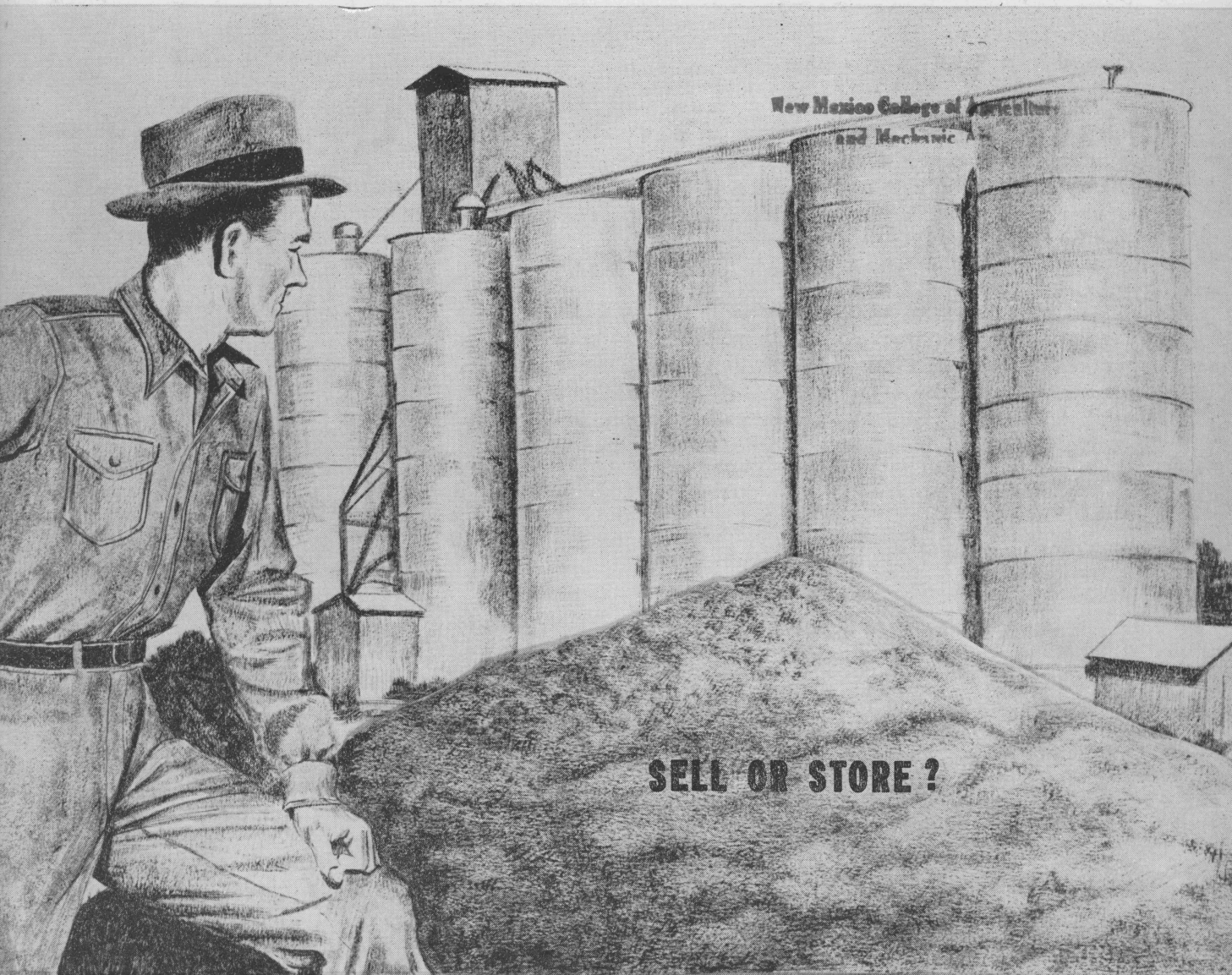


Economic Considerations in Storing Grain Sorghum in Central Texas

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SELL OR STORE ?



TEXAS AGRICULTURAL EXPERIMENT STATION

R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

Summary

Central Texas farmers take a chance of obtaining less net returns if they store their grain sorghum on their own account (not under Commodity Credit Corporation loan) rather than sell it at harvest. The 10-year average seasonal price increase from August to the following March (most favorable month for sale from storage on the average) was slightly more than the cost of storage for the 7-month period on grain that did not require artificial drying for safe storage. When drying was necessary, the total cost slightly exceeded the average price increase. However, the CCC loan-price support program tends to "iron-out" the seasonal increases in price on which returns to storage depend in a "free" market operation.

With the present price support program, most producers are interested in whether to sell at harvest or store under CCC loan. If the net price a producer can obtain by forfeiting the grain is more than the harvest market price, it pays to put grain in storage under CCC loan. If not, he will be taking a chance of loss by doing so. This study gives details for computing the net support price on which the decision should depend.

