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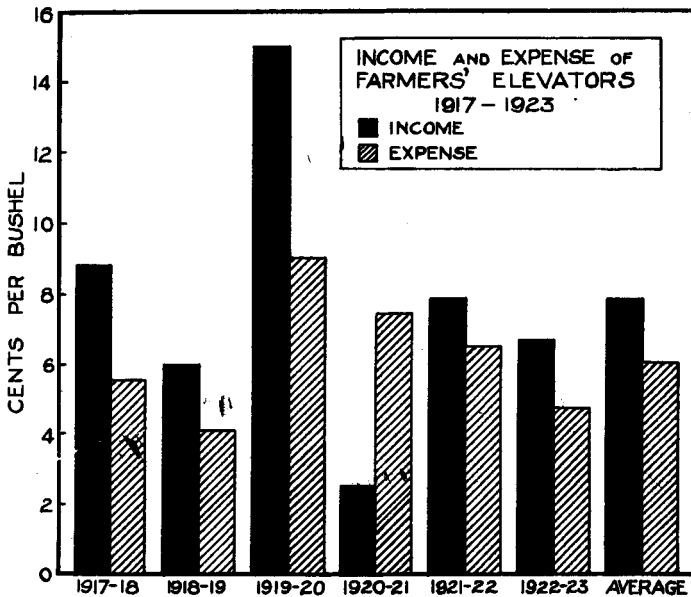
UNIVERSITY OF MINNESOTA
AGRICULTURAL EXPERIMENT STATION

IN CO-OPERATION WITH

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF AGRICULTURAL ECONOMICS

MANAGEMENT PROBLEMS OF
FARMERS' ELEVATORS

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MANAGEMENT PROBLEMS OF FARMERS' ELEVATORS

By H. BRUCE PRICE and CHARLES M. ARTHUR

INTRODUCTION

The object of this study is to discuss the practices of farmers' elevators and to point out the elements of strength and weakness in farmer elevator operation.

The history of the farmer elevator movement since 1917 provides excellent data for such a study, for farmers' elevators are affected by changes in the business cycle in much the same way as other business enterprises. In periods of rising prices most enterprises succeed for profits are large and costs are low. In periods of falling prices costs are large and profits are small. Under such conditions management is given a severe test.

The period since 1917 has been no exception. Many buyers and boards of directors were unprepared for the period of falling prices beginning in 1920. Grain prices were expected by many to continue to rise. Hedging which had been discontinued for the principal grain, wheat, by war-time regulation was therefore not resumed as soon as future trading in wheat was restored. In many cases the records kept gave no forewarning of the losses being incurred by declining prices until irreparable damage had been done or until the reserves and capital accumulated during the preceding period of elevator prosperity were partly or entirely wiped out. The imperfect protection of hedging, the storing of grain in larger quantities by farmers, the bad grading and docking by buyers, the failure to collect elevator charges, or to allow adequate buying margins and high costs of operation are some of the other, altho less important, causes contributing to the present distressed condition of farmers' elevators. A comparison of successful and unsuccessful elevators under these conditions is valuable in pointing out the merit of different methods of organizing a local elevator for operation, and the different practices of hedging, storing, buying, selling, grading, docking, weighing, insuring, cleaning, and handling sidelines.

The complete story of the farmer elevator movement during this period cannot be written until the forces set in motion by rising and

NOTE.—Acknowledgment is made of the assistance of B. H. Critchfield, in the preliminary work of this study, and particularly in the section on Storing for Farmers. Valuable suggestions and data were also received from officials of Bishop-Brissman Audit Company, Northwest Audit Company, Charles H. Preston Audit Company, Schultze-Bowman Audit Company and M. W. Thatcher Audit Company.

falling prices have had an opportunity to work themselves out. Some insolvent elevators, for example, are still operating. At the present time, however, the farmer elevators are as important factors in local grain marketing as in 1920. Table I shows that they are just as important from the standpoints of number of elevators operating and of proportion of total grain marketed. For the entire seven-year period they have made a net gain over other types of elevators from both standpoints.

TABLE I
TYPES OF ELEVATORS IN MINNESOTA, 1914-15 TO 1924-25*

Year	Number of elevators				Per cent of grain marketed			
	Farmers	Line	Independent	Mill	Farmers	Line	Independent	Mill
1914-15	296	625	302	205	39	...	...	...
1915-16	299	630	407	234	36	31	23	8
1916-17	331	613	357	222	39	26	19	17
1917-18	356	613	347	235	40	28	18	13
1918-19	390	537	404	274	39	25	20	16
1919-20	423	512	403	263	45	22	21	12
1920-21	417	482	366	257	49	22	20	10
1921-22	447	523	388	152	52	25	21	2†
1922-23	420	459	385	254	46	24	22	8
1923-24	413	466	370	193	48	24	22	6

* Data secured from annual reports of Minnesota Railroad and Warehouse Commission.

† Grain milled not included as formerly.

Data for this study were secured chiefly from annual audits of over 100 elevators covering the marketing seasons 1917-18 to 1923-24; from commission merchants at Minneapolis; and from interviews with 55 elevator operators in Minnesota. The management problems of Minnesota elevators are given special consideration. Due attention is given to the variation in elevator practices and problems in different sections of the state where the proportions of various grains handled or the proportions of grain and sidelines marketed vary. It should be noted, however, that elevators for which audit information was secured are located in those sections of Minnesota, North Dakota, South Dakota, and Montana that are tributary to Minneapolis and Duluth grain markets. A careful examination of the data obtained from the various sources indicates, however, that there is no cleavage of local grain marketing problems by state boundary lines. The analysis of marketing problems in the spring wheat and the corn and oats producing sections of Minnesota is therefore in large measure applicable to the sections of the other states producing and marketing similar grains.

Some consideration is also given to independent elevators. Thirty operators of independent elevators were interviewed. Mention is made, therefore, of any practices or management problems distinctive of this type. The method of operating the two types of elevators are so similar, however, that, except for the problems arising from differences in

ownership, the discussion of management problems for one type applies about equally to the other. The data obtained for both farmer and independent elevators have therefore been combined in many instances where there is no important variation in the two types.

THE MANAGER

Selection of a manager is the chief problem of the board of directors because the success of a local elevator depends more on the type of manager employed than on any other single factor. The manager should be chosen for his integrity, for his knowledge of grain and technical problems of elevator operation, and for his ability to meet producers. He should also know something about principles of marketing.

Most men who are qualified to operate elevators have only practical experience. A few agricultural colleges are offering courses for elevator managers, but the number of graduates is small. The manager must therefore be chosen in most cases on the basis of his previous experience as an assistant to a manager or as manager of another elevator.

Managers' salaries vary from \$1000 to \$3000 per year. The most common salaries range from \$1500 to \$2250 with an average of about \$1800. Farmers have frequently made the mistake of trying to save money by employing inexperienced or inefficient managers at low salaries. Table II shows, for example, that elevators employing the most efficient managers, as measured by the salaries paid, realize the largest profits. It does not necessarily follow, however, that all elevators should hire high-salaried managers because it is only where large volume is combined with efficient management that the large profits of the \$2000 and \$3000 managers are generally realized. Yet, elevators of any volume group can in many instances afford to hire more efficient managers, because the grade of management may not be well adapted to the size of business.

TABLE II
RELATION OF SALARIES PAID MANAGERS AND ELEVATOR PROFITS OF 106 FARMERS' ELEVATORS,
1922-23

Salary	Total net profit (average per elevator)	Number of elevators
\$ 750 to \$1000	\$ 50*	1
1000 to 1250	400	6
1250 to 1500	2060	14
1500 to 1750	2450	12
1750 to 2000	1850	30
2000 to 2250	3310	20
2250 to 2500	4650	16
2500 and over	5660	7

* Loss.

The majority of elevator companies require their managers to give bonds. Minnesota Bulletin No. 152 shows that 78 per cent of the managers gave bond in 1914.¹ But much of the value of the bond is lost because the manager is frequently not required to keep records that indicate the condition of the business without an audit and because the officials are negligent to make frequent record inspection. Frequently, even a careful audit at the close of the year is not made. Losses from such practices as charging the losses of the manager's private speculations to the elevator or of misappropriation of the proceeds from the sales may therefore be undetected, or if discovered there may be no records to base action for reimbursement. A maximum of protection obviously cannot be obtained from such losses unless a complete business record is kept and the board of directors inspect the business regularly. The lack of definiteness in fixing responsibility for the examination of the business on a large number of directors may make it advisable to place the responsibility on a small executive committee consisting of two or three members, probably including the secretary, president, and another member of the board of directors.

COST OF OPERATION

In this study costs include simply out-of-pocket expenses and depreciation. Wages of management are therefore included in costs, since farmers' elevators always employ a manager, but no interest is allowed on proprietors' investment—only interest on borrowed capital is included as a cost. This method of analysis is made necessary by the practice of accountants from whose audits cost data were secured.

There is a wide variation in the costs of operating elevators for any year. Figure 1 shows the range and distribution of costs for 109 grain elevators in the Minneapolis-Duluth grain-marketing area for the crop year of 1922-23. The range was from 1.7 cents to 13.0 cents per bushel; the average was 4.7 cents per bushel. One hundred elevators, or 90 per cent of the total, had costs from 2 cents to 9 cents per bushel. Here, it appears, is great opportunity for a better economy in organization and management.

The first and most obvious cause of these variations in unit costs is volume of business. Figure 2 shows this general relationship graphically. Decrease in cost with increase in volume is rather rapid under 125,000 bushels, and gradual above this volume. The reason for this is that there is, roughly speaking, a minimum-sized elevator building with a minimum of equipment, and labor and management; and costs per bushel decrease until this minimum is economically utilized. Above this point, labor is increased, equipment is increased, buildings are en-

¹ We'd, L. D. H., "Farmer elevators in Minnesota," p. 9.

larged somewhat, insurance and interest are increased, and particularly the salaries of management are increased. They are not increased, however, as rapidly as the volume, with the result that unit costs are apparently still decreasing at 500,000 bushels.

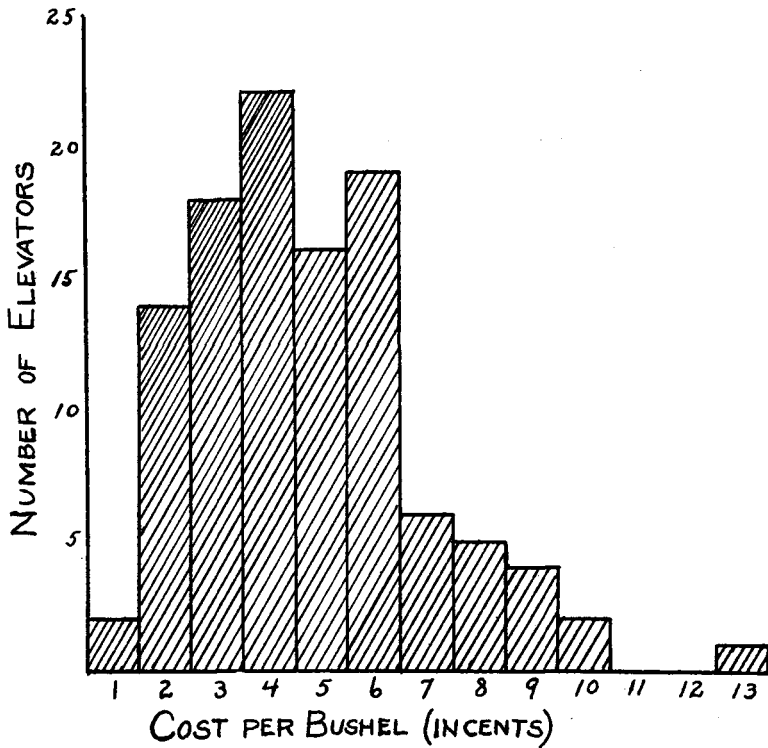


Fig. 1. Distribution of Elevator Costs—109 Elevators, 1922-23

It cannot be argued safely from such evidence that all elevators should be larger and that there should be fewer. The reason that some elevators are handling so small a volume is that this is all the grain that is produced in their territory, and if the elevators were not there, the extra hauling cost to other shipping points would more than offset the extra elevator costs due to the small volume of receipts at this point. In many cases, however, one elevator at a shipping point, if properly equipped and manned, could handle all the business now handled by the two or three. If hauling costs could be determined, it would be possible to combine a curve of variations in hauling costs with volume with a curve of variations in elevator costs with volume, and so construct a curve of variations in the two costs combined. In most cases, such an analysis would show volumes of between 125,000 and 350,000 bushels giving lowest combined hauling and elevator costs, the particular volume

in any case depending more upon the density of grain production than upon anything else.

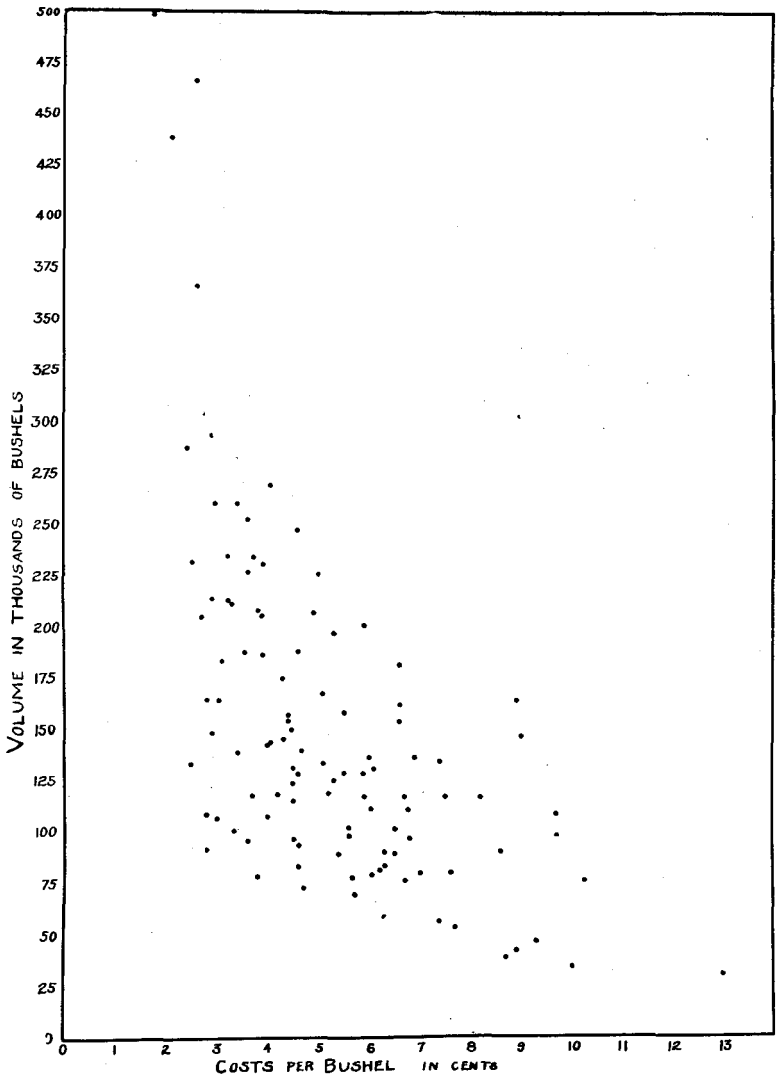


Fig. 2. Relation between Volume and Costs per Bushel of Operating Farmers' Elevators

Altho variations in costs with volume are most obvious, they are probably not the most significant. The 16 elevators with volumes between 100,000 and 125,000 bushels have costs ranging from 2.5 to 9.0 cents per bushel; the 12 elevators with volume between 150,000 and 175,000 bushels have costs ranging from 3.0 to 9.0 cents per bushel; and even the 15 with volumes between 200,000 and 250,000 bushels have costs ranging from 2.5 to 6.0 cents per bushel.

To explain all these variations requires an analysis of individual expense items. Since variations depend in such large measure upon the different methods of operating elevators, the detailed discussion of causes for variations is deferred to subsequent sections of this bulletin and only a summary given here.

Management

The important reasons for variations in management costs are difference in the amount of management hired, difference in salaries paid for various grades of management, or difference in salaries paid for same grade of management. Thus managers' salaries for the elevators in the 135,000 to 145,000 bushel group range from \$1475 to \$2320. The total average management expense in 1922-23, including directors' and secretaries' fees, and traveling expenses, was \$2151, or 31.5 per cent of total expense. Variation in volume of business is an important factor in explaining differences in this cost.

Building and Equipment

This item includes depreciation, repair, and rental expenses. In 1922-23, 13.5 per cent of the total was spent for this purpose. Variations in this expense are due to differences in types of warehouse construction, type of equipment, completeness of equipment, and adjustment of warehouse and equipment to volume of business. Building costs vary because all elevators are not well adjusted to volume of business, and partly because different grain-marketing conditions permit different rates of bin-space turnover. The Federal Trade Commission's study of 2229 elevators in eight states showed an average turnover of 3.9 times.² However, the average for elevators handling corn and other grains was 5.3 times, and for those handling no corn, only 2.8. The marketing period for corn follows that for small grain and extends the time when the elevators are filled to capacity or nearly so. On the other hand, increasing the number of small grains handled reduces the turnover because of the extra bin-space required. Maladjustments of capacity to volume of business may be merely temporary, due to such things as a short crop and the like; or they may be the result of over or underestimating future receipts. In the former case, accurate accounting would adjust the changes each year to suit the volume received.

