100.00	80.95	109.52	135.71	200.00	200.32
Wheat seed	100.00	108.83	97.17	121.91	178.98	149.82
Herbicide	100.00	91.97	160.31	110.24	141.89	226.77
Fuel	100.00	219.23	218.27	202.24	168.59	188.14
Mach. Repairs	100.00	135.73	148.80	172.74	222.47	259.12
Marketing	100.00	150.00	189.32	233.86	286.36	291.48
Operating Int.	100.00	207.47	244.83	212.07	71.84	99.43
Hired Labor	100.00	151.70	214.29	167.35	110.20	138.10
Other	100.00	110.76	120.04	183.49	176.25	211.69
TOTAL Variable Cost	100.00	127.25	153.66	168.91	195.77	217.49
FIXED COSTS						
Insurance	100.00	82.67	104.15	84.84	154.33	128.52
Land Charge	100.00	160.79	123.61	123.61	123.61	123.61
Mach. Interest	100.00	190.37	273.12	273.02	196.29	266.10
Mach. Depreciation	100.00	138.12	162.55	185.63	258.81	258.91
Operator Labor	100.00	131.47	132.69	132.61	81.78	100.00
TOTAL Fixed Cost	100.00	151.66	147.93	149.62	147.07	156.86
TOTAL Cost/Acre	100.00	142.82	150.00	156.61	164.72	178.83

