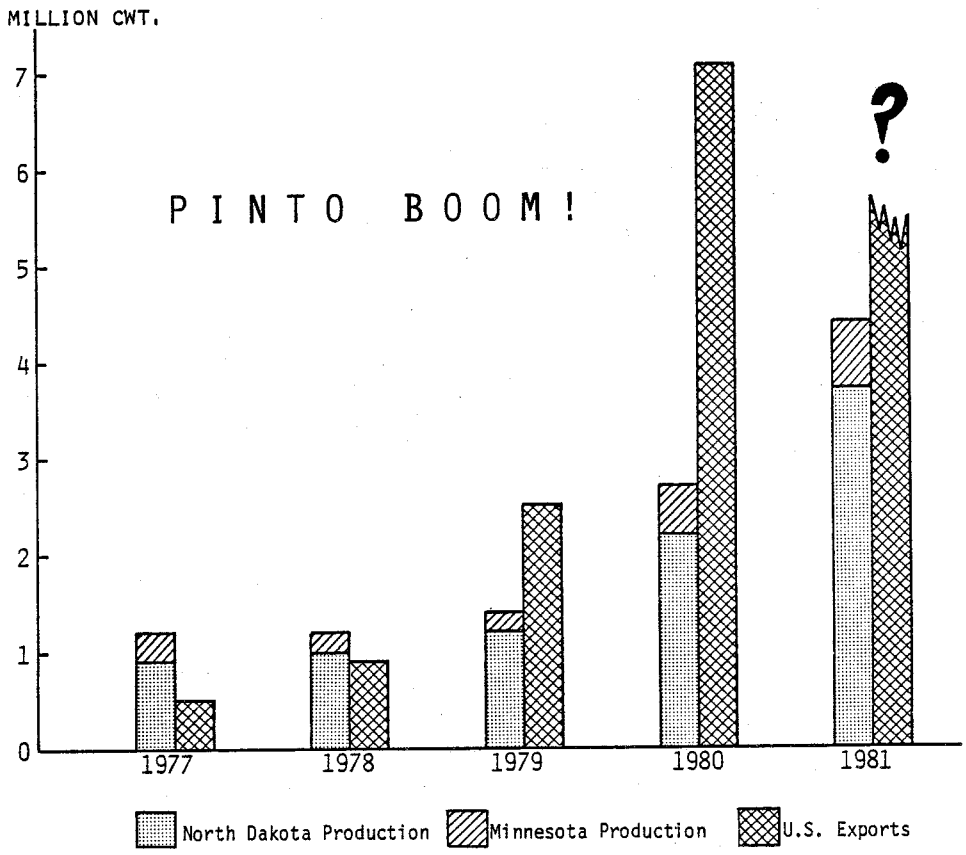
DRY EDIBLE BEANS:

PRODUCTION AND MARKETING, RED RIVER VALLEY



Wallace McMartin
Hubert J. Dufner
Gordon W. Erlandson

Department of Agricultural Economics
North Dakota Agricultural Experiment Station
North Dakota State University
Fargo, North Dakota 58105

Foreword

This report was made possible by the cooperation of many people, especially those growers and dealers of dry edible beans who responded to the inquiries made during a 1977 survey. Tim Courneya, Executive Vice President of the Red River Valley Edible Bean Growers Association furnished additional information and insight, as did Dr. James Venette, Plant Pathologist, North Dakota State University. Several members of the Agricultural Economics Department as well as Dr. Hugh McDonald, Extension Agricultural Economist reviewed the report and made helpful suggestions. Lori Cullen typed the manuscript and Karen Maki reviewed it carefully and made editorial corrections. Carol VavRosky prepared the illustrations. The authors gratefully acknowledge the assistance of each and every one of those mentioned.

Financial support for this study came from the North Dakota Agricultural Experiment Station.

TABLE OF CONTENTS

Highlights

Dry edible bean (DEB) production has increased dramatically in the last five years and the growth in production has been accompanied by a similarly rapid expansion in U.S. exports, particularly to Mexico. At the same time, the market for DEBs has been characterized by erratic price behavior, with fantastically high price quotations in spring and early summer in 1974 and 1981, followed by steep declines in late summer and early fall.

Production of all types of DEBs increased by 92 percent in five years. Pinto beans, the type most commonly grown in North Dakota, increased by 210 percent. In 1981 North Dakota became the leading state in the production of pinto beans. Significant increases occurred in all types of colored beans, especially black, pink, and small red. There was a substantial increase in great northern beans but not in other white kinds.

Management, always a critical element in specialty crop production, is made increasingly difficult by the sudden and drastic changes in price levels. Such changes have suggested a need for better information about how the marketing system works, so a detailed market study was conducted in 1977 by means of interviews with dealers, processors, and growers. The results showed a high degree of concentration; a few firms handled all but a small part of the crop. Dealers tend to follow the leader in making price changes and at times all dealers have "gone off the market" simultaneously, having a depressing effect on prices. It has been suggested that a significant degree of market control might have been exercised by the larger dealers acting in unison. The 1977 study included a statistical analysis of historical price behavior but failed to discover a reliable equation for predicting price movements.

Dry Edible Beans: Production and Marketing in the Red River Valley

by

Wallace McMartin, Hubert J. Dufner, Jr., and Gordon W. Erlandson*

Dry edible beans (DEBs) have only recently become an important crop to North Dakota and Minnesota farmers. The harvested area in North Dakota ranged from 20,000 to 25,000 acres from 1964 to 1969; in Minnesota the largest amount harvested during the period was 9,000 acres (10).[1] Acreage increased slightly in both states in 1970 and 1971. Beginning in 1972, the growth in acres and production was rapid in both states; the 1981 harvested acreage was more than 10 times the average for the eight years 1964-71. The increase in acreage resulted in a similar growth in output, from less than 300,000 cwt. annually in North Dakota in 1964-69 to 4.5 million cwt. in 1981.[2] Most of the increase in production in North Dakota and Minnesota prior to 1980 came at the expense of other producing states. Total production in the United States in the 20 years 1960-79 ranged from 15 to 20 million cwt. with relatively small year-to-year changes. Production jumped to 26 million cwt. in 1980 and to almost 32 million cwt. in 1981. This large increase in acreage has made the DEB industry of considerable economic importance to the area's agricultural economic sector. About 5.9 million cwt. of edible beans were produced in the two-state area in 1981. If $20.00 per cwt. is assumed as an average FOB wholesale price for all grades of processed DEBs sold by area dealers, gross receipts would have been $118 million; $91 million from North Dakota and $27 million from Minnesota. This is equivalent to 3.6 percent of the $2.5 billion in gross receipts from the sale of North Dakota agricultural products in 1981 (14).

The rapid growth in bean production has been accompanied by some significant regional shifts, especially in certain types of beans. Michigan,

---

*McMartin is a former agricultural economist with USDA (retired), Dufner is a former graduate research assistant, and Erlandson is professor, Department of Agricultural Economics.

[1]Numbers underlined in parentheses refer to publications in the list of references, page 57.

[2]One cwt. (hundredweight) = 100 pounds.

the long time number one producing state of white navy beans, has experienced a decrease in production since 1972, apparently due to bean disease problems. The production of pinto beans appears to have shifted to North Dakota from Colorado and Idaho. Such regional shifts, coupled with great price instability, have left the Red River Valley producer with feelings of uneasiness and with premonitions of an uncertain future. The Denver FOB wholesale price for number one cleaned and bagged pinto beans rose from $10.00 per cwt. in the fall of 1972 to $60.75 per cwt. in March 1974, then dropped to $30.15 in September (13). The 1977 pinto bean prices quoted during the first week of September ranged between $15.50 and $16.50, but by the second week of October 1977, the price quote had risen to $32.00 (12). The 1981 prices were quoted as high as $45.00 in June, but were down to $22.00 in September and below $20.00 in December. Such fluctuations demonstrate that DEB market prices, in the short run, are highly volatile, and there is no reason to believe that price stability can be achieved any time in the near future.

Purpose

This report sets forth in some detail the patterns of production, consumption, and exports for DEBs; describes the marketing channels and market structure of the industry; and seeks an understanding of the price volatility experienced in the market.

In an earlier study, a series of personal interviews was conducted in 1977 with DEB dealers, farmers, and others familiar with the bean industry (1). Interviews were usually informal and the conversation often moved freely from one subject to another. Most dealers were willing to discuss their business, although at times they were reluctant to talk about their marketing arrangements, because they felt this information was private in nature. All dealers or their representatives in the North Dakota and Minnesota area were interviewed, and 24 of the 26 processing plants of the area were visited personally. Many DEB traders and other individuals familiar with the nation's industry were contacted in person or by telephone. Results of the interviews are summarized in this report. Experiment Station publications from some bean producing states provided valuable information, though published material on marketing of beans was limited, despite an exhaustive literature search.

Trade journals, newspaper articles, and personal letters provided additional information. Information on bean prices, acreage, production, and exports was obtained from publications of the U.S. Department of Agriculture (USDA) (10, 12, 13, and 15).

Scope and Limitations

This study concentrates on the edible bean industry in North Dakota and Minnesota and the problems inherent in marketing for this two-state area. The national industry is also explored, but in less depth. Since North Dakota and Minnesota produce principally pinto beans and navy beans, these types are investigated in particular, although some attention is given to great northern beans. Foreign DEB production and consumption trends are considered, as the export demand may very well be the single most important factor relative to the future expansion or contraction of domestic production. Relatively little detailed information is available about DEB production and consumption in socialist countries, although large amounts are grown and used.

Most marketing contracts for processed beans are made by trading firms outside of the two-state area; therefore, this study concentrates on describing the market establishment at the first handler and broker/merchandiser levels. Precise figures for determining market share were often impossible to obtain since there is considerable secrecy in the DEB marketing business. Market percentages and shares, when given, are approximations. An attempt was made to analyze the factors affecting pinto bean prices and to develop price predictive equations on the basis of statistical data published by the U.S. government for years 1954-75. Only limited information was obtained from traders as to the inner workings of the DEB marketing system, and none of it could be evaluated statistically for purposes of price determination.

Dry Edible Pulse Origins

Pulses, a term denoting all dry edible legumes produced in pods on herbaceous stems, have a long history as a cultivated crop. They appear to have had various origins. Historical literature records that beans, lupines, and lentils were planted as early as 2,000 B.C. in the Nile Valley (1). Radio carbon dating has established that beans (Phaseolus vulgaris) were present as

early as 5,000 B.C. in the Mexican Aztec culture and are believed to have been an important factor in the development of the Aztec city-state. Beans continue to be important in the Mexican diet and are frequently the subject of Mexican folklore.

Asia is believed to be the homeland of various pulses. Mung beans (Phaseolus aureus) are produced and consumed extensively in China. The soybean (Glycine max) is supposed to have originated in the warm regions of Asia, and was considered by the Chinese, along with rice, wheat, barley, and millet, to be one of five sacred grains essential to their civilization. Garbanzo beans or chickpeas (Cicer arietinum) are native to western Asia and have been cultivated in the Mediterranean region since ancient times (1). Pulses are referred to as a food source in the Bible in the book of Daniel, dating around 600 B.C.

The word "bean" was first applied to a type of pulse common to Europe, known today as the "broad bean" (Vicia faba), which is botanically more closely related to the garden pea (Pisum sativum) than to the common field or garden bean (Phaseolus vulgaris). The varieties of edible beans most commonly grown in the United States belong to the general denomination "kidney bean" and are believed to have originated in Central America (Table 1).

The term "dry edible bean" (DEB), as used in the United States, applies to the common field or garden bean (Phaseolus vulgaris). Lima beans (Phaseolus lunatus), mung beans (Phaseolus aureus), garbanzo beans (Cicer arietinum), and blackeye cowpeas or blackeye beans (Vigna sinensis) are also listed in many publications under the DEB heading. The term DEB, or the word "bean" when used alone in this report, will include those varieties listed by the U.S. Department of Agriculture (USDA) as "dry edible beans" in various statistical publications (13, 15). Soybeans, field or garden peas, and lentils are excluded.

North Dakota and Minnesota Bean Types

Pinto beans constituted 81 percent of all DEBs produced in North Dakota in 1981; the remaining 19 percent were navy beans. Navy beans predominated in Minnesota until 1981, when 49 percent were pintos, 46 percent were navy, and 5 percent were other types. A few great northern beans were produced in both states in earlier years, but none were reported in 1980 and 1981. Other types

TABLE 1. BOTANICAL CLASSIFICATION AND COMMON NAMES OF DRY PULSES

Common Name	Botanical Class and Genus	Example of Class
Common field beans	Phaseolus vulgaris	Navy, kidney, Great Northern (American); habas (Mexican); feijaos (Portuguese); frijoles (Italian); bohnen (German)
Lima beans	Phaseolus lunatus	Standard limas, sieva or baby limas (American); Madagascar limas (Madagascar)
Field or garden peas	Pisum sativum	Common peas, Alaska, Dutch blue, marrowfat
Broad bean and horse beans	Vicia faba	Windsor, fava (England); pigeon beans (Belgium)
Lentils	Lens esculenta	Mediterranean and American lentil
Garbanzos	Cicer arietinum	Chickpea, coffee bean, gram, porquero, gypsy pea
Cowpea	Vigna Unguiculata	Blackeye, crowder pea, ordinary cowpea
Butternut and haricot runner	Phaseolus coccineus	Oregon lima, runnerbeans
Mung beans and Chinese red	Phaseolus aureus	Chinese beans, Oklahoma, China
Soybeans	Glycine max	Not used much for food in Europe
Lupines	Lupinus albus	Used for food to a slight extent

SOURCE: Adapted from (1).

which have been produced in small quantities in the two states include red kidney, small red, pink, cranberry, and black.

Pinto beans were brought into the United States from the northern part of Mexico where they are grown extensively. The seed is somewhat flat and oval-shaped; the seed coat is white, striped or mottled with tan or brown. Varieties commonly grown in the area are vine-type plants of indeterminant growth characteristics, that is, during its growth cycle the plant sends out vine-like shoots away from its base. These shoots bear the pods, which are thus allowed to lie on the ground. The plants' maturity is indeterminant, that is, the pods ripen at various times during its life cycle. Maturity time is about 90 to 100 days after planting.

The navy bean was the first DEB to be produced in commercial quantities in the United States. The seed is small, white, round, and slightly elongated, about the size and shape of the soybean. Varieties of navy beans most commonly grown in this area are bush type plants of determinant growth characteristics, so that the pods are held off the ground, and a definite stage of maturity is reached when all of the bean pods ripen. The time required for maturity is ordinarily between 85 and 95 days.

Protein Value

Beans are the cheapest source of protein available to consumers in the United States, according to the USDA (11). Bean protein is usually less than half the cost of most forms of animal protein. The bean varieties commonly grown in the United States usually contain about 22 or 23 percent protein, which is a higher percentage than that found in milk, eggs, or meat (1). Bean protein, however, is of lower quality because it lacks certain essential amino acids; the absence of any one of them limits the ability of the body to absorb the others and utilize the protein content of the food source. Animal protein is of a higher quality since its amino acid content is more balanced, thereby making its protein available to the body. Beans are low in methionine, cystine and tryptophane, all essential amino acids, but high in lysine. Cereal grains, on the other hand, are rich in methionine and cystine but poor in lysine. Thus, beans and cereal grains are effective dietary complements

when eaten together.[3] Such complementarity helps explain the consumption habits of the Latin American peasant who lives on a diet composed principally of beans and corn. As world population expands and the demand for inexpensive and nutritive sources of food (especially protein foods) increases, the prospect for an increased demand for DEBs is likely.