General Office Expense

Clerks' salaries, postage, stationery, market news, and miscellaneous expenses are included in this cost. The different practices of accountants in charging expenses to this item make the total figures of no value

² Report on Grain Marketing, Vol. I, p. 120.

in comparing expenses of different elevators. An examination of individual items, however, shows that there is a wide variation in cost. Many elevators, for example, provide the manager no clerical assistance. Others incur a large expense for this item, ten elevators paying clerks \$720 to \$1500 in 1923. Market news costs vary with the kind of service, number of services, and completeness of service purchased. Differences in postage, stationery, and miscellaneous expenses depend largely upon the type of manager employed.

Extra Labor

The extra labor cost of 111 elevators in 1922-23 was 9 per cent of the total. Six elevators employed no extra labor, while the expense of others ranged from a few dollars to \$2390, or from a small fraction of one cent to 1.8 cents per bushel. Variations in the amount of labor used and rate of wages paid are the chief causes for differences in this cost.

Power, Light, and Heat

During 1922-23 this item of expense ranged from \$54 to \$1047 per elevator, the range being due chiefly to differences in type, kind, and completeness of power equipment, and volume of business. When the volume factor is eliminated, however, there remains a wide variation. For example, elevators in the 135,000 to 145,000 bushel group had costs ranging from 0.2 to 0.6 cents per bushel. The average cost was \$367 per elevator in 1922-23, or 5.3 per cent of the total cost.

Taxes

Taxes differ between elevators chiefly on account of variations in tax rate, value of plant and equipment, method of taxation, and method of marketing. Grain marketed by local elevators in Minnesota, North and South Dakota are taxed at rates specified by law. In Minnesota and South Dakota, the rate is based on the total amount of grain handled during the tax period. It is $\frac{1}{2}$ mill per bushel on wheat and flax and $\frac{1}{4}$ mill on all other grains in Minnesota, and $\frac{1}{4}$ mill on wheat and flax and $\frac{1}{8}$ mill on other grains in South Dakota. On the other hand, North Dakota and Montana tax stocks of grain at time of assessment.³ In Montana the stocks are taxed on the basis of full market value at personal property rates, while in North Dakota the rates of $\frac{1}{2}$ cent per bushel on flax, $\frac{3}{8}$ cent on wheat, and $\frac{1}{8}$ cent on all other grains apply. Thus in North Dakota and Montana, variation in the policy of storing grain is an important factor causing variations in the taxes paid. Elevators, equipment, and stocks of sidelines are taxed as personal property and taxes paid on them vary with differences in

³ On April 1, in North Dakota and May 1, in Montana.

method of assessment and personal property tax rates. The average tax per elevator was \$210 in 1922-23. The range was from \$60 to \$808. The tax for elevators in the 135,000 to 145,000 bushel group ranged from 0.1 to 0.3 cents per bushel. For the 175,000 to 200,000 bushel group, they varied from 0.1 to 0.2 cents per bushel.

Insurance

Insurance costs vary between elevators because grain value varies with different combinations of grain marketed and because grain stocks vary with different marketing policies. Thus, elevators utilizing storage space have larger insurance premiums than elevators that market grain freely. Moreover, insurance costs vary between elevators because of differences in the completeness of insurance, differences in hazards, and in kinds of policies.

Interest

Interest is one of the principal elevator costs in the spring wheat region where the consignment method of sale prevails. The average outlay in 1922-23 was \$916 per elevator. Differences in the methods of financing, methods of marketing, and value of grain, however, cause great variation in the unit cost of interest. Variations for the 6 elevators in the 135,000 to 145,000 bushel group were 0.2 to 2.6 cents per bushel, and for the 5 elevators in the 175,000 to 200,000 bushel group 0.3 to 0.7 cent per bushel. Attention should again be called to the fact that interest here includes payment for use of borrowed capital.

Direct Sideline Cost

Direct sideline costs include the money outlay for drayage and freight. Available information prevents the distribution of any costs of management, building, equipment, labor, taxes, or insurance to sidelines. Moreover, the smallness of the expense, only \$37 per elevator in 1922-23, indicates that much of the drayage and freight expenses must have been carried direct to the merchandise account. Variations in this expense therefore have little significance.

Miscellaneous

The cost of car liners, miscellaneous supplies, and the like that could not be included in any other items of the expense classification comprise the miscellaneous expense. The average miscellaneous cost in 1922-23 was \$156 per elevator, or one-tenth cent per bushel. Variations in this cost between elevators are, in such large measure, due to the imperfect classification of expenses, that no further analysis will be undertaken.

Another important cause of variation in costs, especially between elevators in different territory, is difference in types of grain handled, or

proportion of different types of grain. Wheat costs, for example, are higher than oat costs and flax costs, higher than wheat.

Two things must be said about these variations in the several cost items. One is that some are high because others are low and vice versa. For example, a high equipment cost may mean a lower extra labor cost. However, there will be for any elevator a particular combination of labor and equipment that gives lowest unit costs—a combination with not too much equipment and not too much labor. There will be a similar least-cost combination of management and labor costs, of management and office costs, of power and labor costs, etc. The other thing is that some of the cost differences, as already indicated in the case of interest, represent differences in quality of service, or, as in the case of storing and sideline service, differences in quantity of service. High salaries for management may be justified by the success of the elevator; high office costs may be justified by the better records and accounts that are kept; and higher costs of handling grain by storing may be justified by the greater convenience and economy of having grain stored at an elevator than on the farm.

The analysis of cost variations therefore resolves itself into two phases, one, that of variations in utilization of cost elements, and the other, that of variations in cost rates. Thus it is found that some elevators have high labor costs because too much labor is employed or poorly utilized, and others because too high wages are paid. Building costs similarly vary, either because of differences in size of buildings or turn-over, or because of differences in type of construction involving different annual costs per cubic foot of bin space. All costs can thus be separated into two functions, one, the physical units of input, and the other, the cost rate per unit of input.

Table III shows by separate items the costs of groups of elevators in separate years from 1918 to 1923. Only part of the elevators in these groups are the same from year to year, but the data are consistent enough to indicate that the sample each year is nearly adequate.

There are two principal causes of variations in total costs: one, variations in volume of business, depending upon the size of crop, and the other, variations in the prices of cost elements. Volume fell from 146,570 bushels in 1918-19 to 78,490 bushels in 1919-20, and costs per bushel rose from 4.13 cents to 9.01 cents. Part of this rise in bushel costs was due to rise in prices of supplies, wages and salaries, interest and insurance, etc., since even with the lower volume of business, the average operating expenses were \$1021 higher in 1919-20 than in 1918-19. Higher prices of grain from 1918 to 1920 made interest and insurance costs higher in those years.

TABLE III
OPERATING EXPENSES OF SAMPLE GROUPS OF FARMERS' ELEVATORS BY YEARS, 1917-23

Element of expense	Average per elevator						All years
	1917-18 (12)*	1918-19 (31)	1919-20 (32)	1920-21 (46)	1921-22 (36)	1922-23 (111)	
Building and equipment.....	\$633	\$848	\$868	\$792	\$702	\$917	\$798
Management	1,498	1,770	1,871	2,279	1,987	2,151	1,926
General office	554	696	868	704	860	1,015	783
Extra labor	420	416	649	573	444	616	519
Power, light, and heat.....	249	297	346	396	308	367	327
Taxes	215	142	253	268	291	210	230
Insurance	514	544	717	553	340	445	519
Interest	625	1,004	1,228	1,119	815	916	951
Direct sideline	25	78	46	29	33	37	41
Miscellaneous	217	257	230	268	121	156	208
Total	4,980	6,052	7,076	6,981	5,901	6,830	6,302
Average bu. per elevator.....	89,820	146,570	78,490	94,520	90,770	145,810	.....
Cost per bu.	5.54	4.13	9.01	7.38	6.50	4.68	6.01

* Number of elevators in the group.

Beginning with 1920-21, elevators began to reduce costs; in 1921-22 the reduction is particularly apparent. The smaller margins and in some cases the financial reverses that accompanied the falling prices of the previous year made this change necessary. The larger volume of 1922-23 raised total costs again, but resulted in low unit costs. The years 1918-19 and 1922-23 are interesting to compare. With the same volume of business, the bushel costs are over one-half cent higher in the latter year. This is principally because management, general office, wages of extra labor, and power and light are apparently not back even to the level of 1918-19 in the country elevator business. This is made clearer by Table IV which gives the bushel costs. Interest, taxes, and insurance are lower because of lower values for grain and account for

TABLE IV
OPERATING EXPENSES OF FARMERS' ELEVATORS BY YEARS

Element of expense	Cents per bushel						Average
	1917-18 (12)*	1918-19 (31)	1919-20 (32)	1920-21 (46)	1921-22 (36)	1922-23 (111)	
Building and equipment.....	.74	.58	1.11	.84	.77	.63	.78
Management	1.67	1.21	2.78	2.41	2.19	1.48	1.95
General office .....	.62	.47	1.11	.74	.90	.70	.75
Extra labor .....	.47	.28	.83	.61	.49	.42	.52
Power, light, and heat.....	.28	.20	.44	.42	.34	.25	.32
Taxes .....	.24	.10	.44	.28	.32	.14	.25
Insurance .....	.57	.37	.91	.59	.37	.31	.52
Interest .....	.70	.68	1.56	1.18	.89	.63	1.14
Direct sideline .....	.03	.05	.06	.03	.04	.03	.04
Miscellaneous .....	.24	.18	.29	.28	.13	.11	.21
Total	5.54	4.13	9.01	7.38	6.50	4.68	6.01

* Number of elevators in the group.

approximately one half of the reduction since the peak of costs was reached. Miscellaneous and direct sideline costs have been pared considerably. Thus altho there have been appreciable reductions since the

flourishing years of 1918 to 1920, when money was spent rather freely because margins were large, the reduction process is by no means completed.

HEDGING

A hedge is a sale or purchase of a "future" against a purchase or sale of grain to avoid possible loss from price fluctuations. It may be completed with one or two pairs of transactions, depending on circumstances. If purchased grain is to be stored until a future delivery month, as for example, No. 1 Northern wheat purchased on January 20 and stored until May, a future may be sold when the grain is purchased and the actual grain or its equivalent in quantity and grade may be delivered from a public terminal elevator on the future contract. The completed transaction is then as follows: (1) January 20, purchase of 1000 bushels No. 1 Northern wheat at \$1.85 per bushel (less freight and margins for operating local elevator); (2) January 20, sale of 1000 bushels May futures at \$1.90; (3) May 1, delivery of wheat on future contract at \$1.90. Gross profit is 5 cents per bushel, as pay for storing.

On the other hand, the manager may wish, as is more generally the case, to sell the grain before the month for which the future is sold. If the grain is shipped out as rapidly as carlot quantities are accumulated and sold when it reaches the terminal market, then a future is purchased when the grain is sold. In this case, there are two pairs of transactions as follows in the order indicated:

Purchases		Sales	
January 10, (1)	1000 bu. No. 1 Nor. \$1.85	(2)	1000 bu. May future \$1.90
January 20, (4)	1000 bu. May future 1.85	(3)	1000 bu. No. 1 Nor. 1.80
Total.....			
		\$3.70	\$3.70

If grain is held longer than May 1, a May future is purchased and a July future is sold to continue the hedge. Subsequently, a July future will be purchased when the grain is finally sold. In this way futures may be purchased and sold several times before the grain is sold.

When an elevator hedges, it is therefore following the same practice as the manufacturer who contracts for raw materials to make the products that he has agreed to sell, or the construction company that contracts for materials and labor to construct the building that it has contracted to build. The elevator has the advantage of a well-organized market in which it can quickly buy and sell its contracts. However, the elevator, manufacturer, and construction company are each trying to protect their buying or selling margins against the loss from price fluctuations. In the first elevator-hedging illustration, the elevator was certain of its buying margin and an additional 5 cents for grain storage

when it sold the future. In the second illustration the elevator lost 5 cents on the cash grain and gained 5 cents on the future because of the lower price when the grain was sold. This situation, it should be pointed out, would have been reversed if the price had advanced. The elevator would then have lost on the future what it would have gained on the sale of the grain, providing the cash and future prices move together as they should in a good market.

The practice of hedging varies widely between elevators. Six out of 30 independent elevators and 13 out of 47 representative Minnesota farmer elevators interviewed on this subject in 1923 were not hedging. Some of those that were hedging did not follow the practice consistently. The extent and methods of hedging among elevators is affected by several factors as follows:

1. **Market conditions.**—Many elevator managers adopt a policy of hedging consistently when prices are falling or erratic, and of ceasing to hedge when prices are advancing or stable. In this way, profits that would otherwise be foregone are realized from rising prices and the expense of one fourth of one cent per bushel for hedging is avoided. On the other hand, the risk of loss from price recessions cannot thus be entirely eliminated. Some managers may thus be able to increase their earnings, particularly if they are cautious and accept the advice of a conservative commission firm, or if they watch the price trends closely. However, the visualizing of price changes from the memory of day-to-day prices, the only information which most managers have, is an unreliable basis for avoiding falling markets. Moreover, once a consistent hedging policy is abandoned, there is always the temptation to take chances in the hope of realizing speculative gains, and once losses have been incurred, the added temptation to speculate in futures to recover these losses.

2. **Method of sale.**—Elevators that sell grain "on track" or "to arrive" hedge less than elevators that sell "on consignment" because the hazards of price fluctuations during the period of transportation are eliminated. However, elevators should hedge less only if the grain is sold "on track" or "to arrive" as soon as it is bought, otherwise, there is no protection against price losses while the grain is stored in the elevator. Available data do not allow us to determine the consistency and extent of hedging by individual elevators, but the proportion of elevators reporting hedging on all grains is just as high in the corn and oat sections of southwestern Minnesota, where relatively a larger part of the grain is sold "on track" and "to arrive," as in the

spring wheat sections where consignment sale is more important.⁴ This may be due to the fact that not long since these elevators handled a great quantity of wheat, rye, and flax on a consignment basis and have simply kept on with their old methods.

3. **Attitude of manager and directors.**—Occasionally grain is not hedged because of the mistaken belief of the manager, or more often the board of directors, that hedging is speculating. There are not many such managements left, however, so it is probably a minor reason.

4. **Negligence of manager.**—Poor records or failure to consult records, or erroneous instructions to the broker, such as to buy futures instead of to sell them, not uncommonly result in elevators being overbought or over-sold. Specific cases could be cited where this amounts to several thousand bushels when the manager thought he was completely protected from the risks of price changes. Occasionally, the wrong future is bought or sold, because the manager forgets in which future he is hedging, or because he does not realize that he is responsible to deliver or accept grain on a future until he has bought or sold the same future. There are, therefore, unexpected profits and losses from price changes in such instances, and occasional costs of audits to determine the long and short position of the business. To prevent such mistakes all that is needed is a simple accounting system and an understanding of the elements of future trading.

5. **Dealing in futures for others.**—Local elevators do not generally act as brokers for individuals in the community who want to speculate, since there is no advantage except the possible creation of a little good will. Of 63 elevators interviewed on this question, only 7 stated that they bought or sold futures for others. There are two objections to this practice: For the elevator there is a great deal of trouble in keeping its customers properly margined; and this is true whether the trades are handled in the name of the elevator or in the customer's name. In the latter instance commission dealers through whom such orders are usually placed will handle accounts only on the assurance from the elevator manager that the accounts are good. The manager is, therefore, under moral obligation to supervise the accounts. Nevertheless, there are occasional unavoidable losses from such business, for which there is no compensation. From the market standpoint such dealing is undesirable because it encourages those who have no intelligent basis for forecasting prices to buy and sell futures. This tends to make the market less stable as they are likely to buy too

⁴ The Report of the Federal Trade Commission on Grain Marketing, Vol. I, p. 214, states that a larger proportion of elevators selling "on track" and "to arrive" do not hedge. This conclusion, however, is based on elevators from the entire grain-producing area and therefore includes a large proportion of elevators in the older corn and oat belt sections of Iowa, Illinois, Missouri, etc.

heavily when prices are rising and when prices begin to fall, become panic stricken and sell too rapidly.

Futures are occasionally sold for producers against a growing crop, or against grain that is harvested. This is a valuable service, since it gives producers greater latitude in selecting the time to sell. For example, in August and September, 1923, many corn producers sold their maturing crops for December delivery and thereby secured a higher net price. Grain in the farm granary that cannot be marketed because of the pressure of farm work, conditions of the roads, or other causes is sometimes sold in the same manner. There are no serious disadvantages in handling such hedging transactions providing adequate margins are maintained to cover losses from fluctuations in future prices—however, ill-feeling may be caused if inadequately margined sales are closed out. On the other hand, the producer is almost certain to give the elevator that handles the hedge preference in selling his grain, and at the same time there is extended to the producer the same opportunity in determining when to sell that every other grain marketing interest has.

6. Volume of grain handled.—Elevators buy in wagonload quantities of 50 to 100 bushels, and sell in carlot quantities of 1000 to 2000 bushels.⁵ Futures are bought and sold in round lots of 1000 bushels. Complete protection of all grain at any given time is, therefore, impossible. However, the fortuitous gains and losses from this source are not large, providing grain is handled in relatively large and continuous volume, and providing only long and short balances of 500 bushels and over are hedged. Under such a policy the gains and losses from over-hedging would probably offset the losses and gains from under-hedging for the season if there were no prolonged price movements. If prices should advance steadily, as during the heavy movement of grain in 1924-25, a small net profit would probably result by hedging all over-sold balances of less than 1000 bushels and not hedging all over-bought balances of less than 1000 bushels. In time of falling prices the reverse of this policy could be followed with profit.