If grain sorghum is put in storage under CCC loan and the market price rises above the net support price plus costs of redeeming the grain as the marketing season advances, the farmer can profit by redeeming the grain and selling it on the market. The study provides the necessary information for computing the "break-even" market price at any time during the season.

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Economic Considerations in **Storing Grain Sorghum in Central Texas**

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THIS STUDY IS CONCERNED WITH ECONOMIC considerations that may be useful to the Central Texas farmer in deciding whether to store or sell his grain sorghum at harvest. The three main decisions are: (1) whether to sell at harvest or store in commercial elevators under his own account (not under Commodity Credit Corporation loan) for later sale, (2) whether to sell at harvest or store in commercial elevators under CCC loan and (3) whether to redeem the grain from CCC loan for market sale or forfeit it to the government.

The present study for Central Texas is similar to that reported in Texas Agricultural Experiment Station Bulletin 868, *Seasonal Price Change and Costs of Storing Grain Sorghum in the Coastal Bend*. The Central Texas study involves computing costs and returns to storage when the harvest month is August rather than in June and July—as in the Coastal Bend area—and includes analyses for grain stored without artificial drying.

Returns to Storage

If the farmer is operating on his own account, not under the CCC loan, the storage returns to grain produced for market sale are the amount by which prices later in the season exceed the harvest price. The price data used for this analysis are based on unpublished but reported mid-month farm prices for grain sorghum in the Eighth Crop Reporting District of Texas, supplied by the Division of Agricultural Estimates, USDA. Grain prices generally may be less in Central Texas than those reported for the Eighth Crop Reporting District because of the greater distance from, and cost of transporting grain to, coastal shipping points. However, the seasonal pattern is similar and the price margins between harvest and later months would be about the same.

The study applies to that area of Central Texas, Figure 1, where the bulk of the grain sorghum is harvested in August. The marketing period is taken as beginning in the harvest month, and ending the following May—just before new-crop harvest of grain sorghum in the Coastal Bend area.

Farmers in Central Texas who harvest in August usually are faced with a depressed market due to heavy supplies at that time. The average August price was lower than the average of any

other month for the 10-year period 1946-47 through 1955-56, Figure 2. Prices tend to strengthen after August and on into the following May.

The selling price of grain sorghum at harvest usually is quoted on a 15 percent moisture-content basis. Since the grain must be dried to 13 percent or less for safe storage in commercial elevators, prices later in the season are for 13 percent grain. Thus, 100 pounds of 15 percent grain at harvest becomes only 97.7 pounds of grain if dried and sold from storage later in the season. Price margins between harvest and later months in Table 1 are computed for two situations. If the grain is harvested at 13 percent, no adjustment is made in the harvest price, since the same weight of grain is involved whether it is sold at harvest or later. If the grain is harvested at 15 percent or more, the quoted selling price at harvest is divided by .977 to obtain a harvest price for an equivalent amount of 13 percent grain sold later.

For example, Table 1 shows that grain harvested at 13 percent would have averaged 11 cents more per 100 pounds in September than in August during the 10-year period 1946-47 through 1955-56. Grain harvested at 15 percent, with the average August price converted to a 13 percent

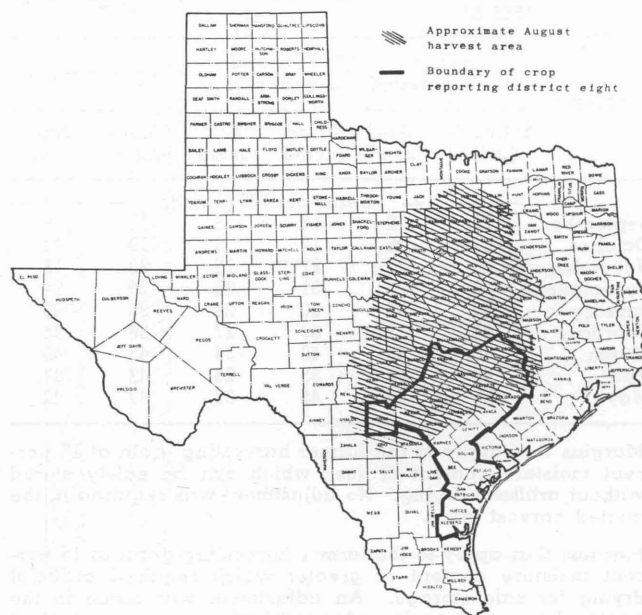


Figure 1. Approximate area of study.