Production of Dry Edible Beans

World Production

China is the world's largest producer of DEBs with about 74 million cwt. in 1980, or 23 percent of the total (Table 2). India is second with 62 million cwt.; followed by Brazil, 43.5 million cwt.; and Mexico, 25 million cwt. The United States is fifth in production with 26 million cwt., or about 6 percent of the total. Half of the world's beans are produced in Asia, 19 percent in North and Central America, 17 percent in South America, and 9 percent in Africa. World production has averaged about 325 million cwt. or about 14.7 million metric tons for the five years 1976-80. This contrasts with average world production of about 400 million metric tons of wheat, 375 million of rice, 75 million of soybeans, and 25 million of rye. It is apparent that beans comprise a fairly small but important part of the world's food supply.

United States Production

Commercial DEB production in the United States began in New York State near the middle of the 19th century (1). For many years New York was the leading producer, but Michigan began to take the lead about 1900. California soon became an important producer and was second to Michigan in 1909 (17). In the war years (WWI, 1918 and 1919), California produced nearly twice as much as Michigan.

Later, beginning in the early 1920s, the bean output in the two states was about the same for nearly 50 years (17 and 10). Michigan has been the

---

[3]Research which provides more information on this relationship has been conducted at North Dakota State University and at the University of Minnesota as well as at other institutions (1).

TABLE 2. WORLD DRY EDIBLE BEAN PRODUCTION, SELECTED COUNTRIES, 1976-80[a]

	1976	1977	1978	1979	1980
	1000 cwt.[b]				
ASIA					
China	137,348	76,985	79,190	88,185	73,965
India	56,901	60,561	54,322	52,911	61,729
Thailand	2,756	4,564	5,776	5,732	6,063
Burma	3,858	4,167	4,167	4,079	4,079
Turkey	3,549	3,571	3,527	3,638	3,527
Japan	3,373	3,792	3,241	3,417	3,594
Other Asia	7,540	8,113	7,804	8,244	8,201
Total	215,325	161,753	158,027	166,206	161,158
SOUTH AMERICA					
Brazil	40,609	50,486	48,237	48,215	43,541
Argentina	3,770	3,968	3,748	5,115	5,181
Chile	1,543	2,469	2,469	2,557	1,852
Other South America	5,600	6,195	5,776	6,063	6,217
Total	51,522	63,118	60,230	61,950	56,791
NORTH & CENTRAL AMERICA					
United States	17,786	16,610	18,935	20,476	26,395
Mexico	16,314	16,976	20,723	23,281	24,912
Guatemala	1,720	1,477	1,786	1,874	1,764
Canada	1,808	1,102	1,698	1,521	1,543
Other North & Central America	5,737	4,576	5,073	4,943	5,660
Total	43,365	40,741	48,215	52,095	60,274
AFRICA					
Uganda	4,784	3,726	3,858	3,990	3,968
Rwanda	3,594	3,792	3,836	3,836	3,880
Burundi	3,461	3,527	3,571	3,638	3,814
Tanzania	3,219	3,307	3,307	3,285	3,307
Other Africa	11,794	12,743	13,250	12,323	12,875[c]
Total	26,852	27,095	27,822	27,072	27,844
EUROPE					
Yugoslavia	3,086	3,748	2,932	3,395	3,527
Italy	2,403	2,161	2,072	1,874	1,808
Spain	2,183	1,543	2,161	2,249	1,786
Romania	1,676	1,830	2,028	1,720	1,720
Other Europe	5,225	5,687	6,151	6,062	5,798
Total	14,573	14,969	15,344	15,300	14,639
USSR	1,896	2,557	2,138	1,764	1,984
OTHER[d]	199	-373	1,324	1,477	596
WORLD TOTAL	353,732	309,860	313,100	325,865	323,286

[a]Data for U.S. from USDA "Crop Production" (15); data for other countries and world total from Bean Marketing Summary (13).
[b]Converted from metric tons. 1000 metric tons x 22.04622 = 1000 cwt.
[c]Partly interpolated from 1979 data.
[d]Includes allowance for statistical discrepancy in original data.

leading producer in the United States for the last five years (1977 to 1981), and California has been second for four of those years (Table 3). North Dakota was sixth in three years, 1977-79, fifth in 1980 and second in 1981. Idaho has ranked third in bean production in each of the last five years.

TABLE 3. DRY EDIBLE BEAN PRODUCTION BY STATES, 1977-81[a]

States[b]	1977	1978	1979	1980	1981[c]	1981 Percent
	----------1000 cwt.----------					
Michigan	(1) 5,664	(1) 5,980	(1) 6,440	(1) 7,752	(1) 7,198	22.6
North Dakota	(6) 1,103	(6) 1,243	(6) 1,418	(5) 2,678	(2) 4,565	14.4
Idaho	(3) 2,165	(3) 2,494	(3) 2,460	(3) 3,329	(3) 4,277	13.5
California	(2) 2,887	(2) 3,323	(2) 3,600	(2) 3,813	(4) 4,022	12.6
Nebraska	(4) 1,767	(4) 1,947	(4) 2,160	(4) 2,730	(5) 3,850	12.1
Colorado	(5) 1,245	(5) 1,632	(5) 1,667	(6) 2,146	(6) 2,755	8.7
Washington	(10) 333	(8) 527	(7) 800	(7) 1,080	(7) 1,380	4.3
Minnesota	(7) 396	(7) 592	(8) 562	(8) 966	(8) 1,339	4.2
Wyoming	(8) 380	(10) 427	(9) 532	(9) 733	(9) 882	2.8
Kansas	(11) 162	(11) 192	(12) 170	(11) 336	(10) 680	2.1
New York	(9) 352	(9) 428	(10) 460	(10) 614	(11) 588	1.8
Montana	(12) 104	(12) 126	(11) 175	(12) 176	(12) 218	0.7
Utah	(13) 2	(13) 24	(13) 32	(13) 42	(13) 60	0.2
Other[d]	50	--	--	--	--	--
UNITED STATES	16,610	18,935	20,476	26,395	31,814	100.0

[a]Numerals in parentheses indicate state rank.
[b]Listed in 1981 rank order.
[c]Preliminary.
[d]Illinois and Indiana. Estimates discontinued after 1977 crop.

SOURCE: USDA "Crop Production" (15).

Total production in the United States has varied considerably from year to year, but the general trend has been upward. Statistics for years prior to 1929 are not uniformly available, but most sources show annual production of 6 to 12 million cwt. from about 1909 to 1929. There was a slowly rising trend from the 1930s to the 1950s, to about 19 million cwt. (Table 4). Production reached 20 million cwt. in 1974 and again in 1979. Output increased sharply to 26 million cwt. in 1980 and almost 32 million in 1981. Nearly all producing states shared in the increase, but the gain was largest in North Dakota--from 1.1 million cwt. in 1977 to 4.5 million cwt. in 1981, an increase of nearly 3.5 million cwt., or 314 percent.

TABLE 4. ACREAGE AND PRODUCTION OF DRY EDIBLE BEANS, UNITED STATES, NORTH DAKOTA AND MINNESOTA, SELECTED YEARS 1929-1982

Year	United States		North Dakota		Minnesota		Ratio: ND + MN To U.S.[a]	
	Area Harvested	Production	Area Harvested	Production	Area Harvested	Production	Acres	Production
	1,000 acres	1,000 cwt.	1,000 acres	1,000 cwt.	1,000 acres	1,000 cwt.	-----percent-----	
1929	1,746	12,212	2	8	5	16	0.4	0.2
1934	1,488	11,218	1	3	7	12	0.5	0.1
1939	1,587	14,200	*	2	2	12	0.1	0.1
1944	1,898	16,645	1	5	4	19	0.3	0.1
1949	1,780	19,223	*	1	2	16	0.1	0.1
1954	1,455	17,125	2	24	3	20	0.3	0.3
1959	1,414	19,087	3	26	1	11	0.2	0.2
1960	1,400	17,411	X	X	X	X	X	X
1961	1,414	19,672	X	X	X	X	X	X
1962	1,414	17,942	X	X	X	X	X	X
1963	1,370	19,982	X	X	X	X	X	X
1964	1,388	17,375	25	165	9	55	2.4	1.3
1965	1,484	16,457	25	225	4	28	2.0	1.5
1966	1,486	19,964	20	294	7	59	1.8	1.8
1967	1,205	15,215	22	213	6	42	2.3	1.7
1968	1,424	17,435	24	240	5	44	2.0	1.6
1969	1,469	18,913	22	231	7	70	2.0	1.6
1970	1,409	17,399	31	403	18	234	3.5	3.7
1971	1,296	15,939	33	429	14	203	3.6	4.0
1972	1,371	17,983	78	936	38	418	8.5	7.5
1973	1,332	16,274	100	1,050	37	592	10.3	10.1
1974	1,516	20,329	94	611	87	696	11.9	6.4
1975	1,466	17,442	122	1,183	48	384	11.6	9.0
1976	1,499	17,786	139	1,112	42	364	12.1	8.3
1977	1,280	16,610	105	1,103	30	396	10.5	9.0
1978	1,454	18,935	113	1,243	42	592	10.7	9.7
1979	1,384	20,476	105	1,418	36	562	10.2	9.7
1980	1,821	26,395	255	2,678	84	966	18.6	13.8
1981	2,201	31,814	415	4,565	103	1,339	23.5	18.6
1982[b]	2,202	X	480	X	110	X	26.8	X

*Less than 500.
XData not available.
[a]Some percentages were calculated from unrounded data.
[b]Indicates prospective plantings as of January 1982 (16).

SOURCES: 1929 to 1959 from U.S. Census of Agriculture (17). 1960 to 1977 from Agricultural Statistics, USDA (10). 1978 to 1981 from annual "Crop Production" USDA (15).

Production by Commercial Classes

The pinto bean has been the leading type in recent years, accounting for 44 percent of the total in 1981; navy beans were next in volume of production with 17 percent (Figure 1). Much of the increase in production in the past

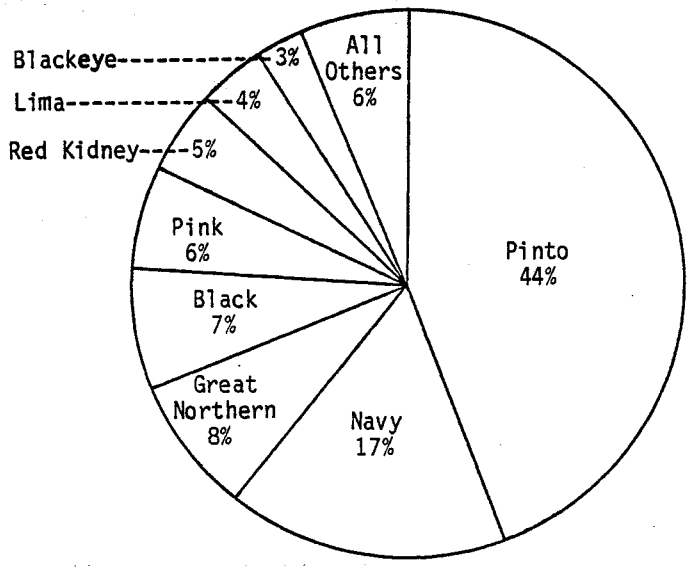


Figure 1. Dry Edible Bean Production, by Type, United States, 1981

SOURCE: "Crop Production, 1981" (15).

five years has been in pintos, the output having increased from about 4.5 million in 1977 to 10 million cwt. in 1980, and 14 million cwt. in 1981 (Table 5). Navy beans are second in importance, but production has been fairly steady for the last five years at a little more than 5 million cwt. Third in importance are great northerns, but gains in production were not quite as spectacular as for pintos. The increase from 1977 to 1981 was from 1.6 million cwt. to about 2.6 million cwt., about 62 percent. Black beans, pinks and red kidneys are next in importance. Production of all other commercial classes has been less than a million cwt., although there have been moderate increases in most since 1975.

Pinto production has increased very rapidly recently. Colorado was the leading producer of pinto beans for many years and maintained the lead until 1980 (Table 6). North Dakota became the leading state in 1980, with Colorado in second place followed by Idaho and Nebraska.

TABLE 5. DRY EDIBLE BEAN PRODUCTION BY COMMERCIAL CLASS, 1975-81[a]

Class	1975	1976	1977	1978	1979	1980	1981
	1000 cwt.						
Pinto	6,367	5,792	4,517	5,638	6,051	10,008	14,005
Navy (pea)	4,140	4,846	5,209	5,604	5,858	5,717	5,405
Great Northern	1,409	1,767	1,603	1,863	1,998	2,112	2,593
Small White[c]	239	335	248	203	193	186	302
Red Kidney	1,477	1,377	1,285	1,827	1,602	1,757	1,577
Pinks	1,154	990	753	687	817	1,750	1,941
Small Red	494	437	305	366	506	646	610
Cranberry[d]	222	257	390	361	310	330	273
Black[e]	212	157	109	168	288	1,451	2,235
Large Lima[f]	408	522	540	458	529	758	621
Baby Lima[f]	416	378	475	512	656	447	629
Blackeye[f]	499	607	800	778	943	698	880
Garbanzo[f]	119	46	63	101	152	67	42
Other	286	275	313	369	573	468	701
TOTAL	17,442	17,786	16,610	18,935	20,476	26,395	31,814

[a]Commercial Classes as defined by USDA.
[b]Preliminary
[c]Includes small quantities of "Flat Small White."
[d]Produced only in Michigan
[e]Also called "Black Turtle Soup."
[f]Produced only in California.

SOURCE: USDA "Crop Production" (15).

Navy beans are produced commercially in only three states, Michigan, North Dakota, and Minnesota. Michigan is the leading state with about 75 percent of the total production. Both North Dakota and Minnesota have gained in production since 1977, while Michigan has declined. Great northern beans are produced primarily in Nebraska and Idaho. A few were produced in North Dakota in 1977-79, but none were reported in 1980 or 1981. Red kidney beans are produced mainly in California, but Michigan and New York are also important producers. Minnesota produced some red kidney beans in 1980 and 1981 but the quantities were relatively small.