A more important element of loss from this situation is the marketing of grain that is received in small quantity and for which a considerable period of time is required to accumulate 1000 bushels. Flax was an important cause of such losses until the Minneapolis Chamber of Commerce and the Duluth Board of Trade recently provided that flax may be sold "to arrive" in 50 bushel lots, which in time are assembled into 1000 bushel lots by buyers as a basis for future trading. The futures of other grains are still traded in 1000 bushel lots. The diffi-

⁵ The average number of bushels of each grain in a straight carload received at Minneapolis in 1922-23, as determined from records of three representative commission firms, was as follows: flax, 1141; wheat, 1326; durum, 1361; rye, 1451; barley, 1605; oats, 2216; corn, 1425.

culty of following any systematic policy of avoiding risks on these grains with the incomplete long and short records that are kept induces most buyers to stop hedging when receipts are light. Other elevator buyers adopt a policy of hedging small purchases of grain only when the price is falling and then hedging when the accumulating of the carlot begins. Others are even more conservative and sell the future when one half of a carload is assembled. Either of the last two methods can be easily followed if a daily long and short account is kept. Losses incurred this way sometimes determine the difference between profit and loss for the whole season's business.

7. **Variations in the relation of cash and future prices.**—Thus far our discussion of hedging has been illustrated as giving complete protection against price change. This has been on the assumption that the relation of cash and future prices is constant. However, cash and future prices do not always change in unison, at the same rate, or in the same direction, with the result that there may be some unavoidable gains and losses from price fluctuations.

These variations in the relation of cash and future prices create two sets of problems: one, the chance gains and losses from short-time variations; the other, the unavoidable gains and losses from long-time variations, which offset the trading profits on grain that is stored. It should be pointed out that both the long-time and the short-time variations are principally due to changes in fundamental market conditions of demand and supply. Thus an actual or threatened shortage of wheat on account of freight congestion may have a greater influence on the cash price than the future price, since wheat may be needed to keep mills operating, ships moving, and the like, whereas the future price is more largely dependent upon prospective future supply and demand. The relation of cash and future prices of the same quality grain may therefore vary from day to day.

This is illustrated in Figure 3, which gives the deviations of the weekly high-and-low price quotations of No. 1 Northern wheat from the prevailing wheat future for 1923-24 for one day each week. No. 1 Northern prices are selected for this illustration because this is the contract grade at Minneapolis. To what extent gains and losses occur depends largely on the volume and rate of marketing. On individual carlots, the gain or loss may be considerable. For example, a carload of low quality No. 1 Northern wheat purchased, shipped, and hedged on October 10, 1923, and sold two weeks later on October 24, would show the following transactions with a net hedging gain of one cent per bushel:⁹

⁹ The high-and-low closing price quotations prepared by the Closing Price Committee of the Minneapolis Chamber of Commerce is used (1) because the official future quotation is a closing quotation, and (2) the closing cash quotation is based on the same quality of grain from day to day, altho frequently a nominal quotation, it permits a more accurate comparison with future prices than a sample or weighted average of cash prices.

Purchases		Sales	
October 10, (1) Wheat	\$1.17 $\frac{3}{8}$	(2) December future..	\$1.18 $\frac{3}{8}$
October 24, (4) December future..	1.14 $\frac{5}{8}$	(3) Wheat	1.14 $\frac{5}{8}$
<hr/>		<hr/>	
Total.....	\$2.32		\$2.33
Net gain, 1 cent per bushel			

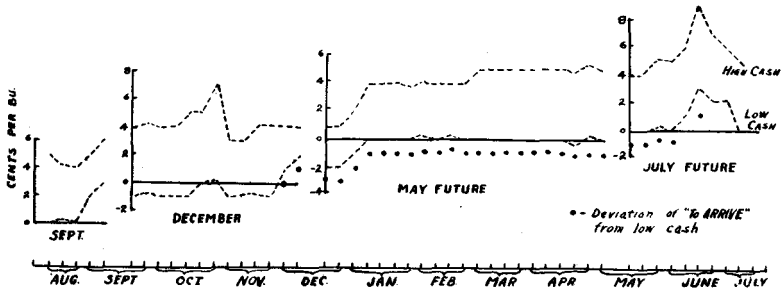


Fig. 3. Deviation of High and Low Cash Prices of Ordinary Quality No. 1 Northern Wheat from Prevailing Future, at Minneapolis, 1923-24

The base for each succeeding prevailing future is higher than the previous future because the deviation of the new future from the old future was determined when the transition from the one future to the other was made. The curves in Fig. 2 and subsequent figures of this section therefore do not indicate price movements of wheat. They merely indicate the trend of the relationship of cash prices to future prices.

A purchase similarly made on October 24 and sold two weeks later on November 7 would realize a net hedging loss of one cent per bushel, because the premiums on cash wheat had declined (that is, the cash price had declined relative to the future price).

If the elevator had been shipping out and selling grain that was stored for farmers, the transactions would have taken place in the order indicated and the results would have been as follows:

Purchases		Sales	
October 10, (2) December future..	\$1.18 $\frac{3}{8}$	(1) Stored grain.....	\$1.17 $\frac{3}{8}$
October 24, (3) Storage ticket.....	1.14 $\frac{5}{8}$	(4) December future..	1.14 $\frac{5}{8}$
<hr/>		<hr/>	
Total.....	\$2.33		\$2.32

The net loss on this set of transactions is one cent per bushel. Hedging gains and losses on cash purchases, therefore, tend to be offset by hedging losses and gains on stored grain that is shipped and sold. Obviously, they do not offset each other completely because the purchase and sale of cash receipts, and the sale and purchase of stored grain, do not occur simultaneously and in the same volume.

A typical elevator does not market a few isolated carloads of grain. It is receiving and shipping a large volume of grain continuously during its busy season. This means that since the spread between cash and future prices is alternately rising and falling, the hedging gains and losses on either the cash purchases or the overshipments of stored grain tend to cancel out. For example, an elevator which in 1923-24 bought a carload of low quality No. 1 Northern wheat weekly, on the basis of the closing cash quotation, and immediately shipped it, and sold it in Minneapolis two weeks later, would have had complete protection for the entire year, with the exception of the periods when the shifts were being made in the prevailing options, because the gains and losses would have completely offset each other. During the transition period from the old to the new option, the rising premiums were advantageous in hedging purchased receipts, but created losses on sales of stored grain. Sometimes the reverse of this situation exists (see Fig. 4).

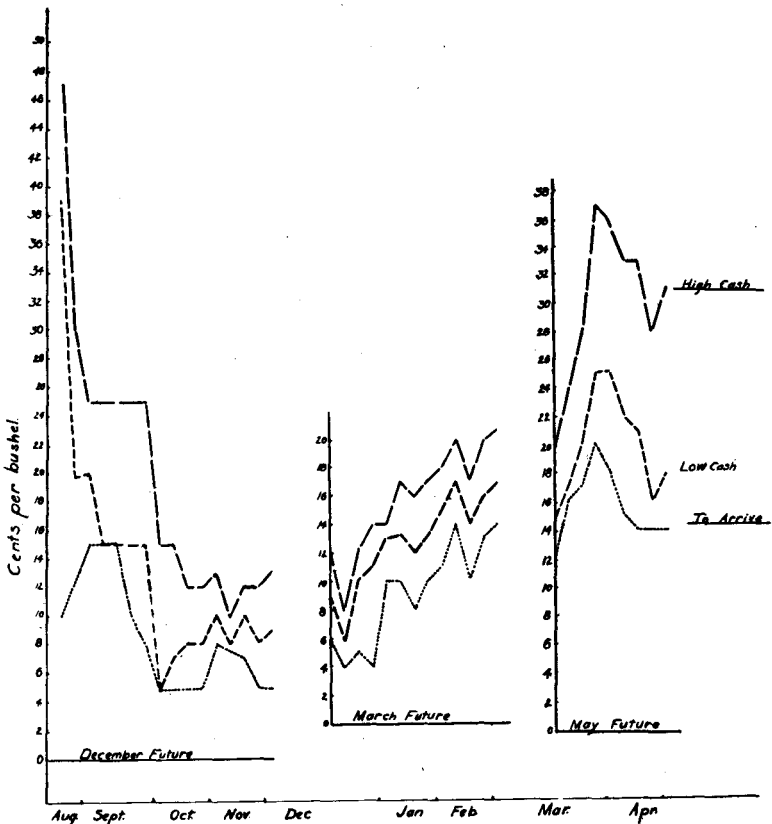


Fig. 4. Deviation of High and Low Cash and To Arrive Prices of No. 1 Dark Northern Wheat from Prevailing Future at Minneapolis, 1920-21

The amount of the hedging gains, it should be noted, are also dependent upon the basis of purchase. The "to arrive" prices generally deviate less sharply during periods of changing premiums, than "spot" prices. Figure 3 does not show this as clearly as Figure 4. However, if purchases had been made on December 5 or June 18 on the basis of "to arrive" instead of "spot" prices, more complete hedging protection would have been realized.⁷

The completeness of hedging protection also varies from year to year and from season to season. Figures 4, 5, 6, and 7 show this strikingly for the principal grade of Hard Red Spring Wheat. Figures 5 and 6, for example, show small deviations between the cash and future prices. If the long-time deviations which allow a premium for storing are eliminated, no change in the deviations for any two-week period is more than 2 cents during the two years 1910-11 and 1911-12, and most of them are a fraction of a cent per bushel.

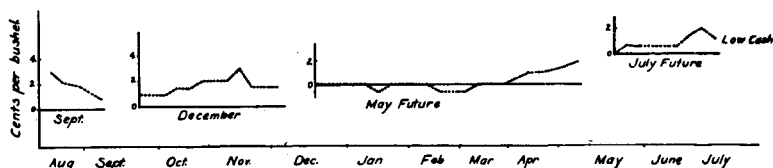


Fig. 5. Deviation of Cash Price of No. 1 Northern Wheat from Prevailing Future at Minneapolis, 1910-11

A single price was frequently quoted, so only the low price is given.

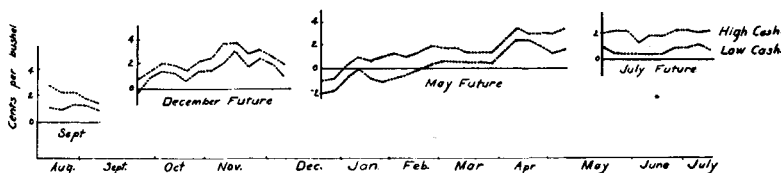


Fig. 6. Deviation of High and Low Price of No. 1 Northern Wheat from Prevailing Future at Minneapolis, 1911-12

Unsettled market conditions or changed milling demand for wheat, or both, have wrought some changes in the relation in recent years. Figure 4 shows the results when both factors were operating in 1920-21—the larger changes in the premiums made the protection from hedging less certain. The accompanying gains and losses, as previously pointed out, were minimized when buying was done on the basis of "to arrive" prices.

⁷ Figure 3 shows the deviations of the "to arrive" from the future price only when it differs from the low cash quotation. The "to arrive" is sometimes quoted as a range, but so often only a single price is quoted, which is the low, that only the low quotation of "to arrive" prices can be used in this study.

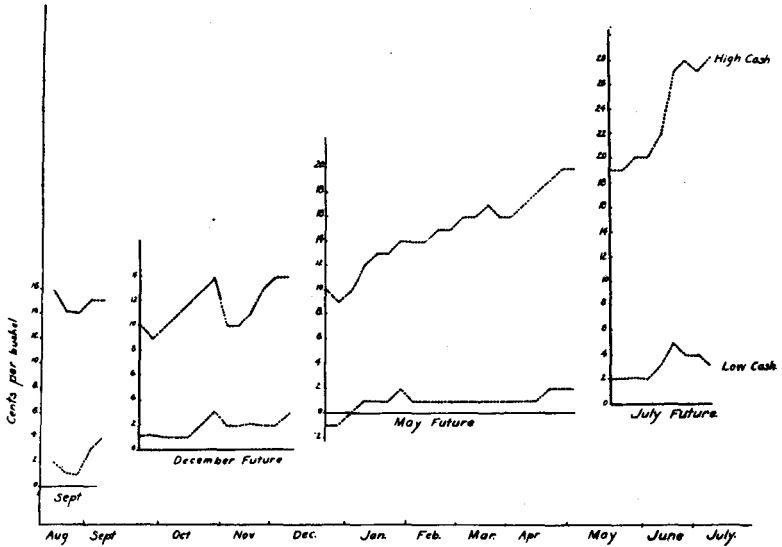


Fig. 7. Deviation of High and Low Cash Prices of No. 1 Dark Northern Wheat from Prevailing Future at Minneapolis, 1923-24

Cash and future prices of wheat that has no unusual milling demand are approaching the relations that existed in 1910-12, as markets become more stabilized and as hedging protection is becoming correspondingly more certain. Figures 3 and 7 show this for ordinary quality No. 1 Northern and for the low quality No. 1 Dark Northern, respectively. The premiums of choice milling wheat in the upper limits of the grades of the Dark Northern and Northern subclasses, are irregular. The fluctuation of the high quotation of No. 1 Dark Northern as given in Figure 7 is a rather common occurrence in recent years. Figure 8 shows the same condition for No. 3 Dark Northern. These figures show that the premiums on the high quality grain tend to deviate from the future more often than the price of ordinary and poor milling wheats, and that they deviate farther. The tendency for these premiums to advance during the heavy movement from the local market is advantageous to the elevators that are buying or have bought wheat, but it is equally disadvantageous to those that have sold and hedged grain for which storage tickets have been issued, since the grain must be bought from the storage ticket holder at a higher price relative to the future in which it was hedged.

The problem of hedging Durum is very similar to that of hedging Hard Red Spring wheats. The wide variation in the quality of Durum wheat within a grade and the milling demand for choice lots cause wide fluctuations in the premiums of the best qualities, similar to those in the premiums of Hard Red Spring varieties. Corn, oats,

and rye, on the other hand, have a better hedging market. It should be noted in Figure 9 that the relation of cash and future prices of oats was not disturbed by the unsettled market conditions of 1920-21 as it was for most of the principal grains. Figure 10 also shows an oat hedging market in which most of the changes in premiums are one cent or less. Rye premiums were very unreliable in 1920-21; but since 1922-23 (see Figure 11) the rye market has been the best grain market in which to hedge at Minneapolis.

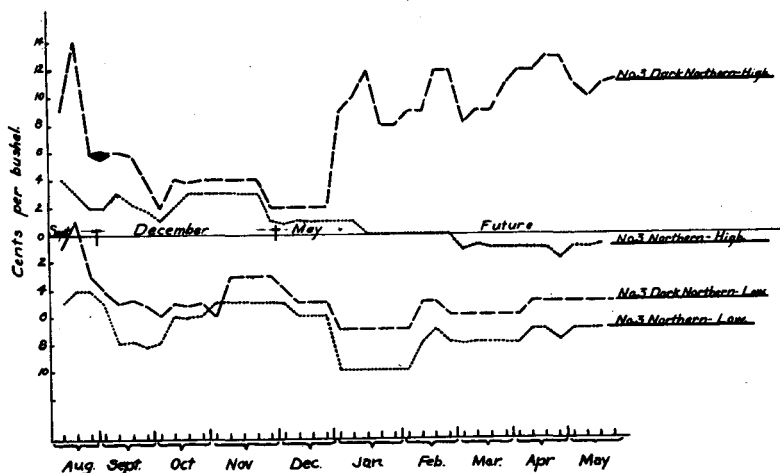


Fig. 8. Deviation of High and Low Cash Prices of No. 3 Dark Northern and No. 3 Northern Wheat from Prevailing Future at Minneapolis, 1922-23

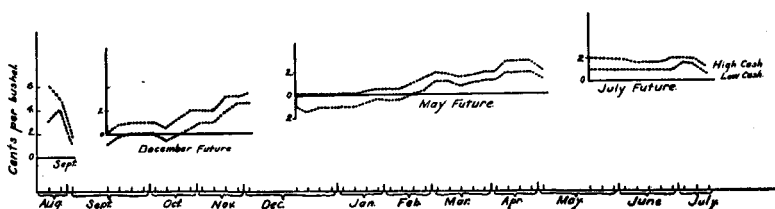


Fig. 9. Deviation of High and Low Cash Prices of No. 2 White Oats from Prevailing Future at Minneapolis, 1920-21

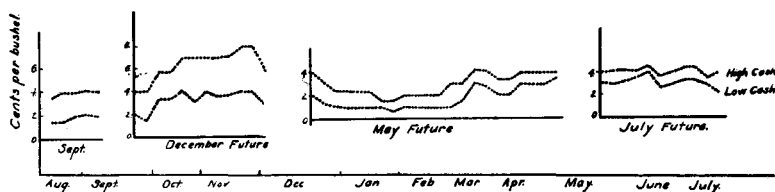


Fig. 10. Deviation of High and Low Cash Prices of No. 2 White Oats from Prevailing Future at Minneapolis, 1922-23

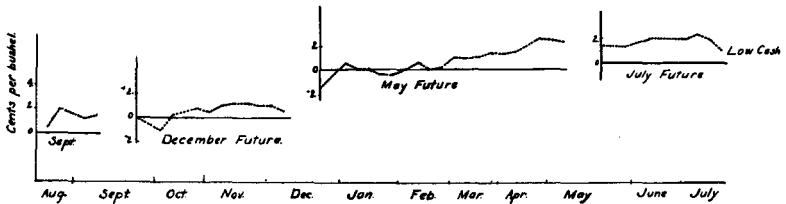


Fig. 11. Deviation of Cash Price of No. 2 Rye from Prevailing Future at Minneapolis, 1922-23

Owing to the frequent inactivity of the Minneapolis corn futures market, corn purchases and sales are usually hedged at Chicago or some other active corn futures market, even tho the grain is shipped to Minneapolis or Duluth. Some gain or loss may therefore result from prices at the two markets getting out of line. Nevertheless, commission dealers and elevator operators are agreed that this is a satisfactory hedging arrangement. Durum wheat is likewise hedged at Duluth, altho sold at any other market, because there is trading in Durum futures only at that market. Flax is difficult to hedge on account of the very small volume of future trading and the consequent fluctuation in premiums. Protection from hedging barley is likewise uncertain. Barley has this advantage over flax, namely that it can be hedged by the purchase or sale of oats or corn futures whenever the "spot" prices of the two grains maintain an approximately constant relation to each other. However, if such hedging is done the market must be watched closely to avoid losses from sudden changes in the price relation of the two grains.

