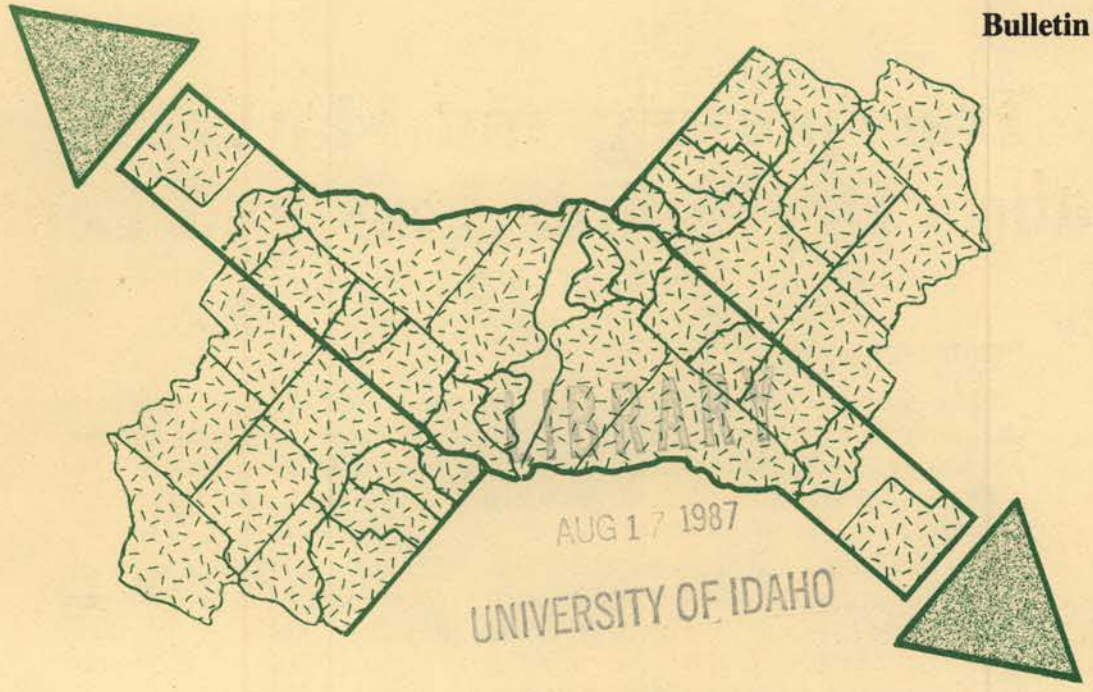
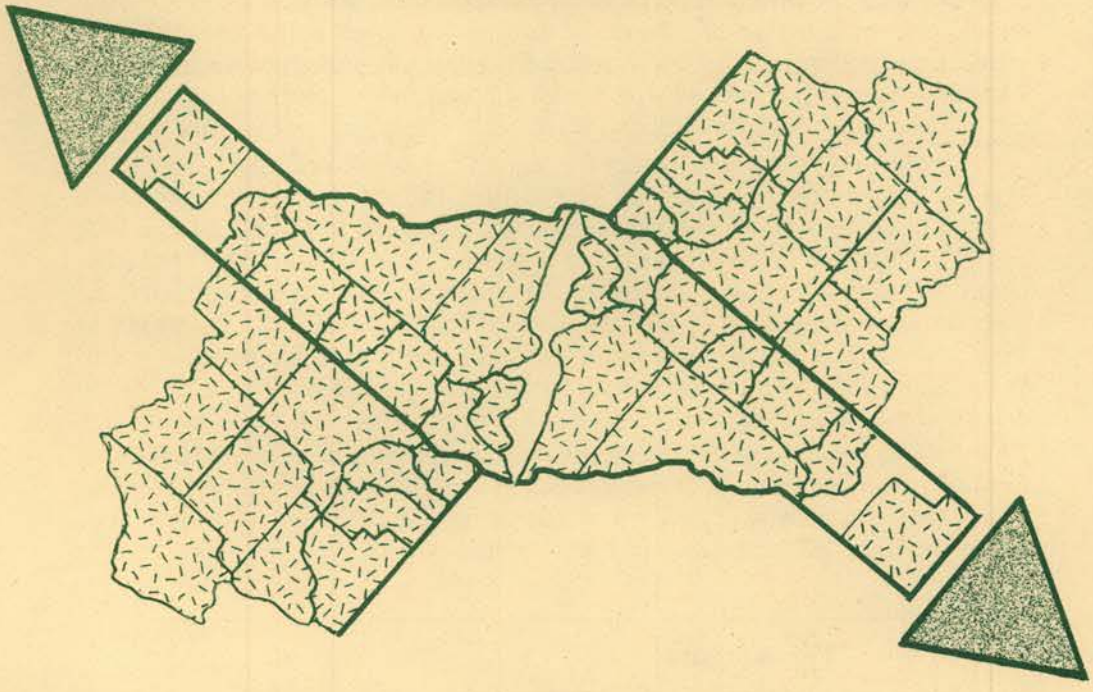
Bulletin No. 667