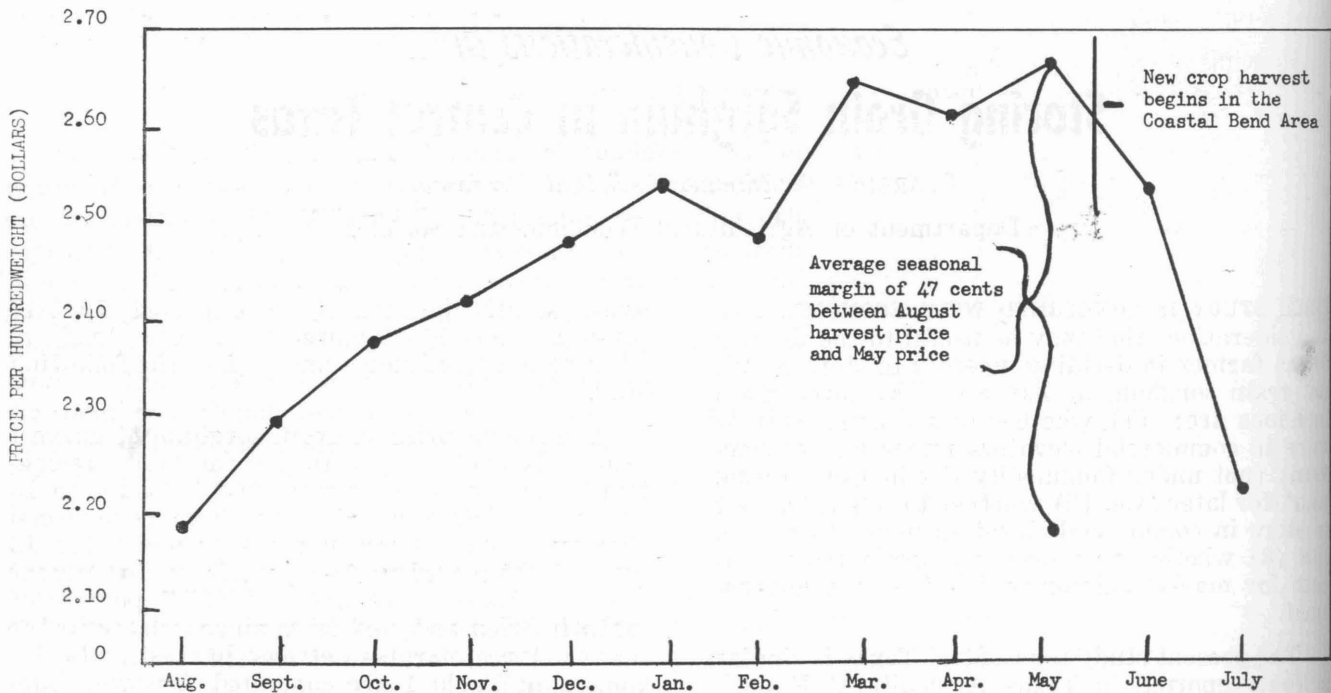


Figure 2. Seasonal change in grain sorghum price, Eighth Crop Reporting District, Texas, 1946-47 through 1955-56.

weight basis, would have averaged 6 cents more in September than in August.

Greatest returns from storage could have been obtained in May if the grain had been sold from storage consistently in one particular month during this period. Returns to storage would have averaged 42 to 47 cents per hundred pounds for grain sold in May and 40 to 45 cents for grain sold in March.

TABLE 1. AVERAGE SEASONAL INCREASE IN PRICE OF GRAIN SORGHUM AFTER AUGUST, EIGHTH CROP REPORTING DISTRICT, 1946-47 THROUGH 1955-56

Month	First 5-year period		Second 5-year period		10-year period	
	Unad-justed ¹	Ad-justed ²	Unad-justed ¹	Ad-justed ²	Unad-justed ¹	Ad-justed ²
	Cents per 100 pounds					
September	11	6	12	6	11	6
October	27	22	12	6	19	14
November	26	21	21	15	23	18
December	28	23	31	25	29	24
January	40	35	30	24	35	30
February	26	21	33	27	29	24
March	50	45	40	34	45	40
April	49	44	35	29	42	37
May	50	45	45	39	47	42

¹Margins that apply to the farmer harvesting grain at 13 percent moisture content or less which can be safely stored without artificial drying. No adjustment was required in the quoted harvest price.

²Margins that apply to the farmer harvesting grain at 15 percent moisture content or greater which required artificial drying for safe storage. An adjustment was made in the quoted harvest price in order to obtain a price equivalent to 100 pounds of 13 percent grain.

Seasonal margins were somewhat greater in the late Forties than in the Fifties probably because of the stronger loan-support program in the Fifties.

Storage Costs

The farmer's cost of holding grain sorghum in commercial storage includes all the charges he incurs that could be avoided if he had sold the grain at harvest. Five charges should be considered in determining the total cost.

Drying

Since grain sorghum is sold at harvest on a 15 percent moisture-content basis, the cost of drying from 15 to 13 percent should be included as a cost to storage. Drying charge above 15 percent is not included, since grain is price-docked (usually 5 cents for each percent of moisture above 15) when sold at harvest. There is no drying charge for grain harvested at 13 percent or less.