The certainty of protection against loss from price changes by hedging, therefore, depends largely upon the extent of hedging and the way hedging is done. Some gains and losses from hedging small purchases or from changes in the relation of cash and future prices are, of course, unavoidable. It has been pointed out that the uncertainty arising from hedging is controlled in considerable measure by the basis of purchase, by the future in which the hedging is done, by the time selected to sell, and by the time when the hedge is transferred to a deferred future. Hedging is thus so inextricably tied up with the buying and selling policy that it is impossible definitely to determine its importance to the success or failure of elevator operation. For example, an elevator that hedges consistently may fail because its buying policy is bad. Most successful elevators, nevertheless, do hedge and many unsuccessful ones do not.

After considering all the facts here presented, the authors believe that hedging is a desirable policy where elevators are buying for cash. Selling "on track" or "to arrive" offers better protection, but unless

grain is sold as soon as it is bought, the protection is not complete. Moreover, selling this way, any premiums that the grain would bring on a sample market are lost, which makes this method of sale undesirable for the principal grains of the spring wheat area. Some uncertainty of realizing hedging gains and losses would exist, but it would be less than the uncertainty of gains and losses from fluctuations in cash prices.

The authors also believe that much better protection for the buying margin could be secured by many elevators now hedging if the following rules were observed: (1) keep complete and up-to-date records of purchases and sales of grain and futures; (2) hedge consistently, promptly, and completely; (3) study the market closely to determine in what future to hedge, when to transfer hedges, and the like, or accept the advice of a reliable commission merchant on such matters. A few elevators buying grain for an outlet where the price is reasonably assured may find hedging unnecessary to success. Others may believe that their information is sufficiently complete and management sufficiently experienced to warrant exceptions to the rules. Still others with large resources may prefer to bear the hazards and not shift them by hedging. But these exceptions should not include many elevators. The buyer for a typical Minnesota elevator does not have information and experience that warrants the board of directors in permitting him to hedge or not hedge as he pleases. Moreover, the stockholders' contribution in capital is so small in most cases that an adverse turn of the market is likely to wipe out the stockholders' equity and cause financial embarrassment, if not insolvency, if the risk of loss from price fluctuations is not avoided by hedging.

STORING FOR FARMERS

The practice of storing grain for producers is followed by a majority of Minnesota elevators. Of 85 elevators reporting, only 20 did not store at all; 57 stored any kind of grain offered; and 8 stored only the principal kinds of grain offered. The proportion of each grain stored depends primarily upon its relative importance to other grains. Sometimes an elevator discourages the storing of grain that is marketed in small quantity. More often a farmer plans to sell these grains at time of delivery and to store only the principal grains on which the success of his farm enterprise chiefly depends. Thus, in the northwestern section of Minnesota, wheat and rye are the chief grains stored; in the southwestern section only corn and oats are stored in large quantities; whereas in the southeastern section, where cash grain crops are relatively unimportant, storing for others is a negligible part of the elevator business.

Audits of 76 elevators located in the spring wheat areas of Minnesota, North and South Dakota, and Montana and known to have stored grain for others in 1922-23 show that there is also a wide variation in the relative importance of storing in communities with similar farming practice. Differences in the customs of farmers in providing and using farm storage; differences in local market conditions, such as credit situation, condition of the roads, weather conditions at harvest time, and the like; and differences in the policy of buyers are the principal factors causing variation.

There are five methods of disposing of grain stored for others, as follows: (1) putting it in special bins reserved for stored grain; (2) holding an equivalent in the general stocks of the elevator; (3) shipping the grain, selling it, and then hedging it; (4) storing the grain at terminal elevators; and (5) shipping grain and selling without hedging.

1. Putting stored grain in reserved bins.—This method has the advantage of keeping the stored grain from purchased grain, thereby enabling the manager to obtain a better check on grades, weights, and dockage, and therefore to calculate the trading profit on the purchased grain at any time. Moreover, since the warehouse receipts, as a group, are at all times fully secured by the grain against which they were issued, losses from miscalculations that may arise from handling both purchased and stored grain are less likely than from mingling the two kinds of grain or from selling and hedging, the two principal methods.

This method of handling stored grain, on the other hand, results in unused bin space, particularly when handling grains that are stored in small quantity. It is much more economical of space to handle grains stored in large quantity in this manner, altho the utilization of capacity is lower than when storing purchased grain, because all producers do not store and surrender storage tickets at the same time. For these reasons, few elevators practice special binning. Of 85 elevators that were visited in this study, only 9 were thus handling stored grain and 2 of them special binned the grain only occasionally as, for example, when they could secure a full bin of grain of the same grade.

2. Holding an equivalent amount of same grade of grain in general stocks of elevators.—This method, like special binning, provides good security for storage tickets. It has the additional advantage of giving better utilization of elevator capacity. Neither method, however, provides for all grain that is stored for others since most of the storing is done during the heavy fall marketing season when the elevator is unable to hold all the grain.

Data obtained from over 600 representative line elevator stations in the Minneapolis-Duluth market area for 1922-23 show that 15.4 per cent of the total annual wheat receipts was stored by farmers in

October, 12.6 per cent in November, 10.2 per cent in December, 10 per cent in January, and 6.6 per cent in May. If the proportion of wheat receipts stored was the same for farmers' elevators, the average storage liability on wheat alone for the 111 elevators on which this study is based, was 14,420 bushels in October, 11,800 bushels in November, 9,550 bushels in December, 9,360 bushels in January, and 6,180 bushels in May.⁸ It is evident, when the storage liability of the other grains is combined with these figures, that the typical elevator with an average capacity of 20,000 to 30,000 bushels is frequently compelled to ship out part of its stored grain in order to provide bin room for its current receipts.

Figure 12 shows the average yearly variations in the proportion of stored wheat that was shipped out by 40 representative farmers' elevators in North Dakota on January 31 of each year from 1918-19 to 1923-24. The solid sections of the vertical bars represent the excess of receipts of stored wheat over stocks of wheat on hand. To what extent the elevators overshipped stored grain because of lack of bin room, available information does not indicate. Some individual elevators undoubtedly shipped freely in order to keep sufficient unused elevator capacity to handle the movement of grain from the farm. A close examination of Figure 12 shows, however, that it is largely a question of insufficient bin room. The season of 1919-20 when the production was small and prices were high and rising, is an exception. Because of falling prices, a large crop, and the advice of agricultural leaders to hold for three dollar a bushel wheat, storing facilities were overtaxed in 1920-21. On January 31, over 20 per cent of the annual receipts, or over 20,000 bushels per elevator, had been stored by farmers. In 1921-22 the shortage of grain cars kept the elevators filled to capacity and compelled farm rather than elevator storage on a larger scale because it was impossible to keep grain moving in large volume to the terminal market. During the two subsequent years, producers returned to their former practice of storing at the elevator. Figure 12 tends to substantiate the prevailing opinion among grain dealers that the practice is again becoming more important.

Figure 13 shows the relation of wheat stocks to storage liability by months for about 500 North Dakota elevators in 1922-23 and 1923-24. These two seasons stand out in contrast to each other in the method of handling stored grain. For example, the average amount of wheat and other grains marketed by these elevators was much larger in

⁸ There are no data available for proportion of grain stored by farmers' elevators and the rate of marketing. The prevailing opinion of line elevator operators and commission dealers is that there is little difference between the proportion of total receipts stored by farmer and line houses. If there is any important difference, probably the farmers' elevators store a larger proportion because the elevators are farmer owned and controlled.

1922-23 than in 1923-24 and the number of bushels stored for farmers was actually much larger in the former year than in the latter. Yet, the grain car shortage in the fall of 1922 held wheat back at local elevators causing an excess of stocks over storage tickets outstanding for every month, except September, from August to January, inclusive, whereas the reverse of this situation existed in the following year.

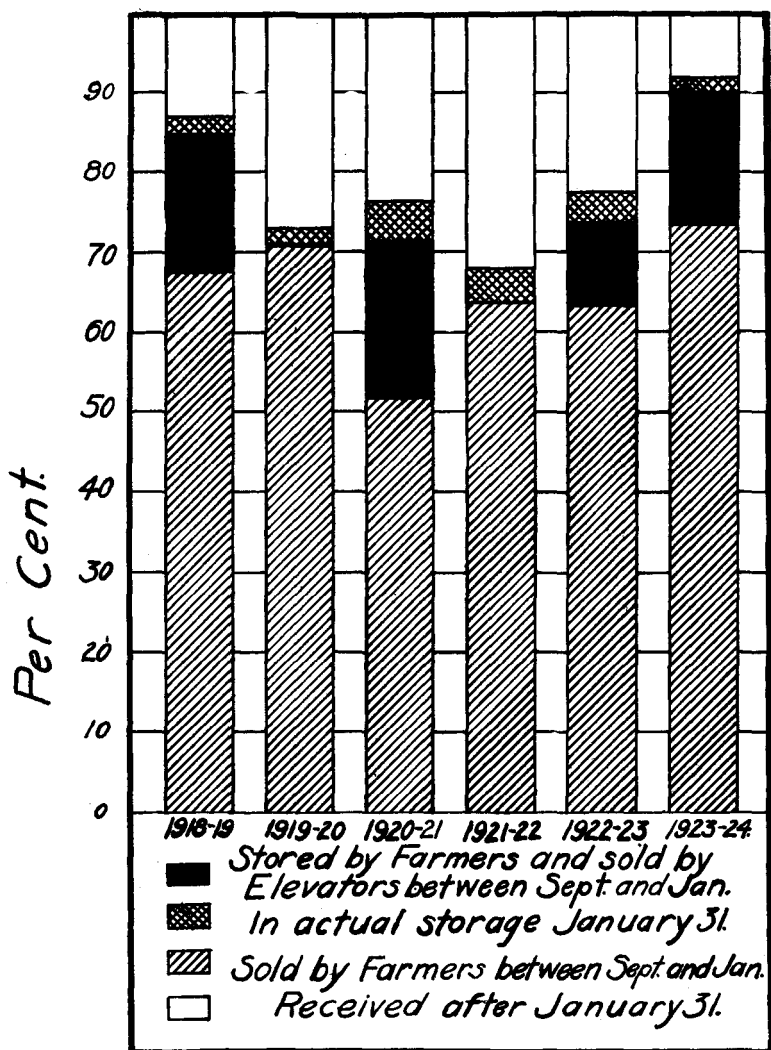


Fig. 12. Movement of Wheat to Market and Sales of Stored Grain between September and January for 40 Farmers' Elevators in North Dakota from 1918-19 to 1923-24

Fig. 12, 13, and 14 are based on data obtained by courtesy of J. N. Hagen, supervisor of grades, weights and measures, of North Dakota.

The movement to terminal markets was free and, in spite of the small volume marketed, the rate of marketing the crop, as indicated in Figure 12, was so rapid that wheat stocks were less than storage liability from August to December. Figure 13 also shows a common situation as regards the overshipment of stored grain during the spring and summer months of 1923. This results partly from the accumulation of storage liability, but chiefly from the shipping out of stocks of grain preparatory to handling the new crop. For this particular season the maximum excess of storage liability over stocks on hand occurred in May and the excess gradually declined, as the storage tickets were surrendered and as stocks of grain from the new crop were accumulated.

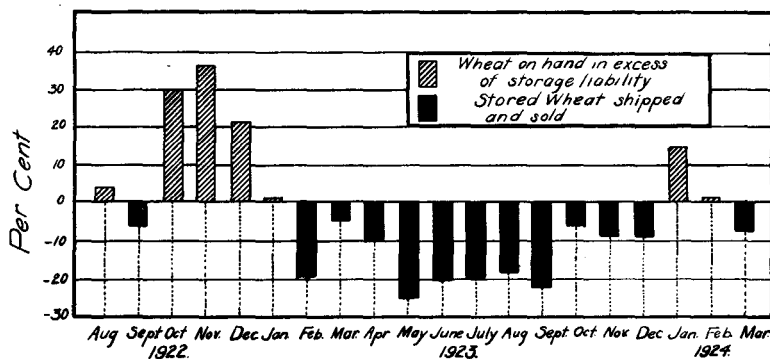


Fig. 13. The Relation of Stocks of Wheat on Hand to Storage Liability for 500 Farmers' Elevators in North Dakota, for 1922-23 and 1923-24

3. Shipping stored grain, and selling and hedging it.—This is the prevailing method of handling stored grain that is not kept in the local elevator. It is simple and convenient for elevators that are regularly hedging consigned grain; it is more convenient and less expensive than storing at terminal elevators; it enables the elevator to handle a larger volume of business; and it provides working capital from the proceeds of the sale of grain.

Hedging, on the other hand, is not always complete protection against loss from price fluctuations. It has been pointed out in a previous section how elevators may incur large losses on stored grain from the advancing premiums on choice milling qualities of Hard Red Spring and Durum wheats. The fluctuation in premiums for corn, oats, rye, and the ordinary quality milling wheats is not ordinarily sufficiently large to cause serious loss in hedging the stored grain that is sold. However, the fluctuation of 15, 20, or more cents per bushel in premiums of the milling wheats and the impracticability of forecasting the time and extent of fluctuations in order to adapt the buying

policy to market situations has resulted in heavy loss to many elevators, particularly elevators located in western North Dakota and Montana where choice milling wheats are produced in large quantity.

Objection is sometimes raised to selling stored grain on the ground that it is a violation of a trust relation between the owner of grain and the elevator and should, therefore, be prohibited. Frequent losses incurred by farmers who have stored grain in recent years are pointed to as evidence that public regulation is not adequate protection to storage ticket holders. Moreover, the large amount of cash realized from the sale of stored grain is thought to encourage unwise purchases of sidelines and the like. It should be pointed out that there are two possible methods of correcting these defects: (1) to provide closer supervision by the state and bonding the manager by the elevator for the proper use of the funds, (2) to require the proceeds from the sale of stored grain to be set aside in a trust fund just as the proceeds from livestock sales are now handled by livestock commission merchants. Some difficulty might be encountered in determining the amount that should be put in the trust fund on account of the mingling of stored and purchased grain. Closer public supervision would probably not prevent all loss because there are too many elevators to supervise; but either method would provide better safeguards than now exist and elevators could continue to accommodate farmers by storing their grain if it seemed advisable from the standpoint of elevator operation.

4. Storing grain accepted for storage at terminal elevators.—Several individual elevators that have been marketing choice milling wheats have experimented with storing in leased bins at Minneapolis in recent years in an effort to escape the losses from advancing premiums on stored grain that is sold. However, the results have not been entirely satisfactory. Elevators are thus able to offer better security for their warehouse receipts by maintaining stocks of grain equal to the storage liability, to escape the problem of handling the proceeds from the sale of stored grain, and to sell grain when the storage tickets are brought in. On the other hand, elevators cannot realize all the premiums that current market receipts command because buyers are prejudiced against deliveries from a terminal elevator, even tho the grain has been special binned, and some loss seems inevitable. Moreover, this method of handling stored grain is expensive. In order to be certain of sufficient capacity, bins must be contracted for in advance and they must be leased for a minimum period of 4 to 6 months to secure the best possible rates. The amount of space required must, therefore, be forecasted accurately if economical storage is realized.

Elevators have not been successful in forecasting their terminal storage requirements thus far, partly because of the wide variation in the practice of farmers in storing from year to year and partly because of the variations in storing from month to month. Table V giving the amount of grain stored for farmers by two representative elevators for a five-year period illustrates how difficult it is to determine the space to hold stored grain that cannot be accommodated at the local elevator. The size of the crop and the volume handled is an important factor affecting the amount stored, but it is not wholly reliable.

