



Marketing of malting and feed barley in Montana and in the United States
by Edward Dean Vaughan

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY in Agricultural Economics
Montana State University
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Abstract:

The apparent need for this study arose in about 1957 when the barley variety Betzes was released in Montana as a potential malting barley. Following designation by the Malting Barley Improvement Association of Betzes as an approved malting variety, there immediately arose many problems of marketing.

Purpose of this study was to examine the market for barley and malting barley in the context of the opportunities and problems in the marketing of malting barley produced in Montana. Objectives were to attempt to determine whether, and if so, what form of marketing improvements might be made and to examine the market in terms of needed research aimed toward the solution of marketing problems. The study was conducted largely as a library type analysis utilizing secondary sources of data. The purpose, objectives, methods' and progress of the study were discussed and approved in a meeting of the thesis committee at Montana State College on December 11, 1962. At that time the study was visualized as a panoramic view of the market structure and as a basic reference piece on malting barley marketing. A companion study of the nature of the market for malting barley specifically in Montana was initiated by the Montana Experiment Station in 1960 and, at this writing, was in progress.

This study included a description of United States and Montana production, distribution, and marketing of barley and malting barley. The malting and brewing processes were reviewed in terms of the market requirements for malting barley. The brewing industry was examined from the point of view of consumption of beer, the major end product of malting barley. Pricing and price relationships were analyzed and related to governmental price and production policy. As an important market outlet, the export market was considered in terms of future prospects for the maintenance and possible expansion of overseas sales' of barley.

The writing of this dissertation was considered by the author as an anti-climax in that the chief contribution of the study and its related efforts has been to the development of Extension Service educational programs concerned with the marketing! and production of malting barley. It is hoped that this writing will further contribute to those programs and to future research studies dealing with more limited and specific marketing problems.

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IN MONTANA AND IN THE UNITED STATES

BY

EDWARD
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A thesis submitted to the Graduate Faculty in partial
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in

Agricultural Economics

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ABSTRACT

The apparent need for this study arose in about 1957 when the barley variety Betzes was released in Montana as a potential malting barley. Following designation by the Malting Barley Improvement Association of Betzes as an approved malting variety, there immediately arose many problems of marketing.

Purpose of this study was to examine the market for barley and malting barley in the context of the opportunities and problems in the marketing of malting barley produced in Montana. Objectives were to attempt to determine whether, and if so, what form of marketing improvements might be made and to examine the market in terms of needed research aimed toward the solution of marketing problems. The study was conducted largely as a library type analysis utilizing secondary sources of data. The purpose, objectives, methods and progress of the study were discussed and approved in a meeting of the thesis committee at Montana State College on December 11, 1962. At that time the study was visualized as a panoramic view of the market structure and as a basic reference piece on malting barley marketing. A companion study of the nature of the market for malting barley specifically in Montana was initiated by the Montana Experiment Station in 1960 and, at this writing, was in progress.

This study included a description of United States and Montana production, distribution, and marketing of barley and malting barley. The malting and brewing processes were reviewed in terms of the market requirements for malting barley. The brewing industry was examined from the point of view of consumption of beer, the major end product of malting barley. Pricing and price relationships were analyzed and related to governmental price and production policy. As an important market outlet, the export market was considered in terms of future prospects for the maintenance and possible expansion of overseas sales of barley.

The writing of this dissertation was considered by the author as an anti-climax in that the chief contribution of the study and its related efforts has been to the development of Extension Service educational programs concerned with the marketing and production of malting barley. It is hoped that this writing will further contribute to those programs and to future research studies dealing with more limited and specific marketing problems.

CHAPTER I

BARLEY MARKETING IN MONTANA

Until 1954, when wheat acreage restriction went into effect, barley was a relatively minor crop in Montana. Since then, production has increased to the point where Montana ranks among the leading states in barley production. For all practical purposes, barley is the only significant alternative on much of the diverted wheat acres. During the late 1950's, annual production of barley in Montana varied from 41 to over 52 million bushels.

Historically, grain trade channels in Montana have been geared to the handling of wheat. The trade found it difficult to segregate barley from other grains during the processes of marketing. With increasing production of barley, there arose problems of harvest, storage, transportation, pricing, quality, variability of supply, interregional competition and market outlets. Foreign markets became an important, but unstable, market factor. Barley producers also discovered that Montana's livestock feeding industry was not keeping pace with increasing feed grain production.

The release of Betzes barley by the Montana Experiment Station (in 1957) and its approval by the trade as a malting variety (in 1958) provided an opportunity for Montana producers to take advantage of price premiums associated with the sale of malting barley.

The malting industry annually uses approximately 100 million bushels of barley. About 10 percent of the total usage or 10 million bushels is two-row malting barley. Until 1957 this market, largely in the Midwest and East, was satisfied by Idaho, Oregon, and northern California. With

the approval of Betzes as a malting variety by the Malting Barley Improvement Association, Montana began to compete with other two-row barley producers in the Pacific Northwest.

In the meantime, freight rates on Washington and Oregon malting barley were reduced, offsetting Montana's advantage in shipping barley to midwest malting centers. Colorado, Idaho and Alberta, Canada, began producing Betzes barley. Agronomic research for improved malting varieties continued in all barley producing areas. Within a period of two or three years the question changed from "Can Montana produce an acceptable malting barley?" to "Can Montana successfully compete in the marketing of malting barley?"

Malting barley is produced in Montana in the Gallatin Valley and in Teton, Pondera, and Glacier Counties. The principal markets are the malt houses located in Minnesota and Wisconsin. The problems associated with its marketing are found at all levels.

Little previous work dealing with the economics of marketing malting barley has been done. In Montana research and extension work has been concerned primarily with problems of production and the technological problems of harvesting and handling by farmers.

Some time after this dissertation was started, a research project was initiated by the Agricultural Economics Department of Montana State College, entitled Marketing Two-Row Malting Barley in Montana. ^{1/} The objectives of

^{1/} Ewasiuk, W. J., Project Statement, Montana AES, September 27, 1960.

the project were to:

- (1) Examine the market potential and specific outlets for Montana malting barley.
- (2) Determine the buying and selling practices of elevators and maltsters.
- (3) Recommend changes in marketing procedures.

The project was designed as a study of the specific nature of the marketing of two-row malting barley in Montana and as a complementary study to this dissertation which was designed as a "panoramic view of the market structure and problems of the United States malting barley marketing." 2/

The Problems

By the mid-1950's, Montana's barley marketing problem had become serious. In a 1957 Master's degree thesis, Fedje 3/ hypothesized that even though the Montana market for barley was undeveloped, the market could be expanded through increased livestock feeding, increased production of malting barley, and through new and expanded market outlets such as the export market for pearled barley. At the time of Fedje's study, Montana had no approved malting variety of barley. Hence his analysis and conclusions were directed mainly toward expanded livestock feeding as a market for barley.

2/ From notes taken during a meeting of the dissertation committee at Montana State College, December 11, 1962, attended by Clive R. Harston, Chairman; John L. Fischer; William J. Ewasiuk; and the author.

3/ Fedje, D. L., An Analysis of the Market Structure for Montana Barley and Potential Outlets, Montana AES Agricultural Economics Research Report, No. 1, Bozeman, Montana, May, 1957.

During the period 1954-1958, plant breeders at Montana State College were being pressed to develop an acceptable malting barley. Compana, the variety in greatest production, was not recognized either by the United States Department of Agriculture or by the malting industry as a malting variety. 4/ The variety Betzes, which was brought to the United States from Poland, was first tested in Montana as a possible malting variety in 1953. It was released in 1957 for commercial production and recommended for irrigated land or for areas of above normal rainfall east of the Continental Divide in Montana. 5/ Betzes yields satisfactorily on dry land but cannot be expected to consistently produce a malting quality barley. It compares favorably with other varieties as a feed barley. It is also recommended as a pearling barley.

Agronomically, Betzes is a two-row, medium-early variety of moderate yield. It is white seeded, midtall, moderately stiff strawed, rough awned, has medium to small seeds, and has a tendency to shatter when mature. 6/ Montana's climate is favorable for the production of bright, disease-free barley. But the climate also results in high protein barley which is

4/ Small quantities of Compana were being used for malting by the Great Falls Brewing Company.

5/ Montana Cooperative Extension Service mimeo folder, Betzes Barley in Montana, Bozeman, Montana, March, 1958.

6/ Montana AES Cereal Quality Control Laboratory Second Annual Report, released as The Malting Quality of Montana Barleys in Agron. and Soils Department, Mimeo Leaflet No. 30, Bozeman, Montana, October, 1959.

undesirable in malting. 7/ Thus the future for malting barley in Montana appears to be on irrigated land or in areas of high rainfall - conditions favoring the production of a lower protein content barley.

Just as all barley is not necessarily acceptable for malting, neither is Betzes necessarily acceptable for malting even though an approved variety. 8/ Thus, ideally, barley must be segregated from other grains; Betzes must be segregated from other barley until tested; portions of Betzes meeting malting requirements must be segregated from that which does not meet the requirements; and malting quality portions of the Betzes crop may need to be further segregated into lots which are relatively uniform in such malting quality factors as protein content; test weight; color, size, and plumpness of kernel; rate of germination; and kernel damage. Few, if any,

7/ Protein is a nitrogenous compound. If there is too much protein--hence too much nitrogen--in barley, chemical reactions result in a malt which may cause instability in the finished brew. Some nitrogen is necessary in the malt to furnish nutrient for the yeast during fermentation. Nitrogen also acts as a carbonic gas carrier in the finished brew. Thus too much nitrogen causes a "hazy" beer, but too little slows fermentation. See: Banasik, O. J., "Evaluation of Barley Quality," North Dakota Agricultural College, Bimonthly Bulletin, Fargo, North Dakota, July-August, 1957.

8/ In a paper presented to the Western Barley Conference at Spokane, Washington, in 1955, John H. Parker of the MBIA said: "Malt for brewing may be made from nearly any kind of barley. However, it is only reasonable that brewers and maltsters prefer the higher quality barleys for their particular purposes. Thus total barley production is not a necessary indicator of the quality of the malting barley available. Frost, diseases, etc., may not significantly reduce total barley production but may seriously reduce the supply of high quality barley for malting."

individual producers or grain handlers have had sufficient storage facilities to handle the relatively small quantities produced or received according to the above described ideal quality segregation.

Pricing problems have also been evident. Even though a particular lot of Betzes may meet malting standards, it does not necessarily follow that a malting price will be paid. In some cases producers have felt that premiums should be paid for all Betzes. In other instances grain handlers have purchased Betzes from farmers at malting prices and later found that they had to resell it at feed prices--or vice versa.

The handling, storing, and pricing problems in the marketing of Betzes were additionally complicated by a lack of understanding of the malting and brewing industries by both producers and local grain handlers.

These and other problems were recognized by producers and the grain trade. The Director of the Malting Barley Improvement Association said:

"If Montana is eventually in the position of marketing large quantities of malting barley, it must be recognized that this barley will very likely have to be marketed through the recognized grain marketing channels and be sold on the Minneapolis market as is other malting barley produced in the Midwest." 9/

Proposed Producer Marketing Associations

Betzes barley producers, generally, were sympathetic with the storage and handling problems of the grain trade but were not content with an inadequate marketing system for a new crop which, though small relative to wheat, held the potential of significant additional annual farm income. In

9/ Letter by A. J. Lejeune, Director, MBIA, Addressed to E. D. Vaughan, Montana Extension Service, March 7, 1958.

the summer of 1958, there occurred an incident illustrative of Montana's malting barley marketing problems. That incident is summarized in the following paragraphs.

Members of the Gallatin County Grain Growers Association, who were producers of Betzes barley, were dissatisfied with the marketing of their crops. Their reasons were that local grain marketing facilities apparently could not adequately handle the problems of testing, segregation, and pricing of Betzes as a malting barley. Their proposed alternative was to form a producers marketing and/or bargaining association to sell their barley direct to maltsters. The Montana Cooperative Extension Service Marketing Economist, E. D. Vaughan, 10/ and the Gallatin County Agent, Owen Wirak, 11/ were requested to assist in determining the feasibility of the proposal. It was decided that the Extension Marketing Economist would visit the Minneapolis Grain Exchange and interview commission firms, maltsters, and others interested in the malting barley market concerning the proposed bargaining association. Grain trade representatives interviewed were cordial, interested, alarmed, and unanimous in their reactions

10/ Now Assistant Director, Marketing Division, Federal Extension Service, USDA, Washington, D. C.

11/ Now Marketing Specialist, Cooperative Extension Service, Washington State University, Pullman, Washington.

to the proposal. Their opinions were summarized as follows: 12/

- (1) The malting industry is actively interested in seeking out new areas of malting barley production.
- (2) Local elevator problems in the handling of Betzes as a malting barley are recognized and efforts are being made to overcome those problems.
- (3) It is recommended that producers store their barley on the farm at harvest time, have samples tested, submit test results to local elevators, who may then act as agent for producers in seeking malt house buyers directly or through grain exchange commission firms. Barley shipped to Minneapolis may be sold either "on track" or "to arrive", depending on market conditions at the time.
- (4) It is considered unethical for maltsters to send buyers into the producing area for direct purchase from producers.
- (5) If and when Betzes is produced in commercial quantities, local grain handlers will be active in the market.
- (6) Any attempt by a producer's marketing organization to sell direct to maltsters or to otherwise bypass regular grain trade channels will be opposed.

With a crop of barley ready for harvest, the producers, feeling more helpless than mollified, accepted the general recommendation in No. (3) above. Local elevators then made an apparently sincere effort to cooperate with producers in handling and marketing their malting barley. This compromise solution was generally adopted in all major Betzes-producing

12/ From a letter by E. D. Vaughan in the form of a Malting Barley Marketing Report, addressed to the Gallatin County Grain Growers Association, c/o Owen Wirak, County Agent, July 21, 1958.

areas in the state. It did alleviate--but it did not necessarily solve-- problems of segregated storage, sample testing, handling and pricing.

Some time later (in 1960) there was an attempt on the part of a group of farmers to combine the original proposal for a malting barley marketing bargaining association in the Gallatin Valley with the recommendations of the grain trade as given above. The following outline summarizes the proposal:

Proposed

Gallatin Valley Malting Barley Marketing Association

I. Background

1. Gallatin Valley wheat acreage allotments have been severely reduced. Malting barley appears as a profitable alternative crop.
2. Production conditions indicate the Gallatin Valley as a potentially reliable source of supply of high quality malting barley in relatively large total quantities.

II. Existing Marketing System

1. Same as traditional farmer to local elevator grain marketing methods with one exception: Barley stored on the farm until purchaser calls for delivery. Reason: Local elevators, geared to handling wheat, cannot properly bin and store relatively small quantities of malting barley.

III. Need

1. Producers market malting barley individually at different times, and in varying quantities and qualities.

2. Feel they aren't receiving full value for barley of malting quality and are not utilizing their potential bargaining power.

IV. Purposes

1. Educational--advice and assistance to farmers in methods of planting, harvesting, sampling, storing, testing, handling, marketing.
2. Profit--through emphasis on quality and concentration of volume under the marketing control of a bargaining association, producers may realize greater returns.
3. Reduced costs--buying costs to the grain trade should be reduced by having the output of many producers available through a single marketing agency.

V. Methods

1. Full utilization of established grain trade channels. Barley to be sold in the same manner as individual producers normally market their crops. Difference--selling the combined output of members by a sales committee of the association.
2. Producers to sign long-term, enforceable contracts naming the association as sales agent.
3. Association to specify malting quality standards and accept for sale only barley meeting those standards.
4. Producers required to have adequate farm storage facilities for maintenance of quality of grain stored.
5. Producers sample each load as binned. Association's representative samples each bin. Bin sealed. Producer's and association's representatives samples tested for quality simultaneously in State Grain Laboratory. 13/

13/ See quality report form on page 12.

6. Entire quantity under association control advertised for sale on the basis of quality as tested. (Buyer may re-test if desired.)
7. Buyer required to purchase the entire stock of the association. Delivery could be at one time or spaced within reasonable limits.
8. Proceeds, after costs, would be prorated to members according to quantity and quality.

The new or revised proposal was never carried out. Presumably, the producers involved could not agree on the details, and the grain trade remained cool to the proposal.

Although different in some respects from "regular" trade practices, the Gallatin Valley proposal for cooperative marketing of malting barley represented no drastic departure from regular grain marketing channels. For purposes of comparison, it may be noted that in the Pacific Northwest cooperative malting barley marketing is not an uncommon practice. In the state of Washington, for example, there have been at least two recent attempts to develop integrated organizations for marketing malting barley. One of these is concerned with the production of Atlas and Traill barleys in Columbia and Walla Walla Counties in southeast Washington. Extension agents in the two counties, local Crop Improvement Associations, and the Columbia County Grain Growers' Association worked together to supply malting barley on a contract basis to the Great Western Malting Company at Vancouver. The Western Farmers' Association of Seattle contracted directly with farmers to produce Hannchen for the Schlitz Brewery. Apparently, for

Betzes Barley Quality Report

Grower _____

Address _____

Lab. No. _____ Other identification _____

Weight per bushel _____ lbs. per bu.

Dockage _____ %

Sound barley _____ %

Moisture _____ %

Skinned and broken kernels _____ %

Other grains _____ %

Foreign material _____ %

Other barley _____ %

Damaged kernels _____ %

Type of damage _____ %

Protein (over-dry basis) _____ %

Kernel size assortment

on top 7/64 sieve _____ %

on top 6/64 sieve _____ %

on top 5/64 sieve _____ %

thru 5/64 sieve _____ %

Remarks:

Montana Grain Inspection Laboratory
Montana State College
Bozeman, Montana

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reasons unknown to the author, these two attempts have not been entirely satisfactory even though cooperatives dominate the Pacific Northwest grain trade.

CHAPTER II

BARLEY IN THE GRAIN MARKETING SYSTEM

Basically the need for studies of grain markets stems from the fact that the flow of grain through marketing channels is affected by ever changing kinds and amounts of production, technological advances, adjustments in farming operations, population and consumption patterns, domestic and international markets and competitive advantages. This is a study of the market for malting barley. The physical channels of marketing and the institutions involved are essentially the same for all grains, including barley and malting barley. Thus it would seem desirable to examine the grain marketing system to determine what changes have taken place in grain marketing and to determine how barley, as compared to wheat, is marketed. The changes and differences are important in possible recommendations for future changes in barley marketing procedures.

Grain Marketing Channels

The so-called "regular grain marketing channels" include the organizations and agencies which handle grain and perform the services of storage, delivery, processing, etc., from farmer to consumer. Typically, the channel includes:

Country elevators, handlers, and truckers constituting the farmers' primary market;

Brokers, agents, and dealers;

Secondary outlets including terminals, sub-terminals, and port elevators;

Food, feed, and industrial products processors;

Wholesalers, exporters, and the Commodity Credit Corporation;

Retailers.

For purposes of this study, the following definitions 1/ are assumed:

County elevators are those located in grain-producing areas and engaged primarily in receiving grain from farmers for future sale and delivery to secondary elevators. Country elevator size is up to about 10,000 bushel capacity.

Terminal markets consist of a grain exchange, several large secondary elevators, and a network of marketing agencies and facilities.

Terminal elevators are the large elevators located in terminal markets and whose primary function is that of receiving grain from country elevators and other sources for later sale or delivery to processors and exporters.

Sub-terminal elevators generally are larger than country elevators and are often, but not necessarily, smaller than terminal elevators. Size of sub-terminals may range up to 100,000 bushel capacity. Chief distinction between sub-terminals and terminals is that they are located in areas where there is no grain exchange.

1/ The definitions are those found in: Heid, W. G., Jr., Changing Grain Market Channels, Washington, D. C., USDA, ERS, Marketing Econ. Div., ERS, 39, November, 1961.

Port elevators may be of varying capacity and are distinguished by location at water transportation facilities for the handling of export grain.

Changes in Grain Marketing

During the past 20 years some of the important changes which have occurred in grain marketing channels include the following: 2/

Both the production and off-farm sales of all grains have increased.

Large (but now decreasing) amounts of grain have been channeled into Commodity Credit Corporation storage.

Country elevators have decreased in number and increased in size.

More grain is handled by the remaining country elevators, but more grain also bypasses them going from farmers to subterminals or terminals.

Volume of grain from country elevators going directly to processors has declined. Brokers, commission firms, and other agencies are now more likely to be an intermediate step in the channel.

Grain exports have increased.

The nature of the total barley marketing problem may be illustrated by use of United States Department of Agriculture statistics for 1959. For all

2/ Ibid.

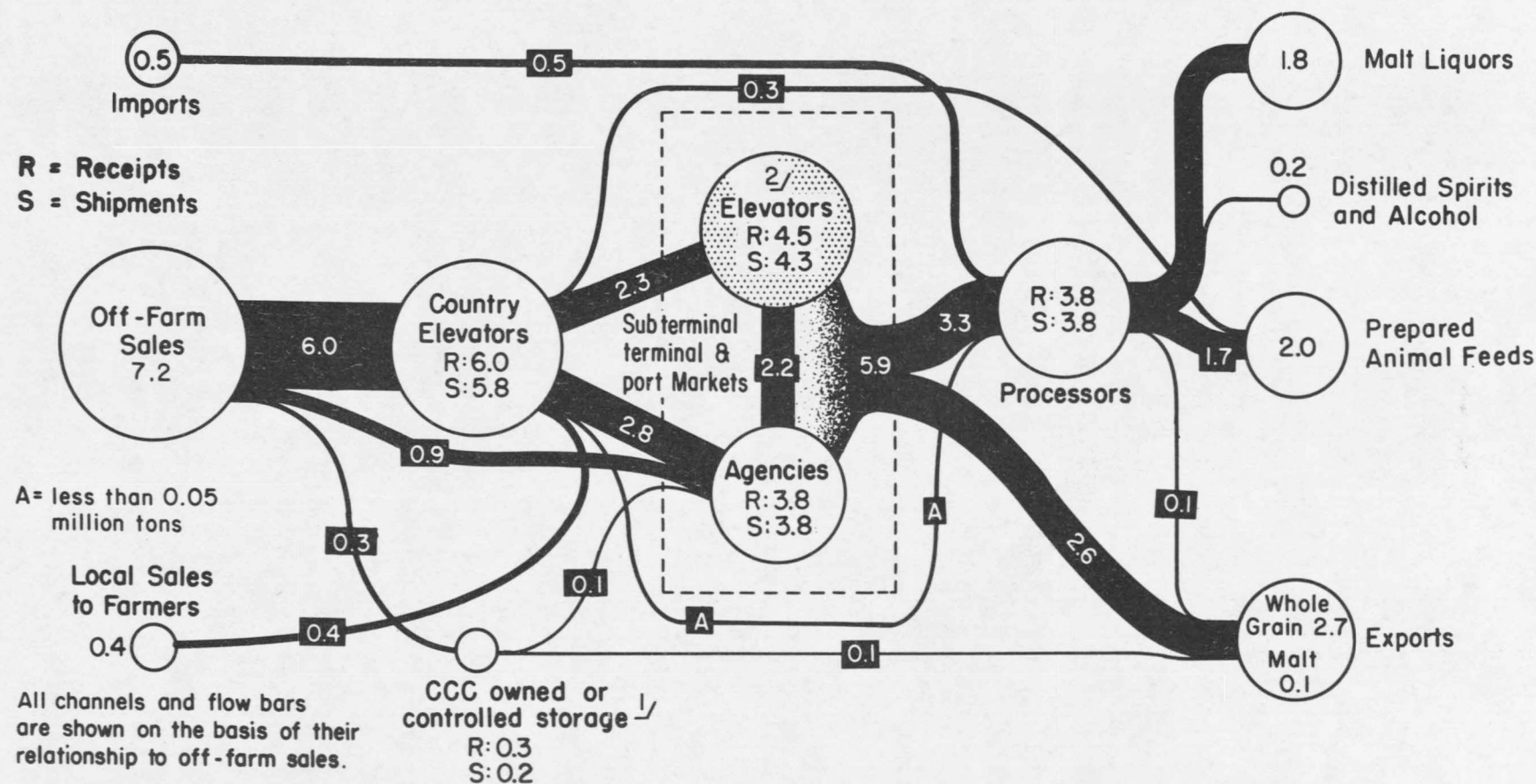
feed grains, country elevators received 85 percent of the total off-farm sales. Approximately 70 percent of the total barley produced entered marketing channels, but 17 percent of the amount marketed bypassed the country elevators. Therefore, because a relatively small volume of barley flows through country elevators, there is a chronic handling problem: Barley must be segregated from other types of grain and the small volume of barley finds it difficult to compete with other grains for bin space. For the year 1959, processors received about half of off-farm barley sales. Malt liquors accounted for 1.8 million tons of barley, 0.2 million tons went into distilled spirits and alcohol, 2.0 million tons went into animal feeds, 2.8 million tons were exported, and the remainder flowed into feed channels or carryover. Figure 1 shows the 1959 barley marketing channels.

Comparison of Barley and Wheat Marketing Channels

In the past there has been a common statement to the effect that most of the barley produced is used on the farms where produced and that most of the balance goes through regular channels into the malting trade. Figure 1 demonstrates that this particular "rule of thumb" has become inaccurate.

In 1959 a high percentage of the barley produced entered marketing channels (See previous paragraph.) From Figure 1 it may be calculated that:

Eight-three percent of off-farm sales of barley went to country elevators. Seventeen percent bypassed the elevators going directly to agencies (primarily commission firms) and a smaller amount to Commodity Credit Corporation owned or controlled storage;



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^{1/} Flow of other CCC-owned grain is included in the country and subterminal, terminal, and port elevator receipts and shipments.

^{2/} Shaded area indicates that 1959 receipts based on the 1939 definition of terminal elevators would have been approximately 88.4 percent of the subterminal, terminal, and port elevator receipts based on the 1959 definition.

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Figure 1. Marketing Channels for Barley - 1959.*

* Source: USDA photo.

Forty percent of country elevator sales were to terminal elevators; 48 percent to agencies; and 12 percent to prepared animal feeds, direct to processors, and local sales to farmers;

Terminal elevators received 51 percent of their supplies of barley from country elevators and 39 percent from agencies; Sales from the terminal markets (terminal elevators and agencies) were 56 percent to processors and 44 percent to export;

Fifty-three percent of processors' sales were to malt liquor and distilled spirits and alcohol, 45 percent to prepared animal feed products, and 2 percent to export;

Only 25 percent of off-farm sales went into malt liquors or about 17.5 percent of the barley produced.

From the farm to the terminal markets, the channels through which barley flows are nearly identical to those for wheat. In many cases the same firms within the channels handle barley, wheat, and other grains. For comparative purposes, Figure 2 presents the market channels for wheat. It may be calculated from Figure 2 that:

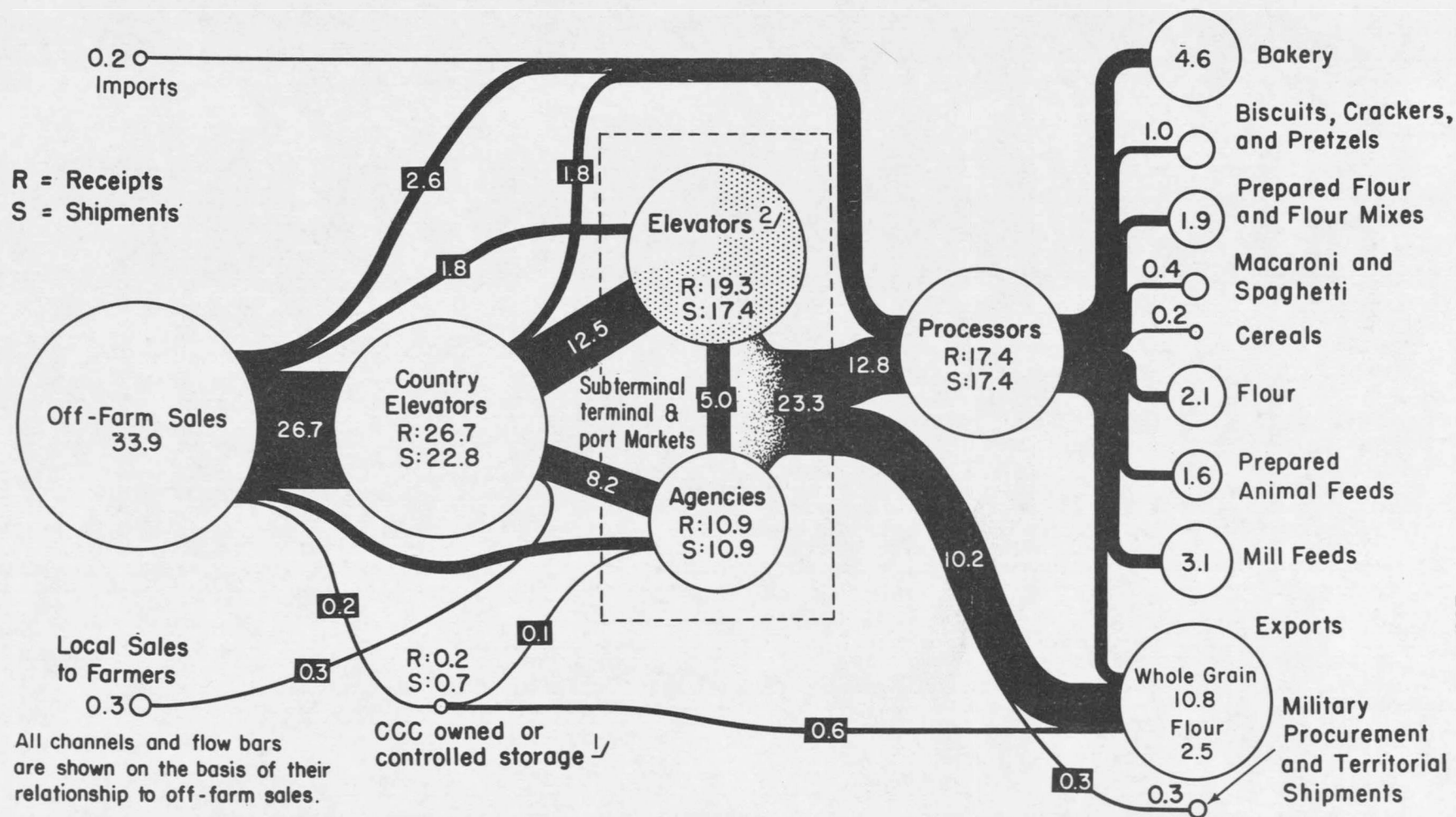
The volume of off-farm barley sales was only about 21 percent of off-farm wheat sales;

Seventy-nine percent of the off-farm wheat sales went to country elevators and 21 percent bypassed the elevators;

Fifty-five percent of country elevators sales of wheat were to terminal elevators, 36 percent to agencies, and 9 percent direct to processors and to local sales to farmers;

Sixty-four percent of terminal elevator receipts of wheat were from country elevators, 26 percent from agencies, and 10 percent direct from farms;

Sales from terminal markets were 55 percent to processors and 45 percent to export.