Transporting and Marketing Idaho's Dry Edible Peas and Lentils

Wesley Harris and Neil Meyer



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Transporting and Marketing Idaho's Dry Edible Peas and Lentils

Wesley Harris and Neil Meyer

Summary

Idaho has historically produced about 40 percent of total U.S. dry edible peas and lentils. The two crops are produced in two small areas known as the Palouse and Camas Prairie. Farmers in these areas use peas and lentils in rotation with barley and wheat to reduce disease, insects, environmental stress, soil erosion and the need for inorganic fertilizers.

This study found that Idaho dry edible peas (DEP) and lentils were transported an average of 10 miles from the producer to the processor, at a cost of $.0144 per hundredweight per mile. The processor grades, cleans, bags and stores them until they are sold to the next buyer. From the processor, about 70 percent of the peas and lentils are marketed for export; the remaining 30 percent go for domestic uses such as seed and food.

The survey on which this study is based accounted for 315,000 hundredweight of dry edible peas and 242,056 hundredweight of lentils (28 percent and 48 percent, respectively, of the 1981 Idaho production of these crops). As the crops were marketed, 98 percent of the DEP and 46 percent of the lentils were transported to Northwest ports, presumably for export, while another 7 percent of the lentils were transported to southeastern ports.

Trucks were the predominant mode of transportation, with 79 percent of DEP and 84 percent of the lentils shipped by truck to Northwest ports. The remainder were transported by rail. All lentils transported to southeastern ports went by rail. These results, when combined with earlier surveys, show a continued decrease in rail use and an increase in truck and truck-barge shipments over a 6-year period.

Exports provide the major market for Idaho's dry edible peas and lentils. DEP exports decreased 66 percent from 1973 to 1978, but rose to over 137,000 metric tons (MT) in 1983. DEP exports subsequently decreased to 130,000 MT in 1984 and 124,500 MT in 1985. Lentil exports decreased from 36,000 to 12,000 MT between 1973 and 1978, then increased to 76,000 MT in 1981. Since then, lentil exports dropped to less than 33,400 MT in 1984, but rose slightly to 34,100 MT in 1985. Many foreign and domestic factors influence export demand, including weather, inflation, economic growth and exchange rates. Further research is needed to determine the factors influencing Idaho and U.S. dry edible pea and lentil exports.

Dry edible peas and lentils directly contribute over $20 million to Idaho's total farm marketing receipts. Peas and lentils also contribute nonmarket benefits and to long-term productivity in the form of reduced fertilizer application for other crops in the rotation, disease control and soil erosion control.

The Authors

Wesley Harris is a former research associate and Neil Meyer is Extension agricultural economist, both in the University of Idaho Department of Agricultural Economics, Moscow.

Introduction

Nearly all of the U.S. dry edible peas and lentils are produced in two areas in northern Idaho and eastern Washington known as the Palouse and Camas Prairie. In 1981, Idaho produced 860,000 hundredweight of dry edible peas and 507,000 hundredweight of lentils, which together accounted for just over $20 million or almost 1 percent of Idaho's farm marketing revenue. About 70 percent of each year's production is normally marketed through export. According to the USA Dry Pea and Lentil Council (1984), dry edible peas (DEP) and lentils are marketed to over 90 countries worldwide. Their ". . . high nutritional value, low cost, long shelf life and quick cooking properties. . ." make these crops attractive food sources, especially for low per capita income countries. The 30 percent of DEP and lentil production that remains in this country is used for seed and soups. Small quantities are used in manufacture of snack foods, breakfast cereals, baked goods, beverages, meat extenders and noodles.

Purpose

This publication focuses on the production, transportation, marketing and economic contribution of Idaho's dry edible pea and lentil crops. This bulletin is one of a series on the transportation and marketing of agricultural crops produced in Idaho.[1]

Method and Study Area

Primary data for this publication came from personal interviews at Idaho and Washington dry pea and lentil processing plants in July and August 1982. Information on producer transport practices was obtained in a fall 1982 mail survey that went to 32 of the 34 processing plants listed as members of the American Dry Pea and Lentil Association. The 14 plants that responded handled 28 percent of the DEP and 48 percent of the lentils produced in Idaho during the 1981 season.

The questionnaires used in these contacts were designed to secure data on the transportation of DEP and lentils to (specifically whether they were Idaho- or Washington-grown) and from the processing facility, the mode of transportation, destination and the cost of transportation.