Production in North Dakota and Minnesota

Production of DEBs in North Dakota and Minnesota tends to be concentrated in Red River Valley counties. Grand Forks County was the leading

TABLE 6. DRY EDIBLE BEAN PRODUCTION, BY COMMERCIAL CLASSES, BY STATES, 1977-81

Bean Type & State[a]	1977	1978	1979	1980	1981[b]
			1000 cwt.		
PINTO					
North Dakota	944	966	1,158	2,248	3,715
Colorado	1,243	1,628	1,659	2,131	2,720
Idaho	785	1,138	1,114	1,629	2,421
Nebraska	597	652	704	1,020	1,700
Wyoming	316	363	454	689	834
Kansas	162	192	170	336	680
Minnesota	221	218	205	421	660
Washington	91	259	306	498	643
Michigan	65	89	112	850	384
Montana	91	109	137	144	188
Utah	2	24	32	42	60
United States	4,517	5,638	6,051	10,008	14,005
NAVY					
Michigan	4,884	4,974	5,260	4,827	4,070
North Dakota	150	270	247	404	725
Minnesota	175	360	351	486	610
United States	5,209	5,604	5,858	5,717	5,405
GREAT NORTHERN					
Nebraska	1,140	1,280	1,456	1,700	2,118
Idaho	387	513	459	368	427
Wyoming	64	64	78	44	48
North Dakota	9	3	3	0	0
Montana	3	3	2	0	0
United States	1,603	1,863	1,998	2,112	2,593
LIMA					
California	1,015	970	1,185	1,205	1,250
United States	1,015	970	1,185	1,205	1,250
RED KIDNEY					
California	643	1,003	771	957	830
Michigan	230	408	410	390	351
New York	260	315	314	348	312
Minnesota	0	0	0	21	39
Nebraska	0	0	0	10	32
Idaho	102	101	107	31	13
United States	1,285[c]	1,827	1,602	1,757	1,577

- continued -

TABLE 6. DRY EDIBLE BEAN PRODUCTION, BY COMMERCIAL CLASSES, BY STATES, 1977-81 (CONTINUED)

Bean Type & State[a]	1977	1978	1979	1980	1981[b]
	----------	----------	1000 cwt.	----------	----------
OTHER TYPES[d]					
Michigan	485	509	658	1,685	2,393
California	1,229	1,350	1,644	1,651	1,942
Idaho	891	742	780	1,301	1,416
Washington	242	268	494	582	737
New York	92	113	146	266	276
North Dakota	0	4	10	26	125
Colorado	2	4	8	15	35
Minnesota	0	14	6	38	30
Montana	10	14	36	32	30
Nebraska	30	15	0	0	0
Kansas	0	0	0	0	0
Utah	0	0	0	0	0
Wyoming	0	0	0	0	0
United States	2,981	3,033	3,782	5,596	6,984
ALL TYPES					
UNITED STATES TOTAL	16,610	18,935	20,476	26,395	31,814

[a]States are listed in order of rank in production in 1981.
[b]Preliminary.
[c]Total includes 50,000 cwt. produced in Illinois and Indiana.
[d]Includes small white, pink, small red, cranberry, black, blackeye, garbanzo, and "other" (see Table 4).

SOURCE: USDA "Crop Production" (15).

producer with 940,000 cwt. in 1981, and Pembina County was next with 537,000 cwt. (Figure 2). Virtually all the production is concentrated in the eastern one-third of the state. In Minnesota, bean production is not as highly concentrated in any geographical area. Marshall and Polk counties, both in the Red River Valley, ranked first and third, respectively, in production in 1978. However, Renville County, located in the Minnesota River Valley, ranked second in production. Hubbard County, located in the north central part of the state, ranked fourth. The next highest ranking counties were Swift, Ottertail, and Yellow Medicine. Some DEB production is found in most of the major agricultural areas of the state; exceptions are the extreme southeast and southwest corners.

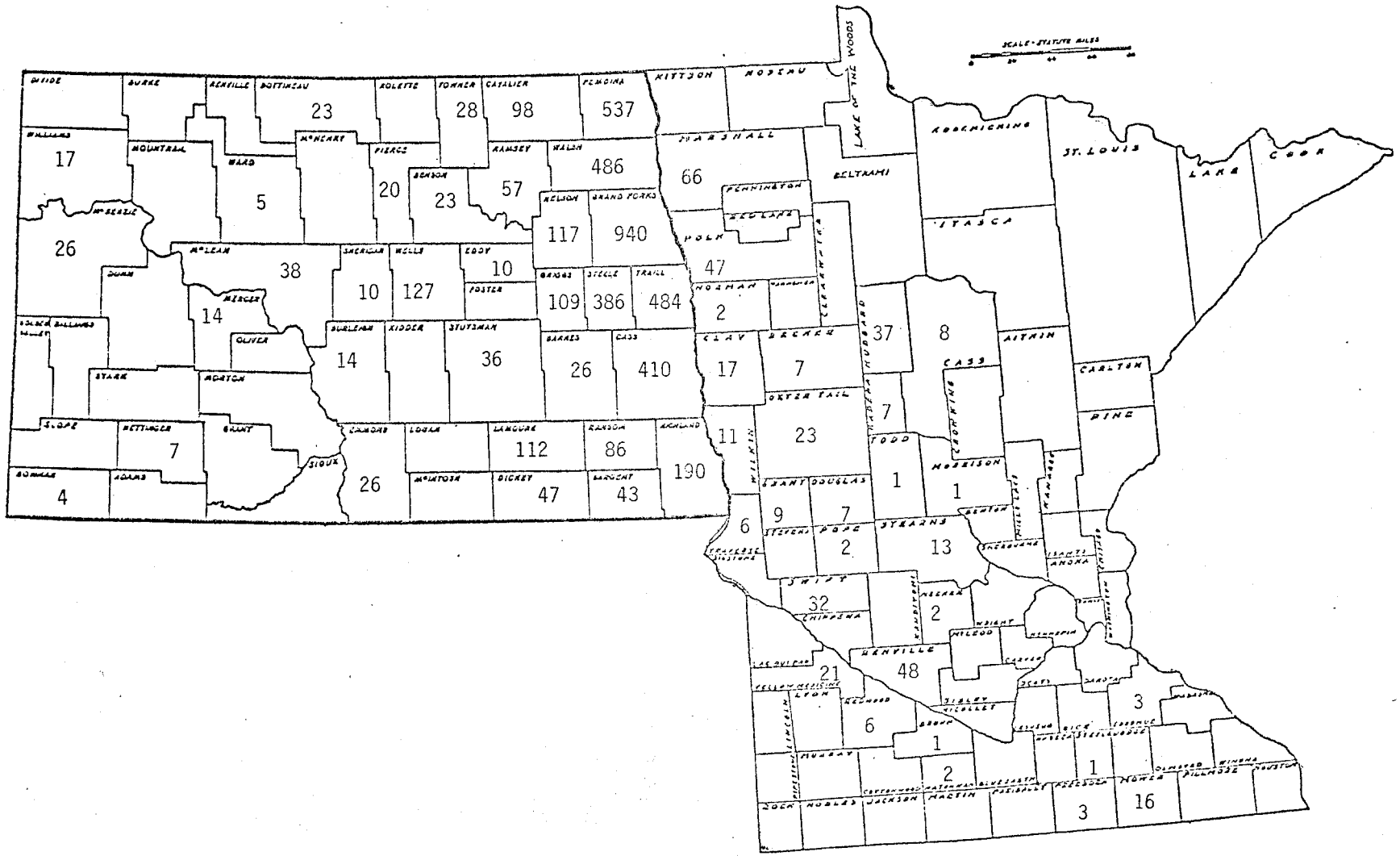


Figure 2. Production of Dry Edible Beans, by Counties, North Dakota in 1981 and Minnesota in 1978 (1,000 cwt.)

Sources: (7, 17).

Yields

Yields of dry edible beans vary greatly from year to year, from farm to farm, and from one commercial class to another. Pinto beans grown in North Dakota and Minnesota generally yield about 20 percent more than navy beans under similar growing conditions. Yields as high as 3,600 pounds of pinto beans per acre have been reported in North Dakota under optimal conditions (1). Yields up to 2,825 pounds of navy beans have been reported in Minnesota. Generally, the southern parts of the two-state area have higher yields than the northern parts, presumably due mostly to climatic differences. Average yields for the two states run considerably lower, as shown by the following tabulation (in pounds per acre) (15):

Year	North Dakota	Minnesota
1977	1,050	1,320
1978	1,100	1,410
1979	1,350	1,560
1980	1,050	1,150
1981	1,100	1,300

A reasonable yield expectation in an average year might be 1,200 pounds per acre in northern counties and 1,500 pounds per acre in southern counties. Yields in most North Dakota counties were much higher in 1979 than in 1980 or 1981. Among the top 10 producing counties, the 1979 yields ranged from 1,270 pounds per acre in Traill to 1,550 pounds in Cass and 1,560 in Ransom. In 1980, Pembina county averaged 1,500 pounds per acre, Cass averaged 1,190 pounds, and the other 8 of the top 10 were below 1,000 pounds (7). For navy beans, it appears that there is a significant difference in yields between northern and southern counties under dry-land conditions. One DEB processor reports the yields of navy beans in the north and the south are more nearly alike under irrigated conditions.

Production Practices[4]

Beans are very susceptible to frost, so they are generally planted in late spring when there is little danger of freezing. They grow best under

---

[4]Detailed production recommendations are provided in (4) and (8). Production practices and costs are found in (2).

conditions of abundant moisture and warm temperatures. Since they are leguminous, they fix nitrogen in the soil from the air, and therefore produce well in nitrogen-poor soils and fit nicely into crop rotations. Some farmers use beans as an alternative to summer fallow, because bean production enables them to control weeds and improve soil conditions in much the same way as summer fallow. Many farmers have included beans in a crop rotation with small grains, potatoes, and sugar beets. Planting of DEBs occurs after the planting of grain and sugar beets and harvest occurs after grain harvest but before the sugar beet harvest. The frost-free growing season in the North Dakota-Minnesota area is barely long enough for most bean varieties, and occasionally a fall frost kills them prematurely, severely reducing yield and quality. Sometimes an early frost destroys the crop completely. On the other hand, very often fall frosts do a service to the farmer by killing the foliage of the bean plant as it nears maturity, causing it to dry up before combining and eliminating the need for defoliation. Since beans can be discolored by excessive moisture, they ordinarily are harvested as soon as the vines are dry.

A typical sequence of springtime field operations might be (1) to cultivate the soil, (2) apply a pre-emergent herbicide, (3) drag crosswise, (4) plant, (5) drag again to kill weeds and assure that all seeds are covered, and (6) cultivate after seeds sprout, using a row-crop cultivator with dirt shields. Beans are usually cultivated one or two times. The last cultivation should be shallow to avoid damage to the root system, and to "hill up" the bean rows, facilitating cutting operations at harvest time. Nearly all bean growers apply herbicides to control weeds. Certain spraying operations may be necessary to control diseases. Spraying is usually by airplane.

The bean vines dry up naturally in the fall, with or without the aid of a killing frost. No spray defoliants are applied. The most common harvest method for pinto beans is to cut the plant from the roots with a bean cutter mounted on a tractor. Many farmers use a rod weeder to separate the dirt from the vines. Next, beans are lifted out of the ground and put into windrows. Varieties that stand upright are sometimes straight-combined. However, the pods hang very near the soil and the combine does not pick them all up, so it is a less satisfactory harvest method. Once the beans have been cut and windrowed, they are very susceptible to loss, either through staining from rainfall or through blowing and shattering by wind.

Combining may be accomplished with an ordinary grain combine, operated at reduced cylinder speeds to avoid shattering or splitting the beans. Sieves need special adjustment and wind speed should be increased to just short of the point at which beans are blown out of the back of the combine. Specially manufactured bean combines are available commercially and are highly recommended because the cylinders are specially designed to avoid splitting the beans.

Pinto beans should be harvested at moisture contents between 13 and 15 percent, while navy beans should be harvested at higher levels, 17 to 18-1/2 percent. If drying facilities are available, it may be advisable to harvest at still higher moisture contents so as to reduce splitting and cracking. Ordinarily, unheated air is adequate for drying beans, but if heat is used, it should be applied at a low level. The moisture content should not exceed 13 percent for long-term storage (1). Special conveyor-belt elevators are recommended for moving beans from one place to another so as to reduce the cracking of seed coats.

Diseases[5]

DEBs are subject to various diseases during their growth stage. The principal bean diseases encountered in the North Dakota-Minnesota area are rust, bacterial blight, white mold, and root rot. Rust, which has been particularly severe in recent years, can be controlled through repeated applications of fungicide. Bacterial blight is spread primarily through rain storms and enters plants through wounds or natural openings. It is also spread through infected seed, so certified seed is recommended. It can survive through winter on field debris but does not live in the soil after the plant debris is decomposed. No spray is completely effective in controlling bacterial blight, but certain sprays containing copper retard its development.

White mold is a fungal disease that occurs under conditions of high humidity and massive bean foliage. Rotation with nonsusceptible crops such as grain or the application of a systemic fungicide seems to be the most effective means of control. Root rot seems to appear under dry conditions. It can be partially remedied by pushing soil against bean plant stems while cultivating.

---

[5]For more information on DEB diseases and their control, see (3) and (18).

It is generally recommended that beans be planted in a three or four year rotation with other crops to avoid disease problems. Sunflowers and beans are not compatible in a rotation because both crops are susceptible to white mold. Experiment stations are developing disease resistant varieties to assist in disease control.

Consumption Patterns

World and Domestic Consumption

Beans are consumed in most nations of the world, yet different types are not readily substituted for one another, and per capita consumption varies greatly from one country to another. Beans are a relatively cheap source of protein, so their per capita consumption is relatively high among low-income groups. People in Brazil use mostly brown, red, or black varieties; consumption was estimated at 56 pounds per capita in the 1960s (1). Mexico's per capita consumption is about 39 pounds, mostly pinto and black beans. The traditional Mexican diet consists largely of beans and corn, a combination which has high calorie value as well as a balanced protein content. White beans are preferred in the countries of northern Europe; for example, France purchases quantities of great northern beans from the United States, while the United Kingdom imports mostly navy beans. Consumption patterns vary considerably among various ethnic groups in the United States, where per capita consumption has been about 6.5 pounds annually. Spanish-Americans in the Southwest and blacks in the Southeast consume large quantities of pinto beans. Puerto Rican-Americans in New York prefer black beans. Blackeyes, usually called "blackeyed peas," are eaten mostly in the South. White beans are preferred in the North; some bean traders have observed that the historic Mason-Dixon line divides the nation's bean market between white and colored varieties. Apparently people who adopt a particular type of bean as a staple or customary food source become very much accustomed to its taste or other characteristics and do not readily substitute it with a different type.

Consumption By Region and Income

Households with high consumption levels of beans are typically southern, low income, and rural, according to a 1977 USDA study (11). In the South,

families with annual income after taxes below $15,000 used about one-third pound of beans per week, while families over $15,000 used only about one-half as much (Figure 3). Consumption by households in the South and in the West tended to be higher than other regions in the nation for each income level identified in the survey. Average consumption among farm families was higher than urban families.

Exports

The DEB industry in the United States depends heavily on export trade, and much of the growth in bean production has been a result of the increase in exports. In 1975, exports of all bean types were equivalent to about 15 percent of the year's crop; by 1980, 56 percent were exported (Table 7). During the six years 1975-80, more than half the great northern beans were exported as were about one-fourth of the navy and red kidney beans. Export of pinto beans was less than 15 percent of production in the three years 1975-77, but by 1980 exports had increased to more than 70 percent of that year's production. In 1980, 48 percent of the total bean exports were pintos (Figure 4).

More than half of all beans exported by the United States went to Mexico in the year ending September 1981, and Mexico took nearly one-third of U.S. exports in 1980 (Table 8). Previously, and especially in 1978 and 1979, the United Kingdom was our most important export market, and Japan has also been important. Some countries, Angola and Brazil for example, have been in and out of the market for U.S. beans from year to year.

Most of the beans going to Mexico were pintos, indicating the importance of Mexico as a market for North Dakota beans. The United Kingdom imports mostly navy beans from the United States, and most of these are from Michigan (1). Our exports to Japan are mostly limas, exports to the Netherlands are mostly navy beans, and exports to France are mostly great northerns. Our exports to Canada are mixed, but mostly navy and red kidney beans.