Uniform Storage

This includes the cost of storing, insuring, conditioning and care of grain in storage. The amount charged is that allowed under the Uniform Grain Storage Agreement. The rate was .047 cent per bushel per day, or about 2.5 cents per 100 pounds per month.

Loan Handling

If the grain is put in storage under CCC loan, there is a 1 cent charge per 100 pounds for executing the loan papers and other CCC office expenses.

In-and-out Charge

The charge for receiving the grain at the elevator was 7.25 cents per bushel, and for loading out, .75 cent per bushel—a total of 8 cents per bushel, or slightly less than 14.3 cents per 100 pounds. If grain under CCC loan is forfeited, the government pays the in-and-out charge, but if redeemed from CCC loan the farmer pays the charge.

Interest

If CCC loan grain is redeemed, the farmer must pay 3.5 percent interest on the loan to the date of repayment. If the farmer stores the grain on his own account, not under the CCC loan program, interest is a cost if he must borrow funds to finance storage or if he uses his own funds and, by so doing, foregoes opportunity to use those funds elsewhere at a profit. However, if he finances the storage himself with funds that would otherwise be idle during the storage period, interest should not be charged to the storage operation.

To Sell or Store on Farmer's Own Account

If the farmer is operating on his own account without regard to the CCC loan program, his decision to sell or store at harvest depends on whether the returns from storage will more than cover his costs, columns 5 and 6 of Table 2.

TABLE 2. FARMER'S COST OF STORING GRAIN SORGHUM IN COMMERCIAL ELEVATORS IN CENTRAL TEXAS, 1956

Month	Cost of storing grain under CCC loan ¹				Cost on grain not in CCC loan ²	
	If forfeited		If redeemed ³		Not dried	Dried
	Not dried	Dried	Not dried	Dried		
	Cents per 100 pounds					
September	19	25	18.5	24.5	17.9	23.9
October	19	25	21.6	27.6	21.4	27.4
November	19	25	24.8	30.8	25.0	31.0
December	19	25	27.9	33.9	28.5	34.5
January	19	25	31.1	37.1	32.1	38.1
February	19	25	34.3	40.3	35.7	41.7
March	19	25	37.3	43.3	39.1	45.1
April			40.9	46.9	42.7	48.7
May			44.5	50.5	46.2	52.2

¹Assumes the grain is stored about the middle of August and costs are those accumulating to the middle of subsequent months under the various conditions of storage.

²Includes interest at 6 percent assuming grain valued at \$2 per 100 pounds, that is, a 1 cent charge per month for interest.

³Grain sorghum in CCC must be redeemed before March 31 or forfeited to the government. Therefore interest is charged at 6 percent in April and May rather than the 3.5 percent on the government loan.

Two cost-returns situations are involved: (1) grain harvested at 13 percent moisture content or less does not require artificial drying for storage, and the farmer obtains the quoted market price if it is sold at harvest and (2) grain harvested at over 13 percent moisture content must be artificially dried for safe storage.

