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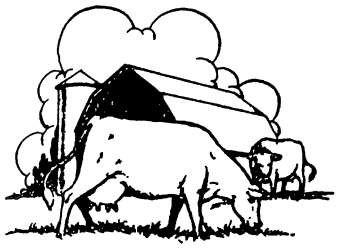
SPECIAL ISSUE—FARM STORAGE OF GRAIN



MINNESOTA
farm business NOTES

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Farmers Seek Storage Space as Bins Overflow

Harold C. Pederson

Many of our corn cribs and grain bins—both on farms and elsewhere—are full. This situation makes it necessary for many producers to consider more on-the-farm storage when making plans for the future.

The large supplies of grain, corn, and soybeans have resulted from a series of good crops and a marked decline in export demand. The outlook for 1953 crops indicates that the upward trend in the over-all supply of these commodities will continue. Thus all indications point to a need for more storage space in order to meet requirements.

Government programs also play a part in this development. Support prices in the form of commodity loans necessitate storage facilities which the producer must have on his farm or provide in some other way. The first commodity loans took on-the-farm storage for granted, but soon other forms of storage were used.

The local elevator or commercial warehouse facilities at other points continue to be the most attractive alternative to farm storage. Such facilities usually offer both a satisfactory and economical solution to storage needs; but like farm storage, their capacity is limited. Both are geared only to normal conditions.

The Changing Storage Problem

Providing more ear corn, soybean, and grain storage space on the farm involves a number of problems. The grain industry is undergoing changes. Farm storage of the three crops plays a different role today than it formerly did due to changes in methods of harvesting, transportation, artificial drying, and grain sanitation regulations.

These trends are especially noticeable in the case of cash grain. Cash grain refers to wheat, soybeans, barley, flax, corn (on some farms), and other grains that are sold for cash and not used as feed on the farm.

Rapid Delivery Reduces Expenses

Producers like to move their grain to the market rapidly and, where possible, directly from the combine. In some areas a parallel development is under way with corn. Artificial drying units, for instance, are causing changes in the harvesting and marketing techniques of the corn crop.

Such changes have reduced expenses of labor, transportation, and the risks involved.

In consequence, many producers prefer to transfer grain to local elevators in order to shift the responsibility of storage.

Why More Farm Storage?

Producers have been asked by their government to provide more storage on their farms where it is economical to do so. Much of the corn is eventually used there as feed anyway.

This request is accompanied with several incentives. For instance, a cash allowance is assured producers who reseal for another year the corn and wheat they now have under price support on their farms. Also, four-year loans to build additional storage can be had at 4 per cent interest. And in some areas special programs are offered which are not practical in this state.

All Storage Costs Money

The question of how much storage there should be on the farm, in the local elevator, and at subterminal and terminal points brings forth a number of considerations. The following appear to be the more significant ones:

1. The great variation in the size of crops from year to year complicates plans for storage. Then, too, the harvest comes within a few months, whereas the rate of consumption is distributed fairly uniformly over the 12 months.

2. The market demand at support levels for most of the commodities has been below production in recent years. This trend has resulted in abnormally large inventories or carry-overs.

3. Losses in quality may be particularly costly now in view of the current program of the Pure Food and Drug Administration to condemn grain which is considered unfit for human food consumption.

4. Artificial drying of small grain and corn create uncertainties as to future investments in storage facilities. In lean years storage space is unused. Bumper crops or accumulated reserves naturally create a shortage of space. Added to these uncertainties there is always the possibility that the storage space is not located where it will do the most good.

Emergency Storage. The costs involved in providing storage limit the permanent facilities. It seems unlikely that either on-the-farm or commercial facilities will ever expand to the extent necessary to meet the so-called peak storage needs. Emergency storage therefore may offer one of the best solutions for years like 1953 when the demand for space is abnormally high.

Several types of buildings may be used for emergency storage. It may be a building like a garage, machine shed, or farm supply house which can be adapted to grain storage when needed. A building suited to such a variety of uses is frequently referred to as a dual purpose or multipurpose unit.

Movable bins or cribs also have some of the characteristics of emergency storage facilities because such units do not become a permanent part of the farm. If the time comes when they are no longer needed they may be sold and a portion of the original investment recovered.

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Emergency storage units for ear corn are less likely to be adapted to other uses.

A Many-Sided Question

Storing grain, therefore, involves a number of costs and also some hazards which are difficult to anticipate.

Storage facilities represent a capital investment. Shrinkage and losses in quality which may occur during the storage period, payments for insurance, and protection against insects and rodents are carrying charges which cannot be avoided. These capital costs and carrying charges are present from the time the crop is harvested until it is finally fed or sold. Therefore the only question is where the grain should be stored and who can assume the risks at the lowest cost.