Production

Nearly 100 percent of U.S. DEP and lentils are produced in Washington and Idaho (USDA Agricultural Statistics). On the average, Idaho produces 40 percent of the U.S. totals. Idaho production figures are shown in Table 1. Nearly all of the DEP and lentils are grown in a region 150 miles long and 40 miles wide extending from Spokane, Washington, to Grangeville, Idaho (Pederson and Casavant 1980), known as the Palouse and the Camas Prairie (Fig. 1).

Table 1. Idaho production of dry edible peas and lentils, 1975-84.

Year	Dry edible peas	% of U.S. production	Lentils	% of U.S. production
	(cwt)		(cwt)	
1975	959,000	35.1	300,000	NA
1976	826,000	38.4	248,000	NA
1977	563,000	55.0	91,000	NA
1978	1,501,000	41.7	322,000	NA
1979	704,000	34.5	281,000	NA
1980	1,449,000	23.7	507,000	44.1
1981	860,000	NA	414,000	NA
1982	1,271,000	NA	295,000	NA
1983	1,392,000	NA	213,000	NA
1984	1,107,000	NA	141,000	NA

Source: USDA Agricultural Statistics.
NA indicates not available

The Palouse and the Camas Prairie have an excellent growing season climate — hot days and cool nights, with adequate moisture — for producing lentils and DEP. Farmers in these areas can produce several economically viable crops as alternatives to wheat and barley, so they have a number of beneficial crop rotation possibilities involving wheat, barley, peas, lentils, rape and other crops. According to Summerfield et al. (1982), crop rotations including lentils provide advantages including reduced susceptibility to disease, insects and environmental stress, increased soil erosion control, less severe disease infestations in cereal grains, better control of grassy weeds and less need for inorganic fertilizers, particularly nitrogen.

Peas and lentils are grown with similar cultivation methods. Fields are prepared by plowing or discing in the fall or early spring, followed by firming the soil with a harrow or rodweeder (Krenz 1980). Fertilizers consisting of molybdenum, sulfur, phosphorus and potassium are applied during field preparation (Summerfield et al. 1982). Austrian winter peas are planted in September or October; other DEP and lentils are planted in April and May. Fields are roller packed, then herbicides and insecticides are applied in early summer for weed and insect control.

Harvest occurs primarily in August after the vines and pods have dried. The peas and lentils are either swathed before combining, to allow vines and pods to dry more quickly, or combined directly with a modified grain combine. Normally, 10.3 percent of DEP and 6.25 of lentil production are needed for seed to replant the same acreage (Brooks 1985).

Transportation

The first transportation of DEP and lentils off the farm is from the field or on-farm storage facility to the local

[1]Other publications in the series include these College of Agriculture bulletins available from Extension agricultural agent offices in your area:

EXP 636 — Idaho Grain Producers: Adoption of New Marketing Methods

EXP 649 — Marketing Idaho's Dry Edible Beans

EXP 653 — Transporting and Marketing Idaho's Wheats and Barleys

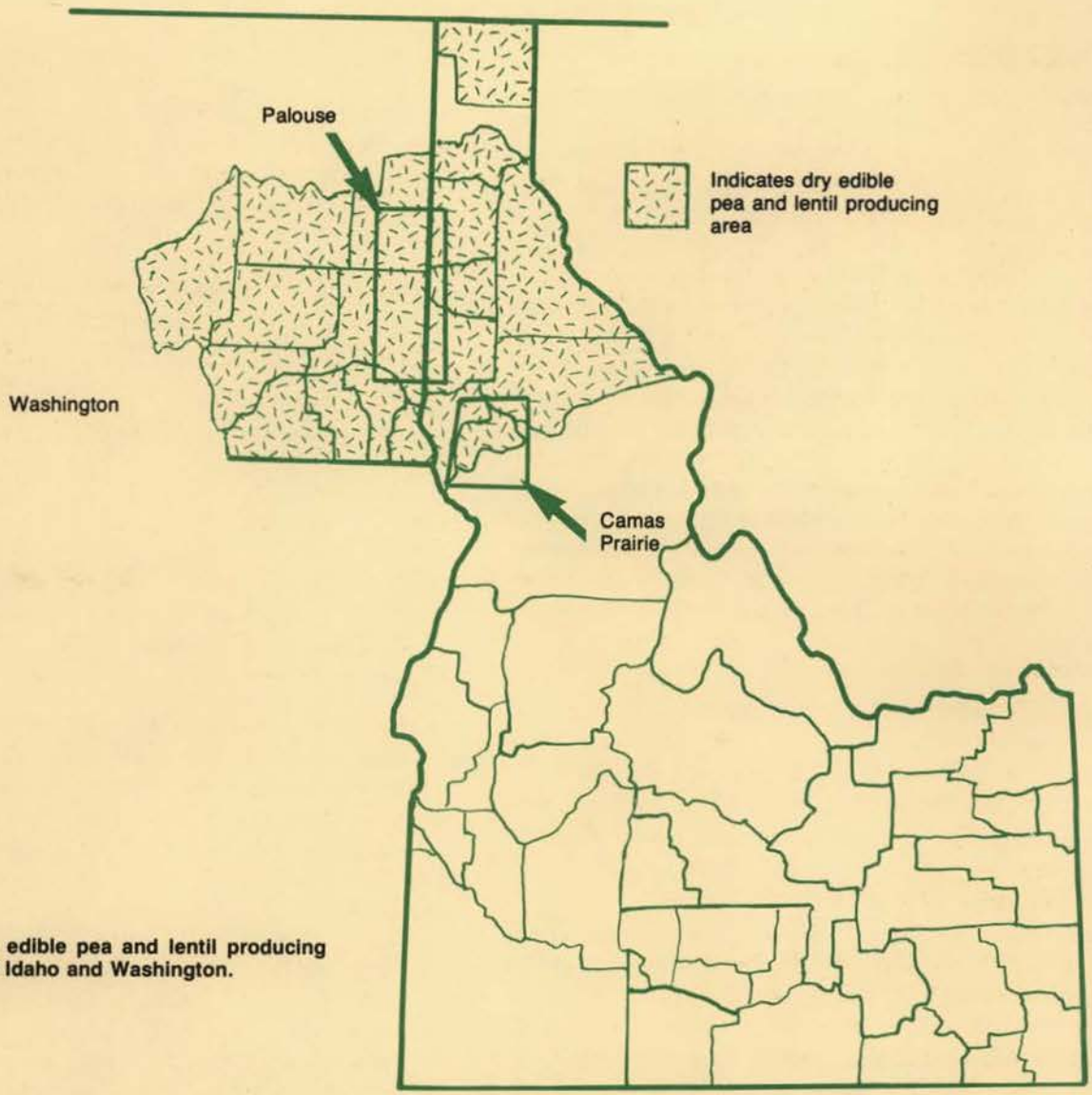


Fig. 1. The dry edible pea and lentil producing areas of Idaho and Washington.

processor. According to this study, the producer hauls DEP and lentils an average of 10 miles at an average cost of $.0144 per hundredweight per mile. The producer pays the cost of transportation and normally hauls the lentils and DEP in farm trucks with a capacity of 8,000 to 20,000 pounds.

After the peas and lentils are delivered to the processor, they are graded and cleaned according to USDA standards, usually bagged and then stored.

Later, a buyer contacts the processing plant for a price quotation for a certain type, quantity and grade of peas or lentils. If the quotation is satisfactory, arrangements are made for transporting the goods to the purchaser's designated destination.

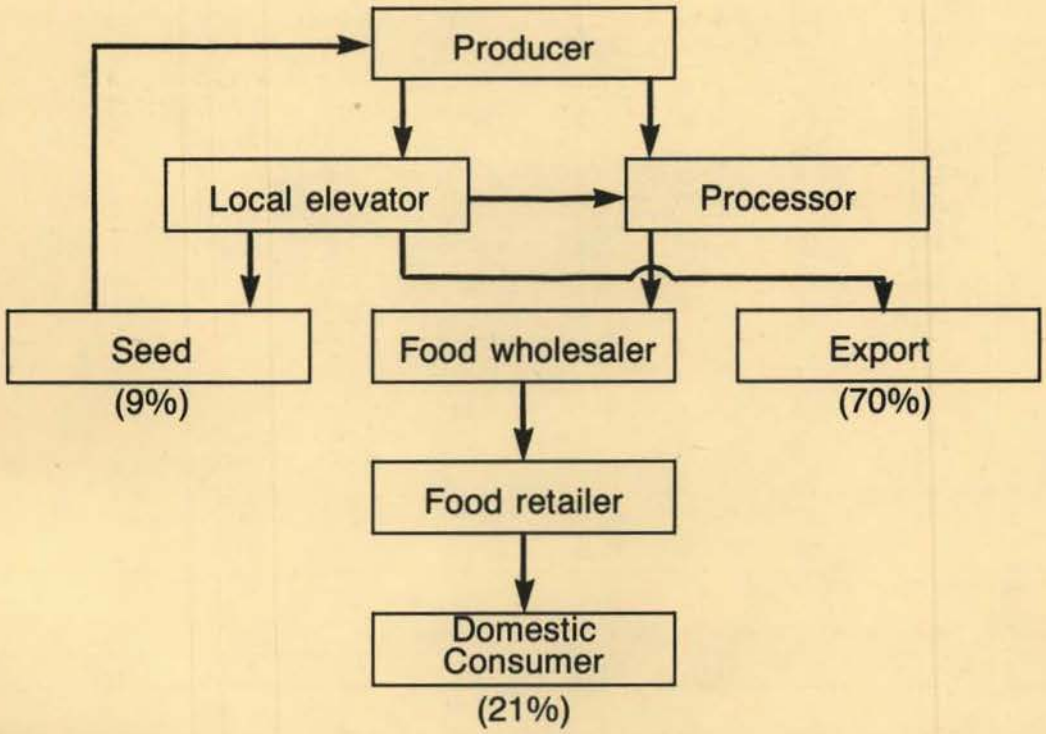
The processor has several alternative marketing routes. Exports account for nearly 70 percent of the lentils and DEP marketed. The remainder are usually marketed to food wholesalers, and eventually to consumers, or back to the producers for use as seed. The general DEP and lentil marketing flow is shown in Fig. 2.