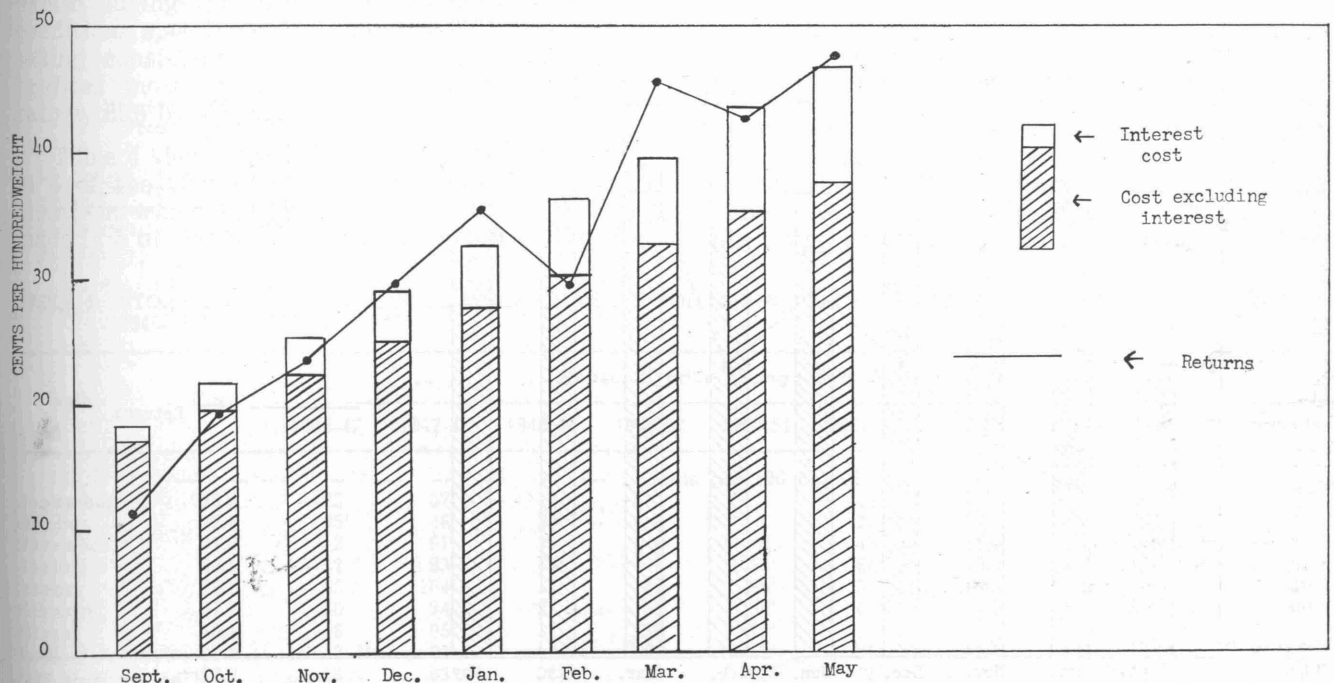


Figure 3. Average seasonal margins between August and later prices compared with storage cost for grain sorghum stored safely without artificial drying.

been made by selling in January—returns of \$1.10 per hundred pounds against 32 cents cost.

The table shows that the farmer, facing the average cost-price situation on which the study is based, would have made a profit in 6 of the 10 years by selling in either March or December, but would have lost money in 4 years. The profits would have been less from December than from March sales, over the 10-year period.

The farmer could have profited from storage in most years if he had predicted the month that price would be highest. However, it is advisable to adopt a policy of consistent selling in the month that shows most favorable over a long period, unless he studies demand and supply conditions and is willing to gamble on predicting the price movement during a particular season.

Dried for Safe Storage

Costs of storage are increased by the amount of the drying charge; returns to storage, in the form of margins between harvest and later prices for an equivalent amount of grain, are not as high for grain that must be dried.

Figure 4 compares the average costs and returns on grain dried for safe storage. The cost of drying from 15 to 13 percent was computed at 6 cents per 100 pounds.

At no time did the average returns exceed the costs of storage including interest. The average returns exceeded costs of storage with no interest charge in only 1 month (March). The farmer would have lost money had he consistently stored and sold from storage in any one particular month during the period studied and under the conditions specified. He would have lost less by selling consistently in March, but would have profited most by selling his grain at harvest rather than by storing.

Table 4 shows the farmer could have profited in 6 of the 10 years had he selected the right month in which to sell. Profits could have been made in 5 of the 10 years by consistent selling in

January, or in 4 of the 10 years by consistent selling in December, April or May. Although profits were possible in only 3 of the 10 years from March sales, the higher profits in those 3 years combined with smaller losses in the other 7, made March the most favorable month for consistent sales from storage—less loss would have been incurred from March sales.

Storage Returns and Price Support

The farmer who stored on his own account, not under the CCC loan-price support program, would have obtained small (if any) returns from storage operations in recent years unless he had predicted accurately annual changes in price. Considering the risk and uncertainty involved, it probably would have been more profitable to sell at harvest if the CCC loan-price support program had not been an alternative. With the program in effect, not many farmers have stored on their own account.

The price support program probably has affected the relative returns to storage. Over a period of years in a free market, without price support, the difference between the harvest price and later prices is expected to cover the cost of storage. Since many farmers sell their grain at harvest, some by necessity and others to avoid the uncertainty of later prices, the heavy supply put on the market at harvest, with little going into storage, unduly depresses the price at harvest. Most of the grain is sold at harvest so there is less to sell later in the season. The price is bid up for this lighter supply as the season advances, Figure 5. Greater seasonal price margins result.

The price support program changes the situation. A good part of the grain is induced into storage at harvest under CCC loan because the farmer can obtain immediate cash and because the support level, if effective, is more favorable than the market price at harvest. Less grain put on the market at harvest keeps the price higher. A larger supply of grain available for sale from CCC storage later keeps prices from

TABLE 4. STORAGE COST AND ANNUAL PRICE CHANGES FOR GRAIN SORGHUM ARTIFICIALLY DRIED BEFORE STORING, 1946-47 THROUGH 1955-56

Month	Cost	Seasonal price change from August by years									
		1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
		Cents per 100 pounds									
September	23.9	-23	37 ¹	17	-4	1	12	20	-1	-3	10
October	27.4	35 ¹	46 ¹	23	6	1	22	11	-7	15	-9
November	31.0	-2	61 ¹	36 ¹	0	9	46 ¹	7	-8	18	16
December	34.5	-62	93 ¹	43 ¹	5	36 ¹	64 ¹	9	-3	26	30
January	38.1	-53	104 ¹	45 ¹	12	65 ¹	67 ¹	9	13	-5	40 ¹
February	41.7	-50	34	31	25	64 ¹	67 ¹	5	11	4	48 ¹
March	45.1	-6	85 ¹	35	39	71 ¹	71 ¹	1	32	26	44
April	48.7	7	93 ¹	32	32	57 ¹	75 ¹	-13	41	-10	55 ¹
May	52.2	16	83 ¹	38	28	61 ¹	75 ¹	-16	33	37	67 ¹

Price increase greater than storage cost.