TABLE V

AMOUNT OF GRAIN STORED AT TWO LOCAL ELEVATORS BY FARMERS, FOR FIVE-YEAR PERIOD, 1918-19 TO 1922-23

Year	Elevator 130			Elevator 132		
	Bushels handled	Bushels stored	Per cent of total stored	Bushels handled	Bushels stored	Per cent of total stored
1918-19	42,227	2,913	6.9	131,168	73,885	56.3
1919-20	85,043	14,247	16.6	96,667	37,246	38.5
1920-21	79,092	43,598	55.1	100,987	78,748	78.0
1921-22	87,151	37,344	42.8	97,849	83,115	84.9
1922-23	216,575	143,749	66.4	116,866	108,077	92.4

Elevator 130, for example, marketed approximately the same quantity in 1919-20 and 1920-21, but stored only 14,247 bushels in 1919-20 and 43,590 bushels in 1920-21. Variation in the amount stored by Elevator 132 was even greater for the same years. An analysis of line elevator storing shows for the eight-year period 1915 to 1923 that 9.9 per cent of the total annual receipts were stored in September; 11.1 per cent, in October; 10.4 per cent, in November, 9.6 per cent, in December; 8.7 per cent, in January; 8.5 per cent, in February; 8.2 per cent, in March; 7.3 per cent, in April; 5.5 per cent, in May; 4.3 per cent, in June; and 3.9 per cent, in July. The seasonal variation differs from year to year. In 1920-21, stored grain represented 17.5 per cent of the annual receipts in April and 15.8 per cent, the previous October. In 1922-23 it was only 9.6 per cent in April and 15.4 per cent, in October. A big problem is therefore to predict, on the basis of sentiment among farmers, probable transportation conditions, size of crop, and the like, the maximum amount that farmers are likely to store at the elevator at any given time. Then, if all overshipments of stored grain are to be kept at terminal elevators, engage space for the difference between the maximum storing and the amount that can be stored in the local elevator. Some idle space would be unavoidable if the bin room is contracted for a longer period than a month, unless it is used to store purchased grain. In 1922-23, for example, 37 per cent of the space contracted to store maximum storings of farmers in October would be idle in April on a six-month contract. Storing grain

in public elevators is even less practical than special binning. It avoids excessive costs from idle space by special binning, but monthly rates per bushel are somewhat higher for this kind of storage service and the elevator loses a larger part, if not all, the premium that it wishes to save because it receives only minimum quality grain of any grade delivered to it on public warehouse receipts.

5. Shipping and selling grain without hedging.—This is the least common method of handling stored grain and the least desirable because of the hazards involved. Elevators with such a policy would have made large profits on stored grain in 1920 when prices were falling, but they would have taken disastrously large losses from advancing prices in 1924. Farmers' elevators cannot afford to incur such risks when there are such comparatively simple and inexpensive methods of shifting them as hedging.

An important feature of storing, which too many managers overlook or minimize, is the cost. Only a detailed cost analysis of the elevator business would give the cost of storing. Enough evidence is obtained in this study, however, to indicate that it is considerable. For example, in addition to the cost of space for storing grain, extra clerical work is necessary to make out and record storage tickets and to report monthly holdings of stored grain to the railroad and warehouse commission. A special storage license must also be secured at a cost of \$5 in addition to the license for doing business. A surety bond must be filed with the railroad and warehouse commission to cover the full amount of the storage liability. Insurance must also be carried if the grain is stored in the elevator and some shrinkage must be expected. The trouble and expense of conditioning may also be necessary. Maximum utilization of elevator capacity may not be realized if grain is special binned and even if an equivalent grade and quantity is held in the general stocks of the elevator storing may reduce the volume of grain that would otherwise be handled, or interfere with the merchandising of the purchased grain. If the grain is sold, the cost of hedging and possible loss of premiums is incurred, or if stored at terminal elevators, the cost of terminal elevator space must be included.

Some Minnesota elevators have reduced the cost of storing by filing a personal surety bond of members of the board of directors instead of the bond of a surety bonding company. The saving thus effected does not warrant the disadvantage to farmers in assuming personal responsibility for an elevator's storage liability, however. Several instances might be cited where individual farmers have lost heavily from this practice.

Underestimation of these costs by some managers results in an unhealthy competitive condition in which those who will not charge for storage service force all other elevators to the same unbusinesslike practice. The Minnesota law permits a maximum charge for receiving, insuring, handling, and storing 15 days, or part thereof, of one-half cent per bushel, and after the first 15 days one thirtieth of one cent per bushel per day.⁹ North Dakota, South Dakota, and Montana permit similar, altho not the same, charges. Yet, the miscellaneous gross trading profit, not more than 50 per cent of which was probably derived from handling and storing for the six years 1917-18 to 1922-23, averaged only seven tenths of one cent per bushel on all grain handled. Sixty-five elevators estimate an average storage period of two to four months. This means that the farmers' elevators, as a group, are failing to realize the major part of an important source of income. Moreover, by failing to charge for the full cost of service they are compelling farmers who store their grain at the farm to pay some of the cost of storing other farmers' grain at the elevator. This burden may be shifted to farmers who provide their own storage only indirectly through a somewhat lower price paid for the grain, but it is no less real on this account.

It is easily understood from the above discussion why most elevator operators prefer not to store grain for others. Yet, competition, desire for income, and convenience to farmers cause elevators to continue to render storing service. The slow progress that is made in improving the inefficiencies in handling stored grain, however, raises the question as to whether some changes in the present method of marketing grain should not be effected. Four modifications of the existing system are often suggested, namely, co-operative line elevator operation, pooling, handling grain on a service basis, and limiting amount of grain stored. Of these methods the operation of an elevator as a unit in a co-operative line system appears to be the most satisfactory from the standpoint of handling stored grain. By being able to consider stocks of grain in any elevator as security for storage tickets outstanding, a line elevator system can distribute its grain among different elevators in such a way as to maintain stocks on hand equal to the storage liability at all time, thus avoiding overshipping of stored grain and being able to store as much grain as the farmers offer. This is well illustrated by the results of commercial line elevator operation given in Figure 14. When this figure is compared with Figure 13 the advantage of the line elevator method of marketing is obvious. Line elevators had no overshipments of stored grain with the exception

⁹ Minnesota Laws, 1923, Sec. 5, ch. 114.

of the four summer months when elevator stocks were reduced in preparation for receiving the new crop, whereas the farmer elevator stocks were less than storage liability for a much longer time.

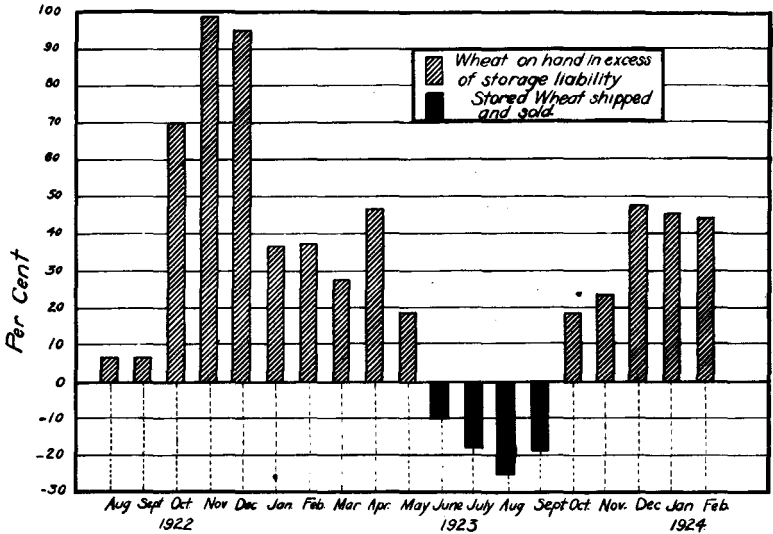


Fig. 14. The Relation of Stocks of Wheat on Hand to Storage Liability for about Twenty-five Commercial Line Companies in North Dakota, for 1922-23 and 1923-24

Pooling, on the other hand, only increases the amount of grain offered for storage, altho this depends somewhat on the pooling method. If the elevator controls the time of delivery, grain can be kept on farms for a longer period. But if the example of the wheat growers' associations should be followed in operating an annual pool to which the producer can deliver grain at any time he pleases, storing would become more difficult because grain would probably be marketed even more rapidly during the fall months than at the present time. The elevators would, therefore, be forced to sell and hedge much grain, or provide for terminal storage. Otherwise, the elevator would have little choice in selecting the time to sell. If the pooling is done by another organization, such as a wheat growers' association, which uses existing marketing facilities and which controls a large proportion of the grain, the volume of grain handled may be just as large as formerly, but a larger proportion must be handled on the basis of public warehouse receipts. Under these circumstances, the elevator will probably realize a smaller buying income because such organizations are more likely to call for delivery of grain and do their own selling than farmers. Experience of elevator buyers indicates, however, that it is easier to collect storage charges from a pooling organization than from farmers.

Handling grain on a service basis like a livestock shipping association markets livestock also increases the amount of grain stored since practically all grain would remain in the elevator more than 24 to 48 hours before shipment could be arranged. The greater relative importance of storage charges as a source of income would doubtless induce all managers to pay more attention to collecting charges and thus make it easier to obtain payment for the service; moreover, hedging, risk-taking, and overshipping of stored grain are automatically solved since buying for cash and overshipping of stored grain would cease. On the other hand, managers will doubtless discover that either their bin capacity is very poorly utilized by trying to market grain in this manner with a small number of bins or patrons will be much dissatisfied with the mixing of different quality grains that is otherwise necessary.

Limiting the grain stored to an amount that can be economically handled at the elevator is a practical solution of overshipments of grain; and entirely ceasing to accept grain for storage solves the whole problem. Either policy may be adopted by Minnesota elevators. An elevator is not compelled by law to store grain in Minnesota and if it does, it is not required to accept an amount in excess of 50 per cent of its capacity.

Whether elevators should generally limit the amount of grain presented for storage is a question that must be determined by each elevator. Independent and commercial line elevators can decide upon the basis of the effect on elevator business, but the farmers' elevators must take into consideration additional factors of convenience and cost to the farm enterprise and the value of greater freedom in choosing the time to sell. If the gains of these factors offset the losses and inconveniences of storing, then elevator storing is the proper policy. The relative values of these two factors which affect grain producers in their dual capacity as farmers and elevator owners, however, must be determined largely on the basis of producing and marketing conditions in each community. The amount of grain to be marketed per farm, nearness to local market, condition of roads, kinds of vehicles used for hauling, and length of marketing period as affected by the amount of other kinds of farm work and the lateness of harvest are important factors to be considered. Elevators marketing choice milling wheats, flax, and barley are undoubtedly wise to limit their stored grain to amounts that can be conveniently stored in the elevator, owing to the possibility of large losses from hedging sales of stored grains. In diversified farming sections, where the production of marketable grains is comparatively unimportant, many elevators are already limiting the amount of grain stored without serious inconvenience to farmers. In principal grain-producing sections of northwestern Minnesota, North

Dakota, and Montana, where harvests are late and winters long and rigorous, elevators will have to continue to store much grain if farmers are given much choice in selecting the time to sell. These are the elevators that are now storing the largest proportion of grain marketed and whose success depends most largely upon collecting storage charges and properly hedging sales of stored grain.

SELLING

The selling problems of an elevator are when to sell, how to sell, and where to sell.

When To Sell

There is no discretion as to when most of the grain marketed by an elevator must be sold. Limited storing capacity generally forces the manager to ship most of it as soon as transportation can be provided. However, the elevator whose stocks of old crop grain have been marketed can begin to accumulate stocks as soon as the marketing movement starts in the fall; and after the peak of the movement is reached, stocks of the grains and grades desired for storing may be accumulated in larger quantities. For this part of the business the selling time becomes important.

Fortunately for elevators, most of the stocks may be accumulated in October, November, and December, when prices average lowest for most grains produced in the Northwest, and stored until the spring months, when prices average highest. Elevators that bought wheat in November during the five-year period 1909-10 to 1913-14 could have sold it at an average gross profit of 5 cents the following May. During the seven-year period of rising prices from 1914-15 to 1920-21 they could have sold at an average gross profit of 30 cents per bushel if they bought when prices averaged the lowest in October and if they sold in May when prices averaged the highest.¹⁰ In individual years elevators may have fared better or worse. One year out of the 1909 to 1913 period elevators received 5 cents less in May than they paid in November and gained from 5 cents to 11 cents per bushel in the other four years. During the 1914 to 1920 period gross profits ranged from 20 cents to \$1.20 per bushel from storing in six years, and a loss of 81 cents per bushel was incurred in the seventh year, 1920.

Individual elevators may also have gained or lost from storing, depending on when they bought and when they sold. No. 1 Northern wheat bought in December, 1911, could have been sold at a profit of 14 cents per bushel the following May, while if it had been bought

¹⁰ Based on the weighted average price of No. 1 Northern wheat. Data obtained from the U. S. Department of Agriculture Yearbook, 1923, p. 626.

in October and sold in July, there would have been a loss of one cent per bushel, allowing nothing to cover the costs of storing. From 1909 to 1913 the lowest average fall prices were in October for two years, and in December three years and the highest average prices the following springs were in May two years, June one year, and July two years. The problem of determining when to buy for storage and when to sell is therefore not simple, and country buyers are likely to have either large losses or large profits if they try to select the best time to buy and sell on the basis of available market information. The uncertainty of income from storing is much reduced, however, if stocks are accumulated gradually during the two- or three-month period of lowest prices in the fall and, if the same proportion is sold in each of two or three months for which the price averages highest over a period of years. In periods of stable or rising prices risks incurred are small.

Experience of recent years shows that this is not a satisfactory method of selling stored grain, particularly when price movements are big. No. 1 Northern wheat purchased in October, 1919, sold the following May at a profit of 42 cents per bushel, but when purchased and sold the same months the following year it was sold at an average loss of 61 cents per bushel. On 20,000 bushels this amounts to a loss of over \$12,000 or 75 per cent of the average stockholder's equity in farmers' elevators in 1919-20. The serious feature of such losses, it should be pointed out, is not so much their size as the unpreparedness of the farmers' elevators to meet them. Over a period of years, storing profits undoubtedly exceed storing losses. This could scarcely have been otherwise from 1914 to 1919 when prices were rising rapidly. Yet, the tendency of boards of directors to distribute any profits as patronage dividends left the elevators without adequate reserves to absorb the shock of adversity with the result that this was a contributory factor to the financial embarrassment of many elevators and to the bankruptcy of many others. Periods of greater price stability show similar, altho not such extreme, results. In the fifteen-year period from 1899 to 1913, for example, the average price of No. 1 Northern wheat was lower in May than the previous November for three different years, and the premium of May prices over November prices did not cover the cost of storing for three other years.

The safer policy is to hedge stored grain. Large merchandizing organizations, such as line elevator companies and terminal elevators that are in a better position to speculate than farmers' elevators, hedge consistently. Such a policy produces smaller, but more certain, profits on stored grain. However, it does not simplify the problem of determining when to store or when to sell. Table VI analyzes possible

gains from storing No. 1 Northern wheat from 1905 to 1915 by showing the relation of cash and future prices from October to May of each year. The May future is selected because that is the one in which hedging is done chiefly. It frequently is the most active future by November and is often satisfactory for hedging in October. By using the May future to hedge the grain purchased for winter storage, elevators save the cost and avoid possible loss of transferring from the December to the May future. Only the low cash quotation is used because premiums within a grade were relatively unimportant during this period.

TABLE VI

RELATION OF PRICE OF NO. 1 NORTHERN WHEAT TO PRICE OF MAY FUTURES, 1906 TO 1916
Expressed as a premium of the cash over (+) or as a discount under (—)
the future, in cents per bushel*

	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15
1905-6	-1 6/8	-1 4/8	-1 6/8	-2 4/8	- 4/8	+ 2/8	+1 6/8	+1 7/8
1906-7	+2 4/8	+3 2/8	+2 4/8	+1 7/8	+1 6/8	+1 4/8	+2 4/8	+1 2/8
1907-8	+1 1/8	-3 2/8	-3 1/8	- 6/8	+1 6/8	+ 6/8	+2 6/8	+1 2/8
1908-9	-2 6/8	-1 4/8	- 6/8	+1 1/8	+1 4/8	+1 6/8	+1 4/8	+1 2/8
1909-10	- 4/8	+1 5/8	-2 2/8	+1 2/8	+ 6/8	+ 3/8	+ 2/8	+ 1/8
1910-11	-2 6/8	-1 1/8	-1 6/8	-1	0	+ 4/8	+2 4/8	+1 3/8
1911-12	-4	-3 4/8	-3 4/8	0	+ 5/8	+1 1/8	+2	+1 7/8
1912-13	-6 1/8	-4 4/8	-4	- 6/8	-1 4/8	-1 4/8	+2 4/8	+2 7/8
1913-14	-5 3/8	-3 4/8	-1 7/8	-1 4/8	+1	+1	+2 1/8	+2 4/8
1914-15	-6 6/8	-3 6/8	-2 3/8	-2 1/8	-1	+3	+1 4/8	+2
1915-16	- 5/8	-1 5/8	-2	+ 4/8	- 2/8	+ 4/8	+2	0
Average	-2 3/8	-1 5/8	-1 4/8	- 2/8	+ 3/8	+ 5/8	+1 7/8	+1 4/8

* Data are based on official closing price quotations of the Minneapolis Chamber of Commerce. The low quotations for the cash is used.

Times of purchase and sale are also important in affecting the income from this method of selling. Thus, wheat purchased October 15, 1907, at a premium of 1 1/8 cents over the future and sold in April at a premium of 2 6/8 cents showed a profit of 1 5/8 cents, but when purchased on November 15 at a discount of 3 2/8 cents it returned a profit of 6 cents per bushel. On the whole, October appears to have been the best time to buy wheat, because the average discount of cash prices for that month, 2 3/8 cents, was the largest of any month, altho a larger profit would have been realized by accumulating stocks in November one year and in December two years. There was no preference between October and December in two years out of eleven. April, on the other hand, was the best time to sell, altho March would have been a better time for three years, and May two years. Extending storage until June or July and transferring the hedge to the July future might have given the largest profits in some years. No. 1 Northern wheat purchased on October 15 and sold on April 15 would not have produced a loss for a single year of the period if it had been hedged. In 1906-7 there would have been no income if wheat was

purchased in October and sold in April. The profit for the other years would have ranged from $6/8$ to $8\ 5/8$ cents per bushel, or an average of $4\ 2/8$ cents for the period. If the elevators had not hedged they would have sold at a loss five years out of the eleven. Elevators that increased their storings when the fall discounts of cash prices were relatively large and secured the larger earnings that are associated with them probably realized considerably more than the $4\ 2/8$ cents average.