Figure 1. Dryland wheat variable costs and total costs per acre

Estimated costs from OSU Wheat Cost Studies, 1974-1999

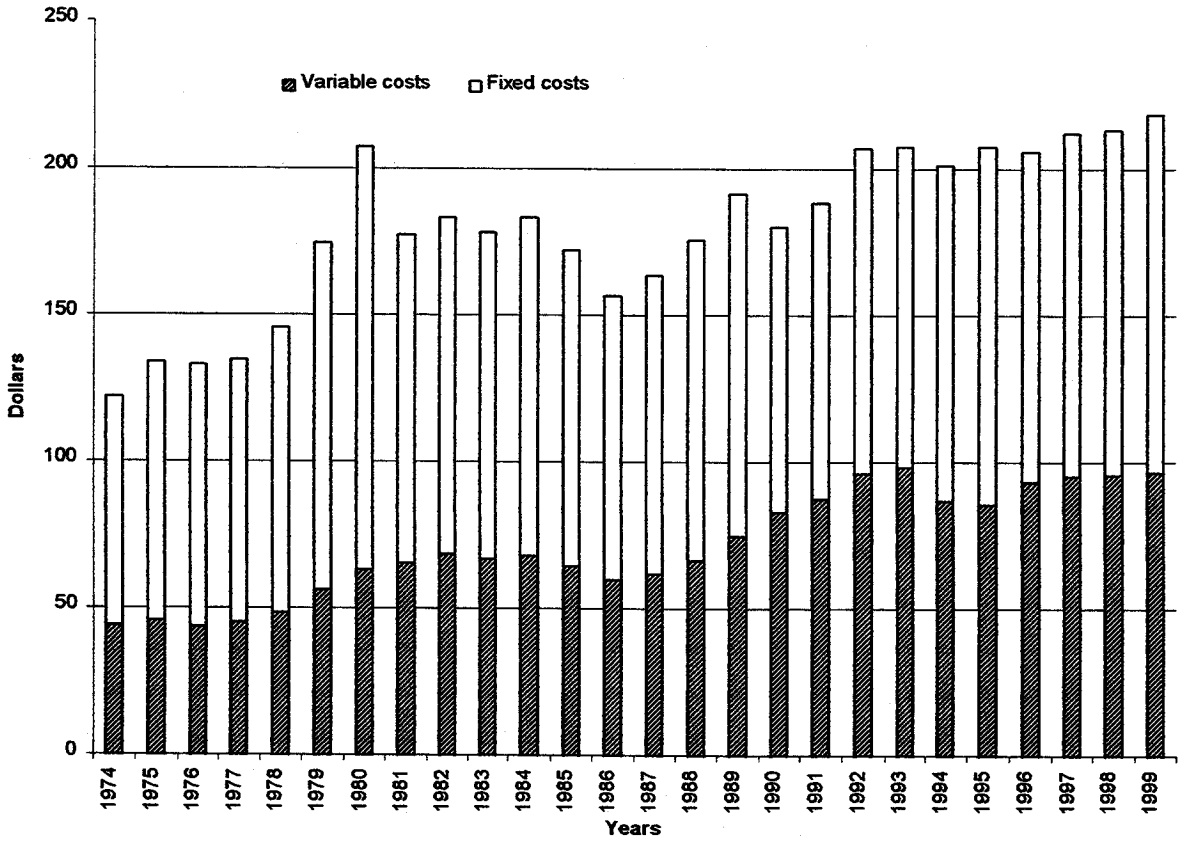


Figure 2. Sherman County, machinery and equipment costs per farm

USDA Census of Agriculture

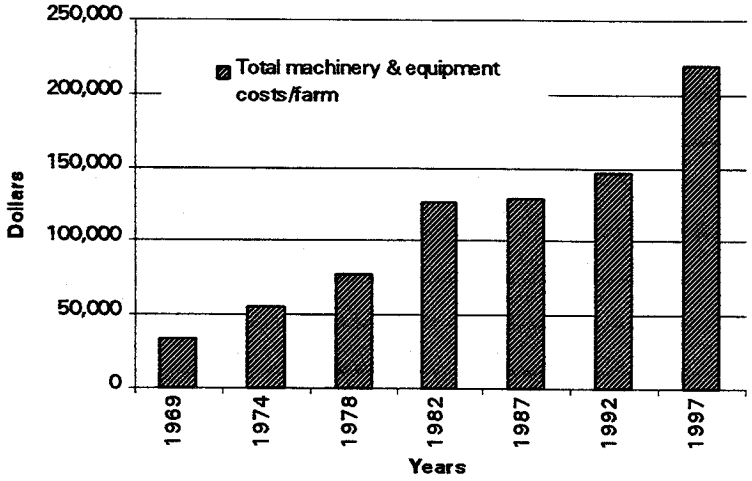


Figure 3. Sherman County, machinery and equipment costs per harvested acre
USDA Census of Agriculture

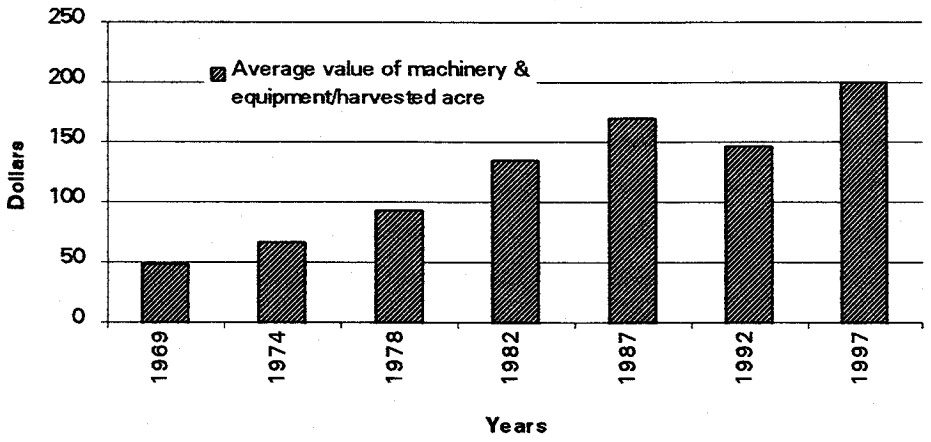


Figure 4. Sherman County, average farm size and harvested wheat acreage
USDA Census of Agriculture

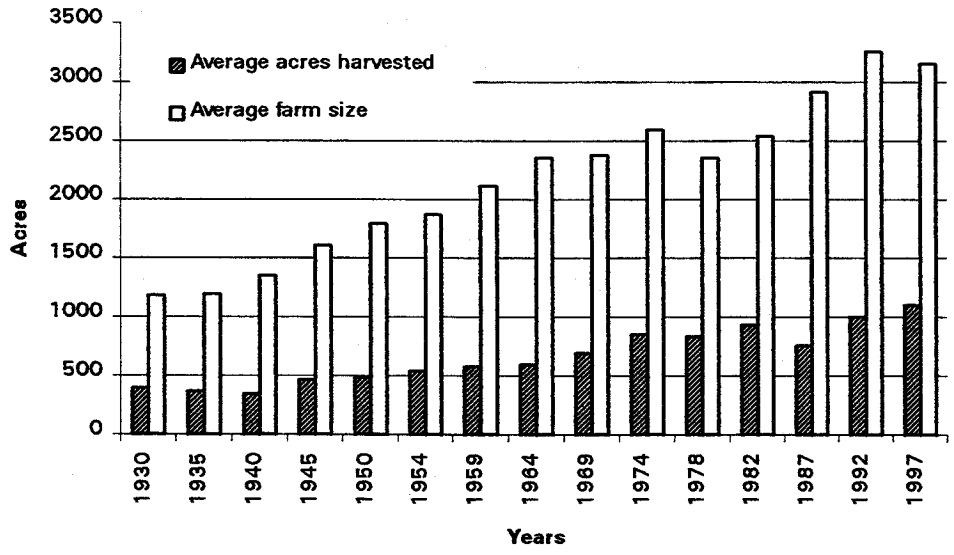


Figure 5. Canola return over cash costs as a function of yield

Estimated return from OSU Canola Enterprise Budget EM8747
Assumes price of $0.09/lb