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^{1/} Flow of other CCC owned grain is included in the country and subterminal, terminal, and port elevator receipts and shipments. CCC acquisitions into commercial storage totaled 14.3 million tons during 1959. CCC dispositions from commercial storage totaled 3.9 million tons during 1959.

^{2/} Shaded area indicates that 1959 receipts based on the 1939 definition of terminal elevators would have been approximately 71.6 percent of the subterminal, terminal, and port elevator receipts based on the 1959 definition.

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Figure 2. Marketing Channels for Wheat - 1959.*

* Source: USDA photo.

From the above, it may be noted that even though barley and wheat market channels are essentially the same, there are these differences:

Volume of off-farm wheat sales was nearly five times that of barley;

A larger portion of off-farm barley sales goes to country elevators or a larger percentage of wheat bypasses country elevators;

Agencies handle a larger portion of the barley crop than they do of wheat (presumably to "spot" barley suitable for malting before it becomes commingled with feed barley);

Proportionately, sales to processors and to export of both wheat and barley from terminal markets were nearly identical.

Influence of Change on Barley Marketing

It may be hypothesized that the differences and changes noted in this chapter may separately or in combination influence the future course of malting barley marketing in one or more of the following ways:

Comparison of data on barley production, barley malt used for alcoholic beverages, and beer sales (See Tables I, IV, and XIII) lead to the assumption that consumption of the final product - beer - has been and probably will remain more stable and less subject to increase than the production of barley for malt. This, plus the fact that, if necessary, any barley may be malted, results in downward pressures on the price of malting barley;

Malting barley rarely if ever falls into government storage, but Commodity Credit Corporation holdings of other grains indirectly influence malting barley prices;

Fewer but larger elevators and the fact that barley marketings are small relative to wheat will result in increasing difficulties in handling malting barley on a segregated basis in areas where wheat or other grains predominate. An offsetting force may result from declining storage of Commodity Credit Corporation grains in commercial facilities;

Fewer, larger, and probably more specialized grain handling and processing facilities will give further impetus to the role of commission firms or other types of brokers and dealers.

CHAPTER III

BARLEY PRODUCTION AND DISTRIBUTION

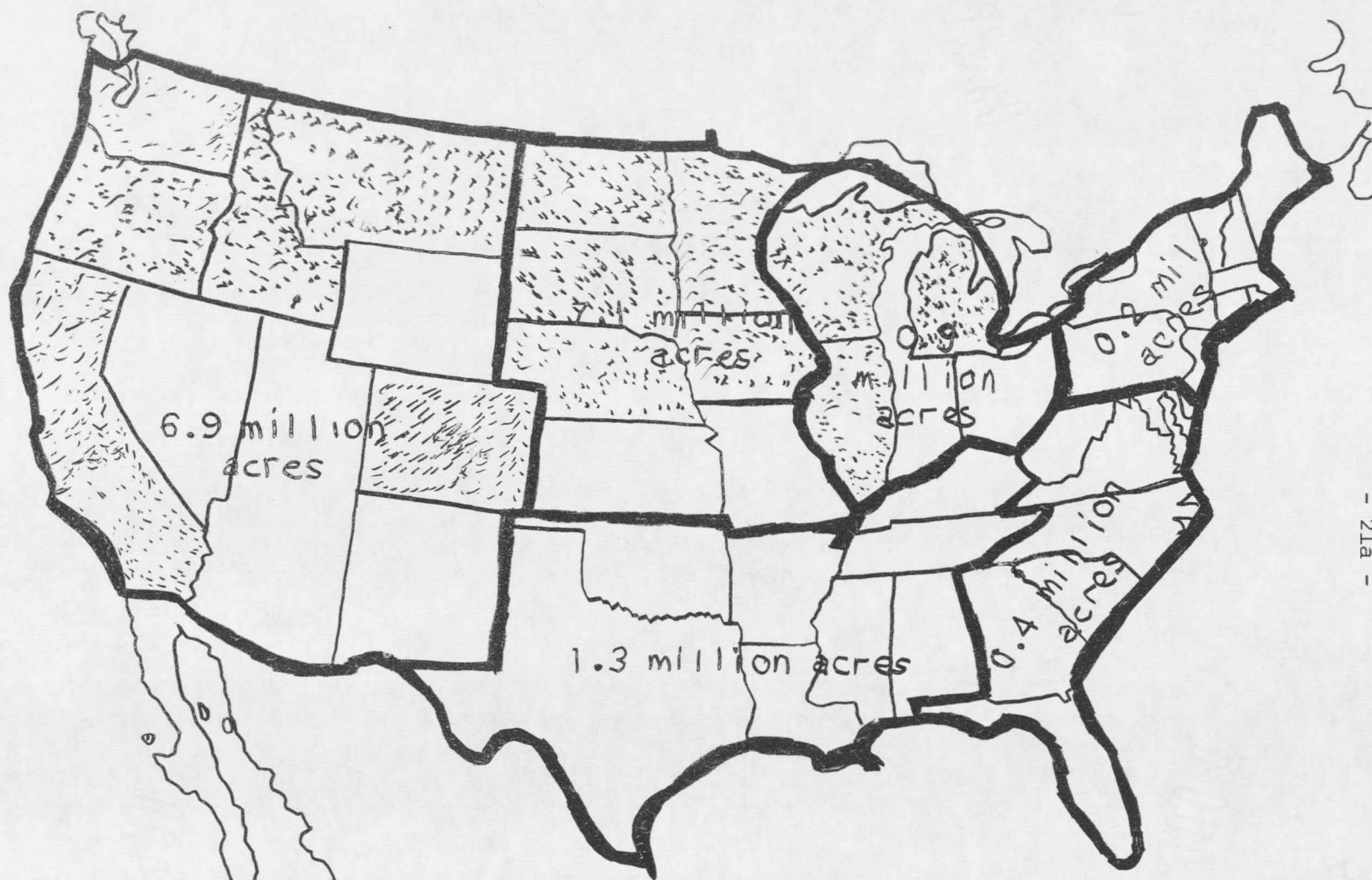
United States Barley Production and Distribution

During the years immediately prior to 1954, United States barley production was declining. In 1954, when wheat acreage restrictions became effective, acreage and production of barley increased sharply. From then through 1961, planted acres varied from about 15 million acres to nearly 17 million acres. These changes are shown in Table I. Simple average data for the years 1959-60 are used hereafter in this chapter. 1/ United States averages for 1959-60 were:

Acres planted	16,216,000
Acres harvested for grain	14,429,000
Yield (bu.) per harvested acre	29.6
Total production (bu.)	426,846,000

Where those 426.8 million bushels of barley were produced is indicated by Figure 3, showing estimated planted acres by regions in the United States. Regional data on acres of barley harvested for grain was increased by 12.5 percent (see footnote 1) to estimate planted acres. Shaded areas on the map in Figure 3 are the 14 malting barley producing States referred to in the 1962 feed grain program.

1/ Reason: The U. S. Feed Grain Program for 1962 legally defined 14 States as malting barley producing areas. The program used 1959-60 averages in computing acreage restrictions. Note that U. S. harvested acreage for 1959-60 was 12.5 percent less than planted acres.



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Figure 3. Estimated 1959-60 Average Barley Acreage Planted by Regions in the U. S. *

* Source: Grain and Feed Statistics through 1961, USDA, ERS, Stat. Bul. 159, Rev. June, 1962. Shaded areas indicate Barley Producing States included in the 1962 Feed Grain Program.

TABLE I. UNITED STATES BARLEY: ACRES PLANTED, ACRES HARVESTED FOR GRAIN, YIELD PER HARVESTED ACRE, AND TOTAL PRODUCTION, 1950-61. *

Year	Planted All Purposes 000 Acres	Harvested For Grain 000 Acres	Yield Bu/acres.	Total Production 000 Bu.
1950	13,010	11,155	27.2	303,772
1951	10,790	9,424	27.3	257,213
1952	9,190	8,236	27.7	228,168
1953	9,615	8,680	28.4	246,723
1954	14,740	13,370	28.4	379,254
1955	16,293	14,523	27.8	403,065
1956	14,732	12,852	29.3	376,661
1957	16,398	14,872	29.8	442,761
1958	16,150	14,791	32.3	477,368
1959	16,817	14,918	28.3	422,383
1960	15,614	13,939	30.9	431,309
1961	15,800	12,969	30.3	393,384

* Source: USDA, Grain and Feed Statistics, Washington, D. C., ERS, Stat. Bul. 159, Rev., June, 1962..

Table II provides a more detailed picture of barley-producing states. Total acres of barley planted (1959-60 average) in the 14 malting barley states are shown according to malting and feed varieties planted. From this data (Table II), it was calculated that 74.2 percent of the total United States planted barley acreage was in those states. Within the 14 states, 61.8 percent of the acres were planted to approved 2/ malting varieties

2/ Approved according to varieties exempt from acreage limitations of the 1962 Feed Grain Program.

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and that 38.2 percent of the acres were planted to non-malting or feed varieties. 3/

TABLE II. ESTIMATED PLANTED ACREAGES OF BARLEY IN FOURTEEN STATES IN THE UNITED STATES, 1959-60. *

State	Malting Acres	Feed Acres	All Acres
Washington	271,411	439,089	710,500
Oregon	247,500	302,500	550,000
California	377,472	1,306,028	1,683,500
Idaho	151,760	390,240	542,000
Montana <u>a/</u>	447,135	1,489,365	1,936,500
Colorado	29,800	583,700	613,500
North Dakota	3,288,893	522,107	3,811,000
South Dakota	415,710	142,290	558,000
Nebraska	---	342,500	342,500
Minnesota	977,130	9,870	987,000
Wisconsin	28,000	10,500	38,500
Michigan	38,000	46,500	84,500
Iowa	3,000	19,000	22,000
Illinois	11,500	76,500	88,000
Total	6,287,311	5,680,189	12,023,500

* Source: Extension Grain Marketing Specialists and State Statistician in the various states.

a/ Betzes only. If acres of Compana were considered as malting rather than feed barley, the figures for Montana would have been: Malting, 1,589,526; and Feed, 346,974.

3/ Calculated on the figure for Montana which included both Betzes and Compana as malting barleys. The figure for Montana shown in Table II includes only Betzes as a malting variety.

Principal Barley Producing States

Assuming United States average figures to be applicable to the malting barley producing region, it was calculated that the 14 states annually produced 192 million bushels of barley of malting varieties during the 1959-60 period. ^{4/} However, barley of malting varieties is not necessarily used for malting. From Table III it may be calculated that the United States average barley utilization for 1959-60 was 91,680,000 bushels malted for alcohol, alcoholic beverages, and for other malt food uses. Consequently, 100,749,274 bushels of barley of malting varieties were channeled into other uses.

According to Lejeune and Parker ^{5/} about 90 percent of the barley used for malting is of the six-row varieties and the remaining 10 percent of the two-row barleys. For 1959-60, this indicates a usage of approximately 82.5 million bushels of six-row barley and 9.2 million bushels of two-row barley.

The two-row malting barleys are produced primarily in the western states. Even though Compana barley in Montana was declared as a malting barley by the 1962 Feed Grain Program, Betzes was the only Malting Barley Improvement Association (MBIA) approved malting barley for the state. (See footnote in Table II.) Thus Montana was competing with Betzes only for its share of the two-row malting barley market.

^{4/} $7,429,702 \text{ acres planted} - 12.5\% = 6,500,989 \text{ harvested acres} \times 29.6 \text{ bu/A} = 192,429,274.$

^{5/} Lejeune, A.J., and Parker, J.H., "The Story of Malting Barley", What's New in Crops and Soils, February, 1955.

TABLE III. UNITED STATES BARLEY DISTRIBUTION, 1950-60. *

Year Beginning July	Domestic Use as Malt	Seed	Livestock Feed	Domestic Disappearance	Exports	Total Disappearance	Stocks End of Year
	000 Bu.	000 Bu.	000 Bu.	000 Bu.	000 Bu.	000 Bu.	000 Bu.
1950	101,400	17,804	144,512	263,716	40,000	303,716	93,569
1951	92,738	15,164	151,368	259,270	31,041	290,311	73,349
1952	83,440	15,672	134,031	238,143	37,053	275,196	51,231
1953	91,448	23,731	130,909	246,088	19,044	265,132	71,144
1954	88,025	26,232	186,237	300,494	43,463	343,957	130,550
1955	90,136	23,719	228,097	341,952	102,890	444,842	117,048
1956	84,036	26,401	215,512	330,949	61,842	392,791	127,460
1957	87,490	26,002	220,913	334,406	91,582	425,988	168,620
1958	89,676	26,403	232,005	348,084	116,685	464,769	195,530
1959	92,536	24,514	232,611	349,661	118,409	468,070	167,389
1960 <u>a/</u>	90,824	24,806	259,853	375,483	85,702	461,185	152,762

* Source: USDA, Grain and Feed Statistics, Washington, D. C., ERS Stat. Bul. 159, Rev. June, 1962.

a/ Preliminary.

Table IV, showing the estimated annual average production of western two-row malting barley, indicates production of about 22.5 million bushels or nearly 2 1/2 times the annual average utilization for malting purposes. Table IV was computed according to United States average yield per harvested acre and on the assumption that harvested acres were 12.5 percent less than planted acres. Thus the production data in Table IV are to be considered only as estimates derived to indicate conditions of supply of two-row malting barley. Data on actual acres harvested and yields per harvested acre of two-row barley were not available for individual states.

The Value of Betzes to Montana

Eslick and Shaw ^{6/} estimated the annual average production of Betzes barley in Montana at about 10.4 million bushels for 1959-60, or about 10 percent less than the estimates in Table IV. Assuming the possibility of a 10 percent $\pm$ error in the calculation for each of the states in Table IV, the annual average production of two-row western malting barley (1959-60) was somewhere between 20 and 25 million bushels. In the same paper, Eslick and Shaw estimated that Montana marketed an average of 20.5 percent of the Betzes crop or 2.1 million bushels as malting barley for the 1959-60 period. Their conclusions on the contribution of Betzes to Montana farm incomes are reproduced as Table V.

^{6/} Eslick, R. F. and Shaw, A. F., The Contribution of Betzes Barley to Montana Farmers' Income, unpublished paper, Montana State College, Bozeman, Montana, 1962.

TABLE IV. ESTIMATED PRODUCTION OF TWO-ROW MALTING BARLEY, WESTERN STATES, 1959-60 AVERAGE. *

	Mont.	Wash.	Ore.	Calif.	Idaho	Colo.
Est. total plantings of all varieties (acres)	1,936,500	710,500	550,000	1,739,500	542,000	613,500
Less est. 12.5% of plantings not harvested for grain (acres)	242,063	88,813	68,750	217,438	67,750	76,688
Est. harvest, all varieties (acres)	1,694,437	621,687	481,250	1,522,062	474,250	536,812
Est. plantings, two-row malting varieties MBIA approved for 1961 (% of total)	23.2	8.7	35.5	3.2	14.0	--
Est. harvest, two-row varieties (acres)	393,109	54,088	170,844	48,706	66,395	29,800
Est. yield (bu/harvested acre)	29.6	29.6	29.6	29.6	29.6	29.6
Est. annual aver. production of two-row barley (bu.)	11,636,603	1,601,005	5,056,982	1,441,698	1,965,292	882,080
Est. total production 6 states (bu).	22,583,660					

* Source: Malting Barley Improvement Association, Varietal Survey/s, Milwaukee, Wisconsin, 1959 and 1960; and Table XVIII.

TABLE V. THE CONTRIBUTION OF BETZES BARLEY TO MONTANA FARMERS' INCOME. *

Item. (See explanations below table.)	1955	1956	1957	1958	1959	1960	1961	Total or Average
Acreage planted to Betzes (%) <u>a/</u>	--	--	--	8.7	19.2	27.1	20.8	--
Betzes produced (bu.) <u>b/</u>	150	11,400	185,500	4,544,800	9,947,500	10,851,900	5,485,000	31,026,250
Marketed as malting barley (bu.) <u>c/</u>	0	6,000	40,000	3,575,000	2,134,000	2,145,000	1,800,000	9,700,000
Portion of crop going as malting barley (%) <u>d/</u>	0	53	22	79	21	20	33	31
ASC barley loan (\$/bu.) <u>e/</u>	--	.86	.77	.75	.59	.59	.79	.73
Estimated price for Betzes used for malting (\$/bu.) <u>f/</u>	--	1.05	1.06	.91	1.20	1.20	1.25	1.11
Malting barley premium over ASC loan (\$/bu.) <u>g/</u>	--	.20	.29	.26	.61	.61	.46	--
Season average price, all barley (\$/bu.) <u>h/</u>	--	.83	.72	.75	.67	.66	.84	.75
Estimated total premiums paid (\$) <u>i/</u>	--	1,200	11,600	929,500	1,301,740	1,308,450	828,000	4,380,490

- a/ Based on varietal surveys by State Agricultural Statistician.
- b/ State production of barley x percentage Betzes. This assumes Betzes is average in yield. Actually, Betzes is somewhat higher yielding than Compana, the other principal variety. Yield increases in some areas may have been offset by shattering losses. Betzes is also produced in areas that probably produce more yield than the state average.
- c/ This represents an educated guess based on conversations with maltsters, maltster buyers, grain handlers, county agents, etc. This could be obtained from maltsters if it were not considered a trade secret.
- d/ The fluctuations here are due to climate, in part, i.e., 1958 was a favorable year. By 1961, a considerable amount of the production was under irrigation even though the year was very poor.
- e/ These are for No. 2 barley or better in Pondera County.
- f/ Again, these are educated guesses and presumably represent an average, not top premiums. They represent prices paid to growers.
- g/ Relatively low premiums 1956-58 may be due to a period necessary to the development of industry acceptance. It should be recognized that local feed barley prices in many instances would be above loan price.
- h/ Based on values given by State Agricultural Statistician.

* Source: Eslick, R. F. and Shaw, A. F., Agronomists, Montana State College Experiment Station and Extension Service, respectively

Montana Barley Production

The role of barley in Montana's agricultural economy is indicated in Table VI, which shows cash receipts from farm marketings for all farm commodities, all livestock, all crops, and for barley. The average cash

TABLE VI. CASH RECEIPTS FROM FARM MARKETINGS IN MONTANA COMPARING BARLEY WITH ALL CROPS AND LIVESTOCK, 1950-61. *

Year	All Livestock and Crops	All Livestock	All Crops	All Barley	Barley Compared to All Livestock and Crops
	000 \$	000 \$	000 \$	000 \$	%
1950	353,780	166,607	187,173	10,391	2.9
1951	439,654	243,580	196,074	8,889	2.0
1952	400,541	195,501	205,040	9,311	2.3
1953	370,612	147,784	222,828	7,311	2.0
1954	386,330	162,632	223,698	14,180	3.7
1955	365,544	160,888	207,434	24,510	6.7
1956	414,851	189,964	225,732	20,859	5.0
1957	400,913	189,004	204,206	20,929	5.2
1958	448,053	229,978	207,533	32,804	7.3
1959	418,286	224,923	193,363	25,746	6.2
1960	405,550	227,094	178,456	23,283	5.7
1961	374,635	225,120	149,515	---	---

* Source: Montana Department of Agriculture and USDA, S.R.S., Helena, Montana.

receipts from the marketing of barley for the period 1959-60 was \$24.5 million, or about 6 percent of cash receipts from the marketings of all crops and livestock (or about 13 percent of all crop cash receipts).

Table V shows an estimated \$1.3 million paid annually to Montana farmers in premiums for malting barley in 1959 and 1960. This is slightly in excess of 5 percent of the total cash receipts from the marketing of all barley.

Table VII shows the acres harvested, yield, production, price, and value 7/ of all Montana barley for the years 1950-62.

The boundaries of Montana's seven crop reporting districts are shown in Figure 4. The percentages of the state's total acres of all barley, dry-land barley, irrigated barley, and Betzes barley grown in each district are shown in Table VIII.

Barley production in Montana is greatest in the North Central and Northeast Crop Reporting Districts. Those two districts, in 1959-60, accounted for 73 percent of Montana's total harvested acres of all barley, 76 percent of the dry-land barley, 31 percent of the irrigated barley, and 89 percent (1960 only) of the planted acres of Betzes barley.

The Southwest and South Central Crop Reporting Districts were important areas for irrigated barley, accounting for 43 percent of the state's total harvested acres in 1959-60. In those two districts, most of the irrigated barley was produced in the Gallatin and Yellowstone Valleys and in irrigated portions of Big Horn and Carbon Counties.

The production of Betzes barley in Montana is concentrated in the North Central Crop Reporting District with the greatest concentration in planted acres in 1960 in Choteau (92,100), Pondera (67,800), Hill (47,900), Teton (46,400), Glacier (39,800), and Toole (39,600) Counties.

Betzes is a Malting Barley Improvement Association approved two-row malting barley for Montana east of the Continental Divide. It was originally released by the Agronomy Department of Montana State College as

7/ Not cash receipts from marketings.

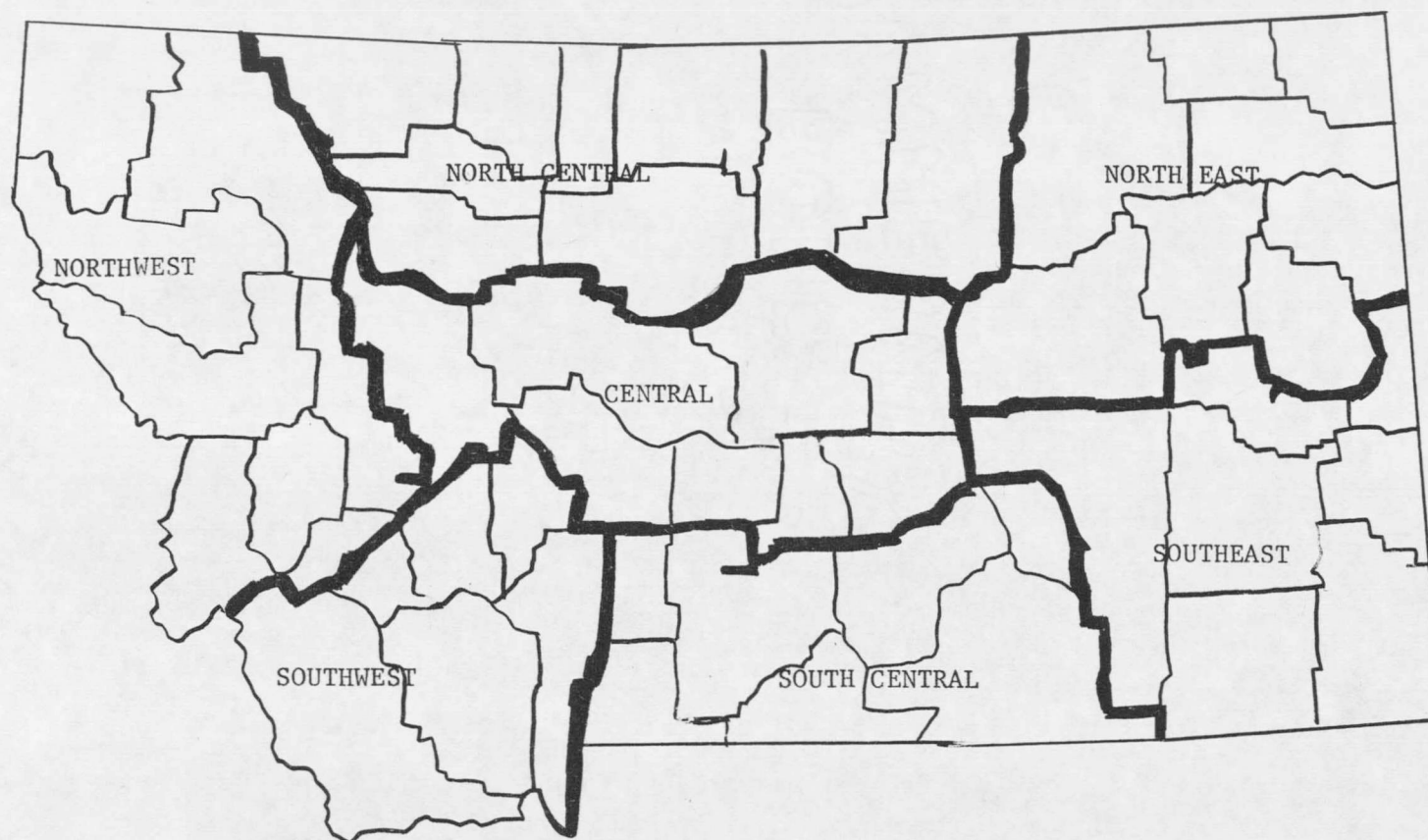


Figure 4. State of Montana Crop Reporting Districts. *

* Source: Montana Department of Agriculture.

TABLE VII. ACRES HARVESTED, YIELD, PRODUCTION, PRICE, AND VALUE OF ALL MONTANA BARLEY, 1950-61. *

Year	Irrigated		Non-Irrigated		Total		Total Prod. 000 Bu	Average Price \$/Bu.	Value of Total Prod. Mil. \$
	Harvested	Yield	Harvested	Yield	Harvested	Yield			
	Acres		Acres		Acres				
	000		000		000				
1950	128	35.8	724	26.0	852	27.5	23,430	0.95	22.3
1951	102	38.6	358	24.3	460	27.5	12,650	1.07	13.5
1952	106	41.9	368	24.6	474	28.5	13,509	1.22	16.5
1953	108	35.3	442	25.0	550	27.0	14,850	1.02	15.1
1954	112	35.7	1,153	24.0	1,265	25.0	31,625	0.97	30.7
1955	83	38.5	1,271	29.4	1,354	30.0	40,620	0.77	31.3
1956	77	40.3	966	27.6	1,043	28.5	29,726	0.83	24.7
1957	95	41.6	1,626	25.6	1,721	26.5	45,606	0.72	32.8
1958	94	43.7	1,489	33.4	1,583	34.0	53,822	0.75	40.4
1959	102	40.6	1,750	26.7	1,852	27.5	50,930	0.67	34.1
1960	92	36.5	1,612	22.8	1,704	23.5	40,044	0.66	26.4
1961	94	40.1	1,371	16.5	1,455	18.0	26,370	0.84	22.2

* Source: Montana Department of Agriculture and USDA, S.R.S., Helena, Montana

TABLE VIII. PERCENTAGES OF STATE TOTAL ACRES OF ALL BARLEY, DRYLAND BARLEY, IRRIGATED BARLEY, AND BETZES BARLEY BY MONTANA CROP REPORTING DISTRICTS, 1959-60 AVERAGE. *

Crop Reporting District	All Barley Pct.	Dryland Barley Pct.	Irrigated Barley Pct.	Betzes Barley Pct.
Northwest	3.0	2.0	15.0	1.0
Southwest	3.0	1.0	20.0	2.0
North Central	53.0	55.0	24.0	68.0
Central	11.0	12.0	9.0	4.0
South Central	7.0	6.0	23.0	1.0
Northeast	20.0	21.0	7.0	21.0
Southeast	3.0	3.0	2.0	3.0
Total	100.0	100.0	100.0	100.0

* Source: Based on Montana Department of Agriculture and USDA, S.R.S., data. an irrigated land malting barley. Consequently, according to the Montana Grain Inspection Laboratory at Montana State College, most of the Betzes barley which has been sold for malting has been produced in Gallatin, Teton, Pondera, and Glacier counties. Its production on dry land (which, in acreage, far exceeds the irrigated acreage) elsewhere in Montana, is, however, explainable. Betzes yields well on dry land - compared to other dry land varieties - and it is a good feed and pearling barley. Ordinarily Betzes produced on dry land is too high in protein to be suitable for malting, but in occasional years its protein level is low enough for malting. Therefore, Betzes may be a two-way dry land barley. It is a good feed barley and may bring the producer a malting premium.

The production of Compana barley, which was classified as a malting barley by the 1962 Feed Grain Program but not by the Malting Barley

Improvement Association, approximately parallels the pattern of dry land barley production in Montana as shown in Table VIII.

Malting Barley Production

Historically the midwestern states of the United States have been the center of production of malting barley. Minnesota, North Dakota, South Dakota, Michigan, Wisconsin, Illinois, and Iowa have been the most important states of malting barley production with the greatest concentration of production in the Red River Valley of North Dakota and Minnesota. Table IX shows yield per acre and total production of all barley in those states, including figures for Montana and total United States production, for the years 1959-60.

TABLE IX. YIELD PER ACRE AND TOTAL PRODUCTION OF ALL BARLEY IN THE MIDWESTERN STATES, MONTANA, AND THE UNITED STATES, 1959-60. *

State	1959		1960	
	Yield Bu/Acre	Production Mil.Bu.	Yield Bu/Acre	Production Mil.Bu.
North Dakota	20.0	76.0	24.5	84.7
Minnesota	29.0	28.5	33.5	29.9
South Dakota	13.5	6.0	30.0	14.9
Michigan	34.0	3.3	35.0	2.6
Wisconsin	38.0	1.9	35.5	1.3
Illinois	24.0	1.7	33.0	2.0
Iowa	37.0	1.0	32.0	0.8
Montana	27.5	52.2	23.5	40.7
United States	27.9	420.0	30.9	431.0

* Source: Malting Barley Improvement Association, Annual Progress Report/s, Milwaukee, Wisconsin, 1959, 1960.

According to Pederson, 8/ about one-third of the total barley produced in the United States is used annually for malting purposes. The balance is utilized as feed and for pearling. The amount used for malting varies from year to year according to barley production and beer consumption. From 1936 to 1940, the United States malting industry produced an average of about 65 million bushels of malt. During the period 1949-1953, the annual average number of bushels of malt produced increased to approximately 94 million bushels. Of those amounts, about 90 percent was produced from barley of the six-row varieties and only about 10 percent was of the western two-row varieties. 9/ Most of the six-row varieties are produced in the Midwest, and two-row varieties are produced in the West--principally in Oregon, Washington, California, Colorado, Idaho, and more recently in Montana. Table X shows the malting varieties of six-row and two-row barley produced in eight principal malting barley producing states during 1959 and 1960. Until the introduction of Betzes, Hannchen and Hanna produced in Oregon, Washington, and California were the principal two-row malting barleys.