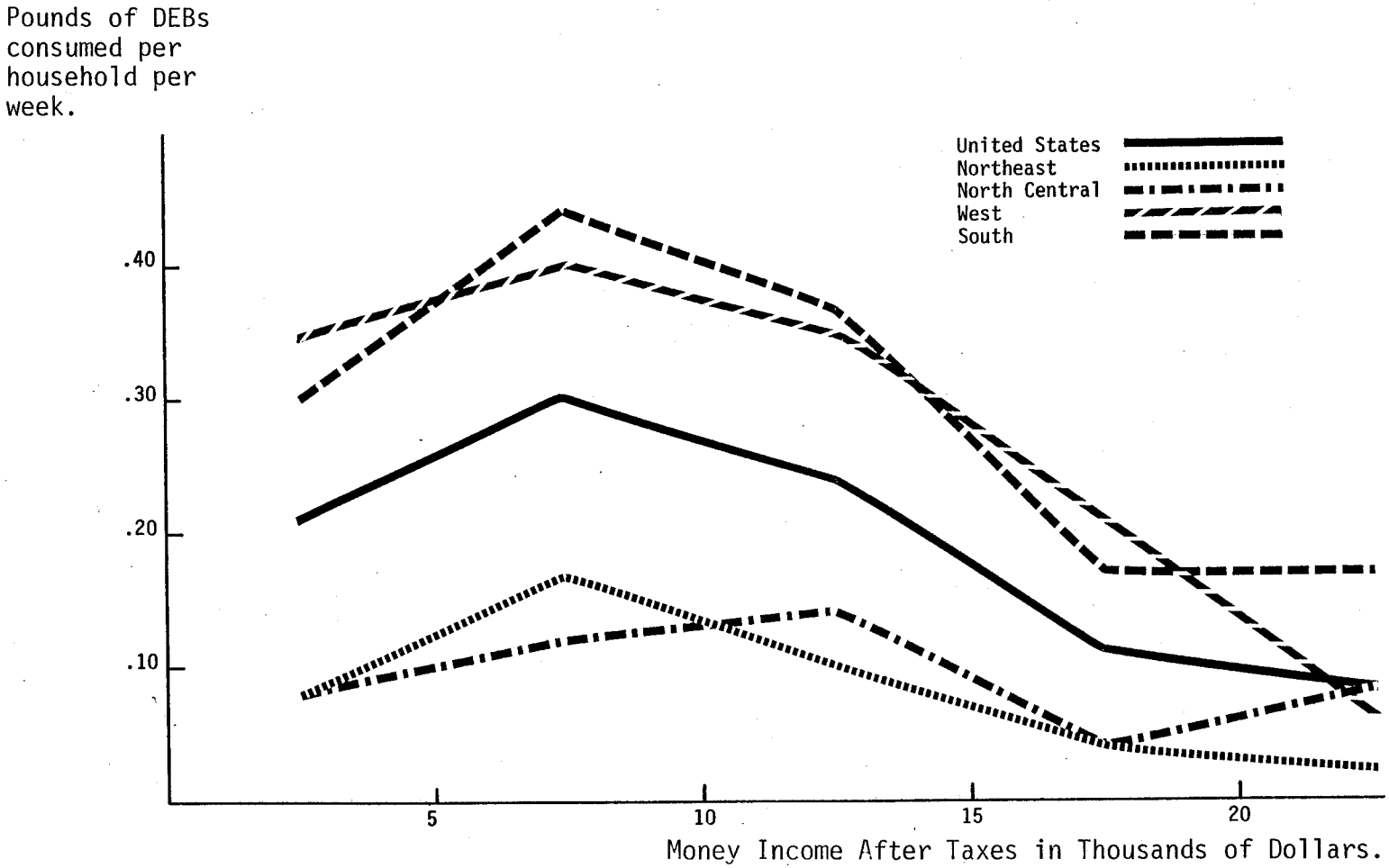


Figure 3. Domestic Household Consumption of Dry Edible Beans by Income and Region, All Urbanizations

Source: USDA (11).

TABLE 7. RATIO OF EXPORTS TO PRODUCTION, DRY EDIBLE BEANS, 1975-79[a]

Commercial Class & Year	Production (Crop Year)[b]	Exports (Year Beginning October 1)[c]	Ratio-Exports/ Production[d]
	1000 cwt.	1000 cwt.	Percent
NAVY			
1975	4,140	831	20.1
1976	4,846	814	16.8
1977	5,209	1,762	33.8
1978	5,604	1,364	24.3
1979	5,858	1,727	29.5
1980	5,717	2,138	37.4
1981	5,405	--	--
GREAT NORTHERN			
1975	1,409	324	23.0
1976	1,767	916	51.8
1977	1,603	785	49.0
1978	1,863	1,070	57.4
1979	1,998	1,218	61.0
1980	2,112	1,336	63.3
1981	2,593	--	--
LIMA			
1975	824	98	11.9
1976	900	239	26.6
1977	1,015	84	8.3
1978	970	262	27.0
1979	1,185	467	39.4
1980	1,205	475	39.0
1981	1,250	--	--
PINTO			
1975	6,367	631	9.9
1976	5,792	799	13.8
1977	4,517	476	10.5
1978	5,638	873	15.5
1979	6,051	2,484	41.1
1980	10,008	7,091	70.8
1981	14,005	--	--
RED KIDNEY			
1975	1,477	155	10.5
1976	1,377	237	17.2
1977	1,285	209	16.3
1978	1,827	384	21.0
1979	1,602	871	54.4
1980	1,757	559	31.8
1981	1,577	--	--

- continued -

TABLE 7. RATIO OF EXPORTS TO PRODUCTION, DRY EDIBLE BEANS, 1975-79[a] (CONTINUED)

Commercial Class & Year	Production (Crop Year)[b]	Exports (Year Beginning October 1)[c]	Ratio-Exports/ Production[d]
	1000 cwt.	1000 cwt.	Percent
OTHER TYPES[e]			
1975	3,225	626[f]	19.4
1976	3,104	988[f]	31.8
1977	2,981	962[f]	32.3
1978	3,033	1,251	41.2
1979	3,782	1,239	32.8
1980	5,596	3,150	56.3
1981	6,984	--	--
ALL TYPES			
1975	17,442	2,665	15.3
1976	17,786	3,993	22.5
1977	16,610	4,278	25.8
1978	18,935	5,204	27.5
1979	20,476	8,006	39.1
1980	26,395	14,750	55.9
1981	31,814	--	--

[a]Production data for 1981 included for reference.
[b]From "Crop Production," USDA (15).
[c]From Bean Market Summary (13).
[d]Exports divided by production x 100. It should not be inferred that all the beans exported in any given year were produced in the corresponding crop year.
[e]Includes whites, pinks, small red, cranberry, black, blackeye, garbanzo, and "other." Seed beans are not included.
[f]Includes an estimate for blackeyes extrapolated from 1978-79 data.

Marketing Dry Edible Beans[6]

Market Flows

The usual flow of DEBs from the farm to the household is shown in Figure 5. Some DEB firms are vertically integrated so that some market channels are circumvented. For example, some processors merchandise their

[6]Most of this chapter is based on the 1977 survey, with the addition of a limited amount of more recent data (1).

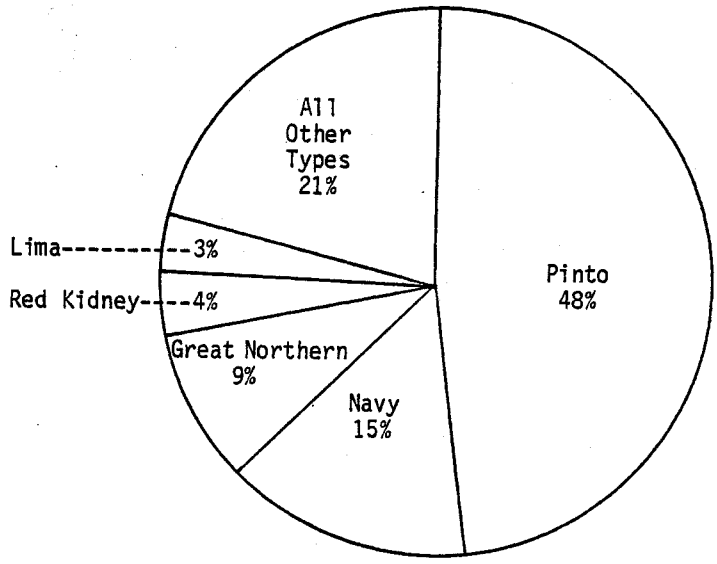


Figure 4. Dry Edible Bean Exports, by Type, 1980[a]

[a]Market year beginning October 1.

SOURCE: Bean Market News (12).

own product and certain canning firms purchase unprocessed DEBs directly from farmers. The amount of vertical integration varies somewhat among bean types.

The Processor

When farmers have harvested their beans, they normally take them to a receiving station or to a processor who grades them and quotes the price the firm will pay for the product. Each load is weighed and sampled, and the sample is graded for quality and foreign material. The farmer receives a ticket as proof of delivery, and at this point may either sell the beans or maintain ownership to sell at a later date. The processing facility may be a plant designed specifically for DEBs, as in the case with most processing facilities in North Dakota and Minnesota, or it may be an ordinary grain elevator with special equipment for handling beans, as is commonly the case in

TABLE 8. EXPORTS OF DRY BEANS BY COUNTRY OF DESTINATION, 1978-81[a]

Country[b]	1976-77	1977-78	1978-79	1979-80	1980-81	1980-81[c]
	1,000 cwt.					Percent of Total
Mexico	135	205	344	2,592	7,967	53.7
United Kingdom	584	1,212	916	1,195	1,409	9.5
Angola	111	0	532	0	845	5.7
Japan	626	153	297	531	693	4.6
Netherlands	277	542	327	412	526	3.5
Canada	269	346	282	344	463	3.1
Algeria	135	424	265	579	459	3.1
France	254	140	275	250	283	1.9
Brazil	75	6	45	12	264	1.8
Nicaragua	*	*	4	250	219	1.5
Venezuela	300	127	359	289	207	1.4
Germany (Fed. Rep.)	196	96	76	146	202	1.4
Belgium[d]	60	69	146	131	135	0.9
Italy	132	166	143	94	132	0.9
Dominican Republic	54	65	51	209	88	0.6
Other Countries[e]	796	656	1,100	962	954	6.4
Total	4,004	4,207	5,162	7,996	14,844	100.0

*Less than 500 cwt.
[a]Includes seed beans but not blackeyes, hence totals do not agree with those in Table 6.
[b]Arranged in 1980-81 rank order.
[c]Calculated from unrounded data.
[d]Includes Luxembourg.
[e]None of these countries took more than 1 percent of U.S. exports.

SOURCE: Bean Market Summary (13).

Michigan. Equipment needed for processing (i.e., cleaning, sorting, and bagging) is about the same as that used to clean small grains for seed.

The processing operation consists of running the beans through one or more mills, the number depending on the quality of the harvested product delivered and the specifications of canners and packagers. The first is the polishing mill, which is used especially for white navy beans (Figure 6). In

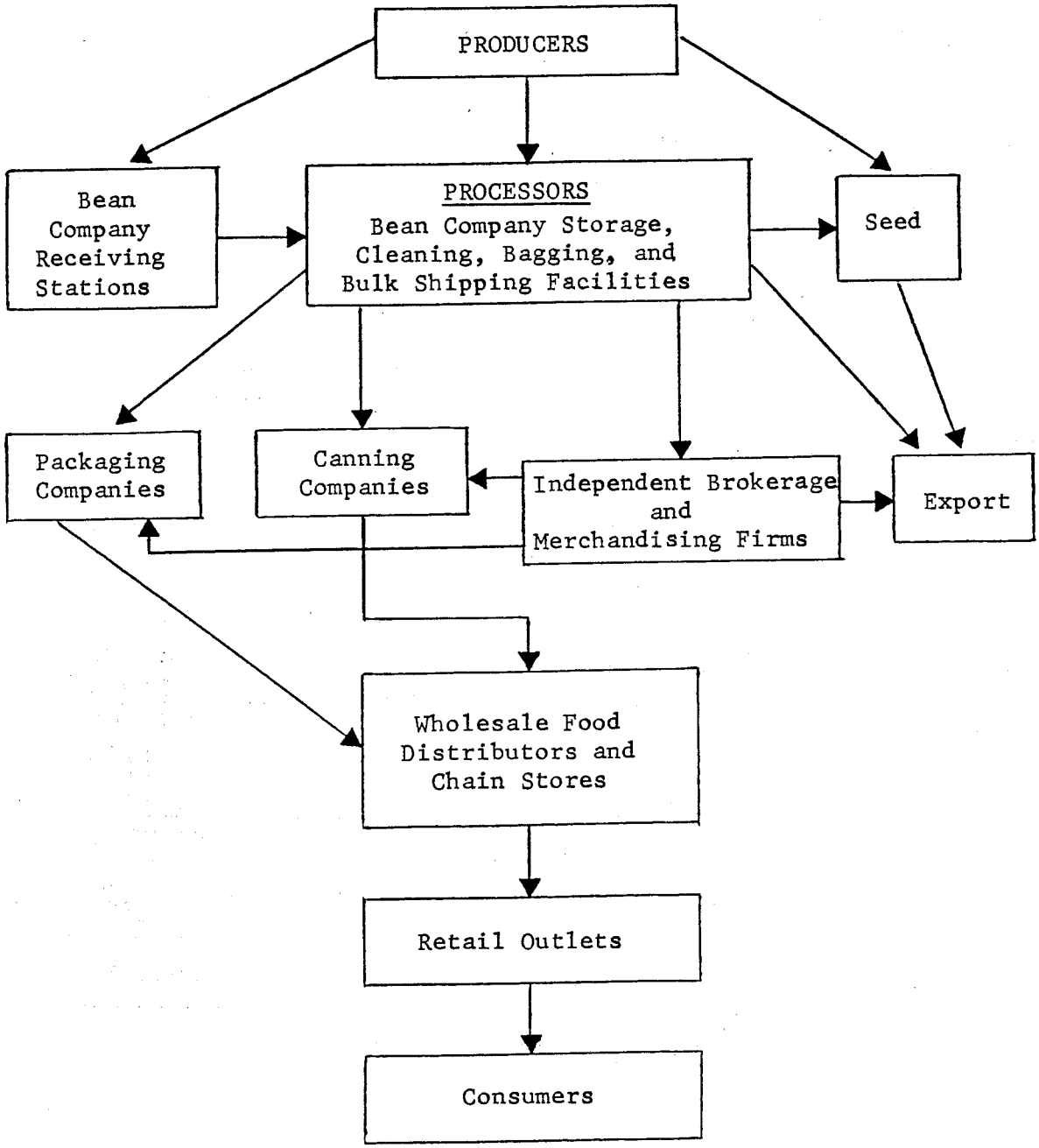


Figure 5. Flow Model for the Dry Edible Bean Industry in the United States

SOURCE: 1977 Market Survey (1).