Estimated Costs of Ear Corn Storage

The Farm Credit Administration in cooperation with certain states has prepared several reports on costs of storage. Bulletin 68 issued in April 1952, *Where and How Much Cash Grain Storage for Indiana Farms,* presents some conclusions which may be applied to Minnesota. Consequently, several tables on fixed and variable costs and other economic aspects of storage have been adapted from that publication.

Data on fixed and variable costs of a farm storage unit are shown in table 1. These figures cover a corn crib in which 4,000 bushels of ear corn can be stored. The total cost of the double, wood slatted building, including a $750 mechanical conveyor, is estimated at $4,350.

Storage costs calculated for new construction in the 1949-50 marketing year varied from 12.9 cents to 25.5 cents, depending on how the corn was to be used and how much of the crib was used.

No doubt many farmers could construct such a unit for less out-of-pocket costs or resort to some other less costly plan of permanent type storage. In such instances, the fixed costs for the storage would be reduced accordingly.

Fixed costs make up a large percentage of total costs. Therefore full utilization of storage space is extremely important as a means of keeping storage costs low. Table 1 shows that the fixed costs per bushel for one year when the crib was full amounted to 9.5 cents, compared with 19 cents when it was used to half capacity.

Full utilization of storage space on the farm, however, is rarely possible for an entire year. Exceptions are noted where commodity loans are made for one year periods and not redeemed during that time. Occasionally, some producers hold over feed reserves, and this results in better utilization.

Table 1. Summary of Costs for Ear Corn Storage

Cost item	Crib full—4,000 bu.		Crib half full—2,000 bu.	
	Cost per bu. when stored for		Cost per bu. when stored for	
	Sale	Feed	Sale	Feed
	cents			
Fixed costs				
Interest*	4.3	4.3	8.7	8.7
Depreciation	3.3	3.3	6.5	6.5
Insurance	0.6	0.6	1.2	1.2
Taxes	1.0	1.0	2.1	2.1
Maintenance	0.3	0.3	0.5	0.5
Total fixed expense	9.5	9.5	19.0	19.0
Variable costs				
Loss, damage, etc.	2.5	2.5	2.5	2.5
Noninsurable risks	.5	.5	.5	.5
Grain insurance	.4	.4	.4	.4
Extra transportation and labor	3.1	.....	3.1	.....
Total variable costs	6.5	3.4	6.5	3.5
Total cost of feed corn	.....	12.9	.....	22.4
Total cost of sale corn	16.0	.....	25.5	.....

* Estimated cost of crib is $4,350.

When the crib was being used to full capacity for cash corn, the fixed costs averaged 60 per cent of the total costs. However, the proportion rose to almost 74 per cent if the corn was being stored for feed because then the extra labor or transportation was not chargeable to the corn. The total cost per bushel for feed corn storage was 3.1 cents less than for cash corn, however, because of the saving in extra labor and transportation.

Interest and depreciation accounted for 80 per cent of the fixed costs. Many farmers overlook these items as expenses chargeable to storage operations. However, commercial storage firms allow for them in determining their rates. While costs as interest and depreciation on such storage facilities do not usually represent an annual cash outlay, they are important items of cost. If the money used to build such facilities were invested elsewhere, it could be expected to yield a return.

Since a corn crib is built solely for the purpose of storing corn, the annual depreciation and interest should be charged to the corn stored in it.

Variable costs, including losses from damage, shrinkage, and grain insurance, amounted to only 3.4 cents a bushel for feed corn. They totaled 6.5 cents for cash corn.

Fixed costs which are based on the original cost of the building deserve emphasis as the major ones in storing ear corn. Any savings which can be made in constructing a new crib will materially reduce storage costs per bushel. Old cribs which were built during periods of lower prices and are still in good repair may be expected to provide much lower storage costs than would new construction. The variable costs in either case would probably be the same.

Estimated Costs of Small Grain Storage

Estimates of costs of storing small grain, also adapted from F. C. A. Bulletin 68, are shown in table 2. The costs are based on a 2,400 bushel capacity unit built over a corn storage unit and costing an additional $650. This type of farm storage building for grain and corn is popular with many farmers. It is not intended to represent an ideal unit, however, because some producers would find variations better suited to their needs.

Total storage costs per bushel for the marketing year 1949-50 varied from 9.4 cents to 11.0 cents for cash grain, depending on whether storage space was used at 60 per cent or full capacity.

Fixed costs for grain storage represented only 25 per cent of the total storage costs per bushel when the capacity of the bin was fully utilized. It represented about 30 per cent when 60 per cent was utilized.

Fixed costs of small grain storage are relatively small compared with those of corn storage. For small grain the fixed costs accounted for 25 per cent of the total costs when the capacity was fully utilized and 30 per cent when

utilization was 60 per cent of capacity. The lower original costs resulted in lower interest and depreciation charges. Also, the small grain for sale involved extra labor and transportation charges, thereby adding to the variable costs.