New Areas, New Varieties, and Competition

During the early 1950's, the malting industry, through the Malting Barley Improvement Association and State Experiment Stations, began a search

8/ Pederson, Harold C., More Profits from Malting Barley, Minnesota Agricultural Extension Service Folder 68, University of Minnesota, December, 1954.

9/ Lejeune, A. J. and Parker, J. H., "The Story of Malting Barley", What's New In Crops and Soils, February, 1955.

TABLE X. PERCENTAGES OF TOTAL ACRES OF ALL VARIETIES OF BARLEY PLANTED TO MBIA APPROVED MALTING BARLEY VARIETIES, SELECTED STATES, 1959 and 1960. *

Variety	Minn.		N. Dak.		S. Dak.		Calif.		Wash.		Ore.		Idaho		Mont.	
	mil. acres		mil. acres		mil. acres		mil. acres		mil. acres		mil. acres		mil. acres		mil. acres	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
	1.04	0.94	4.19	3.43	0.61	0.51	1.76	1.72	0.73	0.70	0.60	0.50	0.56	0.53	1.97	1.91
	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>
(6-row)																
Traill	48.0	50.0	52.0	57.0	27.0	32.0	--	--	--	1.3	--	--	--	--	--	--
Kindred	31.0	36.0	29.5	24.5	41.0	36.0	--	--	--	--	--	--	--	--	--	--
Parkland	4.0	4.0	2.5	3.0	(1.0)	(1.0) ^{a/}	--	--	--	--	--	--	--	--	--	--
Atlas	--	--	--	--	--	--	12.9	13.5	4.6	--	--	--	--	--	--	--
Tenn.																
Winter	--	--	--	--	--	--	4.8	5.8	--	--	--	--	--	--	--	--
(2-row)																
Hannchen	--	--	--	--	--	--	3.4	3.0	4.3	2.4	41.0	30.0	--	--	--	-- ⁻³⁷⁻
Hanna	--	--	--	--	--	--	--	--	3.4	3.8	--	(1.0) ^{a/}	12.0	16.0 ^{b/}	--	--
Heines-																
Hanna	--	--	--	--	--	--	--	--	1.4	2.1	--	--	--	--	--	--
Betzes	(0.1)	(1.0) ^{a/}	--	--	--	--	--	--	--	--	--	--	--	(8.0) ^{a/}	19.2	27.1
Total acres in malting varieties-																
Percentage	83.0	90.0	84.0	84.5	68.0	68.0	21.1	22.3	13.7	9.6	41.0	30.0	12.0	20.0	19.2	27.1

* Source: Malting Barley Improvement Association, Annual Progress Report/s, Milwaukee, Wisconsin, 1959 and 1960.

^{a/} Figures in parentheses are varieties not approved by MBIA for that particular State.

^{b/} Includes Hanna and Heines Hann.

for new areas of malting barley production and for new varieties. Efforts have been concentrated in the northwestern states, including Montana.

Reasons for the shift were that barley diseases and competition from other cash crops had reduced the production of high quality malting barley in the Midwest. Some indication of the effort may be noted in Table XI which shows the numbers of acres of certified seed production for malting barleys

TABLE XI. CERTIFIED SEED PRODUCTION OF MALTING BARLEY VARIETIES IN THE WESTERN STATES, 1957-61. *

Variety	1957 <u>Acres</u>	1958 <u>Acres</u>	1959 <u>Acres</u>	1960 <u>Acres</u>	1961 <u>Acres</u>
Moravian	---	---	1,080	1,775	2,105
Betzes (2-row)	112	496	1,050	809	763
Heines Hanna (2-row)	195	244	110	106	130
Hannchen (2-row)	238	75	17	56	18
Idaho Club (6-row)	---	---	172	105	139
Atlas 46 (6-row)	286	58	140	---	---
Atlas 54 (6-row)	210	95	70	---	---
Atlas 57 (6-row)	---	---	---	---	13
Tenn. Winter (6-row)	---	---	62	31	30
Total	1,041	968	2,701	2,862	3,198

* Source: Malting Barley Improvement Association, Annual Report/s, Milwaukee, Wisconsin, 1958, 1959, 1960, 1961.

approved for the western states from 1957 to 1961. Note the increase in acres of Betzes from 112 acres in 1957 to 1,050 acres in 1959. Betzes was approved for malting by the Malting Barley Improvement Association in 1958 for Montana. By the end of 1961, Betzes also became an approved variety for Idaho and Colorado. In Table X it may be noted that Betzes was being tried in Minnesota in 1959 and 1960 and that 8 percent of Idaho's half million acres of

barley was planted to Betzes in 1960.

The position of Montana in the malting barley market is indicated by the following quotation from the Malting Barley Improvement Association 1960 Annual Progress Report:

"Present indications are that the release of superior new malting barley varieties is on the immediate horizon in the Midwest and impending in western areas . . . In Colorado, for the first time, a limited acreage of Betzes two-row was grown under irrigation in the area north of Denver, east of the Rocky Mountains, and in the San Luis Valley of south central Colorado. Preliminary examination of the crop indicates that there is a potential for the production of Betzes in Colorado."

Winn 10/ estimated that there were 1500 acres of Betzes planted in Colorado in 1960 and a production of 15,000 to 30,000 bushels of foundation seed. In 1961 there were 17,000 acres of Betzes grown under irrigation in Colorado and 22,000 acres in 1962. 11/

The Malting Barley Improvement Association worked with the Montana Experiment Station and Cooperative Extension Service for a number of years and provided funds to aid in the development of Betzes as an approved two-row malting barley in Montana. This, of course, does not mean that Montana has any monopoly on Betzes. The malting industry has been interested in expanding and improving malting barley production wherever feasible.

10/ Winn, J. H., Colorado Extension Service, letter to Owen Wirak, Montana Extension Service, March 17, 1961.

11/ MBIA, 17th and 18th Annual Reports, Milwaukee, Wisconsin, November 16, 1961, and November 14, 1962.

In summary, the following points may be pertinent to a study of the Montana malting barley marketing problem:

- (1) Barley diseases and competing crops threatened the production of high quality malting barley in the Midwest.
- (2) To insure supply, the malting industry encouraged development of new varieties and new production areas.
- (3) Betzes was approved for Montana by the Malting Barley Improvement Association for malting in 1958.
- (4) Quality and quantity of Betzes production in Montana have been erratic.
- (5) A change in freight rates eliminated Montana's transportation advantage over Oregon and Washington two-row malting barley.
- (6) Betzes was tested in other areas and has been approved for Idaho and Colorado.
- (7) Testing and development of malting barley in other areas indicate increased production in other western states and a "comeback" in production in the Midwest.

Whether Montana may develop its potential as a malting barley state depends on how Betzes is produced, threshed, handled, stored, and sold. It depends on whether the malting and brewing industries accept and use two-row barleys, including Betzes, in increasing amounts. And it depends on competition from other production areas.

Approved Malting Barley

The Malting Barley Improvement Association lists the varieties of malting barley which have been approved by the Association for production in several states and for use by the malting industry. Those varieties approved by the Malting Barley Improvement Association ". . . when grown in the states and areas recommended and when delivered to market in pure carlots of sound, bright, plump, low moisture barley, will command premium prices over feed barley. These varieties are considered acceptable for malting and brewing by the members of the Malting Barley Improvement Association and are also approved for production by the Agricultural Experiment Stations in the states listed." 12/ Approved varieties for the various states are published annually in advance of planting seasons.

A barley variety approved for malting by the Malting Barley Improvement Association may or may not be classified as malting barley according to United States Department of Agriculture Official Grain Standards. At present, Federal malting barley grades are divided into two sections--six-row malting varieties and two-row western malting varieties. Barley which may be Federally graded as malting barley may or may not be approved by the Malting Barley Improvement Association.

In an attempt to clear up the confusion, the Malting Barley Improvement Association made the following statements in its 1960 Annual Progress Report:

12/ Malting Barley Improvement Association, Annual Progress Report, Milwaukee, Wisconsin, 1958.

"On August 1, 1959, varietal grading in the six-row Federal malting barley grades was initiated. Only varieties classed as acceptable by the malting and brewing industries were eligible for Federal malting barley grades. . . At the present time, the two-row malting variety Betzes, when grown in Montana and other areas east of the Continental Divide, is not eligible for the western two-row Federal malting grades. 13/ Certain changes in these grades will be recommended by the Malting Barley Improvement Association to officials of the United States Department of Agriculture so that Betzes (and other two-row varieties which may be classified as acceptable for malting in future years) will be eligible to grade under the two-row Federal malting barley grades."

On March 13, 1962, the United States Official Grain Standards for barley were amended to permit Betzes barley produced east of the Rocky Mountains as being eligible for Federal grading as a malting barley. 14/

Before any variety may be listed as approved by the Malting Barley Improvement Association, it is subjected to an exhaustive series of tests. Agronomic data are based on field observations and on Agricultural Experiment Station and United States Department of Agriculture tests. Information on malting and brewing is being developed by the Malt Research Institute at Madison, Wisconsin. Bases for the Institute's tests are that:

"Conclusions obtained by Malt Research Institute, relative to the industrial suitability of barley varieties and selections, are based on the results of numerous evaluations by many collaborators over a period of years. Evaluation procedures consist, first, of

13/ Federal grades for western two-row malting barley specified production west of the Continental Divide only.

14/ Federal Register, March 17, 1962.

pilot scale malting and brewing tests, followed by commercial scale tests, when this becomes possible or feasible. Among the collaborators are representative industry laboratories, both malting and brewing, as well as malting and brewing companies who collaborate in commercial scale tests." 15/

Like all other Malting Barley Improvement Association approved varieties, Betzes was subjected to the above procedure.

"Results of malting and brewing tests over a four-year period have been generally satisfactory and Betzes has been classed as acceptable for malting and brewing when grown in suitable areas of Montana east of the Continental Divide. The future status of Betzes depends on its general use and acceptance by the malting and brewing industries." 16/

Cultural Practices Problems

Even though Betzes has become an approved variety and despite extensive educational efforts by the Montana Cooperative Extension Service and Experiment Station, problems of cultural practice, threshing, storing, etc., continue to plague producers. Many of those problems may be attributed to a lack of understanding by producers of the malting and brewing processes and their requirements. For example, the Malting Barley Improvement Association

15/ Malt Research Institute, Publication XV, Madison, Wisconsin, October, 1958.

16/ Malting Barley Improvement Association, Annual Progress Report, Milwaukee, Wisconsin, 1958.

recommends that barley offered for malting meet the following conditions: 17/

- (1) Not over 5 percent other barley.
- (2) Test weight 45-48 pounds.
- (3) No more than 3 percent to 5 percent through a 5/64 sieve.
- (4) Less than 5 percent skinned and broken.
- (5) Germination 95 percent or higher.
- (6) Not over 13.5 percent moisture.
- (7) Not over 12.5 percent protein.

Those requirements are difficult to meet, but all are for good reasons. 18/

Many Montana wheat producers, accustomed to seeking high protein content and to blending of lots of grain, have been disappointed when their Betzes barley (often produced under dry land conditions) has not met malting requirements. In 1960, the Malting Barley Improvement Association reported on a project designed to help overcome some of the production problems.

Excerpts from that report are as follows: 19/

"A special project was developed in Montana in 1960 to stimulate the production of high quality Betzes barley on irrigated land in the Triangle region. The program was sponsored cooperatively by this Association and the Montana State Agricultural Extension Service. Organizational meetings were held at Fairfield, Conrad, and Cut Bank, January 20, 21 and 22, respectively. A nucleus of 20 growers was selected to cooperate in the first year of the project. These growers were advised on the proper use of recommended cultural and irrigation practices in producing Betzes barley. An educational program on quality factors of malting barley was a part of this project. On July 14-16, 1960, a special tour of Betzes fields in the project was sponsored for farmers in the Triangle area.

17/ See Davis, D. J., Report on the Quality of Commercial Samples of Betzes Barley, Montana Grain Inspection Lab, Mimeo Leaflet #35, Montana AES, Bozeman, Montana, 1960.

18/ See Chapter IV on Malting and Brewing.

19/ Malting Barley Improvement Association, Annual Progress Report, Milwaukee, Wisconsin, 1960.

"The cooperating growers harvested a total of 709 acres with an average yield of 57.4 bushels per acre which produced a total of 40,675 bushels. The average kernel assortment was 86.7 percent plump kernels and 3.8 percent thin kernels. The average protein content dry basis was 12.4 percent. The skinned and broken content averaged less than 2 percent. It is expected that other growers of Betzes on irrigated land will adopt the recommended cultural practices followed by the successful cooperating growers."

Even though beer may, if necessary, be made from malt of almost any variety and quality of barley, it should also be recognized that maltsters purchase only the best barley available which meets their malt production and barley price specifications. The specifications may be variable according to supplies available as well as to other factors. The malting industry's encouragement in developing new areas of production and new varieties is not without purpose. The greater the total production of barley and the more areas of production, the more likely there will be larger quantities of top quality malting barley available. This means that Montana has become involved in a highly competitive business and can expect to receive malting premiums only for the best quality barley for malting purposes.

Montana Grain Inspection Laboratory annual reports and Malting Barley Improvement Association Annual Reports refer to cultural practices and harvesting problems and indicate a concern for quality production of Betzes barley in Montana. 20/

20/ See: Davis, D. J., Report(s) on the Quality of Commercial Samples of Betzes Barley, Montana Grain Inspection Lab Mimeo leaflets #32 and #35, Montana AES, Bozeman, Montana; and Malting Barley Improvement Association, Annual Progress Reports, Milwaukee, Wisconsin, 1958, 1959, and 1960.

In an undated issue, the Malting Barley Improvement Association's "Grains of Truth" newsletter listed 10 steps for success in the production of high quality malting barley. These steps, which are assumed to be applicable to all malting barley producing areas, including Montana, are:

- (1) Plant certified or other clean, pure seed of recommended variety.
- (2) Treat seed for disease control.
- (3) Sow in early spring on fertile soil.
- (4) Fertilize as recommended locally.
- (5) Control weeds.
- (6) Harvest only when fully ripe.
- (7) Thresh carefully to avoid skinned and broken kernels.
- (8) Ship and store at 13.5 percent moisture or less.
- (9) Inspect stored barley regularly to detect heat damage or insect infestation.
- (10) Market pure, one-variety lots.

CHAPTER IV

MALTING AND BREWING

The Malting Process 1/

Malt is a food product which results from specific treatment of barley or other grains. 2/ Most malt produced is used by beer makers with lesser quantities used in distilling, baking, and in other foods and drugs.

During the malting process, certain chemical changes take place in the grain. Insoluble starch changes into a sugar called maltose (the chemical term for malt sugar). Malting releases the enzymes diastase (alpha-amylase and beta-amylase) and peptase. Diastase converts starch into sugar and peptase changes certain proteins. The enzyme diastase and the enzymes produced by growing yeast cells result in fermentation which converts the maltose into alcohol.

A brief description of the malting process may provide a better understanding of the reasons for the quality requirements of barley for the malting process.

1/ This section based on: (1) Lejeune, A. J. and Parker, John H., Guide to Premiums for High Quality Malting Barley, MBIA, Milwaukee, Wisconsin, January, 1953; (2) Watson, C. A.: Bequette, R. K.: and Ellis G.H., Malting Barley. Increased Income to Montana Producers, Montana AES, Cereal Quality Lab. Mimeo leaflet #28, Bozeman, Montana, July 1959; and (3) Vogel, S. L., Thresh Barley for Malting Carefully, MBIA, Milwaukee, Wisconsin, June, 1950.

2/ Conversion factor: One 48-lb. bu. barley = one 34-lb. bu. malt.

The first step in malting is the removal of all thin or cracked kernels and all foreign material. The barley is then steeped, or soaked, in water until the moisture of the barley is approximately 42 percent. The barley is then germinated, or allowed to sprout, which activates and synthesizes certain enzymes. These enzymes are the materials in the germinated barley which break down the starch and proteins in the grain for subsequent conversion to simple sugars and simple proteins which are important to malt users. The sprouting must be uniform and complete so that the conversion of grain products to malt is complete.

When undamaged barley kernels are germinated, the sprout grows from the germ end underneath the husk of the kernel and emerges from the beard end. The husk protects the sprout so that its growth is normal and modification of the barley starch is complete, thus producing high grade malt. Skinned kernels sprout faster because they take up water faster, and the sprouts grow out of the breaks in the kernel, unprotected by the husk. When the maltster stirs the sprouting barley to aerate it and to keep the roots growing, these unprotected sprouts are broken off; consequently, sprouting stops and malt quality suffers.

When the barley has been properly modified, germination is stopped by drying in a kiln, or drying oven. This material is then known as malt. Different malts are aged for a proper period of time and are then blended to meet the exacting requirements of the malt users.

There are several different types of malts, and the type of malt produced is determined by the use for which it is intended. A considerable

portion of the malt produced in the United States is used in the brewing industry. Brewers prefer malt made from approved varieties of malting barley grown in adapted areas. These varieties should have high extract yield and high diastase content. The diastase content of the malt should be high enough to convert its own modified starch and the raw starches of other grains, such as corn, into simple sugars. Distillers' malts are usually higher in diastase than brewers' malts because a small amount of malt is used to convert the starch of other grains into fermentable sugars in the distilling process.

Malt extract is the amount of soluble material that can be extracted from ground malt when mashed with water. The percent of malt extract is important in brewers' malt because it determines to a large extent the amount of product which can be produced from a given amount of malt. The amount of malt extract is influenced by the variety of barley, protein content, and kernel plumpness. Plump, low protein kernels give large amounts of malt extract. Thin, high protein barley often produces extracts which are unstable during the brewing process.

Maltsters' Requirements

Consumers seem to have definite preferences in their beer. Consequently, brewers specify to maltsters the kinds of malt required. In turn, maltsters pass their specifications on to handlers and finally to the farm

producers of malting barley. Generally the requirements of maltsters for barley are: 3/

- (1) Acceptable varieties in carload lots unmixed with other varieties.
- (2) Uniform, vigorous germination.
- (3) Low percent of skinned and broken kernels.
- (4) Bright, clean, sound barley, free from blight, weathering, and damage.
- (5) Free from other grains, foreign matter.
- (6) Ripe, plump, uniform kernels.
- (7) Uniform moisture content.

Barley which may meet United States Department of Agriculture official grain standards for malting may not be acceptable for malting by the trade, either or both because of more exacting standards or because of conditions of supply and demand. At times high quality malting barley may go for feed. At other times that which would ordinarily be sold as feed barley may be used for malting because of short supplied or unusually heavy demand for malting barley.

Any price received for barley above feed prices may be considered as a malting premium. Premium prices are usually paid only for the preferred or

3/ Lejeune, A. J. and Parker, John H., "The Story of Malting Barley," What's New in Crops and Soils, February, 1955.

"approved" varieties. A study by Pederson 4/ showed that in an 8-year period (beginning in 1946) malting barley prices at Minneapolis averaged about 45 cents per bushel above feed prices, with a variation of from 25 cents to 60 cents per bushel premium. His study also indicated that, at least in Minnesota, local elevators priced malting barley according to the elevator manager's belief as to what terminal market price less freight and other costs will be at the time of delivery. It was concluded that the demand for malt had less influence on malting barley prices than the supply of barley offered for sale and that the reputation of the producing area was an important factor in determining whether local elevators may command a malting price premium.

Lejeune and Parker made the following additional conclusions concerning barley requirements of maltsters: 5/

- "1. To obtain maximum premium, segregation and separate binning on farms and in elevators should be practiced.
- "2. Test weight is not adequate as a measure of value of barley for malting. Kernel plumpness is more important.
- "3. Otherwise acceptable malting barley having in excess of three to five percent skinned or broken kernels is discounted in price.
- "4. Without a high (95 percent or better) rate of germination and without a uniform rate of germination, barley is almost useless for malting. (One of the chief

4/ Pederson, H. C., More Profits from Malting Barley, University of Minnesota, Ag Ext. Service Folder 68, December, 1954.

5/ Lejeune, A. J. and Parker, John H., Guide to Premiums for High Quality Malting Barley, MBIA, Milwaukee, Wisconsin, January, 1953.

reasons for loss of germination has been due to storage of barley having in excess of 13.5 percent moisture content.)

- "5. Other discounts for malting barley may result from: heat damage, ground damage, blight or scale, smut, ergot, garlic or other odors; unsound or sick, musty, weathered, frosted, immature, bleached, weevily, treated, or sprouted barley; from barley containing other kinds of barley, foreign matter or other grains; and from uneven or plugged methods of car loading."

The Brewing Process 6/

Beer and ale, both fermented malt beverages, are classed as alcoholic drinks, which are any beverages containing ethyl alcohol in intoxicating quantities. Amounts of alcohol in beer may be as little as 2 percent. The alcohol in alcoholic drinks is obtained by the fermentation of sugar or of starchy products such as corn, barley, wheat, rice, and potatoes to change their starch into sugar. Beverage alcohol may also be obtained by distillation of fermented, mashed fruit.

There are many different formulas for brewing ale and beer. Most beers have an alcoholic strength of from 2 percent to 6 percent. Ale usually contains greater quantities of alcohol than beer, and its more tart flavor results from the use of larger quantities of hops. Beer is ordinarily made from malted barley, but corn or rice may also be used.

Brewing is the making of fermented alcoholic beverages such as beer and ale from cereal grains, yeast, hops, and water. Brewing refers to the

6/ This section based on: (1) Various volumes of The World Book Encyclopedia Field Enterprises, Merchandise Mart Plaza, Chicago, Illinois, 1962 ed.;
(2) How Olympia Beer Is Made, Olympia Brewing Company, Olympia, Washington.

entire process which consists of malting, mashing, boiling, hopping, fermenting, and finishing. These terms, except malting, which has been discussed in the previous section of this chapter, are briefly defined in the following outline of the brewing process:

- (1) Malted barley and other cereals, such as rice or corn, are binned separately by the brewer for combination according to the brewer's particular formula or recipe.
- (2) The barley malt is ground and sent to the mashing tub.
- (3) As the barley malt is ground, a certain portion is diverted to the cereal cooker where it is mixed with the rice or corn and boiled. This mixing and boiling process prepared starches for conversion to other carbohydrates.
- (4) The boiling cereal is pumped into the main mashing tub with the ground barley malt. The temperature rises converting starches into dextrin. When the stirring stops, the solids settle and are removed for processing into dry feed grains for livestock. The remaining liquid is called wort.
- (5) The wort is pumped to a brew kettle where it is again boiled with hops. Brewers use differing amounts of hops to give the beer a distinctive flavor.
- (6) From the brew kettle, the wort goes through a hop strainer and then to coolers where it is chilled.
- (7) After chilling, the wort goes to a starting tank where a yeast culture is added to start the process of fermentation.

The yeast converts sugars into alcohol and carbon dioxide gas. After it is well started, the wort goes into a fermenting tank where the process continues. During the fermenting, the yeast multiplies and settles. It is removed and the most active portions are reused in the starting tanks.

- (8) The young beer is then sent to aging tanks, then through a final filtering, and finally to the canning and bottling lines.

Figure 5 is a schematic diagram showing the general processes of brewing which are followed, with variations, by most brewers.

The Geography of Barley, Malt, and Beer 7/

The origin of barley is lost in antiquity, but there is evidence of its use as early as 3500 B.C. Until about the sixteenth century, barley was used primarily for food--porridge, flour, and beer. Some writers believe that brewing outdates even baking: The first known book on brewing was by George Watkins, published in London in 1773. After the 1500's, barley also became important as a livestock feed.

Presently about one of every ten bushels of barley produced in the world is used for malt. In the United States, this figure is about one for

7/ This section based on: (1) Blaich, O. P., Barley: Its Production and Uses, University of California ditto, August 31, 1961; (2) Combs, W. B., The Production and Grading of Malting Barley, USDA, October 6, 1953; (3) Weaver, J. C., Barley Geography, University of Minnesota mimeo, January 28, 1948; and (4) Brewers Digest Annual Buyers Guide, 1962.

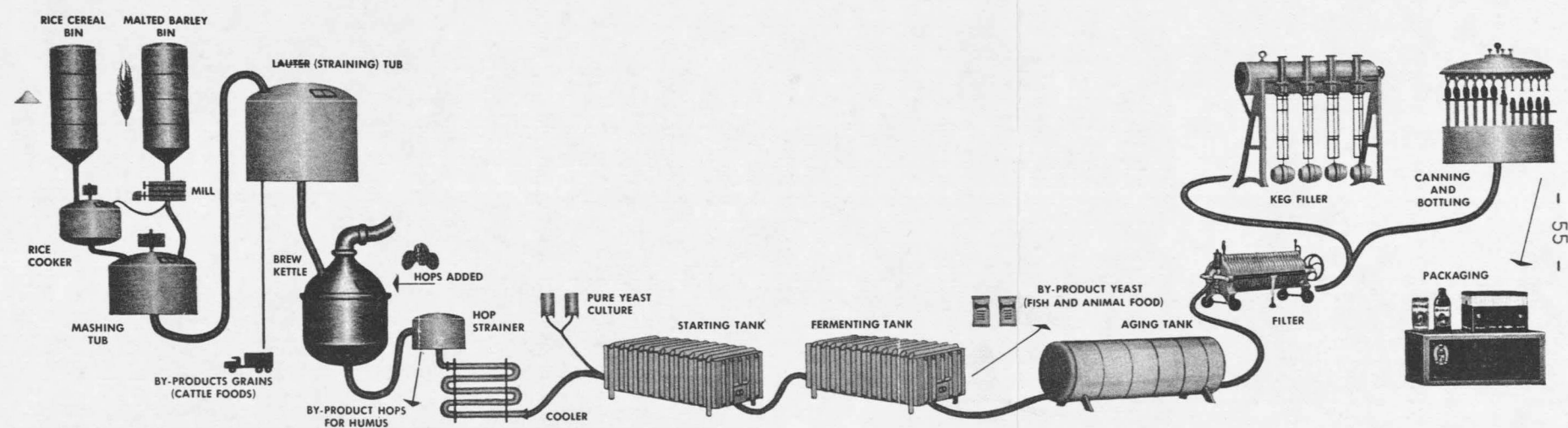


Figure 5. A Typical Brewing Process

every three bushels. Over one-half of the world's barley supply is used for livestock feed. Barley rates fourth place as a feed in the United States following corn, oats, and sorghum. Pound for pound, barley is as good a feed, especially for hogs, as any other feed grain. Its use is limited, however, because other feed grains often produce greater yields per acre. Barley is still used for flour in some parts of the world, producing a dark heavy bread.

Barley was brought to America by the earliest settlers. It was first planted in Massachusetts in 1602, in Virginia in 1611, and on Manhattan Island in 1626. At one time, the principal crop of Rhode Island was barley. The Colonists used barley primarily for brewing. The Spaniards introduced barley to Mexico and southwestern United States.

The Atlantic Coast States were not particularly suited for barley production. So, as the frontier was moved back, barley production also moved westward. By 1820, two-thirds of the United States barley crop was produced in New York State. Thirty years later, in the 1850's, barley production had spread into the Midwest. Its production was concentrated around the urban centers because, even though there was a growing use as livestock feed, the main use of barley was for malt. Costly transportation resulted in barley production near to cities where the beer drinkers lived. The malting and brewing centers of the period 1850-1880 included Wheeling, Detroit, Cincinnati, Chicago, Milwaukee, Davenport, Canton, and St. Louis. Following the Gold Rush of 1848, California became an important barley producing area and has remained so to the present.

In the latter part of the 1880's, transportation had become sufficiently efficient that barley production became diffused into ecologically suitable areas. By 1900 barley production was concentrated in the Upper Midwest of the United States.

Today all of the 11 leading barley producing states are located west of the Mississippi River. (North Dakota, California, Montana, Minnesota, Washington, Kansas, Oregon, Idaho, Colorado, Oklahoma, and South Dakota). The Red River Valley of North Dakota and Minnesota has become the principal United States source of six-row malting barley.

The history of barley production in America has been that of concentrations of population, transportation costs and efficiency, soil and climate, disease 8/, and agricultural policy. 9/ While these and possibly other factors cannot be quantified, their effect on location of malt and brewing facilities should not be passed over without comment.

It is evident that malting and brewing plant locations have been influenced by location of beer consuming centers, transportation, and barley production--but with a lag in time. Once the investment in plant,

8/ This is a very significant factor outside the scope of this study. Particularly since World War II, there has been an increased search for new disease resistant varieties, chemical and mechanical controls, and for new areas of production.

9/ Policy is treated in more detail in Chapter VII. Two examples here will suffice: Until wheat acreage limitations were effected in 1954, Montana produced little barley. By 1950, Montana was a leading barley producing state. Canada's grain policies also encouraged barley production in the 1950's. Canadian producers were permitted to ship one carload of malting barley in addition to their wheat quotas.

equipment, and trained workers has been made, it is not a simple task to move malting and brewing facilities. Barley production has long since moved West, but population density remains high in the North Atlantic region. Thus, malting and brewing firms continue to operate in that region.

Figures 6 and 7 show the location of brewers and maltsters as of 1961. Figure 6 locates brewing plants (not companies). These were first developed in the North Atlantic region, then in the Midwest, and northward into the Lake States at the eastern edge of the great malting barley producing regions of the Upper Midwest and Northern Plains. There is a much lighter concentration of breweries on the Pacific Coast, the Gulf Coast, and a scattering elsewhere. Table XII shows numbers and capacity of breweries in leading states in the United States. Figure 7 locates malt companies (not plants). Figure 7 is an incomplete picture in that some malt companies have plants elsewhere and some brewing companies also have their own malt plants.

It is said that beer may now be profitably shipped up to 500 miles. If so, then it may be verified from Figure 6 that no one, wherever he may be in the United States, need be without a beer!



Figure 6. Location of U. S. Breweries. *

* Source: Brewers' Digest, Annual Buyers' Guide and Directory, 1962.



Figure 7. Location of U. S. Malt Companies.

* Source: Brewers' Digest, Annual Buyers' Guide and Directory, 1962; and U. S. Census of Manufacturers, 1958.