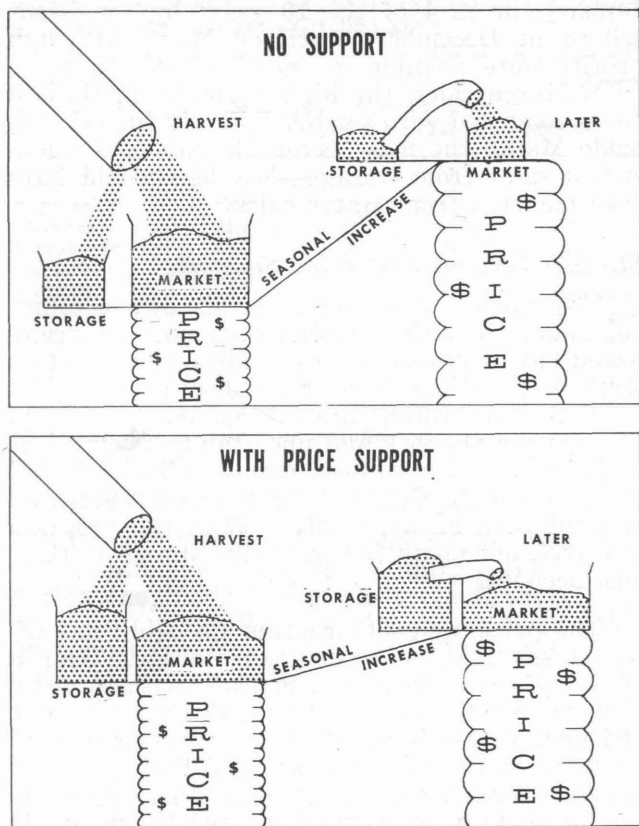


Figure 5. Effect of an effective price support program on the seasonal pattern of prices.

rising as high as they otherwise would go as the season advances. Thus, the seasonal margin between harvest and later prices (the returns to storage) are not expected to be as great under the CCC loan-price support program as under a "free" market situation, Figure 5.

To Sell or Store under CCC Loan

In recent years, and probably in the future, the question faced by most Central Texas producers is not whether to sell at harvest or store on their own account, but whether to sell or put the grain in storage under CCC loan. The farmer needs to know the price-support base for his county, the costs of storage and the market price of grain sorghum at harvest. Since the price-support base varies from county to county, depending on transportation costs to Gulf ports, this section explains how to compute the costs and prices on which the decision is based. The farmer can then insert the actual cost and price data which are relevant in his locality to determine whether he should sell at harvest or store under CCC loan in any particular year.

The farmer who harvests grain at 13 percent moisture content or less can deduct from the base support price in his county the storage costs to the March 31 forfeit date plus the 1 cent per 100 pounds loan handling charge on grain put in

storage under CCC loan. The resulting figure is the net loan he can obtain from CCC, and becomes the net price he receives for the grain should it be forfeited to the government. This net support price can be compared directly with the harvest market price. If the net support price is more than the harvest market price, it would pay to store under CCC loan. If the net support price is less than the harvest market price, he will be taking a chance of loss if he decides to store rather than sell.

As an example, column 1 in Table 2 shows that storage costs from August to the March 31 forfeit date, plus the 1 cent loan handling charge, were about 19 cents per 100 pounds on grain that could be stored under CCC loan without drying. If this 19 cents is deducted from the base support price, the resulting figure is the net loan he can obtain on the grain; if the grain is forfeited, it becomes the net price he receives for his grain.

If the farmer harvests grain at 15 percent moisture content (or above), he incurs a drying charge if he stores under CCC loan. Since a common charge for drying grain from 15 to 13 percent moisture content was 6 cents (3 cents per 1 percent of moisture), this was added to the storage and loan handling charge in column 2 of Table 2. The farmer who harvests grain at 15 percent moisture or above must deduct 25 cents from the base support rate for his county in order to obtain a net support price for the grain if it is forfeited.

In the preceding paragraph, only drying cost for reduction of moisture from 15 to 13 percent is included, although the cost figures are given as applying to grain harvested at 15 percent or greater. The analysis is based on the quoted harvest market price for 15 percent grain and the farmer who brings grain to market with moisture content greater than 15 percent is price-docked if he sells his grain at harvest—the common rate was 5 cents less than the quoted price for each percent of moisture above 15 percent. This dockage presumably covers both the drying charge and loss in weight on grain above 15 percent moisture.