Table 2. Summary of Costs for Farmers' Cash Small Grain and Soybean Storage

Cost item	Cost per bushel: Entire capacity used	Cost per bushel: 60 per cent of capacity used
	cents	
Fixed costs*		
Interest	1.1	1.9
Depreciation	.8	1.4
Insurance	.1	.2
Taxes	.3	.4
Maintenance reserve	.1	.1
Total fixed costs	2.4	4.0
Variable costs		
Shrinkage	2.9	2.9
Noninsurable risks	.5	.5
Insurance	.5	.5
Subtotal variable costs	3.9	3.9
Extra transportation and labor	3.1	3.1
Total costs	9.4	11.0

* Total cost of storage facility estimated at $650 for 2,400 bushel capacity.

This combination corn crib-granary seems to provide slightly less costly storage than may be expected if a separate grain storage facility were provided. A comparison of costs of this type of storage with alternative types is presented in table 3. Individual producers, however, may wish to consider other factors such as resale value in making their choice should they wish to sell their unit some day.

Types of Storage Have Various Uses

The advantages of temporary, semi-permanent, or dual purpose storage plans appear rather obvious for certain situations, especially those where a producer is uncertain as to what extent the storage will be used in future years. Temporary storage facilities offer a low cost solution for surplus grain and corn during years of bumper crops. They also enable greater utilization of the permanent facilities because the latter are more likely to be kept full for a longer period of time each year.

Ear corn. Temporary storage facilities for ear corn may be a circle made with wire or snow fence. A good floor is recommended but frequently not provided. Such a unit provides fairly satisfactory short-time storage for producers who feed livestock from their current year's crop or sell such corn before warm weather or rains come. These temporary units can also be made semi-permanent without much added expense so that 10 to 15 years of service may be had from them. More crib space provided in this manner, therefore, need not be costly.

Fixed costs of corn stored in these emergency storage units are low. And since fixed costs are the major costs in storing corn, the total storage costs are thereby greatly reduced. The open slatted construction of permanent corn cribs gives rise to the belief that ear corn storage must be less costly than grain. However, ear corn requires at least twice as many cubic feet per bushel as small grain does. The cost for a 2,000 bushel corn crib therefore is likely to be larger than the cost of a storage unit that will hold the same amount of shelled corn or grain.

The opportunity of full utilization of permanent corn cribs is also enhanced by the use of some temporary storage. For example, corn sold early or fed to livestock may be taken from the temporary cribs, leaving the permanent facilities full for a longer period of time.

Dual- or multi-use buildings offer only limited possibilities for ear corn storage.

Shelled corn, soybeans, and other grains. The dual purpose or multi-use building for storage of shelled corn, soybeans, and other grains is, of course, a permanent structure. It is more costly than the temporary storage space used for ear corn.

The fact that such dual purpose buildings have other uses is the important consideration. For instance, they may be used as the place to make repairs or store farm supplies. The fixed costs therefore may be allocated to a variety of uses. Another advantage of multi-use storage units is that they frequently permit the regular permanent storage facilities to be used to capacity, or nearly so, for a longer period of time.

Table 3. Comparisons for Different Types of Storage Costs—2,400 Bushel Units

Kinds of cost	Cost per bushel for 60 per cent utilization: Granary over double corn crib—value $650	Separate wood granary plus conveyor—value $1,380	Steel bin plus conveyor—value $1,140
	cents		
Fixed costs	4.0	8.4	6.9
Variable costs	2.5	2.5	2.5
Extra transportation and labor	3.1	3.1	3.1
Total cost for oats	9.6	14.0	12.5
Total cost for soybeans	12.9	17.3	15.8
Total cost for wheat	12.0	16.4	14.9

Elevator and Farm Storage Costs Compared

The comparison of costs of farm and elevator storage offers some complications, as shown in table 4, adapted from F.C.A. Bulletin 68. An analysis of these data shows that the costs of local elevator storage compare favorably with costs of on-the-farm storage. Elevator storage is preferable for periods ranging up to eight months. Short storage periods on the farm result in high fixed costs per bushel and the extra labor and transportation costs naturally loom large.

The comparison in table 4 has some limitations insofar as new ear corn is concerned. To have an accurate storage comparison for new crop corn, storage should be given credit for the natural drying.

The elevator appears to offer the most economical storage for periods up to and somewhat beyond eight months.

To Summarize . . .

There is no clear answer as to where and how these commodities should be stored. The foregoing analysis suggests that there are alternatives to on-the-farm storage which need consideration. Some of the more important considerations appear to be the following:

- Markets usually are unable to absorb all the grain offered at harvest time, so producers frequently must be prepared with an alternative place for grain when such situations occur.

Combines, trucks, and all-weather roads make it possible to move grain from the harvest field to the local elevator in a short period of time. In areas where this trend puts a heavy burden on local marketing facilities, a provision for on-the-farm storage becomes desirable.