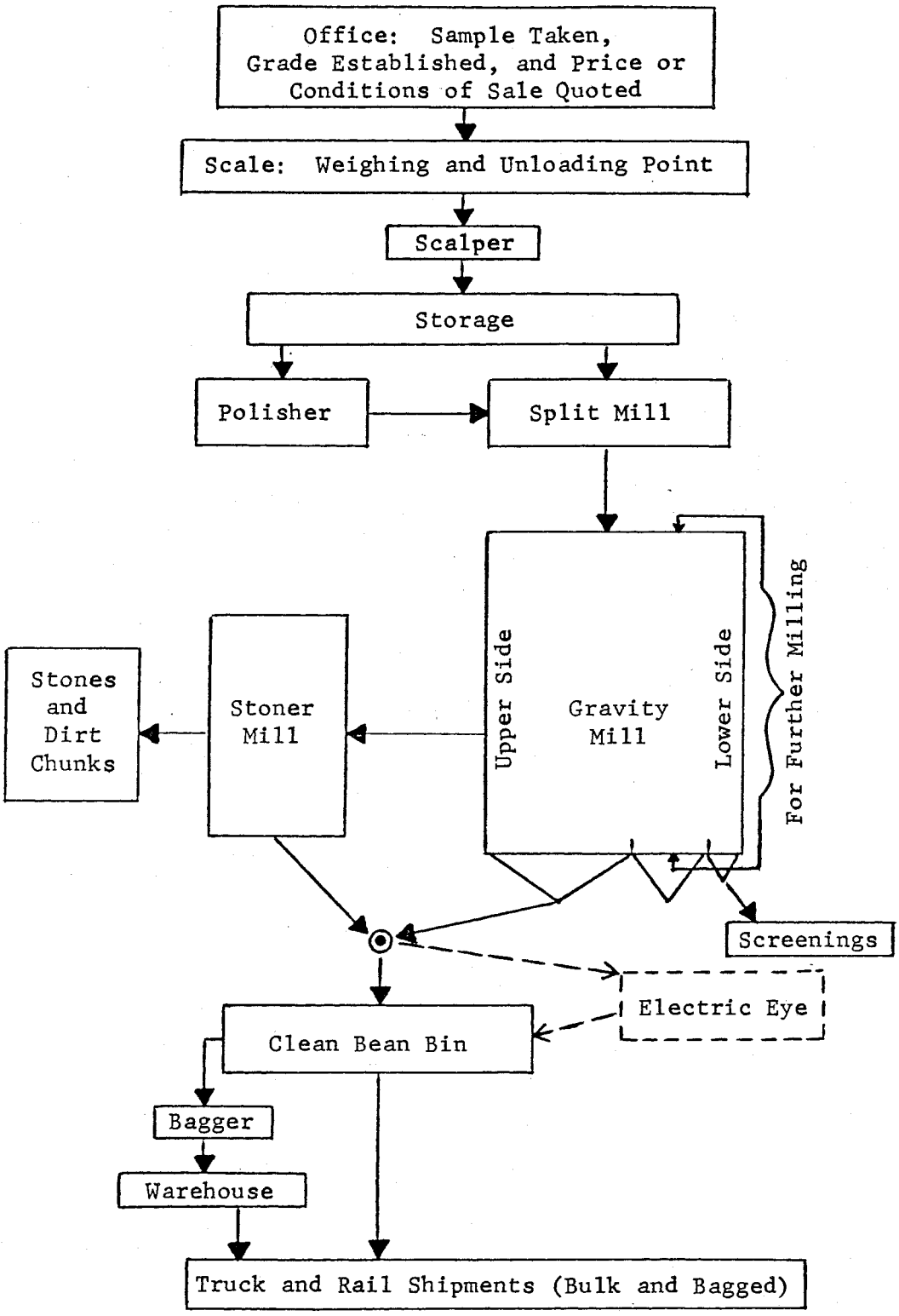


Figure 6. Dry Edible Bean Processing Plant Operations

SOURCE: 1977 Market Survey (1).

this mill, the beans flow through a large screen cylinder in which they are brushed and polished. This process breaks up dirt chunks and splits those beans which are already cracked. They blow into a split mill which separates the splits from the whole beans and further cleans out pods and trash. The beans then go to a gravity mill which shakes them under the influence of an air current and separates them according to specific gravity. This mill separates out dirt chunks, stones, frozen beans, and other foreign materials. Heavy dirt chunks and stones are transferred to a "stoner" mill where they are further shaken to separate whatever beans might have mistakenly gone off the gravity mill. Lighter beans and trash are removed in two cuts. The upper cut, having a higher specific gravity, is returned to the gravity mill for further milling. The lower cut, with the lower specific gravity, is removed and sold as screenings, usually for animal feed.

When there is a problem of discoloration, beans may be run through an electric eye sorting machine, which is expensive and slow to operate. It is used on only a small percentage of the crop, and usually only on white beans.

After processing, the beans may be bagged, shipped in bulk, or kept for further storage.

Brokers and Merchandisers

Beans that have been processed and prepared for shipment are marketed through traders called brokers and merchandisers, who act as the center of the marketing process by distributing existing supplies and negotiating transactions at mutually acceptable prices. Brokers in the DEB industry sell on a fixed commission per cwt., and they do not take title to the beans. Many processors work through a single broker who takes the responsibility for marketing all the firm's product. Together they devise buying and selling strategies and operate as a tightly-knit team. The success or failure of a processor is often determined by the capability of the broker; in particular, the firm's ability to assess the market situation accurately so that all of the processor's output is marketed at a satisfactory price.

The term "merchandiser" is used in the bean trade to designate a marketing firm which takes title to the beans and becomes an intermediary in the marketing process. The merchandiser differs from a broker in that the firm is a risk-bearer, and its economic interests are directly affected by changes in market prices. Since it owns the product being marketed, it has

more freedom of independent action, but competes with other firms in the marketing chain for a market share.

Some brokers are also merchandisers, filling smaller orders through purchase and resale. Ordinarily, a trader acting as a merchandiser makes a larger margin than when acting only as a broker. Usually the broker or merchandiser never sees the product being sold, but instead trusts that the processor will deliver the quantity and quality of DEBs specified in the sales contract, and that the purchaser will find that the delivered product meets the specifications contracted for. Much of the business is conducted by telephone.

Long-established traders with first-hand knowledge and personal rapport dominate the bean trade, a situation arising because there is an area of human discretion with respect to quality, grade, and price and because a proper assessment of supply-demand situations takes time to learn. Both the lack of strict adherence to grades and standards as well as personal and intra-firm loyalties have proven to be formidable barriers to entry for newcomers in the DEB trade. These factors, together with natural economies of size which appear to be present at all levels of the bean marketing industry, have favored the concentration of market power among already established firms.

Shipping

Beans are shipped from processors to packaging firms, canning firms, and export markets through the contractual arrangements of brokers and merchandisers. Shipments may be by rail or by truck, either in hundred-pound bags or in bulk form, depending upon the demands of the purchaser. most processors prefer bulk shipments because bagging adds to costs. Most canning facilities accept bulk shipments and some packaging facilities accept them, but most foreign buyers demand that the beans be shipped in bags. Most North Dakota firms ship both bags and in bulk; for the area as a whole, the ratio of bag shipments to bulk is about half and half. More modern packaging facilities are being designed to handle bulk shipments. Both bulk and bagged shipments can be either by truck or rail.

Packaging and Canning

Pinto Beans

About 80 percent of all pinto beans sold in the United States are packaged in clear cellophane bags, so good color is important. The remaining 20 percent are canned. Pinto beans are noted for changing color and turning dark after prolonged storage. Then they become hard to cook, requiring more time on the stove or in the oven. Michigan-grown pinto beans turn dark especially fast and must be marketed soon after harvest. North Dakota and Minnesota-grown pinto beans hold their color somewhat longer and can be stored until late spring or early summer of the year following harvest before serious discoloration occurs. The Idaho and Colorado-grown pinto beans have the best color-holding ability; they are the most desirable bean to carry over into the following year.

Navy Beans

About 90 percent of the navy beans used in the United States are canned and 10 percent are packaged, so that color is not as crucial a factor as in pinto beans. However, it is important that navy beans be firm and whole, with no cracked seed coats. Beans with cracked seed coats become mushy in the canning process and are likely to be washed out. Even worse, if beans with cracked seed coats are retained in the canning process, the skins will rise to the top of the can, causing a bad appearance when it is opened. Sometimes consumers mistake the germs of the split or burst bean seeds for worms and call the canning company officials to express great displeasure with the product.

Great Northern Beans

Great northerns do not have good canning qualities so they are usually sold as a packaged product. They may serve as a substitute for navy beans in some export markets. Since they are white, it is important to maintain a clear, unstained product.

Market Structure and Marketing Firms

Pinto Beans

Pinto bean production is scattered throughout 11 states (Table 5). The geographical scatter, plus the fact that most pinto beans are sold in dry, packaged form, have favored the development of an industry with numerous small firms performing a wide variety of marketing functions. The large number of firms in the industry suggests that there may be more inter-firm rivalry in pinto bean marketing than in the marketing of other edible bean types.

Some market concentration, however, is evident. Five of the six major pinto bean trading firms noted in the 1977 survey were located in Colorado, three of them in Denver and two in Greeley. Three of the Colorado firms were estimated to have marketed 30 percent of the nation's total pinto bean production. Of the five major exporting companies named in the survey, two were located in Colorado, two in California, and one in New York. Among seven major packagers of pinto beans, three were located in Colorado and two in Texas. Marketing activities are largely concentrated in the Colorado area, but is appears that no particular firm can be said to control the industry.

Navy Beans

The navy bean industry was highly concentrated geographically in 1977 with 94 percent of the commercial production occurring in Michigan, and the remainder in Minnesota and North Dakota.[7] There are a few very large marketing firms located in Saginaw and many smaller firms scattered around Michigan. There are about 70 country elevators in Michigan which handle edible beans. Two farmers cooperative unions handled roughly one-third of the nation's navy beans in 1977. Industry sources have estimated that the cooperatives together with the two larger non-cooperatives market about two-thirds of the nation's navy beans. The larger of the non-cooperatives handled about 20 percent of the total in 1977. This corporation had 26 country elevators in Michigan, most of which handled edible beans along with other grains, and had two bean processing terminals with electric eyes for sorting. The firm also had navy bean

---

[7]By 1981, North Dakota produced 13 percent of the nation's navy beans, Minnesota produced 12 perçent, and Michigan's share was reduced to 75 percent.

processing facilities in Minnesota and North Dakota. Three other firms, one of which has facilities in North Dakota and Minnesota, are believed to handle somewhat lesser amounts.

Most navy beans are canned and two canning firms tend to dominate. Providing canners with an ample supply of crude DEBs is an essential industry priority, since canning operations tend to be large with relatively high fixed costs. Hence it appears that canners work closely with bean dealers, though some beans for canning are purchased directly from farmers. While vertical integration is not so apparent on the surface, trading circles are tightly knit and it appears that pricing decisions are made somewhat collectively by canners and dealers.

Great Northern Beans

The great northern bean industry also is concentrated geographically, with 71 percent of the 1977 production in Nebraska, 24 percent in Idaho, 4 percent in Wyoming, and the remaining 1 percent in North Dakota and Montana.[8] The North Platte River Valley of the Nebraska Panhandle is the principal production area for great northern beans.

As in the case of navy beans, the great northern bean industry is highly concentrated among a few firms. Sources familiar with the industry estimate that one firm handles between 40 and 45 percent of the great northern beans and another handles 25 to 30 percent. The larger of the two firms is a large exporter and packages its own product for domestic sales. Five other companies deal in great northern beans.

North Dakota and Minnesota Processing Firms

The first commercial processing plant for edible beans in the North Dakota-Minnesota area was established in 1944 by Harold Roth at Cambridge, Minnesota. The firm name was "Beans Incorporated." The plant was unusual in that it was one of the first in the nation to have an electric eye for separating discolored beans. Max Campbell and the Gormley brothers, Wes and

---

[8]By 1981 the percentages were Nebraska, 82 percent; Idaho, 16 percent; and Wyoming, 2 percent. None were reported in North Dakota or Montana.

Dick, were pioneers in promoting DEB production in the Red River Valley. Largely through their efforts, about 3,000 acres of pinto beans were planted in the Valley in 1961. Only one processing firm handled beans in the area during the period 1944-54, though both the location and the management of the original plant changed several times. There were only two plants in the area as late as 1962, but in 1963 there were five and by 1977 the number had increased to 25 (Table 9). Most plants are located in the Red River Valley in North Dakota and northern Minnesota, but significant numbers are found in the Minnesota River Valley in the southern part of the state (Figure 7).

Most bean processing facilities in North Dakota and Minnesota are designed specifically for handling DEBs. Unlike processors in other parts of the nation, many (perhaps most) processors in this area deal only in edible beans and related pulses. Some are involved in seed grain operations, but very few are trading small grains or other products for human consumption or for animal feed.

Industry Concentration and Market Share[9]

Processors

The edible bean marketing business, like many others, is characterized by a high degree of market concentration. A few firms have a relatively large share of the business, while a few of the smallest firms have a very small share. Six processors have more than one facility in the area and some have numerous receiving stations. Based on estimates arrived at through the 1977 survey, the six processors with more than one processing plant handle about 80 percent of the beans produced in the area, whereas nine processors with but one plant each handle the remaining 20 percent of the area DEBs. The six smallest processors handle only about six percent of the area's production (Figure 8).

---

[9]Calculations in this section are made on the basis of 15 firms and an average annual production of 1,500,000 cwt., the average for the five years 1973-77. The western North Dakota production area has been excluded from consideration in this section. Market shares are only approximations, since many firms did not reveal their market volume.

TABLE 9. NORTH DAKOTA-MINNESOTA DRY EDIBLE BEAN INDUSTRY MARKET ENTRY AND EXIT OF PROCESSING FIRMS, PROCESSING PLANTS, AND RECEIVING STATIONS[a]

	Processing Firms			Processing Plants			Receiving Stations		
Year	Entry	Exit	Cumulative Total	Entry	Exit	Cumulative Total	Entry	Exit	Cumulative Total
1944	1		1	1		1			
1945			1			1			
1946			1	1	1	1			
1947			1			1			
1948			1			1			
1949			1			1			
1950			1			1			
1951	1	1	1			1			
1952			1			1			
1953			1			1			
1954			1			1			
1955	1		2	1		2			
1956			2			2			
1957			2			2			
1958			2			2			
1959		1	1		1	1			
1960			1			1			
1961	1	1	2	1		2			
1962			2			2			
1963	1		3	3		5			
1964	2		5	2		7			
1965			5		1	6			
1966			5	1		7			
1967	1		6	1		8			
1968			6			8			
1969			6			8			
1970			6	1		9	1		1
1971			6			9			1
1972	6	2	10	6		15	3		4
1973	3	2	11	1	1	15	1		5
1974	4	1	14	8	1	22	3		8
1975			14	2		24	5	2	11
1976	3	1	16	2	1	25	1		12
1977	1	1	16	2	1	25	4		16

[a]Firms, processing plants, and receiving stations which change ownership are listed as both entries and exits.

SOURCE: 1977 Market Survey (1).