TABLE XII. UNITED STATES BREWERIES. LEADING STATES IN NUMBER AND CAPACITY, 1960. *

State	Breweries	Portion of U. S. Total	Total Capacity	Portion of U. S. Total
	No.	Pct.	000 bbls.	Pct.
California	13	5.7	12,930	9.3
Illinois	17	7.5	6,375	4.6
Michigan	11	4.9	9,770	7.1
Minnesota	12	5.3	5,187	3.8
(Montana)	(3)	(1.3)	(400)	(0.3)
New Jersey	8	3.5	10,857	7.8
New York	17	7.5	16,415	11.9
Ohio	12	5.3	7,445	5.4
Pennsylvania	25	11.0	11,130	8.0
Wisconsin	33	14.5	16,752	12.0
All Other (23 states)	76	33.5	41,205	29.8
Total	227	100.0	138,466	100.0

* Source: The Brewers Digest, Annual Buyers Guide and Directory, Mount Morris, Illinois, 1962.

CHAPTER V

STRUCTURAL CHANGES IN THE BEER INDUSTRY

Beer Consumption Characteristics 1/

Beer, by 1961, had become a \$2.2 billion industry in the United States. Sales in that year were at a record high of 89.2 million barrels, up 1.5 percent or 1.3 million barrels over 1960 sales. The brewers, however, were not particularly happy. Total sales were up, but population increases were outstripping total beer consumption. The net result was a per capita beer consumption of 15.1 gallons, which was the same in both 1961 and 1960 and below the peak per capita consumption 18.6 gallons in 1946.

Apparently the beer industry as a whole doesn't know enough about the consumer of its product. An Ernest Dichter study suggested that beer, which is a beverage somewhere between hard liquor and soft drinks, has lost contact with the young potential beer drinker and that the type of beer produced in the United States is really not the type preferred by consumers. 2/ The study

1/ This section based on information contained in several articles in the January 19, 1962, Annual Beer Sales Report issue of Printers Ink Magazine. All data, except as otherwise noted, were taken from this reference.

2/ A possible indicator of this may be construed from the fact that even though imported beer amounts to only 0.6% of the total U. S. Market, imports increased by 500% from 1949 to 1960. A. F. Shaw (Barley Possibilities Important: Income Now Second to Wheat, MSC Div. of Ag. Challenges, Jan.-Feb. 1960) stated that "chances are that the total malt production will shift to 2-row varieties if suitable sources are developed. As in Europe, at the present time, a shift to 2-row varieties may be gradual."

concluded that it is time for the brewing industry to seek answers to some fundamental questions about their products and its consumers.

The historically tradition-bound, mainly family-owned brewers, have been too busy researching their own particular brand market to give much consideration to industry-wide market research. Furthermore, profits have been declining so that individual brewers have been reluctant to finance coordinated industry research. Market wide research development has also been hampered because privately owned brewers have been reluctant to release brand sales data, because varying state laws result in major differences in types of market outlets, and because of the difficulty of interpretation of motivation research (the appeal of beer apparently rests in intangible consumer needs rather than strictly in product utility.)

In the meantime, beer's share of the overall market continued to decline. Why? What are beer consumers like? How do they live? Information of this type, as pertains specifically to the beer market, is rare but interesting and is apparently having some pronounced effects on the brewing industry. The following items suggest the profile of the beer consumer:

- (1) Since the advent of television, people stay at home more often and drink less beer at home than when they go out.
- (2) Too few babies were born in the 1930's and 1940's, resulting in relatively few people in beer drinking age brackets now.

This problem is expected to be overcome in the 1960's when the post-World War II baby crop comes of beer drinking age. 3/

- (3) An Elmo Roper study found that one-fourth of the total population accounts for one-half of all beer drinkers and that one-half of the beer drinkers consume four-fifths of the beer sold. Thus it was concluded that the average consumer either drinks little or no beer or drinks considerable quantities of it.
- (4) Beer ranks third in popularity of all beverages, following coffee and soft drinks.
- (5) There are, according to Social Research Incorporated of Chicago, two basic but not mutually exclusive beer drinking motives: (a) for enjoyment in a social setting where beer is served, and (b) for the pleasurable effects of drinking beer.
- (6) The Roper study, referred to above, also discovered that level of income has little effect on beer consumption.
In fact, low income people are less likely to drink beer!
- (7) A San Francisco firm, the Institute for Design Analysis, describes the beer consumer as being notoriously fickle.
Beer does not enjoy a consistent nor stable consumer image.

3/ More recent beer consumption data indicate that in the 1960's, the World War II baby crop is disappointing the brewers by failing to drink as much beer as anticipated!

Apparently there are some rigid status connotations concerning beer. Some persons feel that beer may properly be served only at particular types of social occasions. Some identify beer with particular age or income groups. Others view beer strictly as a drink of moderation. In other words, there is emotional commitment involved with beer drinking.

- (8) Occasional beer drinkers most often buy on whimsy and frequently don't drink beer simply because they forget to buy it.
- (9) Regular beer drinkers tend to stay with two or three favorite brands. The particular brand and quantity purchased is most likely to be decided upon at the time of purchase (which accounts for the concentration [21 percent of the total] of advertising at the point of purchase).
- (10) Currently, about 60 percent to 70 percent of total beer sales are in retail supermarkets. (Elaborate merchandising methods have boosted beer sales in some retail stores by as much as 650 percent!)
- (11) Brewers have become sensitive to ethnic markets. For example, it has been noted that the Negro market in at least 29 metropolitan areas has become sufficiently large and prosperous to make or break the beer, or any other, market. Beer consumption studies among Negroes indicate that Negroes

drink more beer and are more likely to drink it regularly than whites. Consequently, many public relations conscious brewers are now publicizing such items as their Negro employment policies.

The effects of all this--whimsical consumers, declining per capita consumption, and falling profits--on the brewing industry are significant to maltsters and barley producers as well as to beer makers.

Mergers and Integration

From 1946 to 1961, one-half the number of brewers went out of business at a rate of 16 per year. Many of the breweries were swallowed up in mergers of which there were 18 between June 1960 and December 1961. Result: Fewer but larger breweries. Brewers selling over one million barrels accounted for 71 percent of total 1961 beer sales. Further evidence of the continuing trend for bigness in brewing was that the top 26 brewers increased their volume by 2.24 percent in 1961 as compared to a total industry volume increase of 1.5 percent.

Despite excess capacity in the brewing industry (139 million barrel capacity with an 89 million barrel output in 1961), expansion and integration of facilities, particularly among the big breweries, continues. Presumably the trend of expansion is indicative of outmoded plants and equipment and of decreasing costs with increasing size. Economies of scale are most apparent in utilization of by-products and more particularly in the use of advertising. The trend in facilities integration has been both horizontal and vertical, i.e., brewers merging with other brewers and with brewers buying or building their own malting plants.

The expansion and integration trends have made it difficult for the small brewers whose total costs may be relatively high and who cannot afford to operate their own malting plants.

Another possible problem, particularly for small breweries is that of beer concentrates. Perfection and adoption of the process could convert the big breweries into mere bottling plants and could result in the complete demise of small brewers. This could also significantly alter the location of malting and brewing facilities. (See Chapter IV.)

All these developments point to a continuing strong marketing competition among brewers with emphasis on sales to women in supermarkets, packaging innovations, and new and expanding advertising and merchandising methods. In 1961, the industry spent \$168 million on advertising (\$36 million on television and \$18.5 million for outdoor ads). The top 20 brewers spent a total of \$87 million in advertising or about \$1.93 per barrel sold. Advertising expenditures are expected to increase in the 1960's.

On the horizon the beer industry has projected increasing sales up to 95 million barrels by 1965 and to 110 million barrels in 1970. The projection is based on the assumption that by 1970 there will have been an increase in the percentage of the total population in the 21-39 year age group, which is (or at least has been) the beer drinking age. Other assumed favorable factors include more women beer drinkers and an increase in beer consumption resulting from leisure and outdoor living patterns.

Beer Industry Trends 4/

The recent history of the beer industry in the United States has been one of fewer but larger firms. The demise of small and local breweries began in 1933 when there began a rapid trend of sales of packaged beer as opposed to sales of draught beer in taverns. Table XIII is indicative of

TABLE XIII. NUMBER OF FIRMS, BREWERIES, TOTAL SALES, AND SALES OF DRAUGHT BEER IN THE UNITED STATES, SELECTED YEARS, 1934-60. *

Year	Firms	Breweries	Total Sales	Draught Sales
	No.	No.	Mil. bbl.	% of total
1934	725	725	40.0	75.0
1940	578	580	51.8	48.3
1945	457	461	81.8	35.7
1950	380	392	82.8	28.2
1955	260	292	85.0	22.1
1960	180	229	87.9	19.5

* Source: U. S. Brewers Foundation, Brewers Almanac.

of these trends.

It may be seen that both the numbers of firms and breweries declined but that the number of firms decreased more than the number of breweries. There were indications of the trend toward mergers as early as the 1930's.

4/ Based on information in: (1) Printers Ink, Annual Beer Sales Report, January 19, 1962; (2) Carl M. Loeb, Rhoades & Co., Three Leading Brewery Stocks, Res. Dept. Notes, February 1962; and (3) Business Week, Are Drinkers Doing Their Part?, April 13, 1963.

Local breweries continued to go out of business during the 1940's and 1950's. They could not compete with the regional and national brewers who had advantages of size, wider markets, greater financial strength, etc. Rising costs of operation and declining profits in the 1950's hastened the process. Table XIV shows the number and percent of total breweries in the United States by size groupings. Profit margins for all brewers during the 1950's dropped from 6 percent to 3 percent. It was said that price cutting was an ineffective method of attempting to increase sales, indicating a relatively inelastic demand for beer. Profits per barrel dropped from about \$1.75 in the late 1940's to 75 cents in the mid-1950's. However, the larger brewers managed to maintain a profit of about \$1.00 to \$1.50 per barrel.

During the 20-year period 1940 to 1960, the five largest brewers increased their share of the beer market from one-sixth to one-fourth. The top 10 increased from one-fourth to one-half of the total market and the leading 25 brewers increased from one-third to three-fourths of total beer sales. Table XV presents sales data for the top 10 brewers of 1961.

Some conclusions may be drawn from Tables XIII, XIV, and XV:

- (1) The top 10 brewers--about 5.5 percent of the total number--accounted for more than one-half of the total beer sold in 1961.
- (2) Sales per brewing firm among the top 10 were generally, but not necessarily, related positively to capacity.
- (3) The beer industry operated at 64 percent of capacity in 1961. The top 10 (at 79 percent of capacity) were considerably above "all others" (54 percent of capacity). Sales

TABLE XIV. UNITED STATES BREWERIES, NUMBERS AND PERCENTAGES OF TOTAL NUMBERS BY PLANT SIZE GROUPS, 1960. *

<u>Brewing Capacity</u>	<u>Total Breweries</u>	<u>Portion of Total Breweries</u>
<u>Bbls.</u>	<u>No.</u>	<u>Pct.</u>
Under 50,000	20	10
50,000 - 249,000	70	36
250,000 - 449,000	32	19
450,000 - 649,000	16	8
650,000 - 849,000	19	10
850,000 - 1,049,000	10	5
1,050,000 and over	27	14
Total	194	100

* Source: The Brewers Digest, Annual Buyers Guide and Directory, Mount Morris, Illinois, 1962.

as a percent of capacity may be considered as indicative of relative efficiency. No quantitative conclusions may be drawn here because capacity of breweries must exceed annual sales to allow for seasonality of consumption and because about 5 percent of production is lost through spillage and other wastes. However, in the case of Falstaff, for example, sales of 96 percent of capacity suggests one or more of several possibilities, namely: (a) enviable efficiency, (b) erroneous data, (c) little waste and spillage, (d) stable seasonal sales, and

TABLE XV. SALES AND CAPACITIES OF THE TOP TEN UNITED STATES BREWERS, 1961. *

Brewer	Sales	Portion of Total U.S. Sales	Brewing Capacity	Sales to Capacity Ratio	Portion of Total U.S. Capacity
	<u>Mil. bbl.</u>	<u>Pct.</u>	<u>Mil. bbl.</u>	<u>Pct.</u>	<u>Pct.</u>
Annheuser- Busch	8.5	9.5	10.5	81	7.6
Schlitz	5.8	6.5	9.0	64	6.5
Pabst	5.2	5.8	6.0	87	4.3
Falstaff	5.1	5.7	5.3	96	3.8
Carling	5.0	5.6	6.8	74	4.9
Ballantine	4.5	5.0	5.0	90	3.6
Hamm	3.7	4.1	5.0	74	3.6
Schaefer	3.2	3.6	4.0	80	2.9
Liebmann	2.8	3.1	3.5	80	2.5
Miller	2.6	2.9	4.0	65	2.9
Sub-total	46.4	51.8	59.1	79	42.6
All others	42.8	48.2	79.4	54	57.4
Total	89.2	100.0	138.5	64	100.0

* Sources: The Brewers Digest, Annual Buyers Guide and Directory, Mount Morris, Illinois, 1962; and Printers Ink, Annual Beer Sales Report, January 19, 1962.

(e) remarkable control of inventory as related to production and sales.

Sales leadership among the brewers has changed rapidly as integration, mergers, and acquisitions have occurred and as multiple plant operations and broader geographic distribution and advertising have become recognized as sales boosters. For example, during the past 25 years the four national brewers (Anheuser-Busch, Schlitz, Pabst, and Miller) more than doubled their share of the total market up to nearly 25 percent of total beer sales in 1961. In the same period, the semi-national brewers (Falstaff, Carling, and Hamm) increased their share of the market by five-fold up to about 15 1/2 percent of the total.

Despite the fact of several anti-trust suits, it is expected that the small breweries will continue to fade out of the picture. Sales of draught beer in taverns will probably continue to decrease while canned beer of national brands continues to increase in sales, primarily through supermarket selling. In assessing beer market trends, several characteristics, including costs, prices, taxes, and consumption, are of importance. Data for detailed analyses were not available.

The brewing industry has not escaped the general problem of rising industrial costs. An average of brewing industry costs as a percentage of sales for 1961 was as follows:

Labor.	20 - 25%
Containers	15 - 20%
Other packaging materials.	3 - 5%
Malt	8 - 10%
Other raw materials.	10 - 14%
Advertising and promotion.	6 - 10%
Distribution and other costs	18 - 22%
Pre-tax profits.	3 - 6%

If items 6 and 7 may be lumped together, it is evident that "marketing" costs were the greatest part of the total (24 percent - 32 percent). Selling or marketing costs were high presumably as a result of concerted effort to improve the brewing industry's sales and profit position.

Even though still relatively low priced, wholesale beer prices rose by about 1 percent per year during the five years preceding 1961. An analysis of retail pricing was not undertaken because it is so highly variable depending upon draught vs. packaged, retail store vs. tavern, local vs. premium beers, local preferences, income levels, degree of competition, taxes, etc.

Taxes, Incomes, and Sales of Beer

Taxation is apparently a sensitive subject among the alcoholic beverage industries and is assumed to have an important bearing on beer sales. Since 1940, state taxes (average) have doubled--to about \$2.93 per barrel. Federal taxes per barrel were increased by \$1.00 each of three times during World War II and once during the Korean conflict. Levels of income also are generally assumed to have an influence on beer consumption. ^{5/} Data on the beer industry are not easily obtained. However, the accompanying Figures 8, 9, and 10 may be indicative of the influence of taxes and income on beer consumption. Each of the three are scatter diagrams for 1960 data for the 48 continental states and the District of Columbia.

Figure 8 relates per capita consumption of beer with state excise taxes per barrel of beer. In all of the states having above average excise taxes,

^{5/} This is a questionable assumption. See the previous section of this chapter.

beer consumption was below average. Conversely, in all states where consumption was above average, excise taxes were below average.

Figure 9 compares per capita income with state excise taxes. In this case, it may be seen that in all states where excise taxes were above average, the per capita income was below average. Conversely, in all states of above average per capita income, the state excise taxes on beer were below average.

Figure 10 compared per capita consumption of beer with per capita incomes. Here it was found that of the states with below average consumption, 84 percent were also states of below average per capita income. Of the states with above average per capita consumption, 60 percent were also of above average per capita income.

From a visual analysis and preliminary computations of data in Figures 8, 9, and 10, it was tentatively concluded that:

- (1) Contrary to popular notion, beer is not necessarily a poor man's drink. There appeared to be a positive relationship between per capita income and per capita consumption of beer.
- (2) States with low per capita incomes (presumably in search for sources of revenue) tend to levy higher excise taxes on beer.
- (3) As a result of (2), the high taxes on beer raise beer prices and discourage consumption by the already low average income populace. A further possibility which was

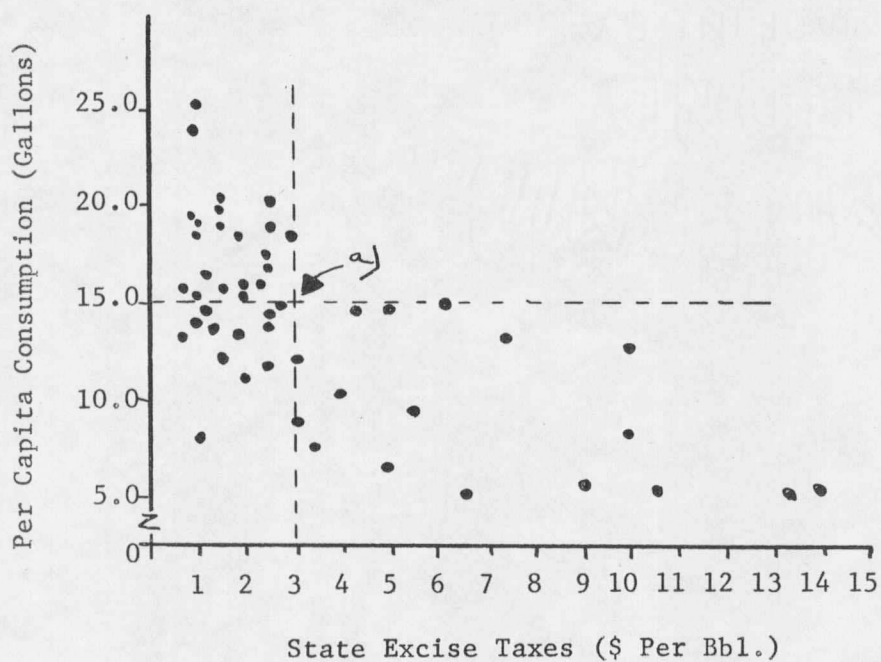


Figure 8. Per Capita Consumption of Beer and State Excise Taxes, by States, U. S., 1960. *

* Source: Data from Loeb, Rhoades, & Co., Three Leading Brewery Stocks, N. Y., February 1962.

a/ U. S. weighted average.

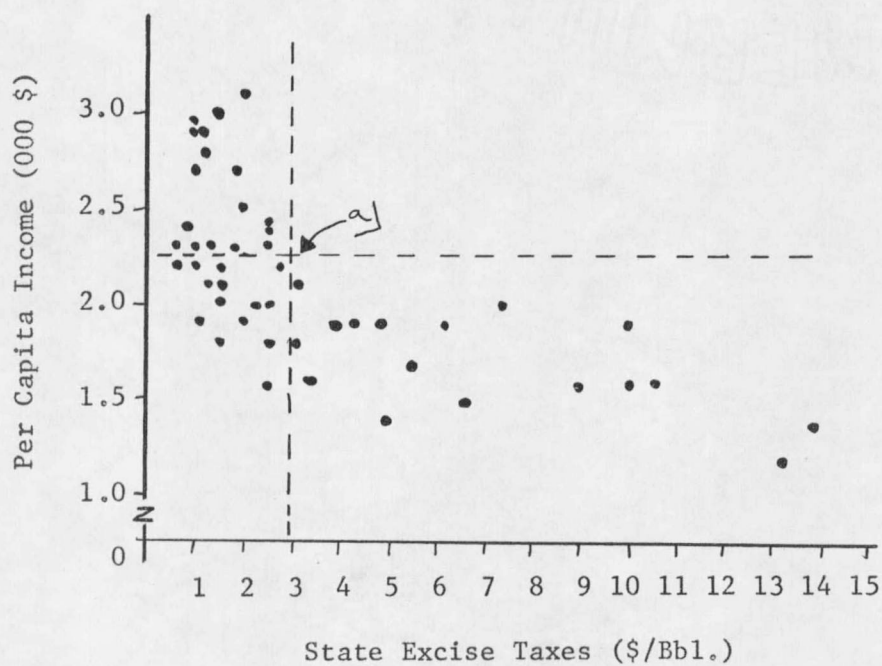


Figure 9. Per Capita Income and State Excise Taxes on Beer, by States, U. S., 1960. *

* Source: Data from Loeb, Rhoades, & Co., Three Leading Brewery Stocks, N. Y., 1962.

a/ X = U. S. average.

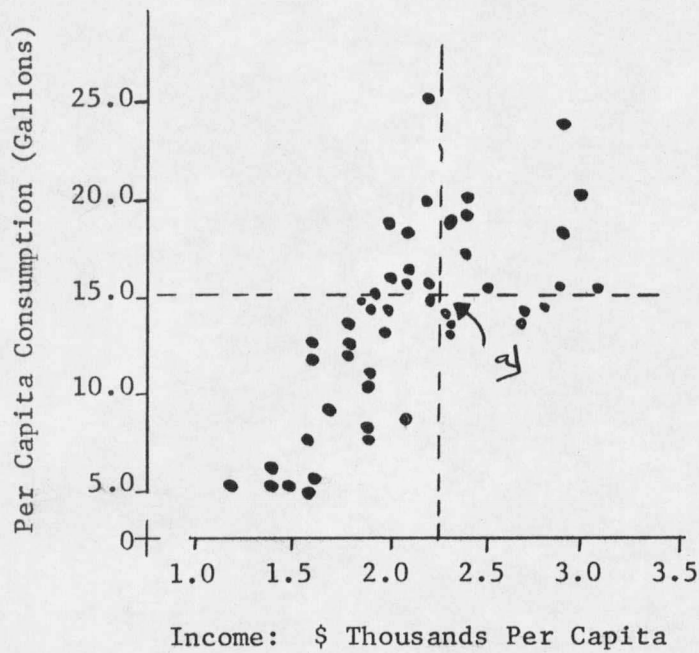


Figure 10. Per Capita Consumption of Beer and Per Capita Incomes, by States, U. S., 1960. *

* Source: Data from Loeb, Rhoades, & Co., Three Leading Brewery Stocks, N. Y., 1962.

a/ X = U. S. average.

not studied could be that of lesser total state revenue from high taxes than would result from increased beer consumption with a lesser tax and a presumably lower price.)

Multiple correlation analyses of per capita consumption, per capita income, and state excise taxes resulted in conclusions that the only statistically significant relationship was between consumption and income. 6/ There is some doubt as to whether one year's data divided into two parts may have been sufficient to obtain statistically conclusive results.

Thus, with the available data, conclusion (1) seems to be verified, but conclusions (2) and (3) remain tentative.

6/ This was in the southern states where incomes were low, taxes high, and consumption low. The data were divided into two parts--the South and the remainder of the U.S. The data were turned over to a statistical laboratory in the USDA for machine analysis of: $X_1 = f(X_2, X_3)$ for the two areas. X_1 - per capita consumption (dependent); X_2 = state excise taxes (independent); and X_3 = per capita income (independent). Results were as follows:

<u>South</u>	"Other" U. S.
$R_{1.23} = .726761$	$R_{1.23} = .460003$
$R^2_{1.23} = .528181$	$R^2_{1.23} = .211603$
$r^2_{12} = .227502$	$r^2_{12} = .044789$
$r^2_{13} = .486030$	$r^2_{13} = .211069$
$r^2_{23} = .173404$	$r^2_{23} = .172149$
$r^2_{12.3} = .082013$	$r^2_{12.3} = .000676$
$r^2_{13.2} = .389224$	$r^2_{13.2} = .174636$

CHAPTER VI

DETERMINING THE PRICE OF MALTING BARLEY

Country Elevator Pricing

Duluth, Milwaukee, Chicago, and Minneapolis all are important barley markets in the United States. Minneapolis is the largest barley market in the United States and probably in the world. ^{1/} Barley is sold in carload lots at terminal market grain exchanges on the basis of samples taken directly from cars by official grain inspectors. Prices are determined by bids on the cash trading floor. Principal barley buyers are terminal elevators, grain dealers, maltsters, and malting brewers. Each purchaser has certain requirements for particular uses of the grain.

How is the price of barley, or other grains, determined? The typical answer is that it depends upon many things which boil down to a common or average judgment among buyers and sellers of basic supply and demand conditions at the time. That kind of an answer is correct but too general to be of much help. For example: Are country elevator barley prices based on terminal prices? Or vice versa? Or both? How does a country elevator operator know what price to pay farmers for barley?

^{1/} Sleik, John, What Happens to Barley on the Trading Floor and in the Malthouse Because of Skinned and Broken Kernels?, G. Heileman Brewing Co., La Crosse, Wisconsin (undated).

A study by the North Dakota Agricultural Experiment Station released in 1954 2/ is indicative of malting barley price procedures. The study pointed out that there was an undercurrent of uncertainty among country elevator operators concerning the pricing of malting barley and a general lack of understanding of terminal market operations. Some operators felt they were purposely being "kept in the dark" on malting barley prices. Others felt that the problem was more one of "organized confusion." Still others thought that at least a part of the problem was due to a lack of a common marketing language for malting barley. Some question was also raised as to whether the rigidity of maltsters' requirements was realistic or even observed by malt barley buyers.

The North Dakota country elevator operators were asked the following questions:

- (1) How do you arrive at your posted or basic price for malting barley each day?
- (2) How do you evaluate the degree of importance of the possible price determining factors listed?
- (3) What sources of price information are used?
- (4) After establishing a basic malting barley price, what factors are used in price determination for particular lots of barley?

2/ Hemphill, Perry V., How Does the Local Elevator Determine A Price for Malting Barley?, N. D. AES Rep. No. 387, from Bi-monthly Bulletin, Sept. - Oct., 1954, Fargo, North Dakota.

A summary of the replies to those questions indicated that country elevator operators generally rely on terminal markets plus their own experience to determine the basic price for malting barley. This price information is obtained from radio reports and market letters of various kinds originating at the terminal markets. Particular lots of barley are then priced according to generally accepted physical quality measurements.

Terminal Market Pricing

Observation and experience support the general conclusion of the North Dakota study that local or country elevator prices are based on terminal market prices. The question then becomes one of how terminal prices are determined.

Analysis of annual average United States barley production and prices received by farmers showed no statistical correlation for the period 1920-1960. Neither was there any significant relationship between annual average terminal market prices (Minneapolis) and annual average United States production, nor between annual average terminal market prices and annual average receipts at terminal markets.

From Tables XVI and XVII there was made an analysis of the prices of feed barley and malting barley. The graphic relationship between the two is shown in Figure 11. In the figure, it may be seen that malting barley prices were always above feed barley prices and that the two prices tended to rise and fall together. ^{3/} During the period covered, the price trend

^{3/} This is a typical relationship. For a comparison of earlier years, see Lejeune, A. J. and Parker, J. H., Guide to Premiums for High Quality Malting Barley, MBIA, Milwaukee, Wisconsin, January, 1953.

TABLE XVI. MINNEAPOLIS CASH GRAIN AVERAGE CLOSING PRICES PER BUSHEL NO. 3 FEED BARLEY, SEASONS 1954-61. *

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	X
	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu
1953-54	1.02	.99	.95	.95	.96	.97	1.04	1.05	1.01	.98	.99	.92	.99
1954-55	.88	.94	1.06	1.10	1.09	1.03	1.03	1.04	1.05	1.02	1.04	.96	1.02
1955-56	.89	.81	.81	.83	.79	.81	.84	.84	.87	.95	1.01	.97	.87
1956-57	.94	.96	.92	.93	1.01	1.02	1.04	1.03	1.01	1.01	1.01	.89	.98
1957-58	.81	.85	.91	.96	.92	.89	.89	.93	.90	.95	.98	.95	.91
1958-59	.98	.92	.94	.98	1.00	1.00	1.01	.98	.97	.96	.94	.90	.97
1959-60	.91	.91	.90	.92	.90	.89	.90	.90	.88	.88	.90	.88	.90
1960-61	.84	.85	.83	.82	.79	.78	.81	.83	.81	.84	.85	.82	.82
X	.91	.90	.92	.94	.92	.92	.95	.95	.94	.95	.97	.91	.93
Index <u>a</u> /96.8	95.7	97.9	100.0	98.9	98.9	102.1	102.1	101.1	102.1	104.3	97.9	---	---

* Source: USDA, Grain Market News, Weekly Summary and Statistics, AMS Grain Division, Washington, D. C.

a/ Trend adjusted.