Conclusions cannot be made so definitely for the period since future trading was resumed in 1920, because the period is too short. Table VII shows that there was a good profit in storing low quality No. 1 Dark Northern wheat in 1920-21 and 1923-24. In 1922-23 there was no profit; in 1921-22 there was a profit only if an elevator bought wheat in December and sold it in April. On the other hand, there was a good return for storing choice quality No. 1 Dark Northern every year, the average return on wheat bought on November 15 and sold on April 15 being $8\ 1/2$ cents per bushel for the three years 1921-22, 1922-23, and 1923-24.

TABLE VII
RELATION OF PRICE OF NO. 1 DARK NORTHERN WHEAT TO PRICE OF MAY FUTURES,
1920-21 TO 1923-24
Expressed as a premium of the cash over (+) or as a discount under (—)
the future, in cents per bushel*

	October 15		November 15		December 15		January 15	
	Low	High	Low	High	Low	High	Low	High
1920-21	+ 8½	+10½	+13	+17
1921-22 ... + 7½	+12½	+ 8½	+13½	+ 4	+ 8	+10	+15	
1922-23 ... + 3½	+10½	+ 4½	+13½	+ 4	+10	+ 1	+20	
1923-24 ... — 4	+ 7	— 4	+ 5	0	+10	+ 1	+14	
Av. 1922-24 + 2½	+10	+ 3¼	+10½	+ 2½	+ 9¼	+ 4	+16¾	

	February 15		March 15		April 15		May 15	
	Low	High	Low	High	Low	High	Low	High
1920-21 ... +15½	+18½	+16	+21	+28½	+38½	+25	+38	
1921-22 ... +11	+17	+ 7	+15	+11	+18	+ 4	+13	
1922-23 ... + 1	+19	+ 1	+19	+ 2	+22	+ 2	+21	
1923-24 ... + 1	+14	+ 1	+16	+ 1	+16	+ 3	+10	
Av. 1922-24 +7½	+16½	+ 2½	+14½	+ 4½	+19½	+ 3¼	+18¾	

* Data are based on official closing quotations of Minneapolis Chamber of Commerce.

Gains and losses realized in storing only the best grade of wheat are given here because this is the grade that is usually marketed in largest quantity and stored in largest volume. Every grade presents a separate problem in itself, however, because the spreads between the different grades fluctuate under changing marketing conditions. To analyze these price relations in detail is a large study in itself and cannot be discussed further here.

The seasonal relationships of cash and future prices of both oats and rye, during the five year 1919-20 to 1923-24 as given in Tables VIII and IX, indicate that storing these grains has not been unprofitable. Three of the five years show a good profit on rye; one shows a fair profit; and only one shows a loss (see Table VIII). Each year shows a storing profit on oats (see Table IX). Some years yield a larger profit than others. In 1919-20, for example, the unusual demand for oats in Minneapolis, resulting from federal aid to the drought-stricken farmers of the West, forced cash oats to a large premium during the spring of 1920. With the exception of 1923-24 every other year has also produced a good return for elevators of the Northwest that stored this grain.

TABLE VIII
RELATION OF CASH PRICE OF NO 2 RYE TO PRICE OF MAY FUTURES, 1920 TO 1924
Expressed as a premium of cash over (+) or as a discount under (-)
the future, in cents per bushel*

	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15
1919-20	- 6	- 2 2/8	- 1	- 4/8	+ 2	+ 4	+10
1920-21	+12 3/8	+13	+17	+ 9	+ 4	+ 8	+ 4
1921-22	- 5	- 4	- 1 4/8	+ 1	+ 1	+ 1	+ 3
1922-23	+ 2	0	0	0	0	+ 1	+ 2
1923-24	- 2 3/8	- 2 4/8	- 1 1/8	+ 2/8	+ 5/8	+ 2	+ 1 2/8
Average	+ 1/8	+ 7/8	+ 2 6/8	+ 2	+ 1 4/8	+ 3 2/8	+ 4

* Data are based on official closing quotations of Minneapolis Chamber of Commerce. The low quotation for the cash is used.

TABLE IX
RELATION OF PRICE OF NO. 3 WHITE OATS TO PRICE OF MAY FUTURES, 1920 TO 1924
Expressed as a premium of cash over (+) or as a discount under (-)
the future, in cents per bushel*

	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15
1919-20	-6 7/8	-3 6/8	+2 5/8	+ 5/8	+4	+5	+7	+10
1920-21	-6 3/8	-4	-2	-1 4/8	- 4/8	0	+1 4/8	+ 1/8
1921-22	-5 6/8	-3 3/8	-3 4/8	-1 4/8	- 7/8	- 2/8	+1	+ 4/8
1922-23	+ 6/8	+ 7/8	+ 4/8	0	- 4/8	+1	+2	+2 3/8
1923-24	-1 7/8	-2	-2	- 3/8	0	- 2/8	+1	+ 7/8
Av. 1920-24....	-4	-2 4/8	- 7/8	- 4/8	+ 3/8	+1 1/8	+2 4/8	+2 6/8
Av. 1921-24†..	-3 3/8	-2 1/8	-1 6/8	- 7/8	- 4/8	+ 1/8	+1 3/8	+1

* Data based on official closing quotations of Minneapolis Chamber of Commerce. The low quotation for cash is used.

† A four-year average is given in order to show the gains from storing hedged grain when the abnormal year, 1919-20, is excluded.

Time of purchase and sale of oats and rye affect the results of storing these grains just as much as wheat. Therefore, elevators should follow a policy of accumulating stocks and selling them in the same quantity, at the same rate, and at the same time each year, if they wish to realize the average storing profits for a period of years. Otherwise, they will realize larger or smaller profits. Such a policy might

be worked out for an individual elevator somewhat as follows: The amount of principal grains to be stored, for instance, 10,000 bushels of wheat, 5000 bushels of oats, and 3000 bushels of rye would be determined in advance; then, on the basis of the relation of average monthly cash and future prices for a period of years, determine what percentage of the purchases and sales shall be made in particular months, as, one third of the purchases in each month of October, November, and December; and one third of the sales monthly during April, May, and June. Some modification of the plan would probably be necessary to suit unusual market conditions, but it would assure elevators, over a period of years, returns equal to the average advance of cash prices relative to future prices.

Modification of this policy is to store only those grains which promise the best returns. Objection may be made to this policy because there is no known method of accurately forecasting future relations of cash and future price. Yet, an examination of Tables VI to IX shows that storing was most profitable in the years when the discount of the cash price under the future price was greatest during the fall. The manager who will study these discounts of the different grains, comparing the deviation of each grain's discount or premium from the normal, may obtain a larger storing income by storing as large quantities of these grains whose cash price is at the lowest relative discount, as the handling of current receipt permits. Either method, it should be emphasized, will probably give better results than the present generally accepted policy of guessing when to accumulate stocks and when to sell.

An important aspect of this problem to farmers' elevators is the time when grain is sold by farmers. Elevator storage is provided to give farmers greater freedom in determining when to sell. The spring wheat producers, as a group, have not been very successful in choosing the best time to sell, however, on this account. From 1906 to 1923 the spring wheat producers owned from 8.6 per cent to 42.1 per cent of their crop in January, and from 2.8 per cent to 23.4 per cent in May. The average was 22.2 per cent in January and 4.7 per cent in May. These percentages are based on data obtained from the records of approximately 600 line elevators operating in the chief spring wheat districts of Minnesota, North and South Dakota, and Montana, and they include both the unmarketed portion of the crop and the grain stored at local elevators. A summary of the data in Table X shows that the producers owned 13.1 per cent of the marketable crop in May when the May price was less than 6 cents higher than the average September price of No. 1 Northern, and that they owned the largest percentages when the losses from storing were largest, in 1910 and 1920. (The data for 1917-18 and 1918-19 are omitted from this

analysis because marketing was abnormally affected by war-time measures.) During the years when May prices were 6 cents or more higher than September prices, the producers owned only 8.3 per cent of the crop.

TABLE X
RELATION OF THE AMOUNT OF SPRING WHEAT FARMERS OWNED TO THE SEPTEMBER, JANUARY,
AND MAY PRICE OF WHEAT AT MINNEAPOLIS, 1905-6 TO 1922-23

	Av. Sept. price No. 1 Nor.*	Crop owned by farmers Jan. 31†	Av. Jan. price No. 1 Nor.*	Jan. price over(+) & under(-) Sept.	Crop owned by farmers May 31†	Av. May price No. 1 Nor.*	May price over(+) & under(-) Sept.
		Per cent			Per cent		
1905-6	\$.81	19.5	\$.83	\$.02	8.6	\$.83	\$.02
1906-7	.74	22.4	.80	.06	8.2	.96	.22
1907-8	1.08	24.4	1.10	.02	12.0	1.09	.01
1908-9	1.03	18.8	1.09	.06	5.8	1.31	.28
1909-10	1.04	18.6	1.14	.10	5.7	1.10	.06
1910-11	1.09	31.1	1.06	-.03	14.7	.99	-.10
1911-12	1.09	20.6	1.06	-.03	6.9	1.16	.07
1912-13	.89	19.5	.89	.00	7.1	.91	.02
1913-14	.87	16.5	.87	.00	6.4	.94	.07
1914-15	1.12	17.3	1.38	.26	4.4	1.58	.46
1915-16	.97	24.2	1.29	.32	10.9	1.22	.25
1916-17	1.64	26.3	1.93	.29	6.9	2.96	1.34
1917-18	2.17	14.7	2.17	0	3.1	2.17	0
1918-19	2.23	8.6	2.21	-.02	2.8	2.59	.36
1919-20	2.56	26.1	3.01	.55	13.5	3.09	.53
1920-21	2.54	42.1	1.79	-.75	23.4	1.55	-.99
1921-22	1.51	21.8	1.34	-.17	12.9	1.56	.05
1922-23	1.10	27.4	1.23	.13	14.8	1.28	.18

* U. S. Department of Agriculture Yearbook, 1923, p. 626.

† Data calculated from "The movement of spring wheat," unpublished manuscript prepared by Hutzal Metzger for the division of agricultural economics, University of Minnesota, and the Institute of Economics, co-operating.

A comparison of January and September prices with the amount of spring wheat owned by farmers in January discloses the same tendency. The average percentage of wheat owned was 24.4 per cent when January prices were less than 3 cents higher than September prices and 22.6 per cent when there was a return of 3 cents or more for storing. In eight of the sixteen years included in the analysis, the January price was either lower than the September or was not enough higher to cover the cost of storing.

These are important facts for members of farmers' elevators to consider in formulating the elevator policy. No hardship would have been imposed on farmers during the period of comparatively stable prices, from 1905 to 1913, by restricting the storing to amounts of grain that could be stored in the elevator or by entirely prohibiting the storing of grain for others. In fact, the producer who sold, say, two thirds of his crop at threshing in September, one sixth in December, and the remaining one sixth in May, realized a better price than the representative farmer who sold according to the prevailing method.

A liberal storing policy, on the other hand, was advantageous during the rising prices from 1914 to 1919 when May prices were never less than 25 cents over September, excepting for the year 1917-18, and the farmers who stored most, whether on the farm or at the elevator, were best off. However, with the return to lower, and probably more stable, prices elevators are likely to operate under conditions most closely resembling the years 1905 to 1913 than the years 1914 to 1919, and they will again be forced to weigh the costs of storing at the elevator and the disadvantage of inadequate income to cover costs against the producers' advantage in being able to store at the elevator.

How To Sell

Elevators sell grain by the following methods: consignment, "on track," and "to arrive." The principal method is consignment. Over 90 per cent of grain marketed from Minnesota, North and South Dakota country points was sold on consignment from 1912-13 to 1916-17.¹¹ Montana's proportion, sold in this manner, was only 80 per cent of grain marketed because of the direct selling of grain marketed at Pacific Coast markets. Seventy-two out of 85 Minnesota elevators interviewed in 1923 reported almost exclusive use of this method and all used it to some extent. Three elevators made most use of the "track" method. Only one elevator reported as having used the "to arrive" method principally.

No important changes are being made in the method of sale. The sale of corn "on track" has increased somewhat along the northern border of the corn belt. There has also been a tendency to sell wheat on the basis of special "to arrive" quotations, but the limited market from which such quotations are obtained seriously restricts their value. Complete protection that "track" and "to arrive" sales give against price fluctuations and the smaller amount of capital required is a strong inducement to use these methods. A few elevators that are selling an ordinary quality wheat are therefore experimenting with these methods of sale. But the advantage of selling grain, particularly wheat and barley, on a sample market and thus securing the premiums that buyers pay and that "track" and "to arrive" prices cannot satisfactorily reflect for the individual station, makes consignment the principal method of sale in the spring wheat markets. The obligation to sell on consignment in return for commission merchant financing should also be mentioned as a factor that perpetuates the consignment sale.

The relative importance of these methods of sale also varies between the different elevators, depending on the market to which they are shipping. Thus elevators shipping oats to Chicago are likely to

¹¹ Report of Federal Trade Commission on Grain Trade, Vol. I, p. 146.

sell "on track" or "to arrive" more often because wire houses are relatively more important receiving middlemen at Chicago than at Minneapolis, Duluth, or Milwaukee. This explains why "track" and "to arrive" selling are relatively more important in southwestern Minnesota (see Table XI) than in other districts.

TABLE XI
NUMBER OF MINNESOTA ELEVATORS REPORTING AS USING DIFFERENT METHODS OF SALE FOR
PRINCIPAL GRAINS MARKETED*

Kind of grain	Red River Valley district			Central district			Southwestern district			Southeastern district		
	Method of sale			Method of sale			Method of sale			Method of sale		
	To arrive	Track	Consignment	To arrive	Track	Consignment	To arrive	Track	Consignment	To arrive	Track	Consignment
Wheat ..	3	3	20	6	1	26	5	12	20	0	1	12
Corn ...	3	3	19	6	4	22	5	18	20	2	5	11
Oats ...	3	3	20	5	4	23	5	19	20	1	4	11
Barley ..	2	3	20	0	2	25	5	18	20	0	1	12
Rye	3	3	20	3	1	26	5	18	20	0	3	12
Flax ...	4	3	20	0	1	25	0	†	†	5	3	11

* The figures include 21 elevators in the Red River Valley district; 26 in the central district; 23 in the southwestern; and 15 in the southeastern district.

† Little flax sold.

Where To Sell

Figure 15 indicates the diversity of markets for Minnesota grains. Altho the bulk of Minnesota grain is shipped to Minneapolis (over 36 per cent in the five years, 1912 to 1917),¹² other markets also receive much. Large quantities go to Duluth from the Red River Valley and central sections of the state (nearly 18 per cent of the total state marketings from 1912 to 1917). These sections are conveniently located to choose between these markets. Red River Valley points and many shipping stations in the central district have the same freight rates to Minneapolis and Duluth. Incidentally both sections also have convenient diversion points which allow greater latitude in diverting shipments from one market to the other. The principal grains shipped to Duluth are Durum wheat, rye, and oats. Hard Red Spring wheat is marketed chiefly at Minneapolis.

Reference to Figure 15 shows that grain from the southern sections of the state finds a greater diversity of markets. All the elevators ship to Minneapolis to some extent. Many of them also ship grain to Chicago, Milwaukee, Cedar Rapids, and occasionally to Sioux City and Omaha. Milwaukee is the principal market for this group, it having received 23 per cent of the total grain shipped from Minnesota local markets from 1912 to 1917, and receives chiefly barley, rye, and small quantities of corn and oats. Oats are shipped to Chicago. Wheat is

¹² Report of the Federal Trade Commission on the Grain Trade, Vol. I, p. 132.

shipped chiefly to Minneapolis, as are also rather large quantities of corn and oats when the production of feed grains is small in North Dakota and Montana.

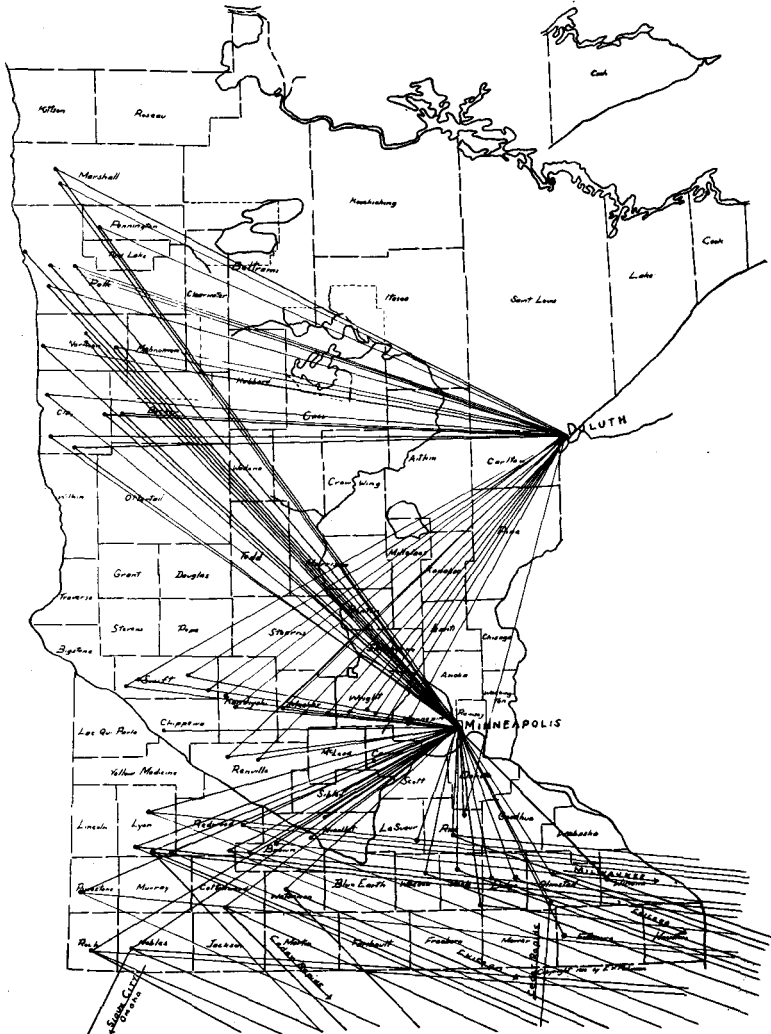


Fig. 15. Location of Principal Markets for Minnesota Elevators

Practically all elevators in Minnesota ship grain to interior markets. These include small flour milling centers and also cereal products manufacturing towns such as Cedar Rapids and Clinton, Iowa. Many elevators also market a considerable quantity of grain locally as feed.