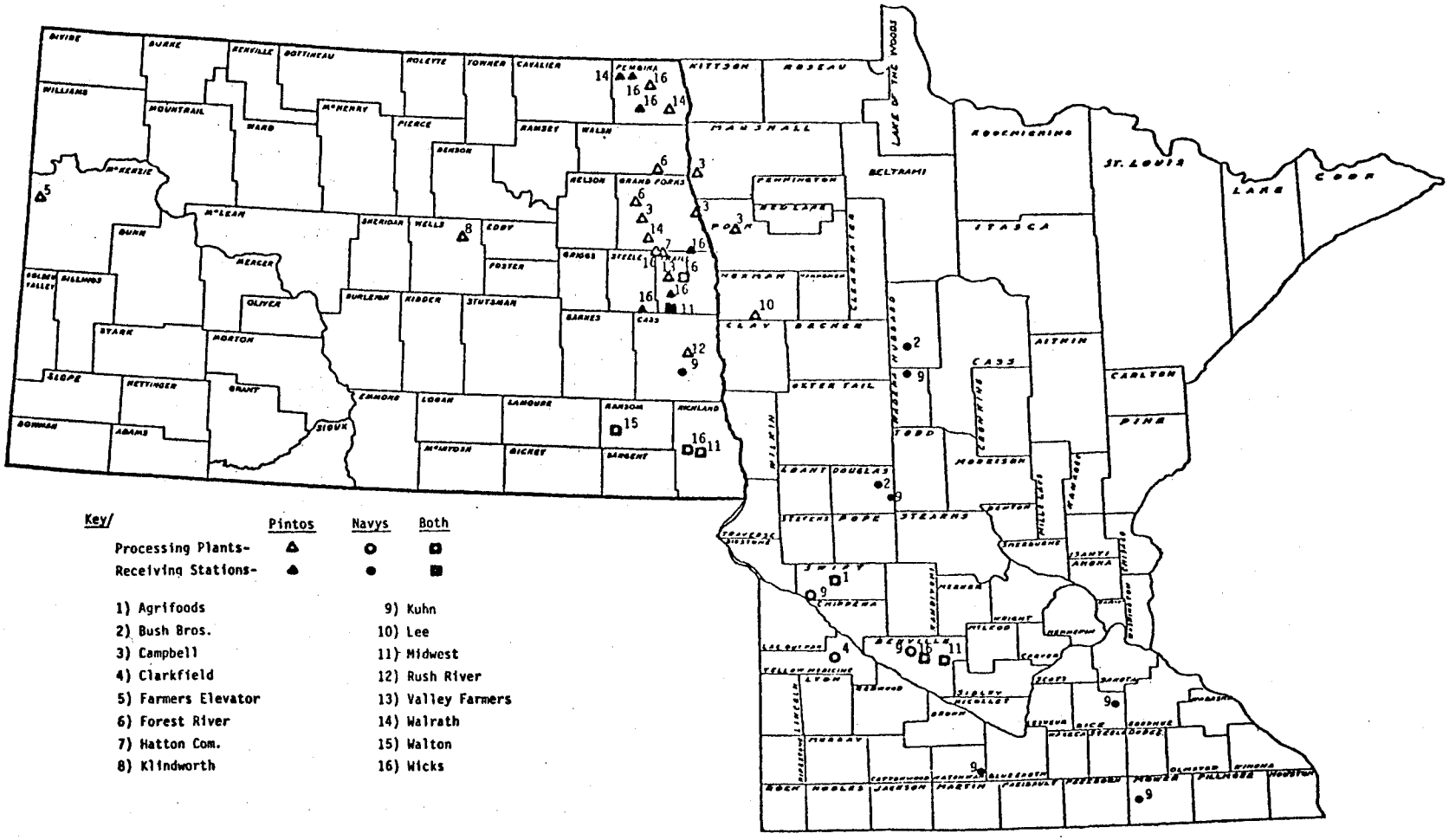


Figure 7. Location of Processing Plants and Receiving Stations by Owner and Bean Type Handled in 1977

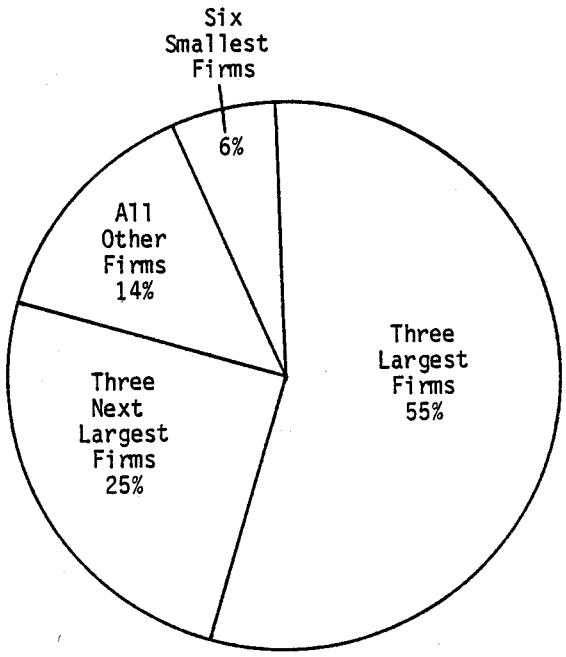


Figure 8. Industry Concentration--Dry Edible Bean Marketing, 1977

SOURCE: 1977 Market Survey (1).

The six largest processors, listed in order of their estimated volume of business in 1977, were: 1) Wickes, 2) Campbell, 3) Kuhn, 4) Midwest, 5) Walrath, and 6) Schaniles. The smallest processors were: 1) Rush River, 2) Walton, 3) Bush Bros., 4) Lee, 5) Klindworth, and 6) Agrifoods.

Brokers and Merchandisers

Most of the area's DEBs are marketed through a few principal brokerage and merchandising firms, though alternate channels are available. For the entire bean industry, two firms take half the marketing business and three more take another 35 percent, leaving only 15 percent for all others (Figure 9). One firm dominates the navy bean market, handling about two-thirds of the navy beans grown in the two states (Figure 10). The pinto bean business is not as highly concentrated, with two firms each handling about one-third of the beans and two others handling about 12 percent each.

The various brokers and merchandisers, and the processors from which each usually obtains beans, were are as follows (in 1977):

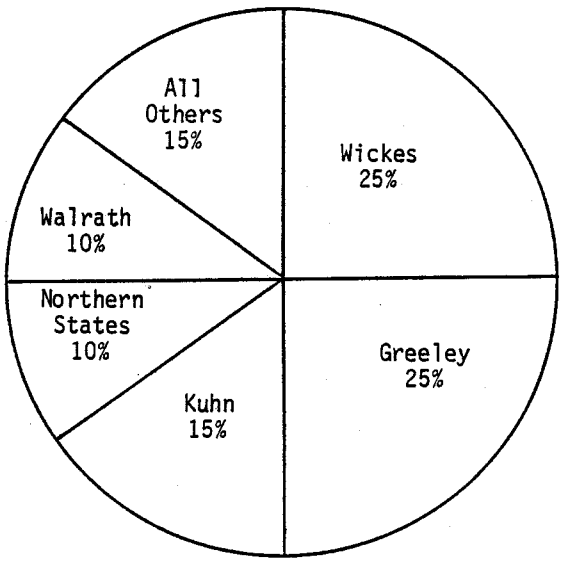


Figure 9. Industry Concentration--Dry Edible Bean Marketing in the North Dakota-Minnesota Area, 1977

SOURCE: 1977 Market Survey (1).

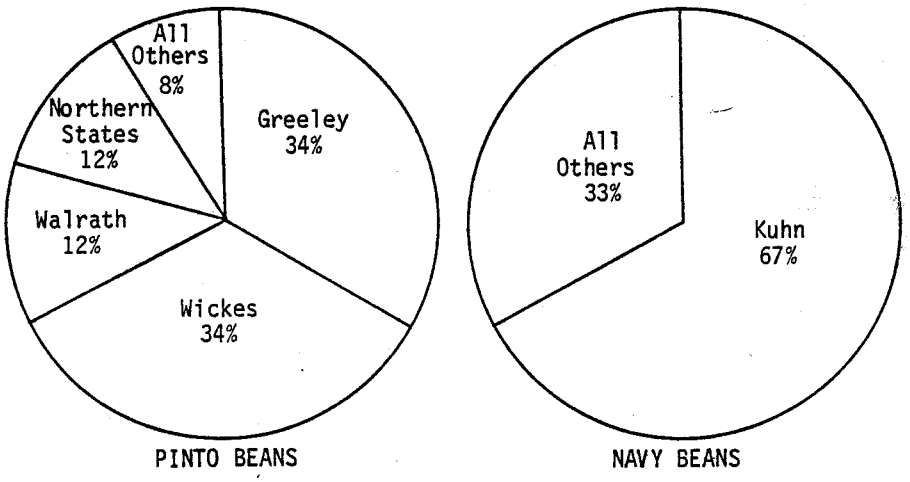


Figure 10. Industry Concentration of Brokers and Merchandisers, by Bean Type in the North Dakota-Minnesota Area, 1977

SOURCE: 1977 Market Survey (1).

Greeley Trading Company

1) Max Campbell Firms: four processing plants (pinto beans)
2) Lee Bean and Seed, Inc.: one processing plant (pinto beans)
3) Hatton Commodities: one processing plant (pinto beans)
4) Forest River Bean Company: two processing plants (pinto beans)

Grant L. Kuhn and Company

1) Dakota Bean Company: one bean elevator without processing facilities (navy beans)
2) Lakeland Bean Company: one processing plant (a second one which is inactive) plus six receiving stations (navy beans)
3) Rush River Bean Company: one processing plant (pinto beans)

Northern States Bean Company

1) Midwest Bean Company: two processing plants plus one receiving station with permanent storage (pinto and navy beans)

E. H. Walrath and Son

1) E. H. Walrath and Son: two processing plants plus one receiving station (pinto beans)

Wickes Agriculture

1) Wickes Agriculture: five processing plants plus five receiving stations (pinto and navy beans)

Other, or unidentified

1) Agrifoods: one processing plant (pinto and navy beans)
2) Bush Brothers: two receiving stations (navy beans)
3) Clarkfield Grain Co.: one processing plant (navy beans)
4) Klindworth: one processing plant (pinto beans)
5) Walton Bean Company: one processing plant (pinto and navy beans)
6) Valley Farmers Bean Association: one processing plant (pinto beans)

Industry Associations in the Two-State Area

There are two organizations in the North Dakota-Minnesota area which broadly represent the interests of the DEB industry. The Red River Valley Edible Bean Growers Association is a producer organization; the North Central Bean Dealers Association is a processor organization.

The Growers Association

The Red River Edible Bean Growers Association (RREBGA) was formed in February of 1976 by a group of growers in North Dakota and Minnesota. Prior to the association's official formation, the same growers were active in promoting their industry through a more loosely structured organization. They petitioned North Dakota State University at Fargo to assign a plant pathologist to work on edible bean diseases and also testified before the 1975 state legislature as to the industry's need for professional assistance. The University, in response to the petition, hired Dr. James Venette to study DEB pathology. The RREBGA currently has one full-time employee, Tim Courneya, of Frazee, Minnesota, who serves as executive vice president.

The RREBGA influenced the North Dakota State Legislature to pass the "Edible Bean Industry Promotion Act of North Dakota," which became law in April 1977 (6). This act requires that five cents per cwt. of edible beans marketed be collected for the promotion of the industry in North Dakota. The checkoff is deducted by processors at the point of purchase. The act also created the North Dakota Edible Bean Council to administer the money collected. The council has five members, each elected by growers from one of five edible bean districts of the state for a three-year term of office. Joe Larson of Portland serves as Chairman. The council has entrusted and funded the RREBGA to carry out the promotion of the area's industry. Most of the RREBGA's efforts have been directed toward the study of bean pathology and market development. The Legislature appropriated $250,000 to finance the organization for the 1977-79 biennium.[10] Minnesota also has a Bean Growers' Council, consisting of five grower members. The council is headed by Vice Chairman Bob Mehlhouse of Olivia, Minnesota. Its functions are similar to that of the North Dakota council and its activities are financed by a checkoff of five cents per cwt. from beans marketed in Minnesota.

The Bean Dealers Association

The area DEB processors have also found a need for working together in an organized fashion. Before becoming formally organized, the processors as a

---

[10]The appropriation for 1971-73 was $240,000.

group were active in promoting amendments to existing laws relating to maximum permissible storage charges. As a result, the law was amended to raise the ceiling on storage charges from two cents per month per bushel to 15 cents per month per cwt., giving dealers more flexibility to adjust storage rates according to fluctuations in prices and prevailing insurance rates (5). A common storage charge among area processors is eight cents per cwt., with variations from firm to firm. The amended law provides that North Dakota farmers must sell their stored beans by April 30 of the year following production or accept redelivery of their product from the processor less $3.00 per cwt. for processing charges. North Dakota and Minnesota pinto beans turn dark when stored beyond the spring of the year following harvest, so this legal provision was needed to protect the processors from possible misunderstandings or disputes with producers.

The North Central Bean Dealers Association (NCBDA) was formally organized in January 1977. Membership in the NCBDA is voluntary and open to all DEB processors of North Dakota, Minnesota, and South Dakota (there were none in South Dakota in 1977). All but a few of the area bean processing firms have become members. Associate membership is open to industries relating to the bean processing business and many firms have joined as associates. Annual dues, the only source of income, are $100 for members and $50 for associate members.

The NCBDA holds an annual winter meeting, usually in Fargo. Its board of directors meets each summer with the Bean Growers Councils of both North Dakota and Minnesota. The purpose of the association is to serve as a sounding board for the resolution of processor problems and to promote the interests of the processing industry in general. It provides an opportunity for processors to deal with issues in an organized group manner and serves as a point of contact between DEB dealers and representatives of related or associated industries.

The NCBDA is one of six major DEB dealer organizations in the United States. The other five are:

1) The California Bean Shippers Association
2) The Rocky Mountain Bean Dealers Association
3) The Western Bean Dealers Association (of Idaho)
4) The Michigan Bean Shippers Association
5) The New York Bean Dealers Association

All six of the regional associations are members of the National Dry Bean Council, which is responsible for promoting the industry nationwide. The Council has been active in promoting bean research as well as the consumption of beans.

Grower Contracts

Pinto Beans

Contracting with growers of pinto beans in the spring had not been common until recently. It appears that erratic price fluctuations and the relative absence of vertical integration in the industry had tended to discourage this kind of contracting. The market for pinto beans expanded dramatically in 1980 and 1981, largely because of exports to Mexico. Contracts with growers were used extensively in 1980 and 1981 as a result of the new demand. The contracts were based on a fixed price for Number One beans, mostly $23 or $24 per cwt. in 1981, and usually required the delivery of a fixed quantity. There has been very little contracting activity so far in 1982 because of uncertainty as to the size of the export market to Mexico.

Navy Beans

Contracting is common in the navy bean market. The 1977 survey showed that between one-third and one-fourth of the navy bean growers ordinarily contract a part or all of their production, mostly in the spring before planting. Processors ordinarily wait for the canning companies to announce the price they will pay for processed beans delivered at the cannery. This price is used by the processors in offering contracts to growers, allowing themselves a margin for processing, normally between $2 and $3 per cwt. The processors then are able to sign contracts with the canning companies for the delivery of a corresponding quantity of processed beans at the price agreed upon.

There are two principal kinds of contracts which processors make with farmers: the total production contract and the specified quantity contract. The total production contract requires the farmer to deliver to the processor the entire production from a certain number of acres at a predetermined price. The total production contract may be made at any time of the year; often it is made during the summer or early fall before harvest begins. This contract is

favorable to the farmer since there are no specified quantity obligations to meet, but it is unfavorable to the processor because he cannot make precise, back-to-back contracts with the canner or packager. The processor must speculate on price for that quantity of beans which either exceeds or falls short of the amount contracted with the canner or packager.

Under the specified quantity contract, the processor agrees to buy a specified quantity at a predetermined price. The farmer normally contracts only a portion of the production from the acreage planted. The amount contracted varies according to the desire of the farmer and processor, but processors have seldom permitted the contract rate to exceed 750 pounds per acre. Rates of 300 to 500 pounds per acre are common, because it is assumed that even in years of low yields the grower will be able to produce enough to fulfill the contract at this rate.