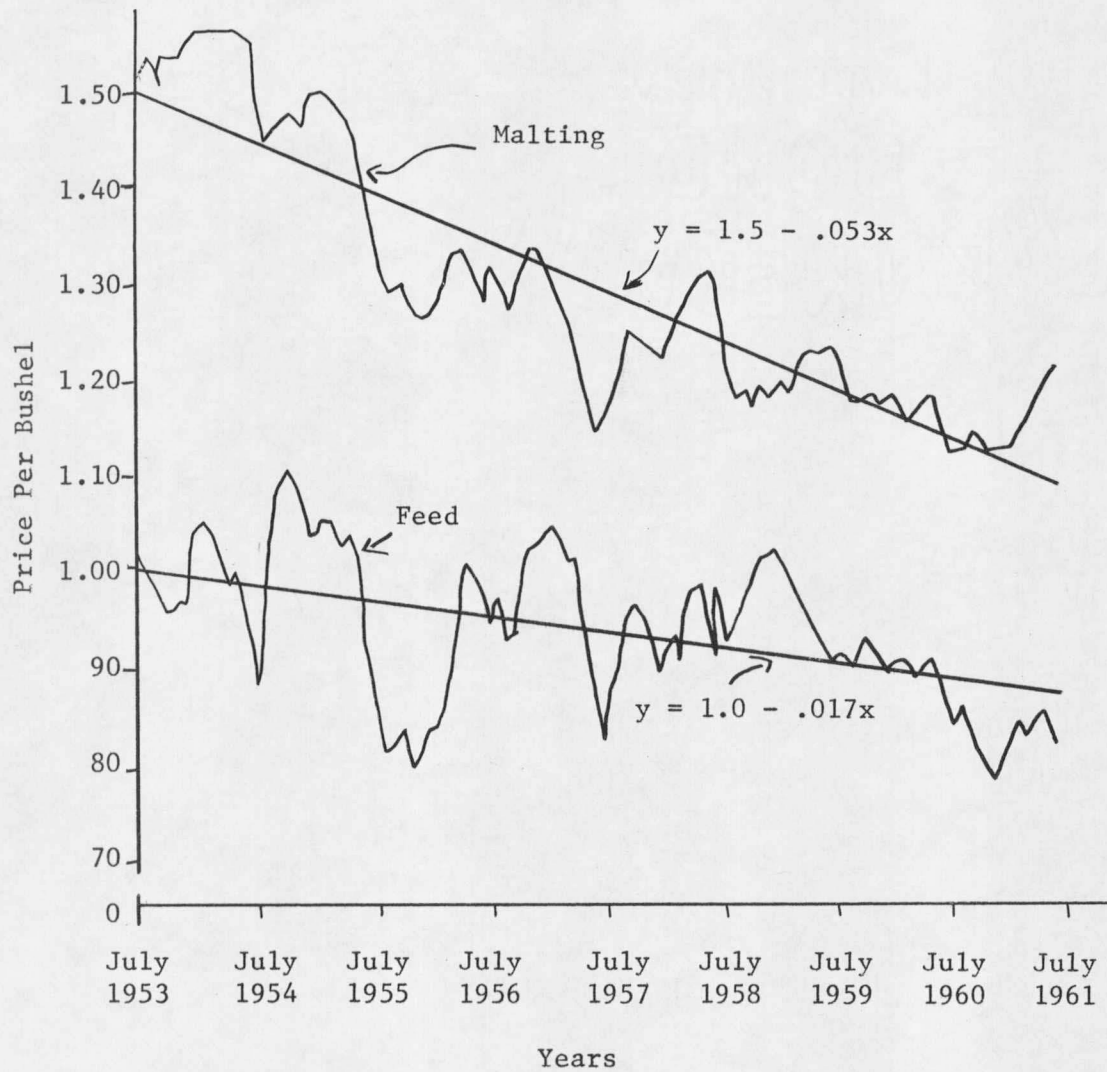


Figure 11. Monthly Average Prices and Trends for No. 2 Malting Barley and No. 3 Feed Barley, Minneapolis, 1953-61. *

* Source: USDA, Grain Market News, AMS, Washington, D. C. (Weekly issues, 1953-61).

TABLE XVII. MINNEAPOLIS CASH GRAIN AVERAGE CLOSING PRICES PER BUSHEL NO. 2 MALTING BARLEY,
SEASONS 1954-61. *

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	X
	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu	\$/bu
1953-54	1.48	1.54	1.51	1.54	1.54	1.55	1.56	1.56	1.56	1.56	1.56	1.55	1.54
1954-55	1.54	1.44	1.45	1.47	1.48	1.46	1.49	1.50	1.49	1.48	1.46	1.44	1.48
1955-56	1.36	1.29	1.29	1.29	1.30	1.27	1.27	1.27	1.30	1.32	1.33	1.29	1.30
1956-57	1.27	1.31	1.26	1.27	1.32	1.34	1.32	1.30	1.27	1.26	1.24	1.17	1.28
1957-58	1.13	1.15	1.20	1.25	1.24	1.23	1.23	1.22	1.24	1.28	1.30	1.31	1.23
1958-59	1.30	1.20	1.17	1.18	1.16	1.19	1.17	1.19	1.17	1.22	1.23	1.21	1.20
1959-60	1.23	1.17	1.17	1.16	1.18	1.16	1.18	1.15	1.14	1.16	1.18	1.17	1.17
1960-61	1.11	1.12	1.11	1.14	1.11	1.12	1.12	1.13	1.14	1.18	1.20	1.22	1.14
X	1.30	1.28	1.27	1.29	1.29	1.29	1.29	1.29	1.29	1.31	1.31	1.30	1.29
Index <u>a/</u>	99.2	97.7	97.7	99.2	100.0	100.0	100.0	100.8	100.8	103.1	103.1	102.2	--

* Source: USDA, Grain Market News, Weekly Summary and Statistics, AMS Grain Division, Washington, 25, D. C.

a/ Trend adjusted.

was downward for both feed and malting barley with a more rapid decline in malting barley prices. 4/

Total supplies of barley available increased, as shown in Figure 12. Total use or disappearance also increased so declining consumption or use per se cannot be blamed for price declines. There appeared to be insufficient difference in the relative rates of change between supply and disappearance to conclude that stocks on hand were necessarily the sole or primary cause of declining prices. It is deduced that the general increase in production and supplies of all types of feed grain was also responsible for the relatively moderate down trend in feed barley prices. This does not explain the greater rate of decline in malting barley prices.

It is technically possible to make malt from nearly any variety and quality of barley. However, as indicated in Chapter IV, maltsters and brewers prefer barley of specific qualifications. Consequently, it is assumed that the premiums paid for malting barley depend in large part on the supply of barley which meets the preferred specifications relative to

4/ Price data for 1961-62 (which became available after Figure 11 was constructed) showed an increase of 24 percent for feed prices and 22 percent for malting prices over the previous year. From the low price points in 1960-61 to the highs in 1961-62 and down again to the lows in 1961-62, feed barley prices rose by a greater percentage than malting prices and fell by a lesser percentage. Whether or not this indicates a continuing trend in the "closing" of the spread between feed and malting prices is unknown.

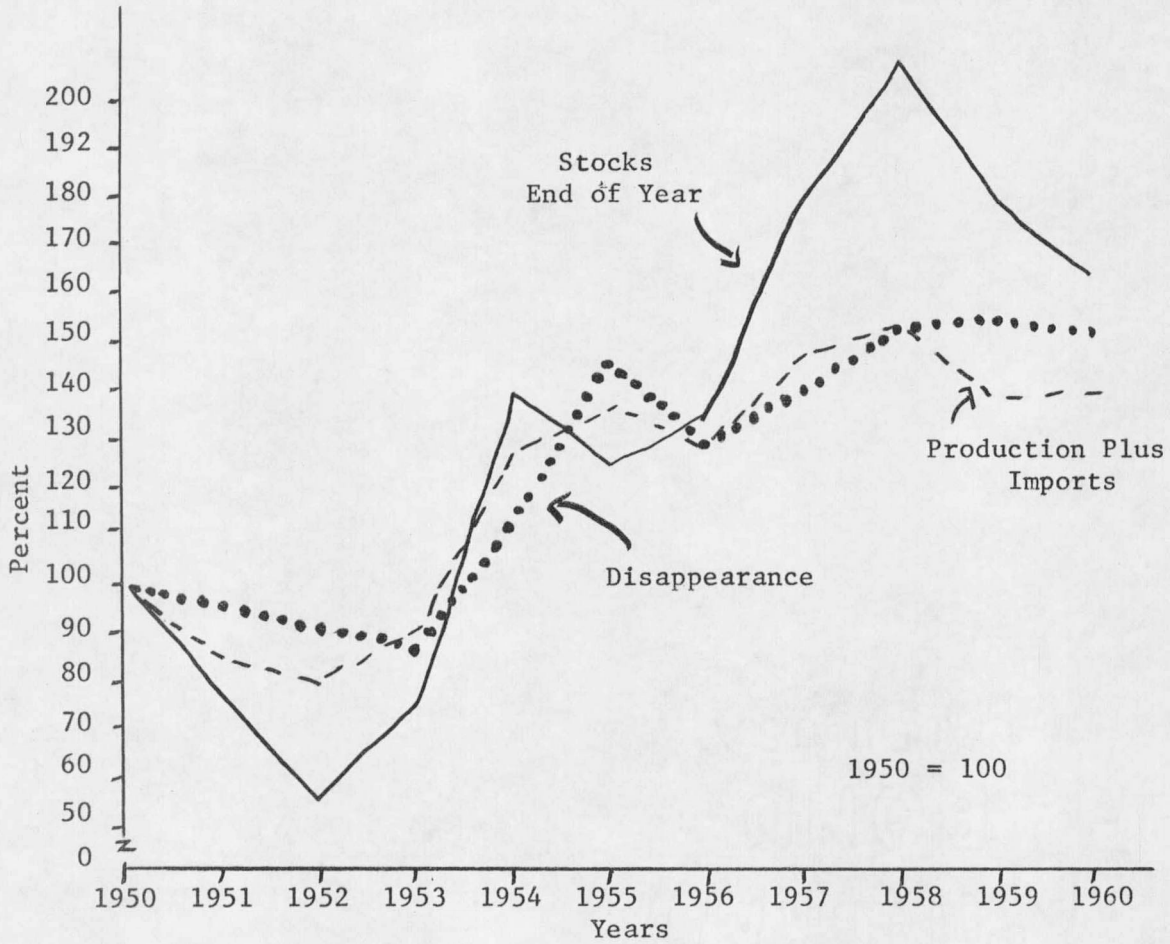


Figure 12. Rates of Change in U. S. Barley Production Plus Imports, Total Disappearance, and Stocks at Year's End, 1950-60. *

* Source: Based on data in Table II, U. S. Barley Distribution.

the total supply of all barley. During the post-war years, the malting industry made a concerted effort to improve the quality of acceptable malting varieties produced, to develop new varieties, and to encourage production in new (as well as in old) geographic areas. Evidently, the efforts have been successful. The relative supply of barley suitable for malting has increased, and malting prices have declined more than feed prices. ^{5/} Further evidence of this supposition is provided in Figure 13, showing the various uses and total disappearance of barley for the years 1950-60. Increased use of barley for livestock feeding and to a lesser extent increased exports have accounted for most of the increase in total disappearance. Amounts of barley used for malting and other uses (primarily for food) have been very stable.

Analyses of malting and feed barley prices at Minneapolis for the period included in Tables XVI and XVII resulted in an expected high degree of correlation ($r^2 = .99+$) and in the regression equation $Y = .08 + 1.299X$. That curve, shown in Figure 14, is consistent with Figure 11 which shows that falling feed barley prices are accompanied by more rapidly falling malting barley prices.

^{5/} This cannot be substantiated statistically because barley does not become malting barley until someone buys it for malting purposes. Out of any given year's supply of barley, a substantial amount which could have been malted is used for other purposes. There are no data available dividing barley supplies into feed barley and malting barley.

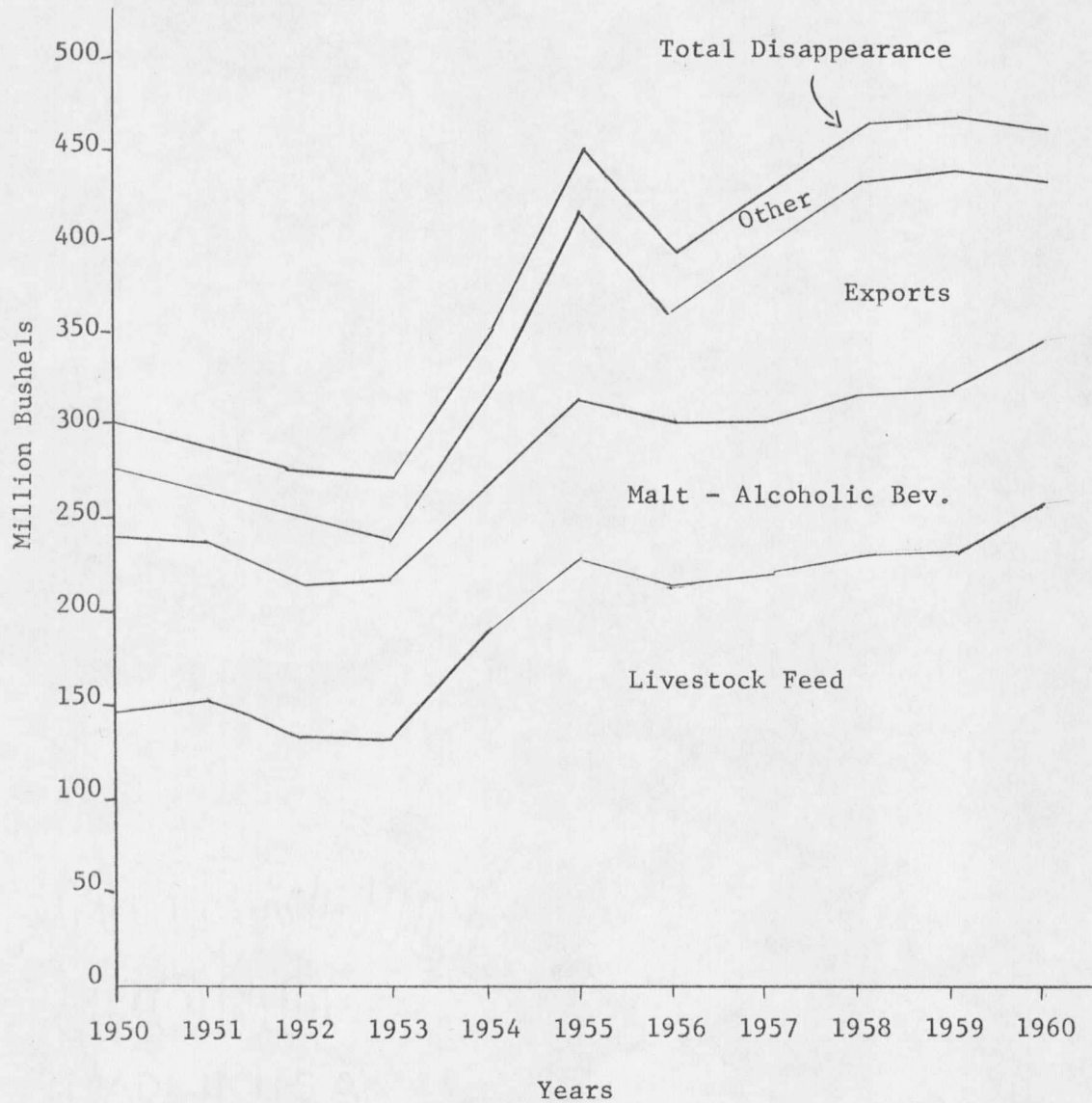


Figure 13. U. S. Barley Uses and Total Disappearance, 1950-60. *

* Source: Based on Table II, U. S. Barley Distribution.

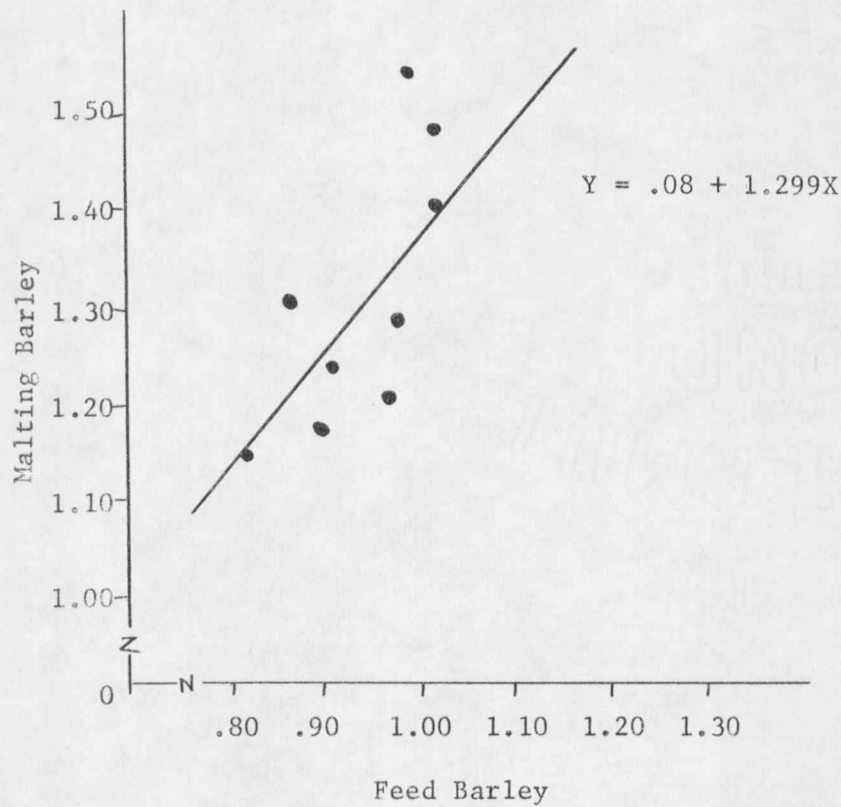


Figure 14. Correlation of Feed and Malting Barley Market Prices at Minneapolis, 1953-61. *

* Source: Based on data in Tables XVI and XVII.

Figure 11, showing monthly prices of barley from 1953-61, gives a visual impression of marked seasonality of barley prices. Figure 15 indicates pronounced seasonality of receipts of barley at various markets. Statistical analyses of the data from which Figures 11 and 15 were developed revealed that the trend line of receipts in Figure 15 is insignificantly upward despite increasing barley production. Apparently, the increased production did not go to the markets but was absorbed in livestock feeding on the farm and to some unknown extent into channels bypassing the terminal markets. ^{6/} Price and receipts data were adjusted for trend and converted into monthly indices. The results are shown in Figure 16. During the month of August, receipts were more than twice the average, dropping to about 70 percent of average in April. Despite this wide swing in monthly receipts, the indices of prices were relatively stable throughout the year. Obviously monthly receipts have little to do with monthly prices. Apparently, the grain trade is geared to seasonal use of barley, to pricing which accounts for highly seasonal receipts, or both.

^{6/} About one third of the barley produced in the U.S. is used on the farm where grown. See USDA, ERS, Stat. Bul. No. 159, revised June 1962.

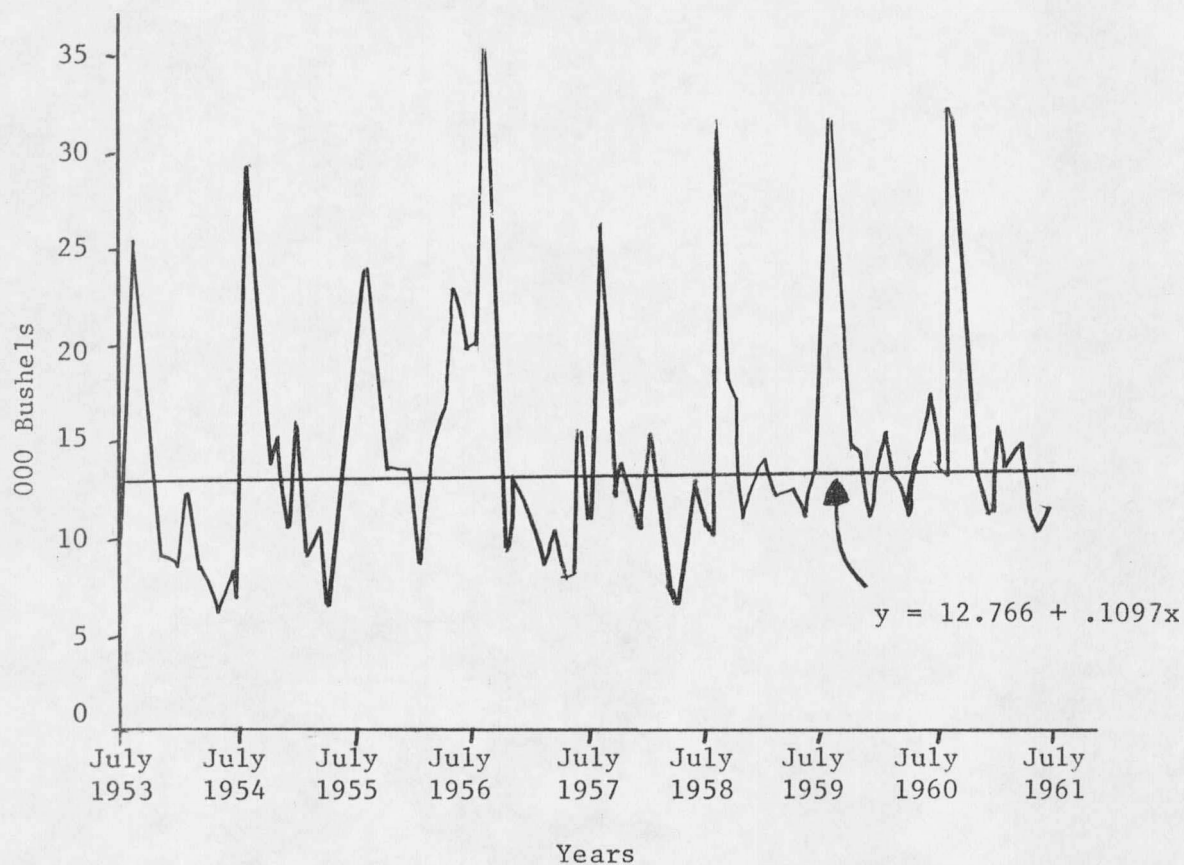


Figure 15. Receipts of Barley by Months at Principal Markets, 1953-61. * a/

* Source: Based on USDA, ERS data.

a/ Minneapolis, Milwaukee, Duluth.

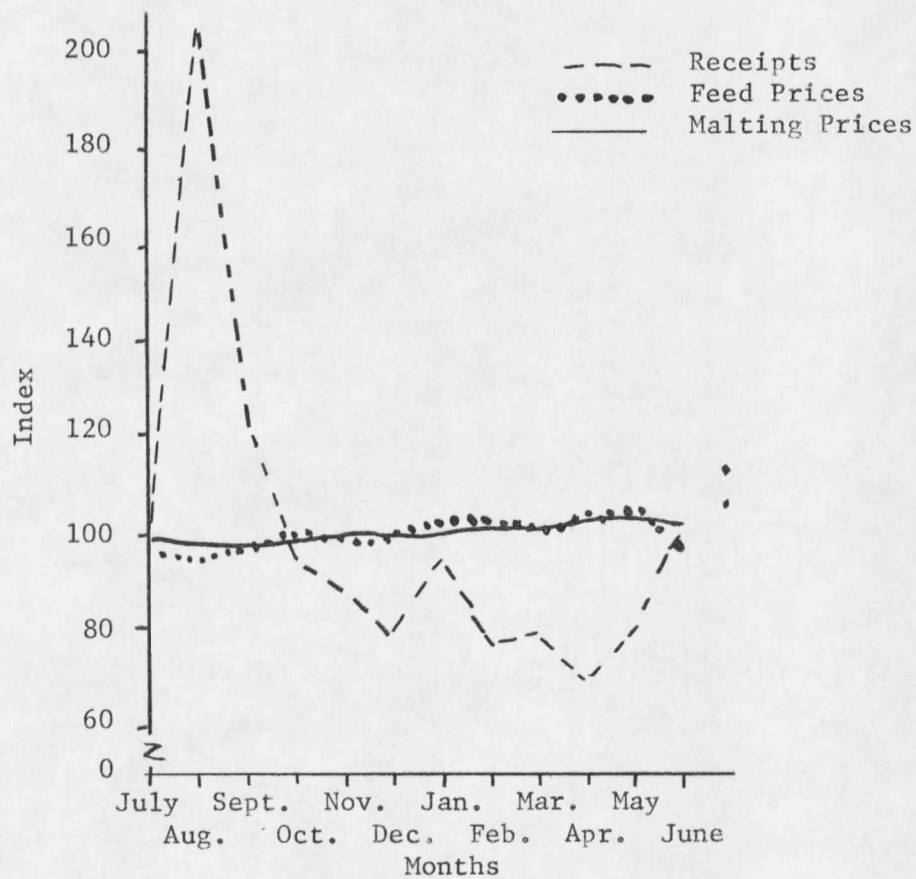


Figure 16. Monthly Indices of Barley Receipts and Prices for Feed and Malting Barley, 1953-61. * a/

* Source: Based on USDA, ERS data.

a/ Indices trend adjusted.

Barley Support Prices

The foregoing analysis is largely an indication of that which does not determine market prices of barley. The factor which does determine barley prices in the market is the support price. Figure 17 is a graphic presentation of linear correlation analysis of national average barley support prices and Minneapolis market prices for all barley for the years 1944-60.^{7/} As might be expected, there was a high degree of correlation and significance of correlation.^{8/} From $\bar{Y} = .468 + .8x$ and from $S_y = .07$, market prices may be predicted from support prices announced prior to the marketing of a particular year's crop. For example, the national average support price for barley (X) in both 1959 and 1960 was 77 cents per bushel. The predicted market price (Y_c) would have been \$1.08. As it turned out, actual market prices (Y) were \$1.10 and \$1.05 respectively.^{9/} The degree of accuracy in predicting market prices in any particular year may vary depending for example, on the degree to which there may be significant changes in market supply and demand conditions after the support price has been decided upon.

^{7/} Excluding 1946 and 1947 as non-representative post-war adjustment periods. These were average prices for all barley--higher than feed prices, lower than malting prices.

^{8/} Standard deviation of Y values: $O_y = 4.76$
Standard error of estimate : $S_y = .0747$
Coefficient of correlation : $r_2 = .999754$
Coefficient of determination : $r = .999508$
Standard deviation of r : $O_r = .000129$
Regression equation : $Y = .468 + .8x$

^{9/} S_y = 50% chance of prices between \$1.01 and \$1.15
 $2S_y$ = 95% chance of prices between \$0.94 and \$1.22
 $3S_y$ = 99.7% chance of prices between \$0.87 and \$1.29

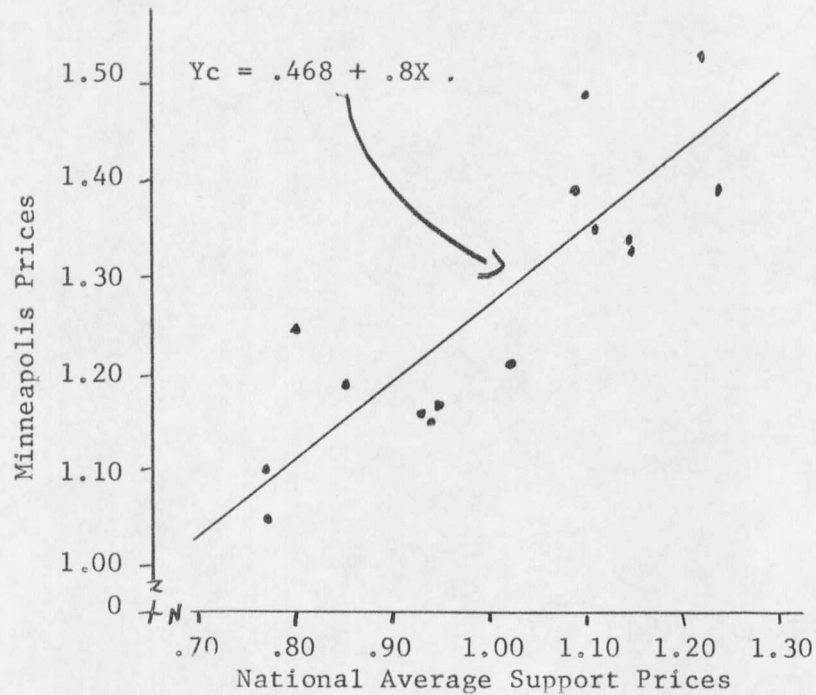


Figure 17. Correlation between National Average Barley Support Prices and Minneapolis Market Prices, 1944-60. *

* Source: Based on USDA, ERS data.

Nor should it be assumed that having predicted an all barley market price that malting barley prices may necessarily be accurately predicted. As we progress from a known (in advance) support price to a predicted all barley market price to feed barley prices to malting barley prices, errors are compounded, and the predictions become rapidly less reliable. Prediction of malting prices from predicted all barley market price becomes in practice largely a matter of subjective analysis.

This is not to imply that a precise analysis of the demand and price structure for all barley, feed barley, and malting barley could not be made. Techniques such as those used by K. W. Meinken to determine the demand for wheat (United States Department of Agriculture, Agricultural Marketing Service, Technical Bulletin 1136, November 1955) and by R. J. Foote and associates to determine the demand for corn and feed concentrates (United States Department of Agriculture, Bureau of Agricultural Economics, Technical Bulletin 1061, October 1952) could be applied to an analysis for barley. To do so would involve a research project of sizable proportions including analysis of a dozen or more endogenous and exogenous variables for mathematical treatment.

CHAPTER VII

AGRICULTURAL POLICY PROGRAMS AND MALTING BARLEY

The Policy Setting

Since it has been found that United States support prices are the principal determining factor in barley pricing, it may be well to examine the agricultural policies, and particularly feed grain programs, which determine support prices.

In 1959 the United States Department of Agriculture published its projected estimates of production of wheat, feeds, and livestock during the period 1960-65. 1/ Presumably those were the estimates which provided the basis for policies and programs for feed grains during the 1960's. In brief, the prospects were for continued excess stocks in the 1960's. Under such circumstances, it was inevitable that feed grains receive considerable political attention.

Under the direction of Secretary Orville Freeman, the United States Department of Agriculture, in 1962, published a bulletin called Food and Agriculture, A Program for the 1960's. 2/ In the bulletin's opening

1/ Christenson, R. P.; Johnson, S. E.; and Baumann, R.V., Production Prospects for Wheat, Feed, and Livestock, 1960-65, USDA, ARS 43-115, Washington, D. C., December 1959.

2/ USDA, Washington, D. C., March 1962.

statement, Mr. Freeman said that, with reference to overall agricultural policy, "a fresh start has been made in 1961. . . ."

The "fresh start" had been an emergency feed grain program for 1961, which--according to Secretary Freeman--had been successful in holding, ". . . total farm production below potential output. . . ." Another similar feed grain program was enacted for the crop year 1962. "Without new legislation in 1962", said Freeman, "the program in effect in the late 1950's would be in effect for 1963 crops. That program has failed--and would fail again." A new program for 1963 was enacted. In the meantime, the feed grain program proposed for the 1960's by Mr. Freeman was expected to reduce stocks, acreage, and government expenditures and to retain support prices and farm income levels--no mean task!

The 1962 Barley Program

Barley was not included in the 1961 United States feed grain program because most of the crop had already been planted before feed grain legislation for that year was enacted. A special, but temporary, barley feed grain program was designed for the 1962 crop year only.

Purposes of the 1962 barley program were to reduce barley acreage and production, reduce stocks and costs of Commodity Credit Corporation barley holdings, to support farm prices of barley, and to pay farmers for diverting barley acres to conservation uses.

Need for a barley program was found in the facts 3/ that United States barley acreage had increased from 10 million to 17 million between 1952 and 1960. The record supply of 659 million bushels of barley in 1958 was nearly double the 1952 supply. The 1960-61 barley supply was 610 million bushels, while utilization for that year was estimated at 458 million bushels.