COMPETITION

All information obtained in this study indicates that there is considerable competition at local grain markets in the Northwest. In 1925, there was an average of approximately two licensed elevator companies at each of the 747 grain shipping stations in Minnesota. This is not quite the same as the average number of elevators, it should be pointed out, because more than one elevator is sometimes operated by the same company. Five stations had 6 or more licensed elevator buyers each; 16 stations had 5; 35 stations had 4; 116 stations had 3; 244 stations had 2; and 331 stations, or 44 per cent, had 1. The 24 licensed track buyers which are located chiefly in the northwestern section of the state are not included in this analysis.

The distribution of farmers' elevators shows that the chief purpose is to provide competition for other types of elevators and that the providing of marketing facilities is only secondary. For example, only 92 stations out of the 391 that have farmer elevators have no other type of elevator buyer and only 13 stations have more than one farmer elevator company. These 13 stations have two farmer elevators each; most of the 13 stations have a farmer individual and a farmer line elevator. Only 52 per cent of all shipping points have a farmers' elevator. Figure 16 shows, however, that the farmer houses are so well distributed over the grain producing sections of the state that most of the shipping points having only other types of buyers feel their influence. The central and northwestern sections of the state have a relatively smaller number of farmers' elevators than the southern section. On the other hand, these are the sections that have the largest number of elevators per shipping point and therefore probably need farmers' elevators least to furnish competition.

Commercial line companies are the principal competitors of the farmers' elevators. Thirty per cent of all buyers in Minnesota in 1924-25 were representatives of these companies. They are relatively more important in the central and northwestern wheat producing sections of the state than in the southern sections. In the former sections, the buyers represent chiefly large line companies with head offices at Minneapolis and Duluth, while in the latter, the companies generally operate a small number of elevators. Independent elevators, on the other hand, are relatively more important in the southern districts than in the central and northwestern districts, where local capital was more plentiful when elevators were being built. They constitute 26 per cent of all local grain buyers. Mill elevator buyers and flour mills outside Minneapolis and St. Paul constitute the smallest group of competitors, excluding track buyers, but their competition is very keen in buying wheat. Fifteen per cent of all elevator buyers belonged

to this group in 1924-25.¹³ According to data compiled by the Federal Trade Commission, about two thirds of them are probably small line elevators and one third individual elevators.¹⁴ The number of flour mills buying direct from producers without operating licensed elevators is unknown. There were, however, 487 interior flour mills in the four northwest states in 1922, 247 being in Minnesota, 88 in North Dakota, 78 in South Dakota, and 74 in Montana.¹⁵

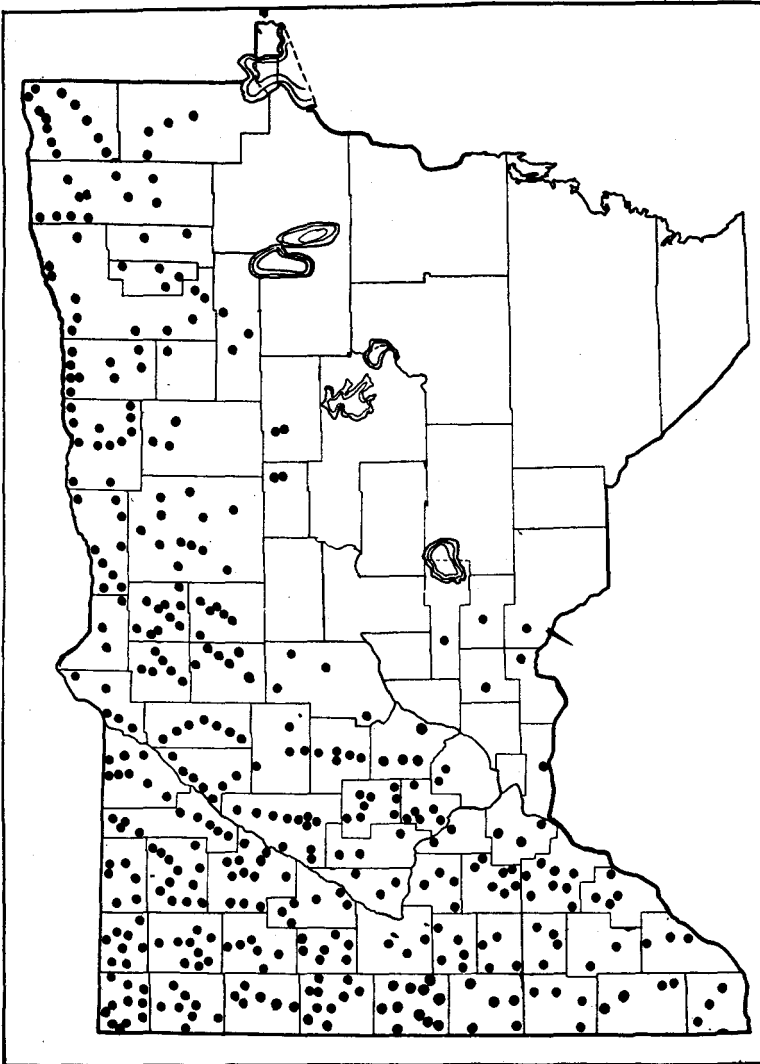


Fig. 16. Location of Farmers' Elevators in Minnesota

¹³ Calculated from data obtained from Minnesota Railroad and Warehouse Commission.

¹⁴ Report on the Grain Trade, Vol. I, p. 328.

¹⁵ The Miller's Almanac for 1922, p. 211.

The intensity and nature of competition therefore varies between elevators and depends upon the types of agencies that are competing and the attitude of competing buyers. The mill elevator, for example, may be willing to forego all merchandising profit and even freight advantages in shipping flour over shipping wheat in order to obtain locally produced grain. It can afford to pay this high for there will still be a profit in milling. The chief problem in meeting the competition of the independent is to overcome the confidence of producers in an enterprise that is locally owned and operated. The advantage of the line company is in the economies of large-scale marketing and in being able to meet competition more effectively at individual stations by reason of operating elevators at many stations. Mill elevator competition therefore tends to result in overpaying for grain, while competition with other agencies tends to be on the basis of both overpaying and overgrading, and underdocking and overweighing.

An elevator has three ways of handling these different types of competition: (1) It may improve the efficiency of the elevator by reducing costs, securing better markets for grain, increasing the elevator income by rendering elevator services, handling sidelines, etc. (2) It may agree upon fair rules of competition with competitors. (3) It may contract with producers for the delivery of grain. The possibilities of improving the efficiency of the elevator business are indicated in other sections of this bulletin and need not be discussed here. This is likely to be a less effective method of meeting mill elevator competition than competition of other types of elevators, however, since the former can sacrifice all merchandising profit if it is necessary to get grain. About all an elevator can do under such circumstances is to continue to buy grain as long as the additional income pays some of the elevator overhead costs in addition to the extra expense incurred directly by marketing grain, and to continue to increase the efficiency of the elevator in order to keep the loss at a minimum.

An elevator may reduce its cost to a minimum and increase its income to a maximum, however, and still be at a disadvantage from such practices as overgrading and underdocking. The practical limitations of arranging with buyers for a reasonable basis of competition is, of course, the buyers' attitude. However, buyers not infrequently refuse to admit that such practices as overgrading or underdocking are unbusinesslike. Others admit the bad features of such practices but consider that their methods are justified if the volume of business is thereby increased. In such cases, the results of these practices should first be explained to producers and then grain should be bought on the basis of quality. Producers will then not only secure

a better price for the high quality product, but they will also understand why they are getting a higher price. The elevator, under such circumstances, should expect to secure a large share of the high quality grain. The quantity may not be large enough to give the most economical operation, but the volume would probably be sufficiently large to permit elevators to continue in business in most cases until competitors are tired of overpaying for large quantities of low grade grain. The authors believe that an elevator should meet the misgrading, misdocking, and misweighing of competitors with similar practices only as a last resort. Our reasons are explained more fully in the following section.

Membership contract is another effective way of meeting severe or unfair competition and assuring elevators a dependable volume of business. However, this has not been a popular method of operation among producers who prefer to sell where they please. Consequently, the penalty clauses that were incorporated in the elevator by-laws during the early history of the farmer elevator movement were generally abandoned or not enforced during the period of prosperity from 1900 to 1920. In 1913, 19.3 per cent of Minnesota elevators had penalty clauses, but only two elevators enforced them.¹⁶ Farmers' elevators by this time had realized an important advantage in volume of business; for example, in 1917 Minnesota farmer elevators marketed an average of 126,000 bushels of grain as compared with 51,000 bushels for line elevators, 60,000 bushels for independent elevators, and 63,000 bushels for mill elevators. Moreover, the trend of prices was upward and there were no sharp declines. The number of failures were small and grain producers generally felt that contracts were an unnecessary interference in the choice of a market. Elevators that created deficits in 1920-21 and subsequent years were therefore often in the difficult position of having large overhead costs and a small volume of business because they could not meet competitors' prices. Considerable effort has been made to put some of these elevators on a membership contract basis, but little headway has been realized. Farmers are obviously cautious in committing themselves to bear a loss, the burden of which may not be distributed in proportion to the grains that each marketed through these organizations. It is evident, therefore, that the membership contract can be effective in stabilizing elevator business only by adopting it as a permanent policy.

¹⁶ Weld, L. D. H. "Farmers' elevators in Minnesota." *Minnesota Bul.* 152, p. 8.

GRADES, DOCKAGES, AND WEIGHTS

Since elevators buy grain on the basis of their own grade, dockage, and weight, and sell on official grade, dockage, and weight at the terminal market, it is important for the manager to make correct determinations in these three factors.

Data secured from a large number of the audits on which this study is partly made indicate that elevators are making the determinations with widely different degrees of success. Of the 67 elevators that were marketing Hard Red Spring wheat in 1922-23 and for which grade overage and shortage information was secured, 5 had overages and 62 had shortages for the highest grade.¹⁷ The variation was from a 6516-bushel overage to a 45,633-bushel shortage, and the average of the overages and shortages for all elevators, as shown in Table XII, was a 8650-bushel shortage for No. 1. The lower grades, it should be noted, have a corresponding excess of sales over purchases because grain has graded lower at the terminal market, altho the overages on the lower grades do not exactly equal the shortage on the highest grade because of errors in docking and weighing. For example, grain purchased as No. 1 and sold as No. 2 will show an excess of purchases over sales if there is underdocking or overweighing when the grain is purchased.

Analyses of Durum overages and shortages give similar results, the chief difference being that the errors in grading, docking, and weighing are greater than for other wheat. Of the 61 elevators for which data are available, 52 had shortages and 9 had overages. The extremes of variation were from an 11,340-bushel overage to a 122,335-bushel shortage, and the average for all elevators was a shortage of 17,701 bushels. This amounts to a loss of at least one grade on 37 per cent of the total amount of Durum marketed. Overages on the lowest grades for most elevators indicate, moreover, that the loss was more than one grade on much grain. Similar data are not available for the other grains.

Weight statements of elevator audits are presented in such a way that weight overages and shortages and dockage overages and shortages must be analyzed together. Frequently no information is given that will permit an adjustment for overages and shortages, due to cleaning individual grains. Therefore, the degree of accuracy on either weighing or docking cannot be determined, altho such information as is available indicates that the inaccuracies are sufficiently large to cause important gains and losses from both weighing and docking

¹⁷ For convenience this class of wheat will be referred to as "Wheat" in this section. Durum wheat will be specified when it is referred to.

for individual elevators. For the 69 elevators whose weight statements were analyzed for 1922-23, weight and dockage overages and shortages ranged from 1468 bushels over to 3642 bushels short for Wheat; from 3361 bushels over to 4016 bushels short for Durum; from 743 bushels over to 462 bushels short for flax; from 1263 bushels over to 1248 bushels short for rye; from 817 bushels over to 590 bushels short for oats; and from 984 bushels over to 663 bushels short for barley. Wheat and flax show an average elevator shortage of 75 bushels and 41 bushels, respectively, and other grains have an average overage of 153 bushels for Durum, 135 bushels for rye, 32 bushels for oats, and 16 bushels for barley. Barley and oats figures do not include any errors in docking because dockage is not provided for in their grade standards.

These data show that the gains and losses from weighing and docking are less than from grading. Generally speaking, this should be true. Grading of grain requires that a large number of characteristics be taken into consideration and judgment plays an important part. Far greater accuracy can be secured in weighing and docking because mechanical determination is possible. Elevator managers are therefore more likely to err in grading grain handled in small quantities than grains handled in large quantities, and in grading grain at the beginning of the marketing season before they have had an opportunity to become familiar with the official terminal grading of the new crop. Many operators have been successful in minimizing these losses, however, by submitting samples of the new crop directly to the inspection department at Minneapolis or Duluth or indirectly through a commission firm, and by careful testing of each load of grain purchased. Other operators, on the other hand, who either fail to submit representative samples to the inspection department or who are careless in examining the grain, in making the weight, foreign material, moisture, and other tests frequently, incur heavy losses. No other explanation than carelessness can be given for the grading methods of an elevator that sells all of a large quantity of grain on the basis of one grade lower than it was purchased; or, that sells all of a principal grain in a subclass lower than the class for which it was purchased, as was discovered to be the case with several elevators.

The chief reason for overgrading by so many elevators, including independent and line elevators, is competition. Every farmer desires to secure the highest grade for his grain, partly because he has produced it and partly because he wishes to secure the highest price. Moreover, the relation between the buyer and the farmer is personal. They are members of the same community and have many interests in common. Rather than create an unpleasant relationship the grain buyer

therefore frequently overgrades to satisfy a customer. If one buyer persists in overgrading, then all buyers are forced to the same practice to meet the competition. Buyers of farmers' elevators, it should be pointed out, are in a less favorable position to be impersonal in dealing with customers than buyers of other types of elevators because the producers are also owners and officers of the elevator. Farmers' elevators are probably, on this account, the chief offenders in overgrading, altho there are no data to verify this conclusion.

The sympathetic attitude of many buyers toward farmers, particularly those who have been farmers or who have relatives living on farms, is also responsible for overgrading. This factor is probably less important than either of the other two mentioned, altho it is equally difficult to correct.

Misdocking exists for the same reasons as misgrading. Judgement need not be so important in determining dockage as grade, since sieves and other devices have been invented to make determinations mechanically. Lack of proper facilities in some cases, pressure of other work, and the indifference of the buyer to use available appliances, injects the human element in docking, however, probably to as great a degree as in grading. Continuous underdocking is more easily avoided under ordinary circumstances than overgrading, on the other hand, since the effect of the former upon the price received is less apparent than the latter. Most customers, for example, do not stop to figure that a 2 per cent variation (1.2 pounds per 60-pound bushel) causes a difference of 3 cents when grain is worth \$1.50 per bushel, whereas the variation in price between the different grades is fresh in mind from conversation with buyers. Buyers often take advantage of this fact and calculate excessive dockage, figuring that they may thereby recoup some of the losses from overgrading. This explains the tendency to overdock. On the other hand, the practical limits of such a policy can be easily overestimated. Buyers in markets where the amount of foreign material is exceedingly large often underdock rather than incur the ill-will of patrons by buying on the basis of the correct amount. In such cases the elevator must either incur a loss or overdock the grain that contains a small quantity of foreign material.

The chief reason for incorrect weighing is the desire of the buyer to offset the losses from shrinkage, invisible loss, and overgrading. Occasionally buyers do underweigh as a means to increase profits altho most buyers whose operations show a gain in weight underweigh because less ill-will is likely to be created among patrons by underweighing than by correct grading. This undoubtedly explains the tendency of farmers' elevators to show a net gain in weight.

Faulty scales or incorrect use of the scales also cause losses or gains in weighing. Scales need more frequent examination and adjustment than they are given by the occasional inspection made by a public official. Some elevators take additional precaution to employ a private scale inspection bureau to test and adjust their scales. This minimizes the errors in weighing altho it does not entirely relieve the manager from responsibility to examine the scale frequently to detect maladjustments. Another equally important cause for weighing gains and losses is the method of breaking the scales. Every perfectly adjusted elevator scale requires several pounds to balance the scale beam. If 15 pounds is so required, the operator may secure 30 pounds on each weight draft to cover the elevator's invisible losses in marketing, if the scale beam is balanced as it moves up when the load is weighed in and as it moves down when the wagon or truck is weighed back.