The survey returns accounted for 315,000 hundredweight of Idaho DEP (28 percent of the reported 1981 Idaho production), and 242,056 hundredweight of Idaho lentils (48 percent of the reported 1981 production). Of these DEP, 98 percent were shipped to Northwest ports (Seattle, Tacoma and Portland) by rail (21 percent) and truck (79 percent). The destination and mode of transportation of the other 2 percent were not disclosed.

Survey results showed that 46 percent of the lentils accounted for were shipped to Northwest ports, 84 percent moving by truck and the other 16 percent by rail. Another 7 percent of the lentils were shipped by rail to Southeast ports (Mobile, Alabama, and New Orleans, Louisiana). Destination of the other 47 percent of the lentils accounted for was not disclosed. The mode of transportation was established, however. Of all lentils accounted for by the survey, 67 percent were transported by truck and 33 percent were shipped by rail.

This survey supports the conclusions of Pederson and Casavant (1980) that the use of trucks as a mode for trans-

Fig. 2. Dry edible pea and lentil marketing flow chart.



porting peas and lentils is increasing while rail shipments are decreasing. Table 2 lists the data from this study and the comparable 1976 and 1979 figures from Pederson and Casavant. Obviously, the rail's share of the transportation market is declining, and trucks and truck-barge have gained market share.

Table 2. Mode of Idaho and Washington dry edible pea and lentil shipment by volume.

Mode	1980-81	1978-79*	1975-76*
	(%)	(%)	(%)
Rail	25.9	31.3	40.7
Truck	74.1	66.7	59.3
Barge	0.0	2.0	0.0

*Source: Pederson and Casavant.

To determine the cost of transportation, the data for peas and lentils were aggregated because of a limited response rate. The average cost of transportation to the Northwest ports was $.98 per hundredweight by truck and $1 per hundredweight by rail. The average rail charge to the southeastern ports was $3.19 per hundredweight. No truck shipments to Southeast ports were identified in the survey.

Another increasingly important aspect of pea and lentil transportation is the use of containers. A container is an 8×8×20 foot or 8×8×40 foot box that can hold approximately 385 or 770 hundredweight bags of peas and lentils, depending on length (Belcher et al. 1979). The containers can be loaded onto trucks, barges and rail cars, allowing versatility in the mode of transportation. The containers have the advantages of reducing splitting, skinning and pilferage, and also may reduce handling costs at the ports (Pederson and Casavant 1980).

Exports

Exports are a topic of great concern both nationally and in Idaho. On the national level, exports have been a growing concern in light of the largest trade deficit on record, an extremely strong U.S. dollar and mixed overall economy. In Idaho, exports provide the major market for the state's DEP and lentils.

The United States consistently exports dry edible peas to over 90 countries worldwide (USA Dry Pea and Lentil Council 1984). Over 75 percent of any one year's exports will go to 10 countries (Table 3). These 10 countries change somewhat from year to year, but 7 consistent importing nations are Colombia, Venezuela, Brazil, United Kingdom, Taiwan, Japan and, recently, Canada. U.S. DEP exports to the largest 10 importers decreased from more than 113,000 metric tons (MT) in 1973 to less than 40,000 MT in 1978, then increased again to a peak of 121,000 metric tons in 1981. The 1982 total was 107,000 MT.

Approximately 70 percent of the U.S. lentil crop is exported in any given year, primarily to 7 countries: Colombia, Venezuela, West Germany, Spain, Italy, Greece and Algeria. The top 10 export markets for U.S. lentils are listed in Table 4. The U.S. has consistently been the second or third largest exporter of lentils in the world (Landon et al. 1982). The largest exporting nation for many years has been Turkey. Other major lentil-exporting countries are Chile, Canada, Argentina, Morocco and Syria.