The 1962 barley program was, for the most part, composed of what had become fairly typical of requirements for calculation of base acres, minimum and maximum diversion of acres, payment for diversion, price support eligibility, and crops eligible as substitutes for diversion. However, the final provision of the program stated that malting barley producers were not required to participate in the 1962 program if:

- (1) they had previously produced a malting barley variety,
- (2) they planted only barley of acceptable malting varieties for harvest in 1962.
- (3) they did not grow in 1962 an acreage in excess of 110 percent of their 1959 and 1960 average barley acres, and
- (4) they did not grow in 1962 an acreage of corn and sorghum grain in excess of the average acres of those crops in 1959 and 1960.

In an October 10, 1961, news release, the United States Department of Agriculture listed 21 varieties of barley for exemption from the provisions

3/ ASCS Fact Sheet, 1962 Barley Feed Grain Program, USDA, Washington, D.C., August, 1961.

of the 1962 feed grain program. 4/ Fourteen states were listed in which producers were eligible for exemption if they planted the designated varieties for 1962 harvest. 5/ Provisions of the program prior to the news release did not elaborate on what was meant by "acceptable" varieties of malting barley which were to be exempt from the law. When the United States Department of Agriculture released the list of exempt varieties and states, it became clear that "acceptable" referred to a combination of Malting Barley Improvement Association approved varieties and states where those varieties were approved for production, of official United States grain grading standards for malting barley, and of other factors. The Malting Barley Improvement Association had this to say:

"In comparing the Malting Barley Improvement Association list with the United States Department of Agriculture list, it will be noted that the USDA includes six other varieties (Barbless, Forrest, Maisa II, Manchuria, OAC 21, and Odessa) and one state (Nebraska) not included in the Association list. These are included in the USDA list for historical reasons or because these varieties are used for malting by some members of the industry (underlining added). While the U.S. Department of Agriculture list did not list the designated varieties by states, the Malting Barley Improvement Association classifies only certain barley varieties, which have general

4/ Including Atlas, Barbless, Betzes, Forrest, Hanna, Haisa II, Hannchen, Heines Hanna, Idaho Club, Kindred, Manchuria, Montcalm, Moravian, OAC 21, Oderbrucker, Odessa, Parkland, Traill, White Winter, Winter Club, and Winter Tennessee.

5/ Including California, Colorado, Idaho, Illinois, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Oregon, South Dakota, Washington, and Wisconsin.

industry acceptance, as acceptable when grown in specific states." 6/

And the fight was on--over a seemingly innocent point: What is malting barley?

Compana and Exempt Barley

While some farmers and farm groups were protesting that the entire 1962 feed grain program should be eliminated (over the question of what is a reasonable county average yield), the Montana Grain Growers Association pursued the issues involved in defining malting barley.

Montana Grain Growers Association President Larry Erpelding was quoted as follows:

"We realize MGGA was the subject of criticism in some circles for not leading a statewide campaign against the entire Feed Grain Program, but our decision has been borne out that a change in the status of Compana was more logical and had better evidence in its support than propositions based on yields or payments.

"It is glaringly evident that all farm programs are involved in politics, and long ago 'politics' was defined as the art of the possible. In this barley matter, MGGA has accomplished what was 'possible'".

Erpelding thanked those who had assisted in the barley campaign, including various members of the grain trade, newspapers, and other publications, and the numerous barley "protest" groups that formed in Montana when the issues were at their peak:

"Although the barley protest groups chose a different approach to the problem, their efforts and subsequent publicity undoubtedly aided in pointing up the importance

6/ MBIA, Grains of Truth, newsletter, Milwaukee, Wisconsin.

of MGGA's drive to have Compana added to the malting barley list." 7/

The Montana Grain Growers Association (primarily a wheat producers organization) may have viewed the barley protest groups' fight to have the feed grain program thrown out as a possible precedent for elimination of wheat programs--which would not necessarily be viewed by all Montana Grain Growers Association members as a desirable consequence. At any rate, the Montana Grain Growers Association pursued the question: What is malting barley?

It appeared that the malting barley provision of the 1962 barley feed grain program--assuming a favorable growing season in 1962--would result in little reduction of the total United States barley production. The 14 states exempted by the law were all malting barley producing states and as a group could be depended on to produce about 95 percent of the nation's total supply of barley of all types. Within those states, most barley producers had a history of production of malting varieties and thus could increase their acreages by 10 percent over their 1959-60 average acreage.

Among the 14 exempt states there was, however, considerable difference in the numbers of "acceptable" malting varieties which could be produced and in relative amounts of malting and feed barleys produced. It was on these differences that the Montana Grain Growers Association fought the battle of Compana.

7/ MGGA, The Wheat Scoop, Great Falls, Montana, March 1962.

At the time (October 1961), there was but one exempt barley variety (Betzes) adaptable to Montana growing conditions and approved as a malting variety by the Malting Barley Improvement Association. By way of comparison, North Dakota had five varieties acceptable to the Malting Barley Improvement Association. In Montana about one-fifth of the total barley acreage was Betzes. In North Dakota over 86 percent was of various malting varieties. Minnesota's malting barley acreage was 99 percent. Thus it was theoretically possible that 80 percent of Montana's base barley acreage would be reduced by 20 percent and the remaining 20 percent of the acreage increased by 10 percent. In North Dakota the situation was nearly the reverse with a possible 10 percent increase in 86 percent of the acreage and a reduction of 20 percent in 14 percent of the base acres. This appeared to Montana producers as an inequitable division of the barley acreage exemption.

On that basis, the Montana Grain Growers Association (then) President George Skarda protested to Montana's Governor, Commissioner of Agriculture, United States Congressional delegation, and the Chairman of the United States Senate and House Agricultural Committees. 8/

Culmination of the Montana Grain Growers Association's campaign was another United States Department of Agriculture news release on February 2, 1962, in which Larker, Trophy, and Compana barleys were added to the exempt

8/ Ibid.

list. Larker and Trophy are North Dakota developed varieties which, at that time, had been recently approved by the Malting Barley Improvement Association for malting. "Compana", said the news release, "is a variety limited to Montana for purposes of the 1962 feed grain program." (Underlining added.)

Compana had for several years been used in small quantities by a brewing company in Montana for malting and brewing. The United States Department of Agriculture had previously exempted six non-approved (by the Malting Barley Improvement Association) varieties "for historical reasons or because these varieties are used for malting by some members of the industry." 9/ On that basis Compana became a Montana malting barley variety for purposes of the 1962 feed grain program even though not approved by the Malting Barley Improvement Association and not a malting variety by official United States grain grading standards. This declaration of Compana as a malting barley was of considerable potential impact in Montana. In 1959 and 1960 (from which barley base acres were calculated), Betzes accounted for 19.2 percent and 27.1 percent respectively of Montana's total barley acreage. For the same years, Compana accounted for 59.3 percent and 59.2 percent. 10/ With the addition of Compana to the exempt list, Montana's malting barley acreage jumped from a little over 20 percent to over 80 percent.

9/ MBIA, loc. cit.

10/ Estimated by Robert Eslick, Agronomist, Mont. AES, Bozeman, Montana.

Predicted Program Effects

From the above discussion and from Table XVIII, the following predictions were made on United States production of malting barley:

(NOTE: Data in Table XVIII for predicted acres planted were available at the time of initial writing. Information on actual acreages planted was not known until 1963.)

- (1) Acreage of malting barley varieties would increase.
- (2) Acreage of feed barley varieties would decrease.
- (3) Total United States acreage of all barley would decrease slightly--if at all.
- (4) Total barley production would be about the same and possibly less than in 1961.
- (5) Malting barley supply would increase relative to feed barley supply, and premiums for malting would decrease.
- (6) The program would accomplish little of its stated goals.

Only 8 of the 14 exempt states made malting vs. feed varietal surveys for their 1962 barley crops. In comparing the actual plantings of the 8 with their 1959-60 averages, it turned out that there was a 15 percent decrease in malting acres planted, a 4 percent decrease in feed acres, and an 11 percent decrease in total acres.

The above result was, of course, annoying to the author because it had been predicted that malting acreage would increase. In Montana the predictions were reasonably accurate. In Table XVIII, there appear two sets of figures for Montana. In the one (with parentheses) is shown the situation

TABLE XVIII. PREDICTED AND ACTUAL BARLEY ACRES PLANTED, AND COMPARISON OF ACRES PLANTED IN 1962 TO 1959-60 AVERAGES RESULTING FROM THE 1962 FEED GRAIN PROGRAM. *

State	Planting Predictions for 1962 a/			Actual Plantings 1962 b/			Comparison of Acres Planted in 1962 to 1959-60 Average		
	Malt.	Feed	All	Malt.	Feed	All	Malt.	Feed	All
	+10% 000 Acres	-20% 000 Acres	000 Acres	000 Acres	000 Acres	000 Acres	%	%	%
Calif.	415	1,090	1,505	258	1,353	1,611	-32	-1	-7
Colo.	33	467	500	---	---	715	--	--	+16
Idaho	167	312	479	190	503	693	+25	+29	+28
Ill.	13	61	74	---	---	65	--	--	-26
Iowa	3	15	18	---	---	16	--	--	-27
Mich.	42	37	79	---	---	69	--	--	-19
Minn.	1,075	8	1,083	832	26	858	-15	+163	-13
(Mont.) c/	(492)	(1,191)	(1,683)	(382)	(1,527)	(1,909)	(-15)	+3	-1
Mont.	1,748	278	2,026	1,718	191	1,909	+8	-45	-1
Nebr.	---	308	308	---	---	291	--	--	-15
Oregon	272	242	514	149	303	452	-40	0	-18
S. Dakota	457	114	571	297	146	443	-29	+3	-21
Wash.	299	351	650	323	323	646	+19	-26	-9
Wisc.	31	13	44	---	---	31	--	--	-20
N. Dakota	3,618	418	4,036	2,481	544	3,025	-25	+4	-21
8 states	8,051	2,813	10,864	6,248	3,389	9,637	-15	-4	-11
14 states	8,173	3,714	11,887	---	---	10,824	--	--	-10
U.S.	---	---	---	---	---	14,701	--	--	-10

(See next page for reference and footnotes).

* Source: USDA, Agricultural Estimates Division, SRS, Washington, D. C.

- a/ Predictions assume maximum increase in malting acreage and minimum decreases in feed acreage under 1962 Feed Grain Program.
- b/ Malting and feed acreages derived from individual state varietal surveys. Data on all varieties planted from USDA, SRS, Agricultural Estimates Division.
- c/ Figures for Montana in parentheses are for Betzes only as a malting variety. Montana figures not in parentheses are for Betzes and Compana. (See pages 116 and 119 of text).

if only Betzes had been listed as a malting variety. In the other is the actual situation with both Betzes and Compana as malting varieties. With Compana as a malting barley, the 1962 Feed Grain Program permitted an increase in total barley acres from a maximum of 1,683,000 to 2,026,000. Actual total acres were reported at 1,909,000, including an 8 percent increase in malting varieties, a 45 percent decrease in feed varieties, and an overall decrease of but 1 percent in all varieties. Obviously, Montana took advantage of its possibilities!

What happened elsewhere? Why didn't the states of normally large malting barley production take advantage of the program? In some cases, such as in Idaho and Washington, they did. In others, such as North Dakota, California, and Minnesota, they did not.

The explanation for North Dakota--which is the largest United States barley-producing state--was that". . . much of our malting barley acreage is Red River Valley oriented" and, in 1962, ". . . much of the crop land normally earmarked for malting barley had mallards swimming on it at planting time. . . ." 11/ Heavy rains resulted in a 15 percent decrease in North Dakota's 3,289,000 average acreage of malting barley. Much of Minnesota's barley is also produced in Red River Valley counties and was subject to the same conditions as prevailed in eastern North Dakota. 12/

11/ From a letter by H. W. Herbison, North Dakota State University, addressed to E. Dean Vaughan, April 8, 1963.

12/ From a letter by H. C. Pederson, University of Minnesota, addressed to E. Dean Vaughan, April 23, 1963.

California's total barley acreage decreased by 7 percent in 1962 as compared with its 1959-60 base, and its malting acreage was down 32 percent. Several factors account for the decline. High yielding varieties of milo are tending to replace barley as a feed crop; the malting varieties produced do not seem to be favored by West Coast brewers, and malting price premiums have narrowed. 13/ The demand for livestock feed is increasing faster than malting needs, and there are greater returns from other crops in California's malting barley area. 14/

In Washington--which has in the past been an important source of supply for two-row malting barley--there was a 15 percent increase in malting barley production but not in two-row varieties. Some beer market changes explain the situation. While United States beer production rose from 85 million barrels in 1956 to 91 million barrels in 1962, sales in the West increased from 7.5 million barrels in 1946 to 13.5 million barrels in 1962--nearly 100 percent increase. As a result, the beer industry in the Pacific Northwest has changed. About two-thirds of the major brewers in the far West are now established as branches of midwestern brewers processing eastern type beer. Consequently, there has been a shift away from the two-row varieties and an increase in Pacific Northwest production of six-row varieties, which produce beer of the eastern flavor. Barley of the six-row

13/ From a letter by Kenneth R. Farrell, University of California, addressed to E. Dean Vaughan, May 8, 1963.

14/ Blaich, O. P., Barley: Its Production and Use, University of California Davis, August 31, 1961.

varieties is being imported into the Pacific Northwest while local production is shifting from two-row to six-row barleys. Another factor in the shift has been the increasing ability of areas in Montana, Idaho, and Colorado to compete in the limited market for two-row malting barley in the midwest brewing centers. 15/

Similarly, in Oregon, which has also been an important two-row malting barley producing area, malting barley production declined sharply in 1962 as compared with the 1959-60 average. Disease in the Willamette Valley reduced plantings; and in the Klamath Basin, Hannchen barley malting premiums have not been sufficiently high to offset the increasing yields from six-row barley varieties. In 1962, much of the acreage formerly in malting varieties was planted to feed varieties. 16/

Program Evaluation

Was the program a success? Previously it was stated that purposes of the program were to reduce barley acreage, production, and stocks. Acreage was reduced (by 10 percent) but not because of the program. Production increased by 33 million bushels primarily because yields per acre increased by 4.1 bushels. Stocks on hand in all positions rose from 335.5 million bushels on June 1, 1962, to 341.1 million bushels on June 1, 1963. Prices received by farmers declined by about five cents per bushel.

Early in 1963, the author asked a United States Department of Agriculture official in a telephone conversation why the special malting barley provision

15/ From a letter by Owen S. Wirak, WSU, to E. Dean Vaughan, May 7, 1963.

16/ From a letter by Ray H. Teal, OSU, to E. Dean Vaughan, June 13, 1963.

had been put into the 1962 program and why it was taken out 17/ of the 1963 program. The reply was that in 1961, production and stocks of barley had decreased (true) and that it was felt that production increases for 1962 were desirable! That reply was in direct contradiction to the objectives as stated above. In any event, the special malting exemption was quietly eliminated from the Feed Grain Program for the 1963 crop.

17/ "Taken out" refers to the fact that the same malting barley exemption was also in the Feed Grain Program for 1963. The difference was that for 1963 the exemption was at the discretion of the Secretary of Agriculture, who did not grant the exemption for 1963 because of the large 1962 barley crop.

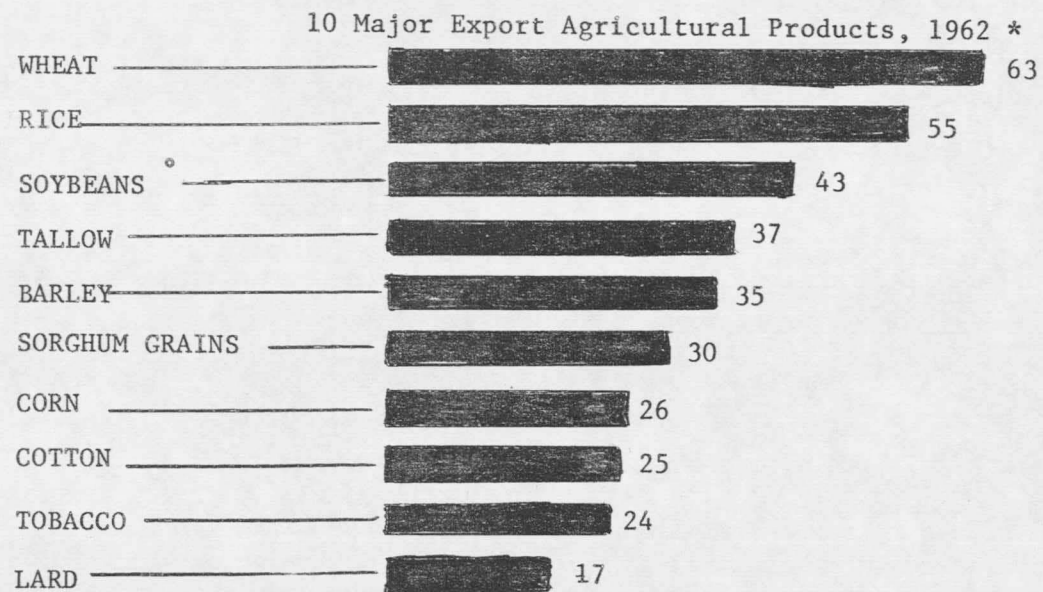
CHAPTER VIII

FOREIGN TRADE IN BARLEY AND FEED GRAINS

United States Feed Grains in World Trade

In recent years it has become a well publicized fact that world trade is of increasing importance to the United States and that exports provide a significant market for many United States agricultural products. The following series of illustrations quantitatively substantiate this statement: Figure 18 shows for various crops the percentage portion exported in 1962. Figure 19 lists the volume of United States agricultural exports to selected countries. Figure 20 shows the relative volume of United States exports of course grains (corn, oats, barley, sorghum, rye, millets) to various regions of the world. Barley is shown in Figure 21 as holding the number 3 position in United States coarse grain exports.

World trade in barley is a somewhat confusing subject. Barley is more important in the United States grain trade than the size of the crop would indicate because a large part of off-farm sales of barley moves into commercial market channels and, as shown in Chapter II, more than half of all United States barley which moves in commercial channels goes either to domestic malt production or into the export trade. The United States is a leading country in both barley production and exports. The largest customer for United States barley is Western Europe, where it is used primarily for livestock feed. While the United States exports feed barley, it also

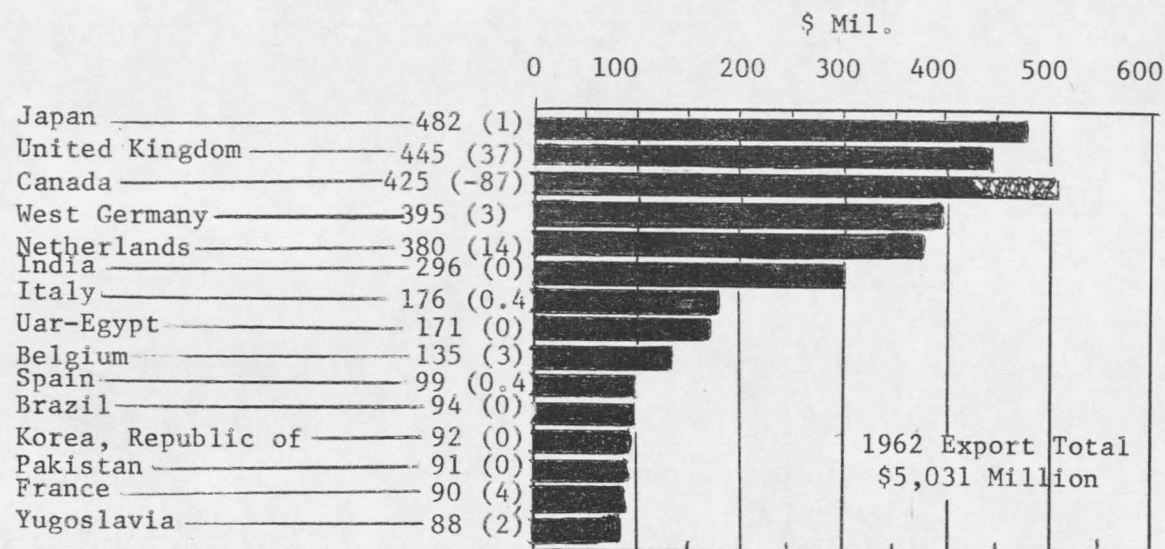


* Exports compared with farm sales for crops and with production for lard and tallow.

° Including oil.

Figure 18. U. S. Exports as a Percentage of Sales. *

* Source: USDA photo.



Amounts in parentheses represent \$87 million subtracted from Canada and added to other countries to allocate to proper countries. Shipments to Canada used to finish loading ships leaving the St. Lawrence Seaway.

Figure 19. U. S. Agricultural Exports by Country, 1962. *

* Source: USDA photo.

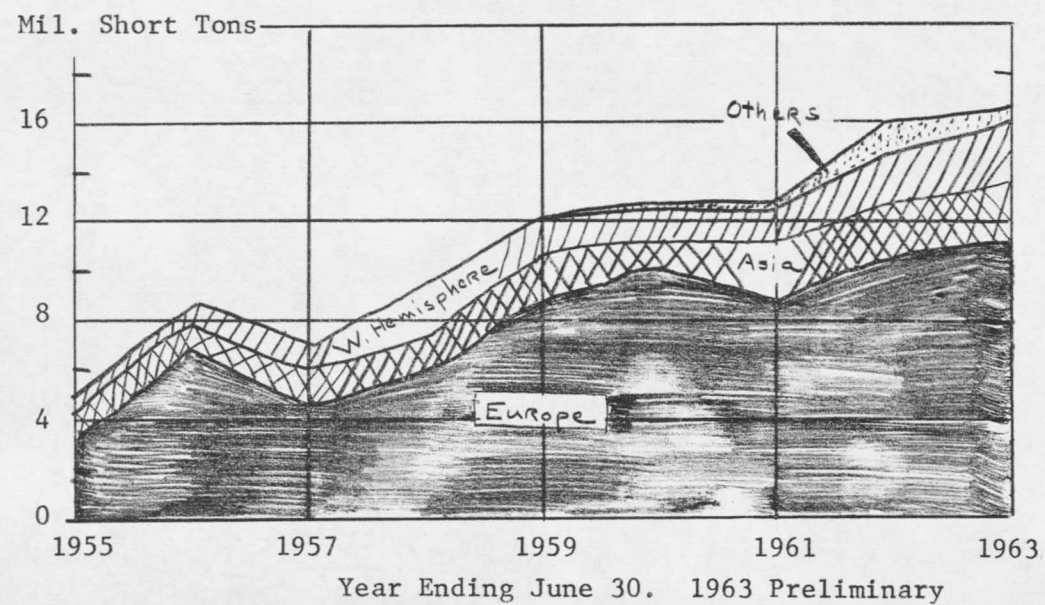


Figure 20. Coarse Grains: U. S. Exports by Area of Destination. *

* Source: USDA Photo.

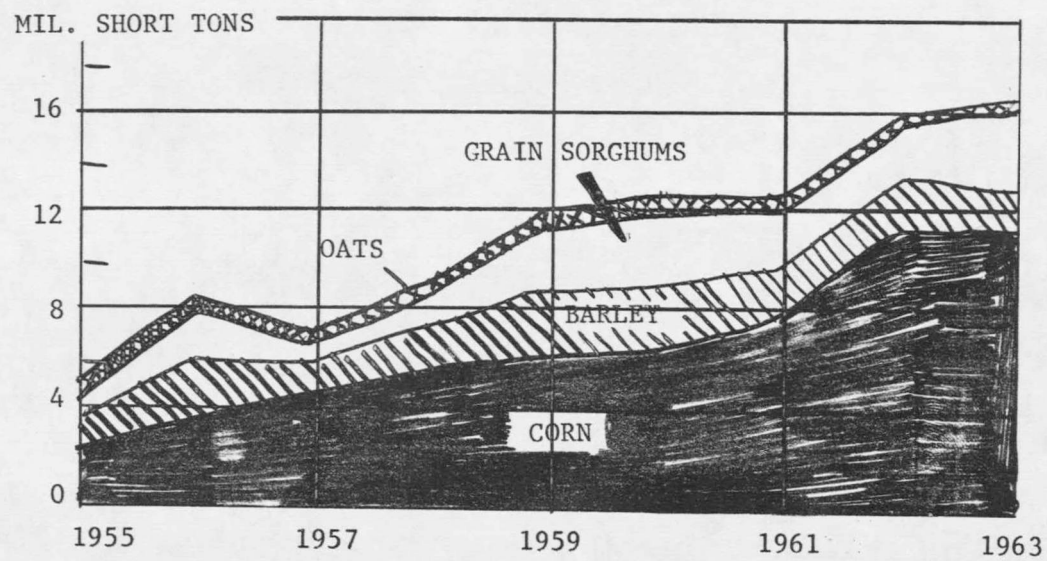


Figure 21. Coarse Grains: U. S. Exports by Commodities. *

* Source: USDA photo.

imports malting barley--primarily from Canada. 1/ An examination of data on international trade and production of barley may provide clues to the future of foreign markets for United States barley.

World Barley Production Patterns

Table XIX shows barley production for several countries and world totals for the period 1950-54 and annually from 1957 through 1961. Total estimated world production, which appears to be slowly rising, is relatively stable at from 3.2 to 3.6 billion bushels annually. Production within any particular country may vary from year to year, due to weather conditions, trade policies, and probably other factors. Calculated on a continental or world regions basis, it is shown in Table XX that western Europe is usually the leading barley producing area, followed by Asia in second place and with North America and the USSR 2/ alternating in third and fourth positions.

Production is, of course, a function of acres and yield per acre. The extremes in yield shown in Table XXI vary from 6.6 bushels per harvested acre in Morocco in 1961 to 68.8 bushels per harvested acre in Denmark in 1960. It will be noted that yields in western European countries are often more than double the estimated world averages.

1/ For a more detailed discussion of these points, see: Blaich, O. P., Barley: Its Production and Uses, University of California, Davis, August 31, 1961; and Schonberg, James S., The Grain Trade: How It Works, New York, Exposition Press, 1956.

2/ The USSR is in both Asia and Europe. Its barley production figures are not included in those for either Asia or Europe.

TABLE XIX. PRINCIPAL ^{a/} BARLEY PRODUCING COUNTRIES OF THE WORLD. ANNUAL PRODUCTION IN BUSHELS
1950-54, AVERAGE AND ANNUAL FROM 1957 THROUGH 1961. *

Country	Average 1950-54	1957	1958	1959	1960	Est. 1961
	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>
Canada	228	216	245	226	207	123
United States	283	437	475	422	431	393
Denmark	89	118	114	107	129	125
France	89	167	179	226	263	247
Germany, West	82	115	111	131	148	125
Spain	89	83	82	94	72	70
United Kingdom	100	138	148	187	198	226
Czechoslovakia	52	63	55	67	80	--
Germany, East	27	35	40	45	55	--
Hungary	30	44	34	50	45	45
Poland	50	56	55	48	58	--
USSR	350	400	440	380	525	500
Iraq	35	60	44	33	37	41
Turkey	128	160	130	140	142	142
China	325	--	--	--	--	--
India	118	132	104	125	125	128
Japan	90	90	86	96	96	83
Morocco	77	22	58	50	52	25
Argentina	39	46	49	51	36	45
Australia	31	32	65	36	71	50
Total:						
Above countries	2,312	2,414	2,514	2,514	2,768	2,368
All other countries	388	761	796	771	787	1,042
Est. World Total	2,700	3,175	3,310	3,285	3,555	3,410

* Source: USDA, Foreign Agriculture Circular, Washington, D. C., FAS (FG2-62, Feb. 1962)
(FG7-61, May 1961) (FG2-60, Feb. 12, 1960) (FG6-59, May 21, 1959).

^{a/} Principal countries arbitrarily limited to those producing 50 mil. bu. or more in any year.

TABLE XX. BARLEY: WORLD PRODUCTION BY GEOGRAPHIC DIVISIONS, AVERAGE 1955-59, ANNUAL 1960 AND 1961. *

Area	Average	1960	1961
	1955-59 <u>Mil.Bu.</u>	<u>Mil.Bu.</u>	<u>Mil.Bu.</u>
North America	675	647	515
Western Europe <u>a/</u>	800	993	1,000
Eastern Europe <u>a/</u>	250	307	285
USSR	440	525	590
Asia	845	820	835
Africa	125	130	75
South America	76	65	65
Oceania	49	74	44
World Total	3,260	3,560	3,410

* Source: USDA, Prospects for Foreign Trade in Wheat, Rice, Feed Grain, Dry Peas, Dry Beans, Seeds, Hops: Washington, D. C., FAS, May 1963.

a/ Excluding USSR production.

World Trade in Barley and Grains

Wheat is by far the most important (quantitatively) grain in world trade, usually amounting to roughly half of all world trade in grains. The "coarse" grains--rye, barley, oats, sorghums and millets, and maize or corn--account for most of the balance. World trade in all grains in the past five years has been approximately double the average of the late 1930's. Trade in barley, all coarse grains, and in all grains is shown in Table XXII. Barley accounts for about one-fourth to one-third of the total trade in coarse grains, and coarse grains are between one-third and one-half of the trade in all grains.

TABLE XXI. PRINCIPAL a/ BARLEY PRODUCING COUNTRIES OF THE WORLD. AVERAGE YIELDS PER HARVESTED ACRE 1950-54, ANNUAL 1957-61. *

Country	Aver. 1950-54 <u>Bu./acre</u>	1957 <u>Bu./acre</u>	1958 <u>Bu./acre</u>	1959 <u>Bu./acre</u>	1960 <u>Bu./acre</u>	Est. 1961 <u>Bu./acre</u>
Canada	28.9	23.0	25.6	27.1	28.1	20.2
United States	27.8	29.2	31.8	28.3	30.9	30.3
Denmark	64.4	68.7	64.1	57.8	68.8	63.1
France	32.9	41.0	40.6	46.1	50.9	44.2
Germany, West	47.5	53.4	51.1	55.6	61.1	45.2
Spain	22.8	22.0	21.8	25.4	20.9	20.5
United Kingdom	48.9	52.6	53.7	61.3	58.7	59.0
Czechoslovakia	33.5	37.9	33.3	40.7	45.7	--
Germany, East	38.2	44.0	48.5	51.8	57.3	--
Hungary	27.3	37.0	25.3	37.6	36.1	35.1
Poland	24.3	29.3	30.2	30.1	32.3	--
USSR	15.6	16.5	18.7	16.0	17.5	17.5
Iraq	14.9	19.6	15.3	12.4	14.4	16.3
Turkey	23.2	24.6	23.6	21.5	22.2	--
China	--	--	--	--	--	--
India	14.7	15.1	13.8	15.1	15.0	16.1
Japan	37.7	38.9	37.8	43.6	46.2	48.5
Morocco	14.6	7.3	13.7	11.8	12.0	6.6
Argentina	24.8	22.5	21.9	22.9	20.0	--
Australia	22.2	15.0	27.1	14.8	25.0	18.8
Est. World Average	22.2	23.3	24.4	24.1	25.0	24.3

* Source: USDA, Foreign Agriculture Circulars, Washington, D. C., FAS (FG2-62, Feb. 1962) (FG7-61, May 1961) (FG2-60, Feb. 12, 1960) (FG6-59, May 21, 1959).

a/ Principal countries arbitrarily limited to those countries producing 50 mil. bu. or more in any year.