Competition Among Firms

Competition among area DEB firms increased during the decade of the 1970s as new processors entered the industry. Competition may take a number of forms other than price, some of which are listed below:

1) Through the distribution and promotion of seed sales in the spring. Farmers are likely to sell their harvested product to the firm from which they obtain seed.
2) Through maintaining physical proximity with area farmers. This has been accomplished by some firms through the establishment of receiving stations at locations convenient for distributing seed and receiving the crop at harvest time.
3) By establishing rapport with area farmers and by providing the services of individuals who visit with growers and help them resolve problems related to production and marketing.
4) By paying mileage to farmers for delivering their product to processing plants and receiving stations.
5) By grading and dockage procedures which may vary from firm to firm. Growers soon learn to avoid processors suspected of practicing irregularities in grading or dockage.
6) Through rates charged for the storage of beans in the processor's facilities until they are sold.

7) By obtaining a capable broker or merchandiser who can move the processor's product in years of abundant supply, and who can move low quality beans when frost or rain damages the harvest.

The most important factors determining the success of the DEB processor seem to be obtaining a large market share through establishing rapport with farmers and careful coordination of the buying and selling with a capable broker or merchandiser.

Problems in Marketing

The 1977 survey revealed some dissatisfaction among farmers and processors with respect to certain aspects of marketing. Farmers complained that the buying and grading practices of processors are often very subjective and vary from one processor to another. Procedures for determining grade, dockage, and price are not standardized.

The dockage procedure itself varies from firm to firm, and may vary from time to time for a given firm. Sometimes processing plants include the discolored or defective beans (referred to as the "pick") along with the "tare" or dockage weight, thereby taking what is commonly referred to as "double dockage."[11] There is also a lack of consistency among firms on the screen size used for grading the beans. Some firms, moreover, return the screenings to the grower after processing has occurred, while others do not. Firms also charge different rates for storage.

Processors have countered such complaints by stating that although there may be differences in grading and buying procedures, their objective is to take into their bins what they pay for. Some processors may quote a high grade and price and take heavy dockage, other firms will quote a low grade and price but take less dockage, so there is no net difference to the producer. The fact that processors use different screen sizes to grade beans is due to quality demands on the part of ultimate purchasers as well as their own frank appraisals of what their mills can do to meet grade specifications. Screens used in mills are interchangeable, and most often (though not always) the size screen used in the milling process is the same as that used for taking dockage and establishing the purchase price. Processors point out that area farmers

---

[11]For an example of double dockage, see (1, page 127).

are very quick to discover differences between firm buying procedures, but they are now coming to the realization that regardless of purchase and grading procedure used, area firms are really very competitive in their payments to farmers.

Processors who were asked whether they follow federal grading standards replied that packagers and canners impose their own grade and quality specifications on the domestic market. Domestic market specifications are usually more stringent than federal standards, especially with regard to bean color. Ordinarily only export shipments are made on the basis of federal standards.

Another area of concern to growers and small independent processors is the feeling that the large processing and trading firms have enough market power to control price movements so as to favor their own interests. Some farmers believe that bean firms buy when prices are low (especially in the early fall) and later on withhold supplies from the market so as to force prices to rise. There have been instances when all of an area's dealers went off the market simultaneously (9).

There may be some evidence to support this view. When price movements do occur, all firms move their prices in similar fashion. Processors have responded to this contention by stating that a bean company cannot afford to withhold its product from the market because buyers will go to a competitor for their supplies, and will later not return to the firm that withheld its supply. Sometimes processors purchase beans from farmers on an upward price trend and make large margins, but at other times they purchase on a downward price trend and are forced to sell at a loss. Processors contend that they must think in terms of average margins over the period of a year. They viewed their margins to be abnormally low in the 1977 marketing year.

Marketing Alternatives

Small, independent (often farmer owned) DEB processing firms have sprung up in partial response to discontentment with the marketing situation, Some have marketed their processed product through less common market channels. The National Farmers Organization has been instrumental in marketing small quantities of unprocessed beans, taking them directly out of the area and circumventing local processors altogether. Shipments of this

kind are federally inspected before leaving the farm, and the sale contract specifies that the grade and dockage level established by the federal inspector must be honored in the sale agreement.

Trade through these alternative marketing channels has been carried on in only limited amounts, yet it has provided a new competitive edge to the area's bean trade and has helped keep the area's industry in line with the national market. Small independent processors, however, have complained that discriminatory behavior has been practiced against them, and that it has been virtually impossible for them to gain entrance into DEB marketing circles. They claimed that on various occasions they were cheated by purchasers on either the grade, weight, or terms of sale and had no viable recourse for resolving the dispute. Generally, they have had difficulty moving their product at competitive prices during the years of abundant supplies.

Most area processors agree that having a sound relationship with a capable broker or merchandiser is essential for the bean processor. They say that it is unrealistic for a new processor to attempt to market a product independently. Traders point out that the demand for beans is quite inelastic and that a relatively large change in prices has very little effect on the quantity consumed. People in some processing firms have expressed the opinion that it would be advantageous for both producers and processors if only one trading interest were responsible for marketing the area's total production.

Dry Edible Bean Prices

Price movements usually become the center of interest in any marketing situation, and attempts to either explain the past or forecast the future are legion. Prices of DEBs are no exception. This report is focused on prices paid for pinto beans because of their importance to North Dakota and Minnesota growers. Bean market prices are usually arrived at through a process of bargaining by buyers and sellers, mostly by telephone. Price is ultimately shaped and determined by the supply-demand situation existing at all levels of the marketing chain. Long-term price trends reflect the seasonal supply-demand situation. Short-term price trends, however, are often not so much a function of total supply as they are a function of the amount available at the local elevator or bean plant. Farmers may try to wait for market prices to peak and then sell their beans on a downward-moving market.

Then traders must continue to bid up prices simply to obtain the supplies needed to cover the day-to-day operating needs of packagers and canners. Farmers may put large volumes of beans on the market soon after the price peaks, so dealers then tend to go off the market for a time and resume purchasing, when prices have fallen.

Recently most of the North Dakota and Minnesota beans have been sold early in the marketing season. For example, in 1979, 50 percent of the crop was sold in the first two months (September and October) and 69 percent was sold by the end of December. In 1980, 58 percent was sold in September and October and 92 percent by the end of December (12, January 6, 1982).

Historical Price Movements

One unmistakable characteristic of pinto bean price movements in the past decade is the very wide variation from month to month and year to year. For example, the price quoted in December 1973 was $30.10 per cwt., and by March 1974 the price had doubled, reaching $60.75, a record high for any month since 1972 (Table 10). In May the quote was down to $53.50, and it declined steadily until September--the beginning of the harvest season--when it reached $30.15.

Prices of some agricultural products exhibit distinct seasonal movements in that they tend to reach low points at the same season year after year and show a similar repetitive pattern of annual high points. No such situation exists with respect to pinto bean prices, at least not in the past ten years. The ten year average of monthly prices shows a barely perceptible low in September, but for the rest of the year the price "curve" is almost flat (Figure 11). Prices in May and June tend to average slightly higher than in other months. However, the data for individual years show that the highest price for the year has never occurred in May, and the lowest price for the year occurred in September only twice, in 1974 and 1978. Prices were essentially flat in 1972, 1976, and 1980, with no seasonal pattern evident, except for a tendency for the price to be lowest in December. Prices were around $26.00 early in 1978, but drifted slowly downward to reach a low of $17.65 in August and September. In three years, 1973, 1977, and 1979, prices were also flat from winter until late summer, then they started to rise and reached the peak for the year in October or later (Figure 12). Prices were

TABLE 10. MONTHLY AVERAGE PRICES OF PINTO BEANS PER HUNDREDWEIGHT BY CROP YEAR, FOB DEALER, NORTHERN COLORADO, 1972-81[a]

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dollars per Cwt.											
1972	11.45	11.70	12.30	13.15	13.10	12.40	11.10	9.95	10.00	10.10	10.05	9.75
1973	9.35	9.60	9.50	9.35	11.20	12.95	13.20	17.10	17.90	24.25	27.90	30.10
1974	39.30	53.40	60.75	57.00[b]	53.50	42.90	39.80	41.00	30.15	35.70	32.55	32.95
1975	31.75	29.95	30.65	29.35	33.20	34.15	35.20	37.15	25.05	23.75	19.70	18.15
1976	16.10	16.45	17.60	15.70	16.30	15.85	15.40	14.05	14.65	14.95	14.35	13.45
1977	13.45	14.05	15.05	14.25	14.65	15.50	16.65	15.75	19.00	29.95	29.00	27.75
1978	26.00	26.30	23.45	20.80	20.90	20.05	18.10	17.65	17.65	19.35	18.60	21.80
1979	21.05	20.80	19.95	20.70	23.35	26.45	25.72	24.40	24.75	25.00	29.08	32.25
1980	34.95	35.25	34.88	31.55	33.00	34.78	34.35	31.25	32.13	31.62	33.81	32.30
1981	33.88	35.00	34.33	36.07	41.50	44.45	40.81	30.31	23.45	22.22	21.69	19.38

[a]Prices for 1972 thru August 1981 from Bean Market Summary (13), and from September 1981 thru December 1981 from Bean Market News (12).
[b]No price was quoted for April 1974; this value was interpolated from March and May quotations.

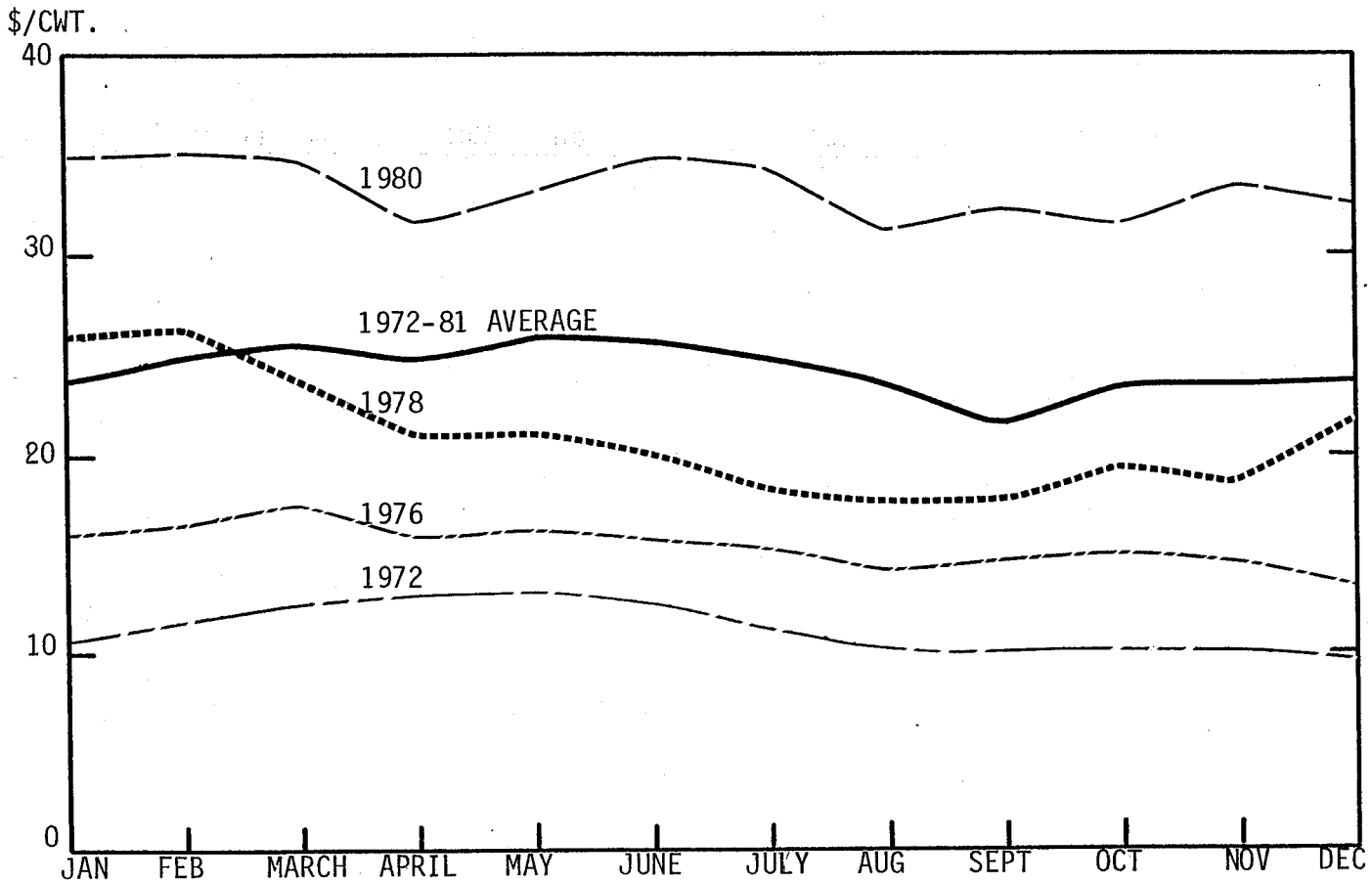


Figure 11. Monthly Prices for Pinto Beans, Selected Years (Showing Little Or No Seasonal Trend)

SOURCE: Table 10.