Table 3. The 10 leading importers of U.S. dry edible peas, 1973-82 (all figures in metric tons).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Colombia	2,685	1,480	3,293	1,378	6,482	2,153	10,236	17,271	16,895	23,175
Venezuela	20,841	9,586	13,867	18,421	12,800	5,675	8,788	7,857	9,934	12,284
Peru	1,299	1,754	0	0	0	0	0	4,499	8,207	4,405
Brazil	10,247	10,786	3,834	6,412	0	0	8,526	3,430	3,906	8,415
United Kingdom	19,873	13,865	14,494	11,102	12,203	3,108	11,547	3,530	4,462	4,467
Netherlands	14,260	3,888	0	0	0	0	4,398	0	0	0
West Germany	4,837	1,649	1,429	0	0	0	0	0	0	0
Spain	1,949	0	3,229	2,005	2,878	1,074	0	0	0	0
Taiwan	6,317	0	7,231	10,722	4,786	4,069	10,533	10,810	14,395	10,314
Japan	18,238	8,430	24,157	8,828	7,216	3,737	7,960	8,269	8,914	3,781
Canada	0	2,055	0	1,407	1,210	1,286	0	2,482	4,843	5,085
Trinidad	0	3,744	2,035	0	0	0	0	0	0	6,134
Italy	0	0	2,303	1,128	0	1,574	0	2,820	0	0
Singapore	0	0	0	1,388	1,334	0	0	0	5,129	0
Costa Rica	0	0	0	0	1,404	0	0	0	0	0
India	0	0	0	0	3,139	1,138	2,219	0	12,352	4,799
Iran	0	0	0	0	0	3,407	4,316	0	0	0
Greece	0	0	0	0	0	0	1,801	0	0	0
Malaysia	0	0	0	0	0	0	0	2,299	0	0
Total	100,544	57,237	75,871	62,790	53,452	27,221	70,324	63,267	89,037	82,859
Total U.S. export	113,535	68,358	93,670	77,311	69,648	39,506	90,535	85,501	121,575	107,639

Source: USDA, Foreign Agricultural Trade of the U.S.

Table 4. The 10 leading importers of U.S. lentils, 1973-82 (all figures in metric tons).

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Canada	0	0	0	0	0	531	1,932	1,631	0	3,057
Colombia	3,735	3,280	1,414	2,455	1,325	774	679	2,834	8,006	7,638
Venezuela	4,424	2,409	2,089	4,521	2,704	659	1,711	2,956	2,429	2,762
Ecuador	0	0	0	926	0	1,545	955	0	0	0
Netherlands	1,319	909	1,658	0	2,651	688	960	1,427	0	0
West Germany	7,709	3,115	8,258	5,193	3,358	776	3,512	1,474	2,425	8,990
Spain	6,702	1,619	4,044	2,684	1,997	1,218	3,080	1,289	3,773	5,877
Italy	1,541	1,698	3,760	3,126	1,217	2,825	2,386	0	2,686	3,486
Greece	4,260	2,133	4,781	3,755	2,055	0	5,328	1,803	3,555	2,263
Algeria	0	799	7,531	8,968	12,933	697	13,754	21,141	31,576	17,864
Brazil	1,117	0	0	0	0	0	0	1,263	0	0
Egypt	0	0	0	0	0	0	0	5,455	10,959	0
Panama	1,670	1,218	1,451	1,479	529	0	0	0	2,009	2,391
France	710	0	1,938	0	0	0	0	0	0	0
Australia	0	350	0	0	0	420	0	0	0	0
Peru	0	0	0	998	0	0	0	0	3,022	3,543
Lebanon	0	0	0	0	1,037	0	0	0	0	0
Total	32,557	17,530	36,924	34,105	29,806	10,133	34,297	41,273	70,440	57,871
Total U.S. export	36,216	19,902	41,504	40,128	32,514	12,218	38,961	45,337	76,511	67,104

Source: USDA, Foreign Agricultural Trade of the U.S.

U.S. lentil shipments to the top 10 importing nations between 1973 and 1978 declined from 36,000 to 12,000 MT. Export volume increased to 76,500 MT in 1981 and dropped again to 67,000 MT in 1982.

The high value of the U.S. dollar compared to other currencies has been associated with low demand for U.S. exports and, therefore, the deficit trade balance. Likewise, the low value of the dollar has been associated with high export demand in the late 1970's. This would seem to indicate a strong relationship between export demand and exchange rates. Recent econometric studies, however, have shown that while this relationship is important, factors such as income, foreign exchange availability and political barriers are also important determinants of export demand (Batten and Belongia 1984). Henneberry and Henneberry (1985) point out that factors of inflation, general economic growth and income must also be considered in the U.S. and importing countries.