TABLE XXII. WORLD IMPORTS AND EXPORTS OF BARLEY AND GRAINS, 1958-62. * a/

Grain	1957-58	1958-59	1959-60	1960-61	1961-62
	000	000	000	000	000
	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>
<u>Imports</u>					
Barley	6,580	6,340	6,020	5,750	7,000
All coarse grains	18,420	20,410	22,600	22,850	28,280
All grains	47,140	51,010	53,750	60,550	70,190
<u>Exports</u>					
Barley	6,680	6,400	6,090	6,820	7,220
All coarse grains	18,960	20,840	22,380	23,000	29,590
All grains	48,270	52,090	54,320	61,870	72,830

* Source: FAO of the United Nations, World Grain Trade Statistics 1961-62, Rome, Italy, 1962.

a/ Conversion factors: 1 bushel of barley = 48 pounds
1 metric ton = 2,204.622 pounds
45.9 bushels of barley = 1 metric ton

Some of the leading nations in the export and import of barley are shown in Tables XXIII and XXIV. During the 1950's, the United States overcame Canada's lead and has been the largest exporter of barley during the period shown. Countries not shown in Table XXIII which have been, from time to time, important in the barley export trade include the Benelux countries, USSR, Iraq, Morocco, Turkey, China, and others. Some of the leading barley exporters are also leading importers, as shown in Tables XXIII and XXIV. Included in both tables are the United States, Denmark, and United Kingdom. If the list were expanded to include all importers and exporters, there would

TABLE XXIII. LEADING COUNTRIES OF THE WORLD IN THE EXPORT OF BARLEY,
1958-62. *

Country	1957-58	1958-59	1959-60	1960-61	1961-62
	000	000	000	000	000
	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>
United States	1998.5	2540.6	2316.5	1808.7	1779.7
Canada	1653.1	1561.1	1306.7	838.0	897.9
Australia	437.0	683.3	567.3	755.2	712.9
Argentina	500.5	250.0	299.7	131.4	201.0
Denmark	408.3	293.4	98.7	59.8	114.7
France	664.7	82.2	408.1	1080.1	1661.2
United Kingdom	92.3	186.0	360.6	124.1	340.6

* Source: USDA, The World Grain Trade, Washington, D. C., FAS-M-53, April 1959; FAS-M-53 Revised, July 1960.

TABLE XXIV. LEADING COUNTRIES OF THE WORLD IN THE IMPORT OF BARLEY,
1958-62. *

Country	1957-58	1958-59	1959-60	1960-61	1961-62
	000	000	000	000	000
	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. ton</u>
United States	583.0	239.4	302.2	247.4	326.0
Belgium-					
Luxembourg	614.2	355.2	302.6	356.5	328.6
Denmark	274.2	334.8	637.8	377.5	321.1
W. Germany	1358.8	1453.8	1500.6	766.9	2103.3
Italy	290.9	186.5	242.7	460.3	473.4
Netherlands	678.4	511.2	454.4	321.2	334.4
United Kingdom	1305.4	1141.3	828.8	965.0	539.8

* Source: USDA, The World Grain Trade, Washington, D. C., FAS-M-53, April 1959.

be many such duplications. Reasons are that a country (such as the United States) may export feed barley and import malting barley--or vice versa. Other countries (such as Benelux) are trading nations and export to third countries their imports from first countries. It is apparent that the United States' greatest competitors in barley exports are Canada, Australia, Argentina, and France.

As previously indicated, Europe--and particularly western Europe--is the best customer for United States barley. Asia has been a large customer but in recent years its purchases declined drastically. Japan formerly had imported United States barley as a rice substitute, and Korea received large quantities of barley, largely under Public Law 480. Other regions of the world have been sporadic in the use of United States barley. Table XXV shows United States barley exports by world regions for the years 1957-62. Specific countries which have been among the larger users of United States barley are shown in Table XXVI. It may be noted from Tables XXIV and XXVI that the world's largest importing countries are among the list of countries which are major importers of United States barley. This does not mean that the large importers necessarily import all or even most of their barley from the United States. For example, the United Kingdom receives most of its barley imports from Canada and Australia.

Prospects for Exports of United States Barley

Because such a large portion of the market for United States barley is made up of exports, both feed and malting barley interests are concerned with the possibilities of maintenance and expansion of foreign markets.

TABLE XXV. U. S. BARLEY EXPORTS BY WORLD REGIONS OF DESTINATION,
1958-62. *

Destination	1957-58	1958-59	1959-60	1960-61	1961-62
	000	000	000	000	000
	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>
Europe	1293.0	1860.5	1955.3	1263.5	1334.5
North & Central America	31.1	40.0	36.2	69.6	108.1
South America	8.7	7.1	65.1	---	0.2
Asia	559.4	535.0	224.6	398.1	29.9
Africa	---	---	18.8	41.0	287.2
Other	1.0	0.1	16.5	36.5	19.8
Total	1893.2	2442.7	2316.5	1808.7	1779.7

* Source: FAO of the United Nations, World Grain Trade Statistics, Rome, Italy, 1958-62.

The remainder of this chapter is concerned primarily with prospects for sales in Europe.

The potential for international trade in feed grains, including United States barley exports, is a mixture of assumed favorable and unfavorable factors. Judging from upward trends in United States exports of feed and food grains over the past ten years, it might be concluded that the United States export picture is favorable. Unfortunately, for purposes of predictions, the past is no necessary indicator of the future.

International Grain Trade Barriers

International trade in agricultural products may take place when sellers and buyers are able to surmount trade obstacles consisting of a combination of domestic agricultural policies and of import and export regulations in the

TABLE XXVI. U. S. BARLEY EXPORTS BY COUNTRIES OF DESTINATION, 1958-62. *

Destination <u>a/</u>	1957-58	1958-59	1959-60	1960-61	1961-62
	000	000	000	000	000
	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>	<u>met. tons</u>
Belguim-					
Luxembourg	301.0	288.8	148.2	93.7	55.6
Denmark	35.7	107.7	204.4	74.3	50.0
W. Germany	145.8	476.8	492.9	207.6	639.7
Greece	20.4	10.0	26.9	51.7	46.0
Italy	13.3	41.1	31.2	58.0	8.1
Netherlands	256.9	583.2	409.9	232.8	224.3
Spain	15.5	112.5	76.7	202.2	92.7
United Kingdom	364.8	46.4	67.2	6.3	15.7
Poland	90.4	119.2	347.5	246.1	96.5
Japan	315.1	333.2	58.3	---	---
Korea	215.3	154.9	---	181.4	10.2
Total (World)	1893.2	2442.7	2316.5	1808.7	1779.7

* Source: FAO of the United Nations, World Grain Trade Statistics, Rome, Italy, 1958-62.

a/ Arbitrarily limited to receivers of 50 metric tons or over in any year.

countries involved. Most, if not all, countries prefer to be internally self-sufficient in the production of agricultural products for such purposes as security and national pride. In many countries, farmers still are numerous and in most instances are politically important. Consequently, countries which are exporters of particular agricultural commodities wish to maintain high levels of production, high levels of income to producers, and to maintain or increase their export market. Countries which import the particular commodity may wish to develop their own productive capacity and to protect domestic producers of the product from undue foreign competition. The

resultant myriads of internal and external controls over production and marketing lead to the conclusion that price for the product may be of lesser importance than other types of international trade barriers. 3/ Those barriers include tariffs, quotas, embargoes, licensing of imports, State trading, and internal price supports and production controls. Table XXVII, showing nontariff restrictions of foreign countries against United States grain imports, gives an indication of the obstacles to trade. Other more general devices such as customs unions and bilateral trade agreements also affect trading of specific products. Nearly every country of the world has some sort of government grain program, no two of which are exactly alike.

European Economic Community Feed Grain Production and Trade Policies

The Common Market in Europe has posed problems to United States grain exporters. Since the European Economic Community has the stated objective of relative self-sufficiency in grains, the United States faces these questions: (1) What will be the future levels of European Economic Community price supports for home-grown grains? (2) What will be the levels of tariff and other protective devices levied against non-member countries? (3) What will be the levels of production in European Economic Community countries? (4) What will be the effects on other non-European Economic Community countries and their markets?

These and other questions about the European Common Market cannot be answered until the European Economic Community itself has reached agreement

3/ Price, however, is still the final factor which determines whether or not a sale will be made.

TABLE XXVII. NONTARIFF RESTRICTIONS OF FOREIGN COUNTRIES AGAINST GRAIN IMPORTS FROM THE UNITED STATES.

NONTARIFF RESTRICTIONS OF FOREIGN COUNTRIES AGAINST GRAIN IMPORTS FROM THE UNITED STATES										
AREA AND COUNTRY	ALL GRAINS	FOOD GRAINS			FEED GRAINS					
		WHEAT FOR HUMAN FOOD	RYE	BARLEY FOR HUMAN FOOD	WHEAT FOR FEED	BARLEY FOR FEED	CORN	OATS	GRAIN SOYBEANS	
Common Market ^①										
Other Europe										
Austria										
Denmark										
Finland										
Ireland										
Norway										
Spain										
Sweden										
Switzerland										
United Kingdom										
The Americas										
Brazil										
Canada										
Colombia										
Mexico										
Peru										
Venezuela										
Other Countries										
India										
Japan										
Lebanon										
New Zealand										
Pakistan										
South Africa										

No restrictions

Control of foreign exchange

Licensing

Mixing regulations

Quotas

Variable import levies or equalization fees

Advance deposit requirements, various taxes

Tie-in purchases of domestic grains by importers (required if imports jeopardize sale of domestic grain at equitable prices)

State trading

Embargo

^①Belgium-Luxembourg, Netherlands, West Germany, France, and Italy.

^②The licenses are sold to importers at public auction.

^①Government importation is not continuous.

^②Importing by both government and private traders is also subject to compulsory exchange regulations, i.e., required exportation of commodities in fixed proportion to planned imports

^③Part of cereals imports done by private traders and subject to licensing and quotas.

on agricultural policy. It seems reasonable, however, to project that within the European Economic Community area the common agricultural policy to be pursued will contain provisions for (1) protection for domestic farmers, (2) increasing production of grains, including barley, as better production techniques are adopted, and (3) decreasing imports of food and feed grains from non-European Economic Community countries. However, it is possible that as population and income levels continue to rise within the European Economic Community there will be increasing consumption of meats. A consequent question arises as to whether the European Economic Community countries may be able to become self-sufficient in feed grain production.

The latter point above relates to feed grain and barley production and trade in other parts of the world. It may be noted that as economic development takes place one of the first changes is an improvement in dietary levels including increased protein consumption. This means increased livestock production and increased use of livestock feeds. Japan, for example, appears to be consciously pursuing a policy of increased livestock production with the realization that it will need to continue the importation of feed grains. Whether the United States may be able to take advantage of such market potentials remains to be seen.

Less encouraging is the fact that relatively few areas and countries of the world are sufficiently developed, economically speaking, to make any rapid increases in livestock production and in the consumption of feed grains. Furthermore, countries which are short of United States dollar exchange are most likely to buy their feed grains from the soft currency countries, and to use their United States dollar supply for other types of purchases.

In addition to the above examples of trade barriers, there are many other production and marketing factors which complicate international trade in grains. Not all areas of the world have soils and climate suited to the production of grain, and variable weather results in marked variation in production from one year to another. Particular kinds of grains for specific uses are even more limited. For example, most of the world's supply of malting barley is produced in certain parts of the United States, Denmark, Germany, Poland, the United Kingdom, the Soviet Union, the Danube Basin countries, and in Chile. ^{4/} The highly variable production in the major producing areas results in an unstable international trade. A country having sizable exports of barley in one year may find itself short for even domestic consumption in the next.

The general conclusion is that there is an increased worldwide need for feed grains. However, factors of trade barriers, and problems of effective demand or purchasing power do not indicate any rapid increase in market potentials for United States barley and feed grains. Those factors do indicate a need for continued effort in market research and in market development.

There is considerable question as concerns the future feed grain market within the European Economic Community or Common Market. Agricultural fundamentalism is basic to the political structure of western Europe and is reflected in official European Economic Community policy and regulations.

^{4/} It may be noted in passing that consumption of beer has been increasing in Europe; thus, there is an increasing demand for malting barley there.

Apparently there is a feeling in most European Economic Community areas that no party can gain and keep power without farmer support which tends toward protectionism--or limited imports of agricultural products. Other groups, such as importers and to some extent consumers, tend to favor liberalized trade. In balance, the position of governments within the European Economic Community seems to be: "Don't pay too much attention to farmers, but enough."

A brief background on some of the European Economic Community countries may help to explain recent European Economic Community action on grain prices:

Germany. West Germany has a relatively intensive agricultural production plant and is second only to France (among European Economic Community nations) in grain production. There is little room for production expansion except through increased yields from application of advancing technology. Grain support prices are high internally, and there is considerable resistance to change from a politically powerful farm organization.

France. As concerns European Economic Community policy, France is the key member nation. All European Economic Community nations except France are expected to continue as feed grain importers. Theoretically, France could expand grain production to the point of being a major source of feed grain supply to the other European Economic Community members. French price policy preference for the European Economic Community is not clear. Presumably, she prefers prices, internally, high enough to be profitable to French farmers

but not high enough to discourage imports from France into other European Economic Community countries. It is further assumed that France prefers relatively high duties on imports into the European Economic Community.

Netherlands. The Netherlands is characterized by a highly intensive but flexible agriculture. Livestock products are exported, and feed grains are imported in large quantities. The Netherlands is committed to low internal feed prices and also to low import duties on feed grains.

Italy. The preference of Italy also seems to be for low internal feed grain prices and low import duties. This is due principally to the fact of increasing livestock production and feed grain production but an even greater increase in meat consumption. Feed production has not been increasing as rapidly as livestock production.

Failure of the European Economic Community to come to early agreement on common agricultural policy resulted from internal pressures from farming and grain trade interests within the respective European Economic Community countries. As of July 30, 1962, the European Economic Community put into operation a Common Agricultural Policy designed to support grain prices in member countries and to control trade. A seven and one-half year transition period is scheduled to end in 1970 with uniform grain prices in all member countries--or with a single market area.

Grain Prices Under the Common Agricultural Policy

The method of operations under the Common Agricultural Policy (CAP) includes the establishment of:

- (1) target prices which are the internal wholesale price objectives,
- (2) intervention prices which are the prices at which governments buy grain (usually at a figure of 5 percent to 10 percent below the target price),
- (3) market prices which normally fluctuate somewhere between (1) and (2), and
- (4) variable tariff levies set according to a level necessary to maintain internal price supports. (This becomes the threshold price.)

Target prices, within some of the European Economic Community countries, are shown in Table XXVIII, comparing 1962-63 with 1963-64.

Increases in Belgian and Dutch prices are offset somewhat by those countries moving from lower quality standards to the higher European Economic Community grain standards. In effect, the no change in German prices resulted in a decrease in prices by reason of increasing quality standards. Outside suppliers were disturbed by the French price increase which presumably may lead to increased production in France.

The target prices within individual countries are established within an agreed-to upper and lower target price limit schedule. That schedule for 1962-63 and 1963-64 is shown in Table XXIX.

TABLE XXVIII. EUROPEAN ECONOMIC COMMUNITY MEMBER COUNTRY GRAIN TARGET PRICES, 1962-63 AND 1963-64. * a/

Item	West Germany \$/M.T.	France \$/M.T.	Italy \$/M.T.	Belgium \$/M.T.	Netherlands \$/M.T.
Soft Wheat:					
1962-63	118.88	90.40	104.40	102.60	91.99
1963-64	118.88	92.20	102.40	104.60	98.34
Change	---	+2.20	-2.00	+2.00	+6.35
Barley:					
1962-63	103.00	72.19	66.40	84.80	79.14
1963-64	103.00	74.38	69.65	86.80	80.66
Change	---	+2.19	+3.25	+2.00	+1.52
Rye:					
1962-63	108.13	72.31	98.59	80.00	69.47
1963-64	108.13	73.77	98.69	80.80	72.51
Change	---	+1.46	+0.10	+0.80	+3.04

* Source: USDA, Foreign Agriculture, Washington, D. C., FAS, August 1962.

a/ These target prices are applicable in the deficit producing areas of each country, except for the French prices and the Italian soft wheat price, which apply in the surplus producing areas of those countries.

Eventually (in 1970 at the end of the transition period), target (and other) prices are to be uniform throughout the European Economic Community. In the meantime, the big issues are unification of grain prices internally and the eventual support level to be decided upon during the transition period.

Only time will tell whether the levels will be low or high and whether the United States may be successful in maintaining and increasing its export market to Europe.

TABLE XXIX. EUROPEAN ECONOMIC COMMUNITY UPPER AND LOWER LIMIT TARGET PRICES, 1962-63 and 1963-64. * a/

Item	1962-63 \$/M.T.	1963-64 \$/M.T.	Change \$/M.T.
Soft wheat:			
Upper limit	118.92	118.92	0
Lower limit	89.43	89.43	0
Barley:			
Upper limit	103.07	103.07	0
Lower limit	71.42	72.17	+0.75
Rye:			
Upper limit	108.17	108.17	0
Lower limit	65.71	67.71	+2.00
Corn:			
Lower limit	62.40	65.60	+3.20

* Source: USDA, Foreign Agriculture, Washington, D. C., FAS, August 1963.

a/ The upper limits apply in the EEC deficit producing areas; the lower limits, in the surplus producing areas.

CHAPTER IX

SUMMARY AND CONCLUSIONS

Summary

During the period 1956-61, which may be termed as the commercial trial period of Betzes barley in Montana, there was received an estimated \$4.5 million additional return to the state in the form of malting premiums. This amounted to an annual average (1959-60) of about 5 percent of total receipts from the marketings of all barley.

The malting industry uses about 100 million bushels of barley for malt each year. About 10 million bushels of that is of the two-row varieties, including Betzes. Calculations of this study indicated that production of all approved malting barley (both six-row and two-row varieties) is about double the actual use of barley for malt. For the two-row varieties alone, production is about two and one-half times the annual malt use. Approximately one-fourth of all off-farm barley sales are for malt use, or about 17.5 percent of all barley produced. Through 1961, about one-third of the Betzes barley produced in Montana had been sold at malting prices. Relative to wheat, Montana markets little barley and an even smaller amount of barley suitable for malting.

The malting industry, through the Malting Barley Improvement Association (composed of malting and brewing companies), has encouraged and financially supported research and development of new and improved malting barley varieties, better cultural practices, and better harvesting and handling methods. Betzes was developed by Montana State College as a malting variety

for Montana with the assistance of the Malting Barley Improvement Association. It is recommended as a malting variety for Montana on irrigated land because dry-land barley is usually too high in protein for brewing.

The quality and quantity of Betzes produced in Montana has been erratic. In addition, there have been other production and marketing problems because producers and local market personnel were not familiar with maltster requirements as relates to the harvesting, handling, storing, binning, protein content, etc., of malting barley.

It was noted that the trend in the grain marketing system is toward fewer but larger firms handling greater volumes of grain. There is an apparent parallel trend in the number and size of operations of grain brokers, commission firms, etc., with these types of agents increasing in importance, especially in the marketing of barley.

Barley which may meet United States Department of Agriculture official malting barley grades does not necessarily meet Malting Barley Improvement Association standards. Barley may meet both standards and still may not be purchased for use in malting.

In any attempt to alter the regular market channels, the most likely departure would be direct marketing from producers or producer organizations to maltsters. Frequently this type of marketing becomes involved with contractual arrangements between buyer and seller in advance of harvest or production. An attempt of this nature was made to develop a producer marketing or bargaining association of malting barley producers in the Gallatin Valley.

The reason for malting barley premium prices is that premiums insure diversion of malting quality barley from feed uses. In this study the data examined showed a closing of the price gap between feed and malting barley prices.

The limited research results available confirmed the observation that local elevator pricing of malting barley is based primarily on terminal market prices plus trading experience and evaluation of the physical character of grain received. The relatively simple statistical methods applied to the data examined indicated no significant causal relationship between United States annual average farm prices and annual average production of barley, between annual average terminal market prices and production, nor between monthly average terminal market prices and receipts. There was found to be a high degree of correlation between feed and malt prices and terminal market prices and support prices for barley. Further statistical analysis indicated stable monthly average terminal market prices for both feed and malting barley relative to market receipts.

It is commonly accepted that United States grain growers have the ability to produce more feed and food grains than the market will absorb at prices acceptable to farmers. Hence the assumed need for some sort of governmental control program for the 1960's. For barley, the program adopted for the 1962 crop included an exemption of malting varieties from acreage restrictions. Requests to permit the exemptions came from farm groups as well as from the malting industry. On the basis of the provisions for malting barley program for the 1962 crop, it was predicted by this study that there would be no reduction and probably an increase in United

States barley acres and production. As it turned out, there was a decrease in acreage but an increase in total production because of increasing yields per harvested acre.

An increasingly important market for United States barley has been in exports--principally to Europe. About one-third of the United States annual production has been exported as feed grain. There is an increasing worldwide need for feed grains. World production of barley is, in total, relatively stable from year to year. However, within particular countries there is a highly variable production.

Vertical integration in brewing has taken the form of brewers' purchase of existing malt companies and building of their own malting facilities. Horizontal integration and expansion in size of the progressively fewer number of brewers has been hastened by obsolescence of the smaller, often outdated facilities of brewing firms which cannot successfully compete with the economies of scale of the larger firms.

Domestically, the principal means of expanding malting barley sales is through increased beer sales. Competition among brewers has revealed that price cutting is a relatively ineffective means of sales expansion. Beer sales may be unresponsive to price changes, but they do seem to respond to changes in levels of consumer income. Hence promotion and advertising expenses are generally high in the beer industry. The brewing industry has long assumed high taxes to be a major deterrent to expanded sales.

Little is known of the drinking habits of beer consumers. This study indicated stable retail prices, a relatively inelastic demand for beer, and a positive relationship between consumer income and consumption of beer.

Other studies suggest that beer drinkers tend to drink either considerable quantities or not at all, and who often don't drink beer because they forget to buy it. They buy most of their beer in supermarkets but drink less beer at home than when they go out.

Conclusions

Even though Betzes barley has brought to Montana about an additional one million dollars per year, there remains doubt that the annual malting barley premium amount to Montana may be significantly increased. This conclusion was reached as a result of production and use comparisons. United States farmers have the ability, and apparently the willingness, to produce more barley and more malting barley than is needed by the malting industry. One need not be an economist to predict the direction of free market price movement under such conditions of over supply.

The over supply of malting variety barley production is encouraged by the actions of both the malting industry and the producers of barley. Montanans presumably are grateful to the Malting Barley Improvement Association for its financial and other assistance in developing and promoting Betzes as a malting variety for Montana. It would be naive, however, to assume that the Malting Barley Improvement Association is a philanthropic organization. Its concern is assumed to be with the production of large quantities of malting barley wherever feasible--and that includes most of the upper Midwest and Plains States and the Pacific Northwest. Most states in the barley-producing regions are in search of new or improved malting varieties. Many have the advantage over Montana of being closer to malting and brewing

plants. Malt may be made from nearly any barley, but maltsters prefer the best and have a better chance of obtaining the best when there are large acreages of barley. These factors suggest the need for an in-depth study of the nature of inter and intra regional competition in the markets for barley, malt, and beer.

Assuming feed value and other considerations to be approximately equal, it is understandable that a farmer who intends to plant any barley is likely to select an approved malting variety in preference to a feed variety. He may gain a malting premium and, if not, he has lost little--if anything. Malting varieties are thus popular in areas approved for their production. This has been repeatedly demonstrated in Montana. Since Betzes is a good feed barley, dry-land farmers raise it because sometimes (such as in an unusually rainy year) it may be suitable for malting and sell at a premium. It may also be true that much of the irrigated farm land in Montana which is suitable for the production of high quality malting barley is equally suited to the production of more profitable alternative crops. These factors tend to result in erratic production in both quality and quantity and do not encourage efficient, reliable marketing.

Assuming the trend of fewer and larger firms and dealers in grain marketing as affecting Montana Betzes barley, it becomes doubtful that the regular grain marketing facilities (which are geared to the handling of wheat) will ever be able to satisfactorily and economically handle barley of malting quality. It is difficult for a small volume of malting barley to compete with other grains for time and facilities in marketing channels. This conclusion appears somewhat paradoxical to the grain trade's insistence

that barley and malting barley should be marketed through regular channels. However, resistance by the trade to any drastic departure from regular channels of marketing goes deeper than vested interest in handling as much as possible of all grains marketed. Maltsters resist direct marketing and possible production contractual arrangements because the quantity, quality, and location of the better malting barley are nearly impossible to predict from year to year. Thus they prefer to remain free to secure supplies from a wide variety of original sources. So long as barley supplies are plentiful, it is likely that maltsters will generally observe the ethics of dealing through regular grain trade channels.

One achievement related to this thesis effort (which covered a span of several years and many types of activities) had to do with the attempt by Gallatin Valley barley producers to organize a malting barley marketing or bargaining association. Some view the attempt as a failure--which it was in that no such organization was developed. It was nonetheless successful in other respects. It resulted in an educational program directed to producers and local elevator management in the production and marketing of barley which would meet malting requirements. It demonstrated to the trade at terminal markets that producer dissatisfaction with marketing methods and facilities is not to be ignored or taken lightly. It indicated to producers that marketing involves more than merely agreeing to price. It resulted in a compromise marketing method which, although less than hoped for by producers, was considered by them to be an improvement.

There is a question as to why a price difference may be required to divert barley from feed to malt uses. The answer is probably a combination of

factors. In part, it may be because of maltsters competing for particular lots of malting barley. It may also be that at a particular time and place malting barley could be purchased at lesser prices, but over a period of time a relatively high premium over feed prices is necessary to encourage farmers to gamble on the production of varieties which may bring malting price premiums. A third possibility is that of some direct relationship between the prices of malting barley, malt, and of spent malt converted to livestock feed.

It was concluded that the narrowing of the feed-malt price differential was due to greater production of all barley of both feed and malting varieties. The analysis indicated that malting barley prices are determined primarily by feed barley prices, which are determined primarily by support prices, and in turn by the very complex interrelationships among supplies and prices of all grains.

It could not be determined from this study whether local elevator pricing or even terminal market pricing accurately reflect basic conditions of demand for the free market supply. The stable monthly average terminal market prices led to the conclusion that the barley market is geared to seasonal use and/or storage and to pricing which takes variable seasonal receipts into account.

In terms of its stated purpose of reducing production, it was fortunate for the barley provisions portion of the 1962 feed grain program that adverse weather and other unforeseeable circumstances prevented some of the larger barley-producing states from taking full advantage of the malting

variety exemption. In Montana the exemption was particularly advantageous because of the inclusion of Compana which previously had been primarily a dryland feed variety used in small quantities for malting by a brewer in the state.

Whether the large European outlet for United States feed grains may continue, increase, or decrease is unknown. Circumstances of direction of European economic growth and the degree of protectionism within the European Economic Community will be the key determinants. The growing world need for increased amounts of feed grains is encouraging but, excepting the more economically advanced countries such as in the European Economic Community, there remains limited ability to buy. World trading patterns change rapidly according to variable production. One year's exporting country may be a heavy importer the following year. This variability in production and innumerable types of national non-price trade restrictions appear to be more important barriers to international trade than is price.

It may be conjectured that whatever degree of economic power brewers have is brought to bear on raw materials suppliers (malt, hops, etc.) If true, such pressure presumably is reflected through maltsters to producers not necessarily or totally in the form of lower prices but also in the form of insistence on higher quality barley and malt. As brewers become larger through expansion and horizontal integration, they can--presumably--afford to operate their own malt plants. Also, it seems reasonable to assume that as a brewery becomes larger, it prefers not to be dependent upon a non-affiliated malting plant/s for its supplies of raw materials. The

entire competitive structure of the beer industry is changing and may be deserving of greater economic research efforts.

With relative price inelasticity and income elasticity of demand for beer, there is indicated a need for thorough study of the beer drinking habits of various income bracket consumers and a detailed analysis of the nature of price and income elasticities of demand. These tentative conclusions about price and income elasticities of demand have raised questions as to the validity of the assumption that tax levels directly influence sales of beer. The same conclusions may also be applied to the fact of large advertising expenses in the brewing industry which may in part account for the recent and rapid trend to integration--both horizontal and vertical. As in other industries, it appears that large promotion and advertising campaigns are most effective for brewing firms having large output and a national market.