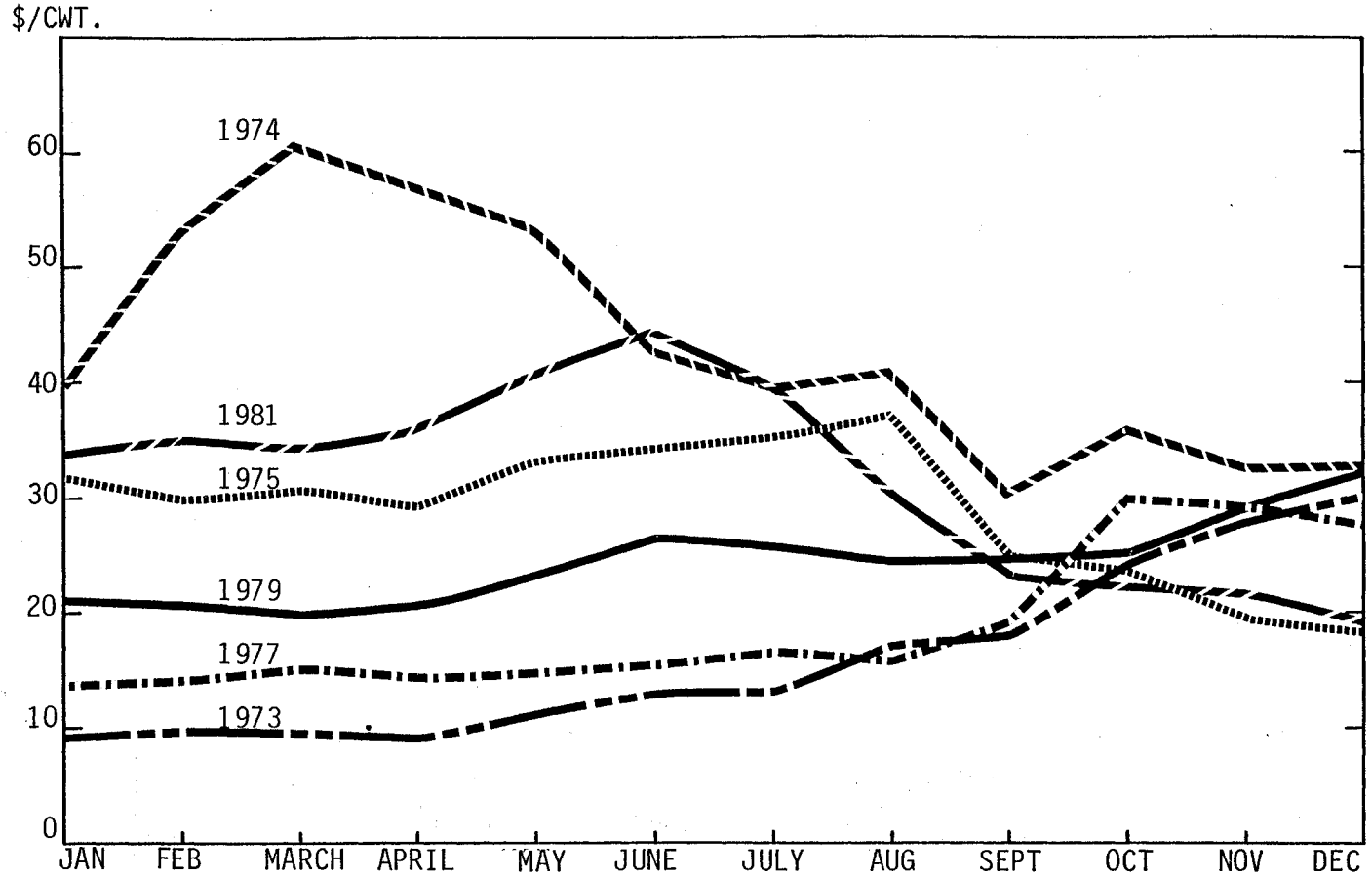


Figure 12. Monthly Prices for Pinto Beans, Selected Years (Showing Widely Different Seasonal Patterns)

SOURCE: Table 10.

relatively steady from January through April in 1975 and again in 1981, then rose fairly rapidly to a peak in August and June respectively, then dropped steadily, with the lowest price for the year in December. Such seemingly unexplainable price behavior makes planning difficult for the entire industry, including producers, processors, traders, canners, and retailers.

Research Into Factors Affecting Price[12]

People who deal in beans, or in any other product for that matter, are likely to be interested in discovering a formula for predicting future prices. An exhaustive review of literature has turned up only a few published studies concerning the factors affecting the price of DEBs. Some of the early work showed that the volume of bean production and the income of industrial workers appeared to have an influence on price, but none had developed a satisfactory equation for predicting price movements. A hypothetical model was developed in the 1977 study to show the relationship between pinto bean prices and a large number of factors, including production, exports, and carryover stocks of pintos and other types of beans as well as population, disposable income, and prices of bean substitutes. Regression analysis was used to test the degree of relationship, and a number of equations were developed in an attempt to explain how changes in the various factors were related to changes in prices. Economic theory would lead one to assume that an increase in the supply of beans would result in a decrease in price (and vice versa) but the statistics used in the regression analysis did not verify this assumption. The results suggest that more than one factor was influencing the pricing mechanism, and it was found that per capita disposable income combined with supply "explained" 64 percent of the price changes in the period analyzed.[13]

---

[12]Details of this research are reported in (1).

[13]The equation is as follows:

$$PBP = \underset{(8.26)}{12.57} + \underset{(.00125)}{.00727}\ PCI - \underset{(.00219)}{.00503}\ PBS \qquad R^2 = 0.64$$

Where PBP = Pinto bean price
PCI = Per capita disposable income
PBS = Pinto bean supply (production minus exports)

The equation did not prove to be a very accurate price indicator for either 1976 or 1977, for it overestimated prices in both years, though it correctly forecasted a higher price for 1977 than for 1976.

The regression analysis proved to be inconclusive. A predictive equation is often only as reliable as the assumptions under which it is developed. A basic assumption for the 1977 study was that the fundamental determinants of pinto bean prices did not change over the years. The assumption was probably incorrect; changes between commodity price-quantity relationships do occur from time to time. These relationships may persist for a number of years at certain levels and then take on new values after a given period of time. It is likely that the extraordinarily high prices for the 1973-1975 period were provoked by factors extraneous to the model and are statistically "unexplainable." Such an assumption, however, leaves open the possibility that vast "unexplainable" price movements could occur again. It is precisely these large movements of the dependent variable that are most important to predict.

Certain factors which might have influenced bean price movements were unmeasured and could not have been used in the regression analysis. The amount of stocks in dealers' hands at a given time might have an influence on prices; in fact, dealers have been known to stop buying altogether at times to dispose of inventory stocks deemed excessive. Also, it is possible that large traders could exercise some control over market prices because a few firms market a large portion of the production. Storage characteristics of North Dakota and Minnesota pinto beans may influence prices. Pinto beans produced in this area cannot be stored beyond April of the year following their harvest. When pinto beans are in abundant supply, prices are likely to sag first in North Dakota and Minnesota because the beans must be sold promptly. The quality of beans produced in any given year is also a factor affecting price. Historical price quotations shown in Table 10 are based on grade Number One. There have been years, such as 1974, when a large portion of the pinto beans in the area were of low quality because of an early frost. Prices quoted for Number One beans in such years may be abnormally high relative to the lower grades because high quality beans may be in short supply.

Summary and Implications

Production Increases and Regional Shifts

Production of dry edible beans has almost doubled in five years, from 16.6 million cwt. in 1977 to 31.8 million cwt. in 1981. A major portion of the increase was from pinto bean production in North Dakota and Minnesota. Rapid growth in the export market, particularly to Mexico, has no doubt been a strong motivating factor influencing production. During the winter of 1982, Mexico delayed forward buying, and domestic marketing firms have been slow to offer contracts to growers. These developments have created some concern among North Dakota growers that a peak in production may have been reached.

The development of the industry was in part due to the initiative of certain private entrepreneurs who took the steps to get the industry started. In so doing, both farmers and merchants gained expertise in producing and marketing beans. This expertise, together with a substantial investment incurred in equipment and facilities, will serve as a stabilizing factor and will encourage continued production in the area (1). Another reason for optimism about future DEB expansion lies in the prospects for world population growth. The demand for inexpensive protein sources will also grow as populations continue to increase, and DEBs are one of the cheapest sources of protein now known.

There are good reasons to believe that DEB production may continue to be profitable for North Dakota and Minnesota growers. On the other hand, some problems may inhibit further growth of bean production. The rapid spread of sunflower production may pose a threat. Sunflowers have been yielding a high return per acre and compete directly with beans. Both crops serve as hosts to white mold, a disease to which they are mutually susceptible, so they are incompatible in a crop rotation. Bean diseases will continue to be a problem for producers, even without any complications which may be due to sunflower production. The North Dakota Agricultural Experiment Station has a specialist in Plant Pathology who devotes full time to research on bean diseases. The Department of Agronomy has a DEB breeding program which seeks to develop new varieties which combine disease resistance with other desirable characteristics such as increased yields, higher protein

level, improved bean quality and more desirable vegetative characteristics to make cultivation and harvesting operations more efficient. These research efforts are strongly supported by the Red River Edible Bean Growers Association, as well as by the Edible Bean Councils of North Dakota and Minnesota.

Consumption

Domestic DEB consumption patterns have remained consistent over the years. Low-income, rural, and minority ethnic groups are the principal DEB consumers. In the United States, colored beans are consumed mainly in the South, and white beans are consumed primarily in the North.

Efforts to promote the consumption of beans have been limited. The U.S. Department of Agriculture has purchased DEBs for school lunch programs occasionally, but these purchases have been sporadic. A solid promotional effort on part of the entire industry might prove effective in increasing consumption of beans as a food source, particularly if the program were to emphasize protein quality and the low cost of bean protein relative to that obtained from other sources.

The Export Market

The export market is probably the most important factor affecting the future of bean production in the United States. For the 1980-81 market year, 71 percent of the pinto beans were exported, as were 63 percent of the great northerns and 37 percent of the navy beans. Most of the pintos go to Mexico, where the future size of the market for U.S. beans is uncertain. Fluctuations in the export market for navy beans are less severe and seem to cause much less anxiety among producers and dealers. Most exports of navy beans go to canners in England, who work quite closely with the Michigan Bean Shippers Association. Rapport has been established over the years so that the English canners feel they have a reliable source of supply and the producers and dealers feel confident that they have an outlet for their market. If a way could be found to develop similar rapport with importing agencies in other countries, especially Mexico, some of the uncertainty in the export market might be reduced.

Grades and Standards[14]

Some North Dakota-Minnesota farmers have complained that they are sometimes cheated by dealers who are subjective about dockage and grading procedures. For this reason, numerous small, independent firms (some of which are farmer owned) have entered into processing and marketing activities. Dealers have responded to farmer complaints by saying that, although dockage and grading procedures may vary from time to time, the effective price paid to farmers most often does not vary significantly between firms. They further state that farmers are quick to discover price, grading, and dockage differences and soon find the marketing arrangement that best suits their interests. Dealers also point out that some of the small, independent firms have gone out of business because they took insufficient dockage, overgraded, or allowed themselves too small a margin.

The problem of standardization in dockage and grading procedures is further complicated by the fact that the domestic DEB industry has its own standards apart from those established by the U.S. Department of Agriculture. It is illogical to conclude that it would necessarily be to the advantage of the producer if all beans were marketed on the basis of federal grades and standards, because industry grade requirements are more exacting than federal requirements and therefore provide for a more sensitive pricing mechanism.

Market Structure

The nation's DEB industry structure is characterized by many sellers (producers) and few buyers (dealers and processors). The navy bean and great northern bean industries are much more highly concentrated (both geographically and in market share) than is the pinto bean industry. The degree to which large-scale buying firms can exert pressure on market prices to favor their own interests is subject to question. Large firms are often price leaders, and smaller firms are price followers. DEB dealers usually move their prices in unison.

The marketing of DEBs appears to be competitive; rival firms compete with one another to increase their market shares. Marketing circles are

---

[14]The material in this section and the next two sections refers to 1977 conditions and is taken from the 1977 market survey (1).

tightly knit, meaning that newcomers often find difficulty in gaining entrance into them. Market information is scarce and highly valued, and may be the most significant single factor in determining the success or failure of the bean marketing firm. In general, large firms have more market information than small firms because their marketing contacts are broader. Various small processing operations have failed simply because they did not have the information and expertise required to market their product to their own best advantage, or because they were unable or unwilling to spend the time and money needed to gain this information and expertise.[15]

Recommendations

Given that there are many small independent firms, as well as a few large ones, handling all the major DEB types, it is evident that competitive forces are present in the marketplace. However, due to a lack of information and marketing expertise, some small firms seem unable to compete on all levels. Large firms tend to prevail, both because they have more market information and expertise and because they control a large market share. To make the market more competitive, it seems desirable to work within the present market structure. External regulations or control by state or federal agencies would most likely only decrease marketing efficiency. It is also doubtful that a radical restructuring of the industry would result in greater market efficiency. Based on knowledge gained in conducting this study, it seems that the most effective way of assuring a competitive DEB marketing system may be to make more information about the industry available at all its levels. Better information might tend to reduce risks and therefore permit lower operating margins for dealers. Likewise, with more information available, the barriers to entry for new firms might be lessened.

---

[15]Large size does not necessarily insure a firm against failure. The Wickes Company, Inc. is a large corporation with many retail divisions in addition to its agricultural interests, which include five DEB processing stations. The company filed for "Chapter 11" bankruptcy on April 24, 1982 (The Wall Street Journal, April 26, 1982). As a result, the status of the beans held in its North Dakota elevators is in question (The Forum, Fargo, ND, April 27-28, 1982). Other bean handling companies are reported to be in financial difficulties because of current economic conditions.

Information of two types would be of value: 1) more complete data on the supply/demand situation for DEBs, and 2) an industry-wide directory of firms. Information of the first type is already being supplied to some degree by the U.S. Department of Agriculture's Bean Market News and other government and industry publications. Information of the second kind is much more scarce, despite the considerable demand for it. A directory of the firms in the industry could possibly be established and updated under the auspices of the National Dry Bean Council, which is in a position to undertake projects in the name of the entire industry. Such a listing would be helpful in establishing trade contacts between domestic dealers and domestic and foreign purchasers, and may prove to be a very valuable asset to the DEB industry.

References

1. Dufner, Hubert J., "Dry Edible Bean Marketing in the Red River Valley," unpublished M.S. Thesis, North Dakota State University, Fargo, 1978.

2. Johnson, Roger G. and Etaferahu Takele, "Dry Edible Bean Production Practices and Costs, Red River Valley, North Dakota," Agricultural Experiment Station, North Dakota State University, Fargo, December 1980.

3. Lamey, H. Arthur, "1982 Field Crop Fungicide Recommendations," Circular PP-622 Rev., Cooperative Extension Service, North Dakota State University, Fargo, December 1981.

4. Minnesota Agricultural Extension Service, "Production Guide: Dry Edible Beans," Special Report 40, St. Paul, Minnesota, circa 1973.

5. North Dakota Legislative Assembly, "Amendments to Legislation Pertaining to Storage of Dry Edible Beans," North Dakota Century Code 60-02-16, -17, -30, -31, and -32, March 1977.

6. North Dakota Legislative Assembly, "Edible Bean Promotion Act of 1977," North Dakota Century Code, Chapter 4 - 10.3.

7. North Dakota State University, Agricultural Experiment Station, "North Dakota Agricultural Statistics," compiled by North Dakota Crop and Livestock Reporting Service, ESS, USDA. Ag Statistics No. 48, 1981; Ag Statistics No. 50, 1982.

8. North Dakota State University, Agricultural Extension Service, "Dry Bean Production Handbook," Circular A-602 Revised, April 1981.

9. Smith, Art, "Future Role of Cooperatives in Marketing Beans, Peas, and Lentils," Economics, Statistics, and Cooperatives Service, USDA, Farmer Coop. Res. Rep. No. 16, Washington, D.C., March 1980.

10. U.S. Department of Agriculture, "Agricultural Statistics," various years, U.S. Government Printing Office, Washington, D.C.

11. U.S. Department of Agriculture, Agricultural Research Service, "Food Consumption of Households in the United States," Vol. 1-5, 1977, (in process of printing).

12. U.S. Department of Agriculture, Agricultural Marketing Service, "Bean Market News," weekly, Denver, Colorado.

13. U.S. Department of Agriculture, Agricultural Marketing Service, "Bean Market Summary," annual 1976-81, Denver, Colorado.

14. U.S. Department of Agriculture, Economic Research Service, "Agricultural Outlook," Washington, D.C., March 1982.

15. U.S. Department of Agriculture, Statistical Reporting Service, "Crop Production, Annual Summary," January, Washington, D.C., various years.

References (Continued)

16. U.S. Department of Agriculture, Statistical Reporting Service, "Prospective Plantings," CrPr 2-4, Washington, D.C., February 1982.

17. U.S. Department of Commerce, Bureau of the Census, "Census of Agriculture," Washington, D.C., 1925, '30, '35, '40, '45, '50, '55, '60, '65, '70, '74, '78.

18. Venette, J. R. and H. A. Lamey, "Dry Edible Bean Diseases," PP-576 Rev., Cooperative Extension Service, North Dakota State University, Fargo, ca 1981.

List of Tables

List of Figures