The export of U.S. dry edible peas and lentils appears to support these recent studies. Figs. 3 and 4 show the weighted relative exchange rate, using a geometric average (Federal Reserve System 1978), of the largest 10 importers of U.S. DEP and lentils for the years 1973 to 1982, and the total export volume for each year. The graphs show little relationship between exchange rates and export demand for either DEP or lentils. In fact, a simple correlation between the two variables (trade weighted exchange rate and export demand for peas and lentils) indicates

positive relationships of .4581 for DEP and .3182 for lentils. This means that when exchange rates increase, the quantity exported also increases, just the opposite of what would be expected.

Regression analysis on DEP and lentil export and the weighted exchange rate variables indicated (through low R^2 statistics and nonsignificant overall F tests for both DEPs and lentils) that the exchange rate explains only part of the variation in the quantity of DEPs and lentils exported. The regression results were as follows:

$$Qe_{DEP} = -476619.59 + 5592.03\ ER_{DEP} \quad R_2 = .2099$$
$$(-1.23) \qquad (1.46)\ \text{t-values} \qquad F = 2.12$$

$$Qe_{Lentil} = -91607.69 + 1343.36\ ER_{Lentil} \quad R_2 = .1012$$
$$(-.65) \qquad (.95)F = .9011$$

where: Qe = Quantity exported
ER = Trade weighted exchange rate

Because of the importance of dry edible peas and lentils to the short- and long-run economy of northern Idaho, and the limits of this study in terms of time and money, further study is needed to indicate the relative factors affecting Idaho and U.S. DEP and lentil exports, and to determine the elasticities of demand for projected exports.

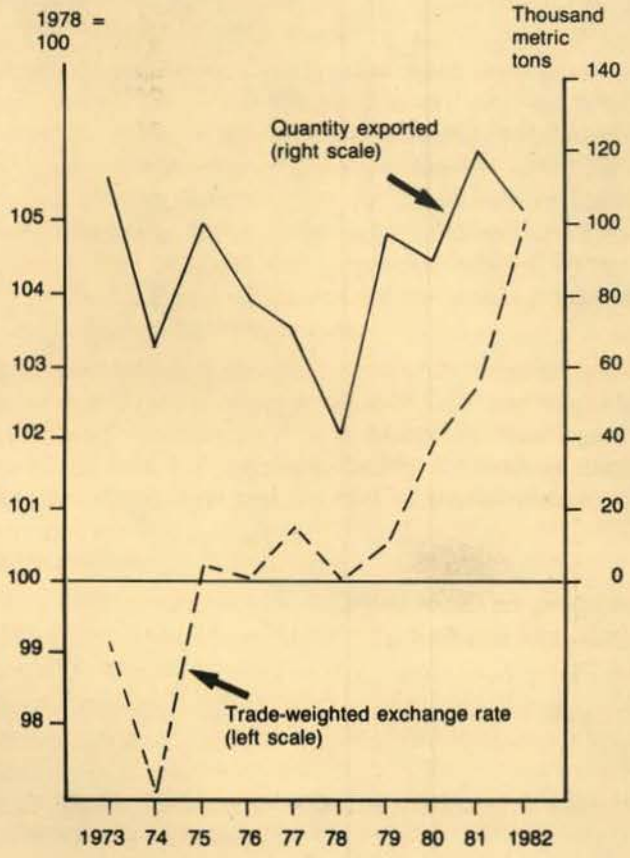


Fig. 3. U.S. dry edible pea exports and trade-weighted exchange rate, 1973-1986.

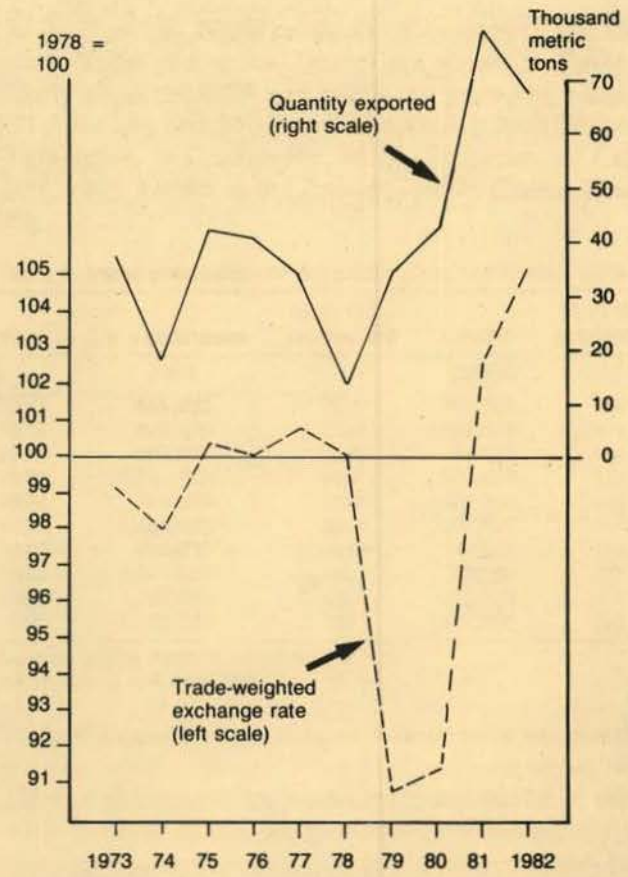


Fig. 4. U.S. lentil exports and trade-weighted exchange rate, 1973-1982.