- Special incentives for farm storage, such as are offered through the Production and Marketing Administration, make farm storage more attractive and practical.

- Participation in commodity support programs are frequently tied in with on-the-farm storage.

• Grain sanitation has become an important factor in storage of grains intended for processing into human food. Special precautions should be taken to prevent quality losses which result in market discounts. Screening of windows against birds, control of rodents (especially mice) and insects, and protection from any other form of filth are essential.

• New storage construction should be considered only when there is a reasonable assurance that it will be used at or near its capacity over a period of time. Provisions for temporary, semipermanent, or dual purpose storage facilities for emergency or short-time periods will often be more economical than permanent type storage.

Temporary facilities also assist in keeping the more costly permanent type storage used to capacity.

• Costs of storing cash grain on the farm generally do not compare favorably with costs of elevator storage unless periods of at least eight months are involved. On-the-farm storage for feed grains and new crop corn, however, is usually a profitable practice.

• Adequate farm storage facilities usually mean less waste for the producer who feeds substantial amounts of his grain and corn.

• Returns for storage are not easily calculated. Having adequate facilities for an occasional critical period may result in substantial savings for one year, even though these facilities may not be used regularly. Storage sufficient for one year's crop seems desirable and appears to have been the goal for most of the farmers included in the study.

• Storage costs will change in the future as they have in the past because of technical developments in grain production, harvesting, transportation, and the extent that the grain is used directly on the farm.

Table 4. Comparisons of Farmers' Cash Storage Costs on Farms in New Double Crib Overhead Granary and at Elevators—1949-50 Marketing Year*

Kind of grain	Storage period	Storage costs per bushel		Farm storage costs compared with elevator costs	
		On farms	At elevators	More	Less
		cents	cents	cents	cents
Oats	1 year	9.6	14.2	.....	5.6
	8 months	9.0	9.2	.....	.2
	5 months	8.5	5.6	2.9	.....
Soybeans	1 year	12.9	14.2	.....	1.3
	8 months	12.4	9.2	3.2	.....
	5 months	11.4	5.6	5.8	.....
Wheat	1 year	12.0	14.2	.....	2.2
	8 months	11.3	9.2	2.1	.....
	5 months	9.8	5.6	4.2	.....
Ear corn	1 year	12.9	14.2	.....	1.3
	8 months	12.4	9.2	3.2	.....
	5 months	11.4	5.6	5.8	.....

* All grain used in these comparisons was considered dry enough for storage. Grain storage costs are calculated for 60 per cent utilization of storage space, ear corn for 100 per cent utilization.

Cash Crops Centered in Certain Areas

Harold C. Pederson

Three of Minnesota's popular cash crops—wheat, soybeans, and corn—are fairly well concentrated in specific areas. However, corn represents by far the greatest value of the three crops.

A review of data contained in the *1951 State Farm Census* reveals the following interesting information on these three:

Wheat. While wheat was once a major crop in Minnesota, it is now important in only a limited number of counties. In fact, six counties accounted for 60 per cent of the production in 1951, although some wheat production was reported in all but two counties of the state.

The six counties that accounted for 60 per cent of the state's production were Polk, Marshall, Clay, Kittson, Wilkin, and Norman.

Soybeans. Soybeans have become an important cash crop in a comparatively short period of time. Its acreage is now about the same as that for wheat but its cash value is substantially larger. It is not reported as a cash crop in 20 northern Minnesota counties because of the very limited production in those areas.

Fifteen counties accounted for 67 per cent of the soybean production reported in 1951. These were Blue Earth, Faribault, Renville, Martin, Freeborn, Redwood, Brown, Mower, Lac qui Parle, Cottonwood, Watonwan, Jackson, Swift, Chippewa, and Waseca.

Corn. Important as wheat and soybeans are as cash crops, they must give way to corn when comparisons are made. There are approximately 10 bushels of corn produced to every one of either wheat or soybeans. Like wheat, this crop is reported grown in all but two counties of the state. Its major economic importance, however, is in the southern half.

The top 33 counties make up approximately 75 per cent of the state's total production. They include one group of six, each producing over six million bushels. They are Martin, Redwood, Jackson, Renville, Blue Earth, and Yellow Medicine.

Another group of seven producing between five and six million bushels each are Freeborn, Mower, Lyon, Faribault, Stearns, Lac qui Parle, and Nobles.

Counties producing between four and five million bushels apiece are Cottonwood, Brown, Fillmore, Otter Tail, Kandiyohi, Chippewa, Rock, and Olmsted.

And the group made up of counties producing from three to four million bushels each is Murray, Sibley, Watonwan, Swift, Wright, Waseca, Nicollet, McLeod, Goodhue, Rice, Meeker, and Steele.

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