However, the net support price on grain harvested at 15 percent moisture content, computed by deducting the 25 cents storage, loan handling and drying charge from the base support price, should be compared with the harvest selling price divided by .977 (to account for the difference in weight between 15 and 13 percent grain) to determine which is the best price on the grain, the net support price or the harvest market price.

An example illustrates the computation. If the farmer's county support rate is set at \$2, the farmer should deduct the 25 cents storage costs from this rate (approximately 18 cents uniform storage charge to March 31, plus the 1 cent loan handling charge, plus 6 cents drying

charge). This gives a net price of \$1.75 per 100 pounds of 13 percent grain which he can receive if he later forfeits to the government. If the market price is \$1.75 for 15 percent grain, the market price is better than the net support price since 100 pounds of 15 percent grain, if dried to 13 percent, becomes only 97.7 pounds (there would be less grain to put in storage under the CCC loan rate). By dividing the \$1.75 market price by .977, he finds that the going market price for an equivalent amount of CCC stored grain is approximately \$1.79 per hundred pounds. The market price in this case is greater than the net support price. A harvest price of \$1.70 on 15 percent grain divided by .977 gives a price of \$1.74 for an equivalent amount of 13 percent grain and would mean more could be made by storing under CCC loan.

To Forfeit or Redeem from CCC Loan

Under the government's loan-price support program the farmer may forfeit the grain to the government and retain the net support price or redeem the grain by paying off the loan before the forfeit date. The farmer has the necessary information available to determine which would be the most profitable at any particular time during the marketing season.

This section deals with the computation necessary to determine at any one time whether the market price is sufficiently high to justify redeeming the grain. The information necessary is the net price support, the costs that could be avoided if the grain were forfeited but would be incurred if the grain were redeemed (the redeeming costs) and the market price at that time.

The farmer may, at any time as the season advances, add to his net loan price (discussed in preceding section) the costs he would incur if he redeemed the grain at that time, and compare the results with the current market price. If the current market price is more than the net loan price plus redeeming costs, it would be more profitable to redeem the grain and sell it on the market. If the current market price is lower, it would be more profitable to forfeit the grain.

The redeeming costs are the uniform storage charge, interest to date of repayment of the CCC loan and the receiving and loading out charge. The uniform storage charge is deducted from the base support rate in order to get the net loan which CCC makes on the grain. (The farmer can get the full amount of the loan by presenting a warehouse statement indicating such charge has been paid in full to forfeit date. It is more convenient to let CCC deduct it and make the net loan since the net price to the farmer is the same in either case and should he redeem the grain, he saves some interest.) If the farmer forfeits the grain, the government is responsible for the storage charge. If he redeems it, the farmer pays

TABLE 5. APPROXIMATE COSTS OF REDEEMING GRAIN SORGHUM PLACED UNDER CCC LOAN IN AUGUST¹

Month	Cost of redeeming grain from CCC loan			
	Receiving and loading out ²	Interest ³	Storage ⁴	Total cost
	— —	Cents per 100 pounds		— —
September	14.3	.6	2.6	17.5
October	14.3	1.2	5.1	20.6
November	14.3	1.8	7.7	23.8
December	14.3	2.4	10.2	26.9
January	14.3	3.0	12.8	30.1
February	14.3	3.6	15.4	33.3
March	14.3	4.2	17.8	36.3

¹Costs are computed in order to apply to the same day of the following months as that on which grain is put in storage in August.

²In-and-out charge was 8 cents per bushel under the Uniform Grain Storage Agreement in 1956. This is slightly less than 14.3 cents per 100 pounds.

³Computed at the CCC loan rate of 3.5 percent and assuming the loan rate was \$2 per 100 pounds.

⁴The Uniform Agreement rate was .047 cent per bushel per day in 1956 which is about .084 cent per day per 100 pounds.

only the net loan, plus interest, and thus is responsible for the uniform storage charge.

The approximate amount of these costs is shown in Table 5. If the farmer redeemed his grain in November, for example, his costs would be about 24 cents per 100 pounds. If he redeemed it in March, costs would be slightly more than 36 cents. This amount is added to the net loan price to determine the market price required to "break-even" between forfeiting or redeeming the grain.

If the farmer computed his net loan support price at \$1.75 per 100 pounds of grain and it would cost 36.3 cents to redeem the grain in March, he would have to obtain a market price more than \$2.11 (\$1.75 + \$0.36) in March to profit by redeeming the grain rather than forfeiting.

Table 6 shows market prices necessary for the farmer to "break-even" with various net support prices if he redeemed his grain from CCC loan. The market prices must be more than those shown in Table 6 to provide a profit to the farmer who redeems his grain—assuming costs are equal to those shown in the left column based on 1956 charges.