LITERATURE CITED

- Anderson, R. N., "The United Kingdom as a Market for U. S. Farm Products", Foreign Agriculture, Washington, D. C., U. S. Department of Agriculture, Foreign Agricultural Service, February, 1960.
- Anderson, R. N. and Hollowell, E. W., "Our New Trade Center in London," Foreign Agriculture, Washington, D. C., U. S. Department of Agriculture, Foreign Agricultural Service, April, 1961.
- Banasik, O. J., "Evaluation of Barley Quality," Bimonthly Bulletin, Fargo, North Dakota, North Dakota Agricultural College, July-August, 1957.
- Banasik, O. J., "Malting Qualities of North Dakota Barley Varieties," Bimonthly Bulletin, Fargo, North Dakota, North Dakota Agricultural College, November-December, 1957.
- Benedict, M. R. and Associates, Destinations of U. S. Farm Exports and Sources of U. S. Agricultural Imports, Berkeley, California, University of California, Giannini Foundation, 1962.
- Bequette, Robert and Shaw, Arthur, Malting Barley in Montana, Mimeograph, Montana State College, Bozeman, Montana, July, 1958.
- Blaich, O. P., Barley Promotion and Market Development under P. L. 480, San Luis Obispo Barley Growers Association, San Luis Obispo, California, June 15, 1961.
- Blaich, O. P., Barley: Its Production and Uses, 4-H Leadership Conference, University of California, Davis, California, August 31, 1961.
- Blaich, O. P., Some Considerations in Regulating the Marketing of Hops, Mimeograph, University of California, Berkeley, California, March, 1962.
- Bower, J. C., "What Proposed Wheat Program Might Mean in Montana," Montana Farmer Stockman, Great Falls, Montana, April 1, 1962.
- Brookins, W. W., Quality Production of Barley, Mimeograph, University of Minnesota, Extension Service, St. Paul, Minnesota (undated).
- Brooks, Bruce, "An Evaluation of the Market Outlets for Pacific Northwest Wheat," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.
- Brooks, Bruce, "A Description of the Washington Wheat Market," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

- Bross, H. E., "The U. S. Wheat Grower and the Common Market," Foreign Agriculture, Washington, D. C., U. S. Department of Agriculture, Foreign Agricultural Service, July 1, 1960.
- Brown, W. G.; Jackson, T. L.; and Foote, W. H.; Economics of Growing Malting Barley, Corvallis, Oregon, Oregon Agricultural Extension Service, August 31, 1959 (Reprinted from Plant Food Review).
- Bryan, Francis, "The Common Market," Better Farming Methods, May, 1952.
- Canadian Grain Journal, Show Interest in New Barley, Press release, Winnipeg, Manitoba, Canada, April, 1960.
- Cereal Quality Laboratory, The Malting Quality of Montana Barleys, Second and Fourth Annual Reports, Montana State College, Agronomy and Soils Department, Mimeograph leaflets Nos. 30 and 40, Bozeman, Montana, October, 1959 and December, 1961.
- Chohlis, John and Nielson, Don, "World Trade and the Common Market," Western Livestock Journal, Denver, Colorado, August, 1962.
- Christenson, Raymond P.; Johnson, Sherman E.; and Baumann, Ross V.; Production Prospects for Wheat, Feed, and Livestock, 1960-65, Washington, D. C., U. S. Department of Agriculture, Agricultural Research Service 43-115, December, 1959.
- Clough, Malcolm, "Feed Situation and Outlook for 1962-63," Midwest Regional Outlook Conference, Peoria, Illinois, August 14, 1962.
- Coleman, D. A., Brewing and Malting on the Pacific Coast, New York, New York, August, 1937, Reprint from Modern Brewer.
- Commonwealth Economic Committee, Grain Crops--A Review, London, England, 1962.
- Cook, Audrey, "Supporting the World's Largest Agricultural Export Business," Extension Service Review, Washington, D. C., U. S. Department of Agriculture, May, 1962.
- Combs, W. B., "The Production and Grading of Malting Barley," Paper for Siebel Institute of Technology, October 6, 1953, U. S.
- Committee for Economic Development, The European Common Market and Its Meaning to the United States, New York, 1959.
- Committee for Economic Development, Cooperation for Progress in Latin America, New York, April, 1961.

- Davis, D. J., Report on the Quality of Commercial Samples of Betzes Barley, Bozeman, Montana, Montana Agricultural Extension Service, Grain Inspection Laboratory, Mimeograph Leaflets Nos. 32 and 35.
- Davis, D. J., Grain Inspection and Grading, Mimeograph publication, Bozeman Montana, Montana Agricultural Extension Service, Grain Inspection Laboratory, (undated).
- Davis, H. P., "Sharing Our Surplus," Foreign Agriculture, Washington, D. C., USDA, Foreign Agricultural Service, February, 1960.
- DeFelice, A. R. and Zaglits, Oscar, "The Common Market and American Agriculture," Foreign Agriculture, Washington, D. C., USDA, Foreign Agricultural Service, April, 1958.
- DeWitt, Donn, Malting Barley Program, Seattle, Washington, Western Farmers Association, (undated).
- Distillers Feed Research Council, Inc., Distillers Feeds: Their Importance to the U. S. Economy, Cincinnati, Ohio, 1951.
- Dunbar, John O., "The 1963 Feed Grain Program," Tarheel Farm Economist, Raleigh, North Carolina, North Carolina State College, January, 1963.
- Elrod, W. E., Jr., Importance of U. S. Farm Exports to Balance of Payments, Washington 25, D. C., USDA, Economic Research Service and Foreign Agricultural Service, Foreign Agricultural Economic Report No. 7, (undated).
- Erpelding, Larry, "Feed Grain Plan to Hurt State," The Wheat Scoop, Great Falls, Montana, MGGA, January, 1962.
- Eslick, R. F.; Davis, D. J.; and Hockett, E. A.; Report on the Quality of Commercial Samples of Betzes Barley Raised in Montana, Bozeman, Montana Montana Agricultural Extension Service, Agronomist and Soils Mimeo Leaflets 20 and 22, November 5, 1957, and October 15, 1958.
- Ewasiuk, William J., Marketing Two-Row Malting Barley in Montana, Montana A.E.S., Res Proj. Statement, Bozeman, Montana, September, 1960.
- Fedje, Duane L., Analysis of the Market Structure for Montana Barley and Potential Outlets, Bozeman, Montana, M.A.E.S., Agricultural Economics Research Report No. 1, May, 1957.
- Fitzgerald, D. A., "The International Age in Agriculture," Foreign Agriculture, Washington, D. C., USDA, Foreign Agricultural Service, February, 1960.

- Foote, R. J. and Associates, The Demand and Price Structure for Corn and Total Feed Concentrates, Washington, D. C., USDA, BAE, Technical Bulletin 1061, October, 1952.
- Fraser, G. O., "U. S. Feed Grains Have Bright Future," Foreign Agriculture, Washington, D. C., USDA, FAS, July, 1958.
- Frazier, Charles L., ASCS Handbook, 1962 Feed Grain County Handbook, Washington, D. C., USDA, ASCS, August 9, 1961.
- Freeman, O. L., "Let's Look at the Record," ASCS Regional Meeting, Atlanta, Georgia, February 8, 1962.
- Freeman O. L., "Food for Peace--Promise and Problems," Foreign Agriculture, Washington, D. C., USDA, FAS, May, 1962.
- Gastineau, R. L., "What are Trade Barriers?", Foreign Agriculture, Washington, D. C., USDA, FAS, September, 1957.
- Great Falls Tribune, Compana's Switch to Malting Barley Could Mean \$2,250,000 to Montana, Great Falls, Montana, March 7, 1962.
- Hadley, N. S. and Associates, 1962 Barley Program Fact Sheet, Lafayette, Indiana, Purdue University Mimeo EC-234, September, 1961.
- Haldeman, R. C., Potential Effects of St. Lawrence Seaway on Costs of Transporting Grain, Washington, D. C., USDA, AMS, Marketing Research Report No. 319, April, 1959.
- Haldeman, R. C., "Research Findings on the Transportation of Grain," National Marketing Service Workshop, Biloxi, Mississippi, November 16, 1960.
- Haldeman, R. C. and Associates, Grain Transportation in the North Central Region, Washington, D. C., USDA, AMS, Marketing Research Report No. 490, July, 1961.
- Hallett and Carey, Ltd., An Analysis of USA Imports of Canadian Barley, Winnipeg, Canada, July 10, 1953.
- Hardin, L. S. and Hesser, L. F., "Market Development in Japan," Foreign Agriculture, Washington, D. C., USDA, FAS, April, 1961.
- Harlan, H. V., Growing Barley for Malt and Feed, Washington, D. C., USDA, Farmers Bulletin No. 1732, November 1943 (revised).
- Harrington, A. H., "Wheat Price Relationships," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

- Harrington, A. H., "Wheat Supply and Distribution," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.
- Harston, C. R., "Proposed Regional Research in Wheat Marketing," WAERC, Marketing Research Committee Meeting, Bozeman, Montana, November, 1961.
- Harston, C. R., "Research Work Related to Wheat," WAERC, Marketing Research Committee Meeting, Bozeman, Montana, November, 1961.
- Heffer, W. and Sons, Ltd., Journal of the Institute of Brewing, Cambridge, England, 1961.
- Heid, W. G., Jr., Changing Grain Market Channels, Washington, D. C., USDA, ERS 39, November, 1961.
- Hemphill, P. V., "How Does the Local Elevator Determine a Price for Malting Barley?", Bimonthly Bulletin, Fargo, North Dakota, NDAES, September-October, 1954.
- Herbison, H. W., North Dakota's Changing Barley Marketing Situation, Fargo, North Dakota, NDAES Mimeo, March 12, 1953.
- Hiram Walker and Sons, Inc., All This from Grain, Peoria, Illinois, 1960.
- Hobson, Karl, "Wheat Price Relationships," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.
- Hoos, Sidney and Bales, J. N., Hops: Statistical-Economic Analysis of Marketing, Berkeley, California, University of California, College of Agriculture, Giannini Foundation Mimeo Report 139, September, 1952.
- Ioanes, R. A., "A New-Old Foreign Market," Agricultural Marketing, Washington, D. C., USDA, June, 1962.
- Ioanes, R. A., "The St. Lawrence Seaway--Effect on Grain Marketing," Foreign Agriculture, Washington, D. C., USDA, FAS, January, 1958.
- Ioanes, R. A., "Our Special Export Programs," Foreign Agriculture, Washington, D. C., USDA, FAS, January, 1961.
- Ioanes, R. A., "What's New in Agricultural Exports?", Foreign Agriculture, Washington, D. C., USDA, FAS, December, 1961.
- Jones, E. W. and Associates, Feed Grain Program's Impact on North Carolina Agriculture, North Carolina State College, Raleigh, North Carolina, Department of Agricultural Economics, Miscellaneous Publication 4, January, 1963.

Kellett, M. G. and Associates, Growing Barley for Malting, Vancouver, Washington, Great Western Malting Company, Inc., (undated).

Kennedy, John F., Message from the President of the United States Relative to an Agricultural Program, Washington, D. C., House of Representatives Document 323, 87th Congress, 2nd Session, January 31, 1962.

Keaton, Clyde R., Competition in the Grain Market of Western Europe, Washington, D. C., USDA, FAS-M-138, May 1962.

Kutish, Francis A., "An Analysis of the 1961 Feed Grain Program," Better Farming Methods, April 1962.

Learn, Elmer W., "The European Common Market," World Trade: What Are the the Issues? No. 4., Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

Learn, Elmer W. and Houck, James P., Jr., "Market Development--The Concept and the Program," Foreign Agriculture, Washington, D. C., USDA, FAS, July, 1961.

Lejeune, A. J., "Malting Barley is Important Crop," Grain Age Magazine, October, 1960.

Lejeune, A. J., "Barley Variety Surveys and Acceptable Varieties of Malting Barley for 1963," Proceedings, Barley Improvement Conference, MBIA, Milwaukee, Wisconsin, June 17, 1963.

Lejeune, A. J., "Malting Barley Outlook, 1963," Grains of Truth, Milwaukee, Wisconsin, MBIA, February 12, 1963.

Lejeune, A. J., and Parker, J. H., Guide to Premiums for High Quality Malting Barley, Milwaukee, Wisconsin, MBIA, January, 1953.

Lejeune, A. J. and Parket, J.H., "Gold Discovered in the Red River Valley," Great Northern Agriculture, St. Paul, Minnesota, 1954.

Lejeune, A. J. and Parker, J.H., "The Story of Malting Barley," What's New in Crops and Soils?, February, 1955.

Loeb, Carl M., Rhoades and Co., Three Leading Brewery Stocks, New York 5, New York, February, 1962.

Long, Mary E., "Australia and New Zealand Watch the Common Market," Foreign Agriculture, Washington, D. C., FAS, September, 1959.

- Ludlarn, F. S. and Associates, Identification of Barley Varieties, Winnipeg, Manitoba, Board of Grain Commissioners for Canada, 1945.
- Malaher, W. G., Malting Barley in Western Canada, Winnipeg, Manitoba, Canada, Searle Grain Co., Ltd., March, 1961.
- Malt Research Institute, Grow and Market Good Quality Barley, Madison, Wisconsin, July 1, 1937.
- Malt Research Institute, Proper Threshing and Handling of Barley, Madison, Wisconsin, June, 1941.
- Malting Barley Improvement Association, Price Support Rate Map/s for Barley, Milwaukee, Wisconsin, 1948, 1959, 1960.
- Malting Barley Improvement Association, Barley Variety Survey Map/s, Milwaukee Wisconsin, 1958, 1959, 1960.
- Malting Barley Improvement Association, Annual Progress Report/s, Milwaukee Wisconsin, 1958, 1959, 1960, 1961.
- Malting Barley Improvement Association, "Betzes Barley Found Acceptable for Malting and Brewing," Grains of Truth, Milwaukee, Wisconsin, November, 1958.
- Malting Barley Improvement Association, "Betzes Barley Not Recommended for Midwest," Grains of Truth, Milwaukee, Wisconsin, January 9, 1959.
- Malting Barley Improvement Association, Report on Barley Improvement Conference/s, Milwaukee, Wisconsin, January 20, 1959, and January 26, 1961.
- Malting Barley Improvement Association, Thresh Malting Barley Carefully, Milwaukee, Wisconsin, May, 1959.
- Malting Barley Improvement Association, Report on Irrigated Betzes Project in Montana, 1960, Milwaukee, Wisconsin, March 29, 1960.
- Master Brewers Association of America, Malting Barley Contest Rules and Regulations, Cincinnati, Ohio, 1935.
- Mauch, Arthur, "World Trade: A Time for Decision," Better Farming Methods, July, 1962.
- Mauch, Arthur, "Why Trade with Other Nations?", World Trade: What Are the Issues? No. 1, Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

McCracken, Willard, "Grain Allotment Fight Flares: Local ASC, Man Fired by Freeman Appointees," Western Livestock Journal, Denver, Colorado, March 22, 1962.

McCracken, Willard, "Montana Feeders, Barleymen Face Threat in Cut Bank Dispute over Federal Action," Western Livestock Journal, Denver, Colorado, March 29, 1962.

Meinken, K. W., The Demand and Price Structure for Wheat, Washington, D. C., USDA, AMS, Technical Bulletin 1136, November, 1955.

Menze, R. E., "Exporters' Position in the Pacific Northwest Wheat Market," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

Mikkelsen, Walter C., "The Miller in the Marketing of Pacific Northwest Wheat," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

Miller, Clarence L., "Our Farm Export Problems," Foreign Agriculture, Washington, D. C., USDA, FAS, December, 1959.

Milwaukee Journal, "Barley Center Seen for City," Milwaukee, Wisconsin, January 24, 1955.

Milwaukee Sentinel, "More Barley Growing in State Urged," Milwaukee, Wisconsin, January 25, 1955.

Minneapolis Grain Exchange, How to Market Grain, Minneapolis, Minnesota, January, 1958.

Montana Department of Agriculture, Montana Agricultural Statistics, Helena, Montana, Volumes III to VIII, 1950 to 1960.

Montana Farmer Stockman, "Wheat, Feed Grain Programs," Great Falls, Montana, February 15, 1962.

Montana Farmer Stockman, "State ASC Committee Suspends Glacier County Committee," Great Falls, Montana, April 1, 1962.

Montana State Department of Agriculture, Montana Directory of Licensed Grain Dealers, Helena, Montana, 1961.

Morrison, K. J., Wheat, Oats, and Barley Varieties Recommended for Washington, Pullman, Washington, WAES, Miscellaneous Publication 14, March, 1958.

Morrison, K. J.; Nilon, Robert; and Roche, Ben; Growing Barley in Washington, Pullman, Washington, WAES, Miscellaneous Publication 30, September, 1959.

Newell, Cameron B., Know Your Barley Varieties, Milwaukee, Wisconsin, Midwest Barley Improvement Association, June, 1950.

Northwest Crop Improvement Association and MBIA, High Quality Malting Barley, Milwaukee, Wisconsin, March, 1954.

O'Donnell, P. E., "Britain and the Common Market," Foreign Agriculture, Washington, D. C., USDA, FAS, September, 1961.

Olson, W. J., "Protein Content in Malting Barley--Effect on Quality," Proceedings, Barley Improvement Conference, MBIA, Milwaukee, Wisconsin January 17, 1963.

Olympia Brewing Company, How Olympia Beer Is Made, Olympia, Washington, (undated).

Oregon State College, Barley: What to Do with It, Corvallis, Oregon, Extension Circular 560, January, 1954.

Pacific Northwest Grain Dealers Association, 1962 Official Directory of Pacific Northwest Grain Dealers Association, Spokane, Washington, 1962.

Paarlberg, Don, "U. S. Agriculture Venture into the International Age," Foreign Agriculture, Washington, D. C., USDA, FAS, November, 1959.

Paarlberg, Don, "Balance of Payments," World Trade: What Are the Issues? No. 2, Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

Parker, John H., The Annual Barley Usage of the Malting and Brewing Industries, American Brewer, May, 1955.

Parker, J. H., The Story of Malting Barley in Wisconsin, MBIA, Milwaukee, Wisconsin, (undated).

Pederson, H. C., More Profits from Malting Barley, St. Paul, Minnesota, MAES Folder 68, December, 1959.

Pederson, H. C. and Crewdson, B. G., Cereal Grains, Oilseeds, and Other Field Crops, St. Paul, Minnesota, MAES Handbook, November, 1958.

Peterson, E. E., "The European Economic Community," Nebraska Farm and Ranch Economics, No. 175, University of Nebraska, Lincoln, Nebraska, September, 1962.

Penn, Raymond J., "Reciprocal Trade Agreements," World Trade: What Are the Issues? No. 3, Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

Porter, Sylvia, F., "Time for a Giant Step," Life Magazine, April 20, 1962.

Printer's Ink, Annual Beer Sales Report Issue, January 19, 1962.

Pugh, Charles, "An Analysis of Policy Alternatives for Feed Grains," Farm Policy Alternatives, Washington, D. C., USDA, FES, March, 1963.

Putnam, Henry O., Malting Barley, Minneapolis, Minnesota, Northwest Crop Improvement Association, October 23, 1957.

Quenemoen, M. E., "1962 Wheat-Feed Grain Program," Montana Farmer Stockman, Great Falls, Montana, November 1, 1961.

Quenemoen, M. E., "1962 Wheat-Feed Program Income Potentials of Production Alternatives," Montana Farmer Stockman, Great Falls, Montana, November 1, 1961.

Rasmussen, Wayne D., "History of America's Farm Exports (I)," Foreign Agriculture, Washington, D. C., USDA, FAS, July, 1960.

Rasmussen, Wayne D., "History of America's Farm Exports (II)," Foreign Agriculture, Washington, D. C., USDA, FAS, July, 1960.

Richter, Jay, "Blueprint for Agriculture," Better Farming Methods, March, 1962.

Root, Floyd, "P. L. 480 and Its Importance to the U. S. Wheat Industry," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

Root, Floyd, "Summary of the International Wheat Agreement," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

Rossiter, Fred J., "Canada and the Common Market," Foreign Agriculture, Washington, D. C., USDA, FAS, August, 1960.

Rudd, Robert W., "Can Exports Solve the Farm Problem?", World Trade: What Are the Issues? No. 6, Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

Schaffner, L. W., Barley Marketing in North Dakota, Fargo, North Dakota, NDAES Bulletin 352, June, 1948.

Schonberg, James S., The Grain Trade: How It Works, New York Exposition Press, 1956.

Seeborg, Ed, "The Japanese Wheat Market," Wheat Marketing Short Course, Washington State University, Pullman, Washington, February 7, 1962.

Shaw, A. F., Betzes Barley in Montana, Bozeman, Montana, MAES Folder, March, 1958.

Shaw, A. F., "The Barley Problem in Montana," Regional Extension Grain Marketing Conference, Great Falls, Montana, May 6-8, 1958.

Shaw, A. F., "Barley Possibilities Important; Income Now Second to Wheat," Challenges, Bozeman, Montana, MSC, January-February, 1960.

Shaw, A. F. and Eslick, Robert, "Alternative Uses for Land Diverted from Wheat and Barley," Montana Farmer Stockman, Great Falls, Montana, November 1, 1961.

Sheppard, Daniel S., "How We Are Developing Markets in Latin America," Foreign Agriculture, Washington, D. C., USDA, FAS, April, 1962.

Siebel Publishing Company, "Buyers Guide and Directory, 1962," The Brewers Digest, Chicago, Illinois, 1962.

Sisler, W. W., "Quality Factors in Malting Barley," Extension Grain Marketing Conference, Minneapolis, Minnesota, May 11, 1961.

Sleik, John, What Happens to Barley on the Trading Floor and in the Malthouse because of Skinned and Broken Kernels, G. Heileman Brewing Company, LaCrosse, Wisconsin, (undated).

Snowden, Obed L. and Donahoo, Alvin W., Profitable Farm Marketing, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1960.

Sorenson, L. Orlo, "Grain Transportation," The Kansas Agricultural Situation, Kansas State University, Manhattan, Kansas, January, 1962.

Swindlehurst, E. B., "Palliser and Betzes Barley," Science and the Land, Edmonton, Alberta, Canada, September 16, 1960.

Sykes, W. J., The Principles and Practice of Brewing, London, England, Charles Griffin and Company, Ltd., 1897.

Taylor, F. R., and Nelson, D. C., Factors Affecting the Transportation of North Dakota Grain, Fargo, North Dakota, NDAES Bulletin No. 430, December, 1960.

Taylor, Maurice C., "Food and Agriculture Act of 1962," Montana Farmer Stockman, Great Falls, Montana, April 1, 1962.

Teal, R. H., Report on Betzes Malting Barley in Montana, Corvallis, Oregon, OAES mimeo, August, 1959.

Thomas, Marion D., Grain Price Relationships, Corvallis, Oregon, OAES mimeo, November, 1962.

Thompson, W. H., "Cross Current in Transportation," Feed and Grain Conference, Manhattan, Kansas, November 28, 1962.

Thuroczy, N. M., Impact of the St. Lawrence Seaway on the Location of Grain Export Facilities, Washington, D. C., USDA, AMS, Marketing Research Report No. 442, December, 1960.

The United Nations, National Grain Policies (Supplement No. 4), Rome Italy, FAO, Commodities Division, 1962.

United States Congress, Agricultural Act of 1961, Washington, D. C., Public Law 87-128, 87th Congress, S. 1643, August 8, 1961.

United States Congress, 1962 Food and Agricultural Act, Washington, D. C., H.R. 10010, 87th Congress, 2nd Session, June 4, 1962.

United States Congress, Trade Expansion Act of 1962, Washington, D. C., H.R. 11970, 87th Congress, 2nd Session, June 4, 1962.

United States Department of Agriculture, Grading Barley at Country Points, Washington, D. C., AIS 54, September, 1946.

United States Department of Agriculture, Handbook of Official Grain Standards of the U.S., Washington, D. C., AMS, Miscellaneous Publication 722, 1956.

United States Department of Agriculture, Fact Sheet, 1962 Barley Feed Grain Program, Washington, D. C. ASCS, August, 1961.

United States Department of Agriculture, If You Produce Barley, Washington, D. C., ASCS Folder, PA 470, August, 1961.

United States Department of Agriculture, Summary and Highlights--The Agricultural Act of 1961, Washington, D. C., ASCS, August, 1961.

United States Department of Agriculture, The Wheat Stabilization and Feed Grain Programs, Bozeman, Montana, ASCS, March, 1962.

United States Department of Agriculture, Revised Estimates of Barley Acreage, Yield, and Production, 1886-1929, Washington, D. C., BAE Mimeo, February, 1935.

United States Department of Agriculture, Farm Production, Disposition, and Value of Barley, 1909-41, Washington, D. C., BAE mimeo, October, 1944.

United States Department of Agriculture, Field Crops by States, 1954-59, Washington, D. C., CRB, Stat. Bul. 290, June, 1961.

United States Department of Agriculture, Fact Sheet; U. S. Agricultural Exports, Washington, D. C., ERS, December, 1961.

United States Department of Agriculture, Foreign Agricultural Trade of the U. S., Fiscal Year 1960-61, Washington, D. C., ERS, December, 1961.

United States Department of Agriculture, Foreign Agricultural Trade of the U. S., Washington, D. C., ERS, August, 1961, February, 1962.

United States Department of Agriculture, Fact Sheet, U. S. Agricultural Imports, Washington, D. C., ERS, March, 1962.

United States Department of Agriculture, World Food Needs, Washington, D. C., ERS, Ag. Inf. Bul. 261, May, 1962.

United States Department of Agriculture, Grain and Feed Statistics, Washington, D. C., ERS, Stat. Bul. 159 (revised), June, 1962.

United States Department of Agriculture, The World Food Budget, 1962 and 1966, Washington, D. C., ERS and FAS, For. Ag. Econ. Rep. No. 4, October, 1961.

United States Department of Agriculture, 1962 Agricultural Outlook Chartbook, Washington, D. C., ERS, FAS, ARS, November, 1961.

United States Department of Agriculture, U. S. Agricultural Exports in Historical Perspective, Washington, D. C., FAS, February, 1956.

United States Department of Agriculture, Developing Foreign Markets for U. S. Farm Products, Washington, D. C., FAS, February, 1958

United States Department of Agriculture, Free Trade Area for Europe--How It Is Developing, Foreign Agriculture, Washington, D. C., FAS, May, 1958.

United States Department of Agriculture, Prospects for Foreign Trade in Feed Grains, etc., Washington, D. C., FAS, January, 1959, January, 1960, May, 1961, April, 1962.

United States Department of Agriculture, "Tariffs and the Common Market," Foreign Agriculture, Washington, D. C., FAS, February, 1959.

United States Department of Agriculture, "Thirty-Six Countries Are Now Involved in Common Markets, Free Trade Area," Foreign Agriculture, Washington, D. C., FAS, February, 1960.

United States Department of Agriculture, "Developing Markets in Italy," Foreign Agriculture, Washington, D. C., FAS, June, 1960.

United States Department of Agriculture, The World Grain Trade, Washington, D. C., FAS-M-53 (revised), July, 1960.

United States Department of Agriculture, Foreign Agricultural Trade Outlook Charts, 1961, Washington, D. C., FAS, November, 1960.

United States Department of Agriculture, U. S. Agricultural Exports, Past and Present, 1925-1960, Washington, D. C. FAS-M-109, February, 1961

United States Department of Agriculture, "Shifts in World Agricultural Trade," Foreign Agriculture, Washington, D. C., FAS, March, 1961.

United States Department of Agriculture, "Common Market Commission Forecasts Smaller Food Import Needs by 1965," Foreign Agriculture, Washington, D. C. , FAS, April, 1961.

United States Department of Agriculture, "How U. S. Wheat Growers Have Boosted Overseas Sales," Foreign Agriculture, Washington, D. C., FAS, April, 1961.

United States Department of Agriculture, Foreign Agricultural Market Development, Washington, D. C., FAS, June, 1961.

United States Department of Agriculture, "Free Ports of the World," Foreign Agriculture, Washington, D. C., FAS, September, 1961.

United States Department of Agriculture, The Barter Export Program, Washington, D. C., FAS, October, 1961.

United States Department of Agriculture, U. S. Grain Exports under Government Programs, 1960-61, Washington, D. C., FAS-M-127, February, 1962.

United States Department of Agriculture, "New U. S. Trade Pact with Common Market," Foreign Agriculture, Washington, D. C., FAS, April, 1962.

United States Department of Agriculture, Foreign Crops and Markets, Washington, D. C., FAS, August 27, 1962.

United States Department of Agriculture, "Common Market Adopts New Grain Trade Rules," Foreign Agriculture Circular, Washington, D. C., FAS, August, 1962.

United States Department of Agriculture, "European Common Market Grain Regulation," Foreign Agriculture Circular; Washington, D. C., FAS, November, 1962.

United States Department of Agriculture, France's Key Role in the Grain Sector of the European Common Market, Washington, D. C., FAS, FAR-122, April, 1963.

United States Department of Agriculture, New Markets for U. S. Agricultural Commodities, Washington, D. C., Miscellaneous Publication 756, February, 1958.

United States Department of Agriculture, Analysis of Grain Export Programs Washington, D. C., Miscellaneous Publication 905, May, 1962.

United States Department of Agriculture, Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products, Washington, D. C., P. & M. A., May, 1952.

United States Department of Agriculture, Three Additional Barley Varieties Excepted under 1962 Feed Program, Washington, D. C., February 2, 1962.

United States Department of Agriculture, Details of Feed Grain Price-Support Programs, Washington, D. C., February 2, 1962.

United States Department of Agriculture, Food and Agriculture, A Program for the 1960's, Washington, D. C., March, 1962.

Vaughan, E. D., Marketing Betzes as Malting Barley, Bozeman, Montana, MAES Mkt. Newsletter, July 15, 1958.

Vaughan, E. D., Malting Barley Marketing Report, Bozeman, Montana, MAES Report, July 21, 1958.

Vickery, R. E., Canadian Wheat Marketing, Washington, D. C., FAS-M-140, July, 1962.

Vogel, E. H., Jr., and Associates, The Practical Brewer, St. Louis, Missouri, Van Hoffman Press, 1946.

Vogel, S. L., Thresh Barley for Malting Carefully, Milwaukee, Wisconsin, Midwest Barley Improvement Association, June, 1950.

Watson, C. A.; Bequette, R. K.; and Ellis, G. H.; Malting Barley, Increased Income to Montana Growers, Bozeman, Montana, Montana State College, Cereal Quality Laboratory, Agronomy and Soils Department Mimeo, Leaflet No. 28, July, 1959.

Watson, C. A.; Eslick, R. F.; Bequette, R. K.; and Ellis, G. H.; Malting Data Obtained on Montana Barley by the USDA Malt Laboratory, Bozeman, Montana, MAES, Agronomy Circ. 29, July, 1959.

Weaver, J. C., "Barley Geography," American Society of Brewing Chemists Conference, Milwaukee, Wisconsin, January 28, 1948.

Western Agricultural Economics Research Council, The Philosophy, Methodology, Basic Tools of Marketing Research, Berkeley, California, November 14-16, 1960.

The Wheat Scoop, "MGGA Wins Compana Campaign," Great Falls, Montana, March, 1962.

Winter, J. S., "The Effect of Changing Transportation Rates on Grain Pricing and Movement," Extension Marketing Workshop, Purdue University, November 1, 1960.

Witt, Lawrence, "Food for Peace," World Trade: What Are the Issues? No. 5, Farm Foundation, North Carolina State College, Iowa State University, March, 1962.

World Book Encyclopedia, (Articles on beer, brewing, malting), Chicago, Illinois, Field Enterprise Educational Corporation, 1962 ed.

Wyllie, Kathryn H., "Latin America Plans Another Common Market," Foreign Agriculture, Washington, D. C. FAS, July, 1960.

Zaglits, Oscar, "The Common Market's Proposed Farm Policies," Foreign Agriculture, Washington, D. C., FAS, February, 1960.

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