Economic Importance to Idaho

In 1981, the total gross value of dry edible peas and lentils was estimated to be $19,200,000. The cash receipts from the marketing of these two crops was $20,549,000.[2] While the dollar value of peas and lentils is not extremely large compared with other crops from a statewide perspective, these commodities are important in the counties where they are grown. One must also consider the nonmarket value of these crops. Their nonmarket values are mainly associated with reduced soil erosion (long-term productivity), lower inorganic fertilizer needs and reduced weed, disease, insect and stress problems for other crops in the rotation. When these nonmarket values are considered together with the market value, these crops are economically important to Idaho.

Besides the direct marketing revenue, DEP and lentils also generate other cash revenues and employment, which are important to the local Palouse area and the state. Producers generally purchase goods, supplies, labor and services with the marketing revenue, in addition to paying rents, taxes and utilities on the local and state levels. These purchases are called direct expenditures or effects.

[2]Marketings can include inventory of previous years sold during 1981.

The producer's expenditures to these firms and agencies are subsequently employed to purchase labor, supplies and services, and to pay taxes and utilities. The purchases by these secondary companies (input suppliers and product processors) and persons are known as indirect effects. The effect of pea and lentil marketing revenue moving through an economy several times and generating further economic activity is known as a multiplier effect (the sum of direct and indirect effects).

Marousek (1979) estimated an income multiplier of 1.34 for a large farm's output in the Jerome-Wendell area of southern Idaho. Sarquis (1982) estimated a much higher multiplier of 2.40 for field crops in Stanislaus County, California. Assuming a comparible multiplier for northern Idaho field crops, the contribution of DEP and lentils to Idaho's economic activity in 1981-82 would be $27.5 million, using the 1.34 multiplier, and $49.3 million using the 2.40 multiplier.

Literature Cited

Batten, D. S., and M. T. Belongia. 1984. The recent decline in agricultural exports: Is the exchange rate the real culprit? The 1984 Review of the Federal Reserve Bank of St. Louis. 1984.

Belcher, G. L., J. R. Jones and K. H. Lindeborg. 1979. Pacific Northwest dry pea and lentil waterborne shipments: Alternatives and potential. Univ. of Idaho Agr. Exp. Sta. Res. Bull. 108.

Brooks, R. 1985. Crop enterprise budgets for lentils (MS 76-10) and dry edible peas (MS 76-12). Univ. of Idaho Coop. Ext. Ser.

Federal Reserve System. 1978. Index of the weighted-average exchange value of the U.S. dollar: Revision. Federal Reserve Bull. 64:8. Washington, D.C.

Henneberry, D., and S. Henneberry. 1985. The impact of foreign exchange rates on agricultural exports. Oklahoma State Univ. Coop. Ext. Ser. Dept. Ag. Econ. 2:1.

Krenz, R. D. 1980. Costs of producing dry edible peas in Idaho and Washington, 1978. Oklahoma State Univ. Agr. Exp. Sta. AE 8082.

Landon, J., D. Young and R. Sargent. 1982. Trends and outlook for the U.S. lentil industry. Washington State Univ. Agr. Res. Center Circ. XC 0639.

Marousek, G. 1979. Farm size and the future of rural communities. Univ. of Idaho College of Agr. CIS 463.

Pederson, L. E., and K. L. Casavant. 1980. Selected transportation and marketing characteristics of U.S. dry edible beans and peas and lentils. Washington State Univ. Agr. Res. Center Circ. 0626.

Sarquis V. 1981. Economic impacts of agricultural production and processing in Stanislaus County. Univ. of California Coop. Ext., Stanislaus County, Modesto.

Summerfield, R. J., F. J. Muehlbauer and R. W. Short. 1982. Description and culture of lentils. Washington State Univ. Agr. Res. Center Sci. Paper 6019.

U.S. Department of Agriculture. Agricultural statistics. Selected volumes. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture, Econ. Stat. Ser. Foreign agricultural trade of the United States. Selected volumes. Government Printing Office, Washington, D.C.

USA Dry Pea and Lentil Council. 1984. USA Dry Peas and Lentils. Moscow, ID.

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