For example, if the farmer computes his net support price at \$1.70 (Table 6, column 4) and, wants to determine whether the market price justifies redeeming the grain in January, he would find January and move along the horizontal line of figures until he came to \$2.01 in column 4. It would pay him to forfeit his grain and retain the net price of \$1.70 unless the market price at that time exceeded \$2.01.

The analyses in this study were based on the alternative of whether artificial drying was included as a cost factor, depending on the condition

TABLE 6. COSTS TO REDEEM GRAIN FROM CCC LOAN COMPARED WITH "BREAK-EVEN" MARKET PRICES FOR VARIOUS NET SUPPORT PRICES ON GRAIN STORED IN AUGUST.

Month	Approximate redeeming costs	Approximate market price required to "break-even" on redeemed grain with a net support price of									
		\$1.60	\$1.65	\$1.70	\$1.75	\$1.80	\$1.85	\$1.90	\$1.95	\$2.00	\$2.05
	Cents per 100 pounds	Dollars per 100 pounds									
September	17.5	1.78	1.83	1.88	1.93	1.98	2.03	2.08	2.13	2.18	2.23
October	20.6	1.81	1.86	1.91	1.96	2.01	2.06	2.11	2.16	2.21	2.26
November	23.8	1.84	1.89	1.94	1.99	2.04	2.09	2.14	2.19	2.24	2.29
December	26.9	1.87	1.92	1.97	2.02	2.07	2.12	2.17	2.22	2.27	2.32
January	30.1	1.91	1.96	2.01	2.06	2.11	2.16	2.21	2.26	2.31	2.36
February	33.3	1.94	1.99	2.04	2.09	2.14	2.19	2.24	2.29	2.34	2.39
March	36.3	1.97	2.02	2.07	2.12	2.17	2.22	2.27	2.32	2.37	2.42

of the grain at harvest. Many storage units in the area studied do not have drying facilities and many farmers may not have the alternative of artificial drying of their grain before storage.

There is greater possibility of deterioration in quality while the grain is in storage if the grain is stored in commercial elevators or warehouses above the 13 percent moisture content set as the safe level maximum.

Acknowledgments

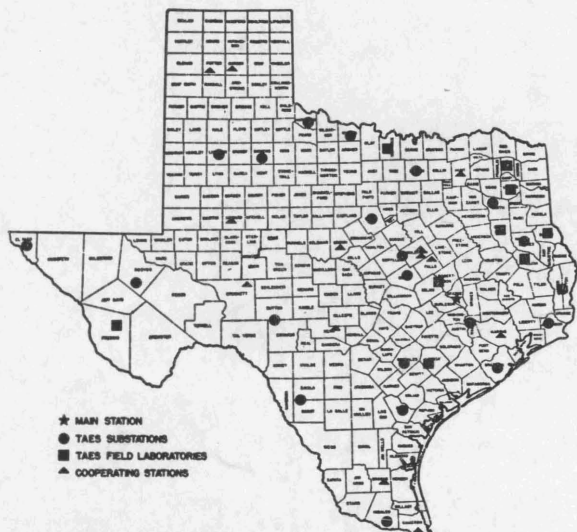
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State-wide Research



Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

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The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of ten parts of the Texas A&M College System

ORGANIZATION

IN THE MAIN STATION, with headquarters at College Station, are 16 subject-matter departments, 2 service departments, 3 regulatory services and the administrative staff. Located out in the major agricultural areas of Texas are 21 substations and 9 field laboratories. In addition, there are 14 cooperating stations owned by other agencies. Cooperating agencies include the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, U. S. Department of Agriculture, University of Texas, Texas Technological College, Texas College of Arts and Industries and the King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

OPERATION

THE TEXAS STATION is conducting about 400 active research projects, grouped in 25 programs, which include all phases of agriculture in Texas. Among these are:

- | | |
|--------------------------------------|---------------------------------|
| Conservation and improvement of soil | Beef cattle |
| Conservation and use of water | Dairy cattle |
| Grasses and legumes | Sheep and goats |
| Grain crops | Swine |
| Cotton and other fiber crops | Chickens and turkeys |
| Vegetable crops | Animal diseases and parasites |
| Citrus and other subtropical fruits | Fish and game |
| Fruits and nuts | Farm and ranch engineering |
| Oil seed crops | Farm and ranch business |
| Ornamental plants | Marketing agricultural products |
| Brush and weeds | Rural home economics |
| Insects | Rural agricultural economics |
| | Plant diseases |

Two additional programs are maintenance and upkeep, and central services.

Research results are carried to Texas farmers, ranchmen and homemakers by county agents and specialists of the Texas Agricultural Extension Service

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENs, the WHEREs and the HOWs of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. Workers of the Main Station and the field units of the Texas Agricultural Experiment Station seek diligently to find solutions to these problems.

Today's Research Is Tomorrow's Progress