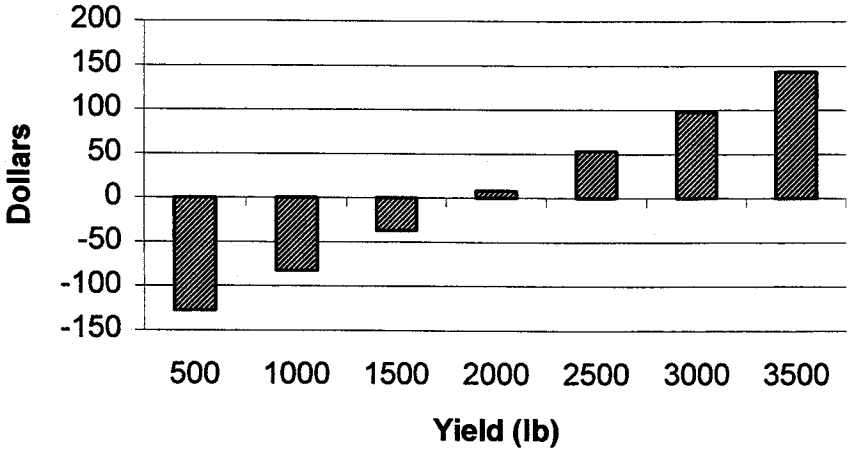


Figure 6. Canola return over total costs as a function of yield

Estimated return from OSU Canola Enterprise Budget EM8747
Assumes price of $0.09/lb

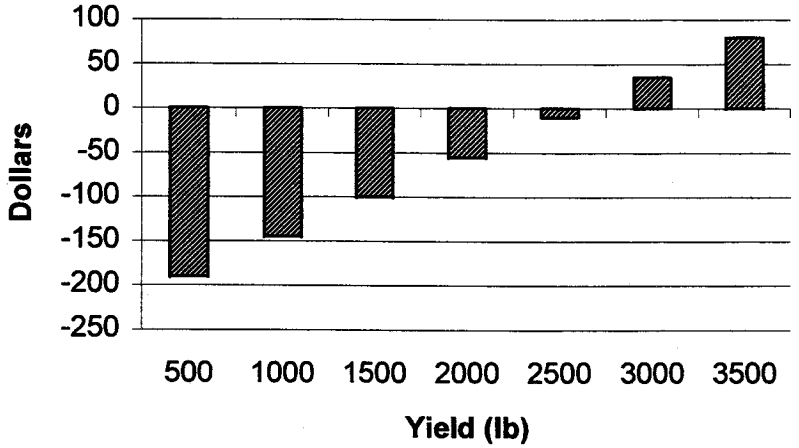


Figure 7. Mustard return over cash costs as a function of yield

Estimated return from OSU Mustard Enterprise Budget EM8746
Assumes price of $0.11/lb

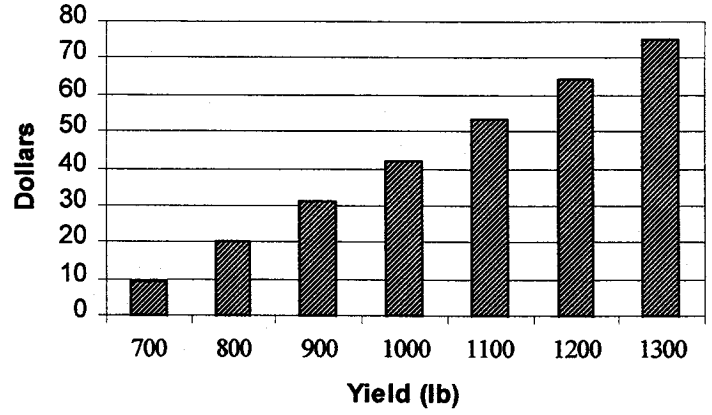
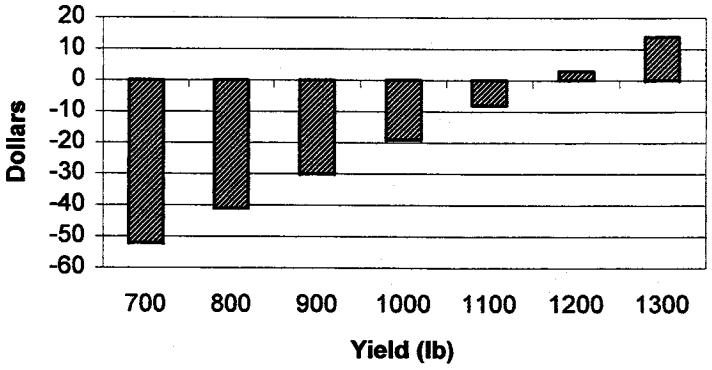


Figure 8. Mustard return over total costs as a function of yield

Estimated return from OSU Mustard Enterprise Budget EM8746
Assumes price of $0.11/lb



Produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University Extension Service offers educational programs, activities, and materials—*without regard to race, color, religion, sex, sexual orientation, national origin, age, marital status, disability, and disabled veteran or Vietnam-era veteran status*—as required by Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973. Oregon State University Extension Service is an Equal Opportunity Employer.

Published February 2000.