Table XII, giving the Wheat and Durum grade overages and shortages for the six years 1918 to 1923, indicates clearly that inaccurate grading, weighing, and docking is not temporary in elevator operation. Every year there was a shortage of No. 1 Wheat and No. 1 Durum, the minimum shortage being 2051 bushels of wheat and 1529 bushels of Durum per elevator. It should be noted that the same elevators are not represented through the entire period but enough elevators are included for more than four consecutive years to give continuity to the data. The quality of the crop appears to be the principal factor affecting the amount of shortage. In 1919-20, 1920-21, and 1921-22, the large grade shortages accompanied crops of low quality in sections where most of the elevators studied are located. The season of 1919-20, the year of lowest average quality, shows the largest grade shortages, 2301 bushels on the average selling lower by two grades or more than it was purchased. This amounts to nearly 10 per cent of the grain marketed, and price spread between grades was rather wide that season. The average quality of the 1920 and 1921 wheat crops was somewhat higher and averages are less extreme but still considerably larger than for the other years.¹⁸ The effect of quality on overgrading could be demonstrated much better if detailed information as to grading factors, such as moisture content and inseparable foreign material were available. A large number of elevators in the Red River Valley section are losing heavily on grades during the present 1924-25 season on account of the moisture condition which did not appear to exist from a casual examination of the grain at time of purchase.

¹⁸ In calculating the extent of overgrading and undergrading, one must consider both the amount of overage or shortage in the highest grade and the relative size of overages and shortages of other grades.

TABLE XII
GRADE OVERAGES AND SHORTAGES OF FARMERS' ELEVATORS FOR THE CROP YEARS
1917-18 TO 1922-23
(Average number of bushels per elevator)

	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23	Average
A. Wheat							
Number of elevators....	9	24	24	29	31	67	
Grade No. 1.....	-3,429	-3,524	-2,051	-6,405	-6,544	-8,650	-4,933
Grade No. 2.....	4,005	1,435	-870	995	1,944	5,686	2,199
Grade No. 3.....	-496	1,095	111	1,051	2,840	940	923
Grade No. 4.....	-108	774	2,412	4,040	1,489	1,889	1,749
Total bushels handled...	54,810	54,921	25,545	40,404	48,429	57,468	46,929
B. Durum							
Number of elevators....	4	16	16	23	28	61	
Grade No. 1.....	-4,462	-4,916	-1,529	-12,152	-6,879	-17,016	-7,825
Grade No. 2.....	3,333	4,164	1,357	11,837	6,808	17,152	7,441
Grade No. 3.....		882	-321	82	-1,197	-685	-206
Grade No. 4.....			356	36	1,395	745	407
Total bushels handled...	22,434	56,928	17,215	41,789	32,613	47,528	36,417

Yearly weight and dockage overages and shortages given in Table XIII show a decided tendency for all grains to have either overages or shortages in the same year. The amount of dockage and the profitableness of cleaning are probably the chief reasons for this condition. From 1918 to 1921 screenings were valuable and much cleaning was done at the local elevators because foreign materials were considered more valuable to market as screenings than as dockage. Since 1921, the low price of screenings has discouraged cleaning and elevators show a net gain in weights and dockage.

TABLE XIII
NET WEIGHT AND DOCKAGE OVERAGES AND SHORTAGES OF FARMERS' ELEVATORS, FOR CROP YEARS
1917-18 TO 1922-23
(Average number of bushels per elevator)

	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23	Average
Wheat	697	-130	-244	-40	2	-75	35
Durum	-171	-123	-175	14	73	153	-38
Flax	25	-109	-32	-111	42	-41	-37
Rye	-39	-4	-24	-22	58	135	17
Oats*	124	230	-58	-45	33	32	52
Barley*	-240	-7	-69	6	7	16	-47

* No dockage for these grains because there is no dockage in the grading system.

The effect of grading, weighing, and docking on the elevator business is indicated more strikingly when overages and shortages are reduced to a value basis. Table XIV shows that gains and losses from wheat overages and shortages varied from a gain of \$1310 per elevator in 1917-18 to a loss of \$1633 in 1919-20, with an average loss of \$684 for the six years. The lower price of Durum kept the gains and losses lower for that grain, although the variation was still from an average gain of \$106 in 1918-19 to a maximum loss of \$688 in 1920-21.

TABLE XIV
SUMMARY OF GAINS AND LOSSES FROM GRADING, DOCKING, AND WEIGHING OF FARMERS' ELEVATORS FOR CROP YEARS 1917-18 TO 1922-23
(Average per Elevator)

	1917-18		1918-19		1919-20		1920-21		1921-22		1922-23		Average	
	Amount	Cents per bu.	Amount	Cents per bu.	Amount	Cents per bu.	Amount	Cents per bu.	Amount	Cents per bu.	Amount	Cents per bu.	Amount	Cents per bu.
Gain or loss from grading, docking, and weighing:														
Wheat	\$1310	2.4	-\$702	-1.2	-\$1633	-6.3	-\$1528	-3.7	-\$1017	-2.1	-\$532	-0.9	-\$684	-1.4
Durum	452	-2.0	106	0.2	397	-2.3	688	-1.6	295	-0.9	165	-0.3	315	-0.9
Total	858		-596		-2030		-2216		-1312		-697		-999	
Gain or loss from weighing and docking:														
Wheat	1429	2.6	-275	-0.5	-615	-2.4	-76	-0.3	4	0.01	-72	-0.1	66	-0.1
Durum	623	-2.5	331	-0.6	536	-3.0	57	0.2	71	0.2	124	.003	-206	-0.6
Flax	91	1.8	-437	-7.4	-125	-2.9	-374	-7.6	126	3.3	-126	-2.6	-141	-2.6
Rye	114	-1.4	-7	-0.4	-52	-0.3	-64	-1.5	51	0.5	94	0.3	-15	-0.5
Oats*	111	0.9	218	0.7	-63	-0.6	-41	-0.4	24	0.4	19	0.1	45	0.2
Barley*	272	-2.5	-10	-0.4	-156	-1.7	10	0.2	6	0.1	15	0.1	68	-0.7
Total	622	0.6	-842	-0.6	-1547	-2.1	-516	-1.0	282	0.3	54	0.04	-319	-0.3
Income from screenings	615		363		1035		228		82		202		421	
Net gain or loss†.....	1289	1.2	-468	-0.3	-1392	-1.9	-2485	-4.8	-1023	-1.0	-493	-0.3	-751	-0.7

* No gains or losses from docking since dockage is not provided in grading system.

† Net gain or loss is the sum of the gain or loss from grading, docking, and weighing Wheat and Durum, the gain or loss from weighing and docking flax, rye, oats, and barley, and the income from screenings.

These figures, it should be explained, were obtained by multiplying purchases and sales of each grade of grain by the average monthly purchase and sale price as calculated from information secured from the Grain Bulletin. The difference between this amount paid and the amount received, as thus calculated, gives the total gain or loss from grading, weighing, and docking a particular grain.

Gains and losses from weighing and docking were obtained by multiplying the overage or shortage from weighing and docking by the net sale price of each grain. As previously explained, available information does not permit gains and losses from weighing and docking to be separated. Any losses in dockage from cleaning grain is also included in the gains and losses of each grain. Data for individual grains, therefore, have no special significance since it is impossible to determine what part of the screenings belongs to each. Oats and barley are an exception since they are usually not cleaned and their foreign materials are not handled as dockage. Oats show a small net gain in weight for the period, and barley shows a net loss of three fourths of one cent per bushel. The largest gains and losses are realized on Wheat and Durum, the principal grains marketed and the chief grains cleaned.

The net result of weighing and docking for this group of elevators, obtained by combining gains and losses of all grains for each year and allowing for the income from the sale of screenings, was a gain of \$102 per elevator. However, operations of only 3 years out of 6 show a profit. The 3 years which show a loss are also the years of largest income from screenings which indicates that docking is a more important source of loss than weighing.

Inaccurate grading is a more important factor than either weighing or docking. If all the income from screenings is credited to Wheat and Durum, the three years 1917, 1918, and 1919 would show a gain from grading of \$668, \$373, and \$156, respectively, and 1920, 1921, and 1922 would show a grading loss of \$1969, \$1304, and \$547, respectively. The average for the 6 years would be a loss of \$437. Moreover, if some of the screenings income should be credited to the less important grains that are sometimes cleaned, the grading loss on Wheat and Durum would be even larger. The tendency to pay a lower price when overgrading is done offsets these losses to some extent. However, it does not seem probable that the elevators were thus able to overcome entirely the average grading loss of 2.4 cents per bushel on all Wheat and Durum marketed in 1920-21, or the loss of 1.6 cents per bushel in 1921-22. Individual elevators must have incurred large grading gains or losses even in 1922-23 when the average grading loss was only $\frac{1}{2}$ cent per bushel. Thirty-seven elevators, or more than

one half of the elevators included in this study, had net losses from grading, weighing, and docking, and this does not include any loss for possible overgrading of rye, oats, flax, or barley (see Table XV). Twenty-nine of the 67 elevators show a net loss of from less than 1 cent to 4 cents per bushel from weighing and docking all grain. Sixty elevators realized a net loss ranging up to 6 cents per bushel from overgrading only Wheat and Durum. The other 7 elevators had grading gains as high as 6 cents per bushel. The gains and losses in Table XV are calculated in the same manner as the data in Table XIV, in making allowance for the income from screenings.

TABLE XV
DISTRIBUTION OF GRADING, WEIGHING, AND DOCKING GAINS AND LOSSES OF 67 FARMERS' ELEVATORS FOR 1922-23

Cents per bu.	Grading, weighing, and docking*	Weighing and docking all grains	Grading Wheat and Durum†
Gains			
5-6	1	0	2
4-5	0	0	0
3-4	1	0	0
2-3	0	2	0
1-2	7	5	0
Less than 1	21	31	5
Losses			
Less than 1	25	26	20
1-2	11	2	25
2-3	1	0	9
3-4	0	1	2
4-5	0	0	1
5-6	0	0	3

* Grading gains and losses for Wheat and Durum and weighing and docking for all grains are included. Gains and losses are calculated on total volume of grain.

† All income from screenings credited to Wheat and Durum. Gains and losses are calculated on volume of Wheat and Durum.

An important aspect of this whole problem is the unbusinesslike practice of correcting, or trying to correct, inaccuracy by inaccuracy. It not only makes the basis of purchase uncertain to offset overgrading, for example, by underweighing, overdocking, or underpaying, but it results in inequitable payment of patrons. If all farmers produced the same average quality grain there would be no inequality, but this is not the case. Some farmers consistently produce a better grade grain than others, and the high-grade grain generally contains a smaller percentage of foreign material than the low. The result is that no matter how the grain buyer tries to overcome a loss from overgrading these farmers lose and producers of poor grain gain. Overdocking grain that contains a small percentage of foreign material to recoup losses of underdocking very foul grain likewise penalizes the farmer who uses the best methods of cultivation.

Grain producers cannot afford to operate elevators on this principle. It is uneconomic for the efficient producer to subsidize the inefficient producer. Some inaccurate grading, weighing, and docking will obviously exist from the very nature of the problem. However, these can be reduced to a point where they are unimportant to the success of elevator operation by methods that have already been stated or implied. Grading and docking may be kept in fairly close line with the terminal markets by sending samples to commission merchants at the beginning of the crop movement or for special lots of grain, by using the standard equipment recommended by the Minnesota Railroad and Warehouse Commission and the United States Department of Agriculture and by grading and docking each purchase of grain carefully. Correct weighing depends on the scales being properly adjusted and used. This means frequent testing of the scales and proper breaking of the scale beam. Line elevator companies have found that bonding country buyers for weights is successful in preventing weight shortages. The competition of buyers who manipulate grades, weights, and dockages to get business presents a special problem that may require some modification of a policy of buying on the basis of accurate determinations unless the board of directors and the patron stockholders give the elevator manager their full support in meeting such competition.

CAPITAL REQUIREMENTS

Fixed capital requirements of elevators are for building and equipment and operating capital requirements are for purchased grain, sidelines and labor and insurance tied up in grain and merchandise.

Building and Equipment

The value of building and equipment of 111 elevators as secured from audits for the year 1922-23 ranged from \$2245 to \$50,150. The average was \$11,850 per elevator (see Table XVII). Seventy-five per cent of the elevators were fairly evenly distributed within the wide range of \$5000 to \$20,000. An analysis of the value of Minnesota elevators shows that the value of buildings, including elevator and sideline buildings, constitute about 85 per cent of the total value of buildings and equipment, and the value of elevator is about 70 per cent of the total value.

The value of elevators varies because of differences in size, number and arrangement of bins, materials used in construction, and method of determining value. The capacity of farmers' elevators varies from 10,000 bushels to 60,000 bushels in the northwestern states, altho

capacities usually range from 15,000 bushels to 40,000 bushels. The number of bins ranges from 5 to 26, the most common number being 12. Elevators in the spring wheat sections have more bins than elevators in other sections but the difference is not large.

Wood, wood and galvanized iron, concrete, and brick are the principal construction materials. Wood is the most common because it is cheapest. Seventy-five per cent of Minnesota elevators are frame-cribbed elevators with walls constructed of planks laid flatwise on each other and spiked together. Frame-cribbed elevators covered with galvanized iron are the second most important type. Wooden frame, concrete, and brick construction rank next in order of importance. Of 85 elevators visited, only 3 were made of concrete and 2, of brick. These materials are used chiefly in constructing elevators in the important grain-producing sections where the volume of grain is large.

Variations in the method of determining present value causes important differences in the evaluation of buildings and equipment as given in financial statements. Accountants whose audits are used in this study generally used a conservative present-cost-of-construction basis for calculating the value of property, some consideration being given to the age and condition of the property. However, since the auditors are not experts in the evaluation of elevator property and since the elevator records frequently give little information as to cost and age of the property, evaluations are not made on an entirely uniform basis.

The principal sideline buildings are coal sheds and feed warehouses. The value of occasional corn cribs, dwellings, lumber sheds, and potato warehouses is also included in the above value of elevator and equipment. Fifty farmers' elevators out of 55 visited had coal sheds. Capacities vary from 50 to 1200 tons, the average being about 250 tons. The average capacity of coal sheds of independent elevators is about 175 tons and they are somewhat more cheaply constructed. Warehouses for handling feed and other merchandise are less common and cost less per elevator than coal sheds. Only 33 farmers' elevators out of 55 had warehouses.

Size of investment in equipment depends upon kind, size, and completeness of equipment. Different kinds of equipment in their order of importance are: scales, engines and motors, cleaners, and office furniture. There is wide variation in value of all kinds of equipment. All elevators have dump scales for weighing grain as it is received at the elevator. Many have additional automatic hopper scales to weigh grain as it is shipped out. Still others have outside platform scales for weighing coal, feed, and the like, or even several small scales for weighing small sales of sidelines. There is a great difference in the

size and cost of scales; dump scales, for example, vary in size from 3 to 12 tons. The most common sizes are 5 and 10 tons. The size and cost of scales tends to vary directly as the size of the elevator varies, altho there are many instances of maladjustment in the investment of scales in both large and small elevators.

A similar analysis of engines and motors, cleaners, and office equipment shows a wide variation in the investment of this equipment. The number of engines or motors ranged from 1 to 16. Occasionally, engines and motors were obsolete; others could not be operated by the manager. Sufficient information is not available to determine how many were not in use because they are obsolete, altho it is quite obvious that there is frequently more power equipment than is needed. Seventy-eight per cent of the elevators have cleaning equipment; those not having this equipment are located chiefly in the corn and oat sections. Cleaners were rated at 200 bushels to 1000 bushels per hour, 200 to 400 bushels per hour being the usual sizes. Cost varies chiefly with the capacity of the cleaner, altho the kind of cleaner is an important factor. Elevators marketing grain that is difficult to clean need more expensive kinds of separators. The value of office equipment varied widely between elevators. Some offices are scantily and inexpensively furnished with a small amount of simple furniture and grading apparatus, while other offices have good furniture, possibly a safe, a calculating machine, or complete grading equipment, including a moisture tester, wild oatkicker, etc.

Operating Capital

Operating capital is represented in the current assets of the business, including cash on hand, accounts receivable, notes receivable, inventories of purchased grain and sidelines, grain in transit, advances to farmers, margins, accounts receivable from commission firms, railroad claims, deferred charges such as unexpired insurance, inventory supplies, and many other miscellaneous items. These items represent the amount of capital tied up in current operations of the elevator.

The average operating capital requirement of 111 farmers' elevators in 1922-23 was \$13,310 or 53 per cent of the total capital requirements. These are the capital requirements at the end of the crop year or near the end when the volume of grain business is smallest and the sideline business is near the maximum. Most of the audits from which the data are secured cover a crop year ending anywhere from April 30 to June 30, the time at which the year ends, depending upon the auditor's convenience. Stocks of grain are therefore at a minimum. On the other hand, the need for capital to finance the sale of supplies is large at this time. Farmers' accounts have accumulated

since the heavy supply-buying season of the previous fall, and twine, seed, and machinery sales are heaviest at this season of the year.

The chief operating capital requirements are for marketing grain, and they are represented chiefly in stocks of purchased grain, cash on hand, accounts due from commission firms, advances to farmers on storage tickets, and margins deposited with brokers for hedging operations. Table XVI shows that these items have a different importance at different times of the year, and are affected by rate of marketing, method of marketing, and method of financing. The value of purchased grain reaches a maximum during the second quarter when the movement during October and November is greatest, and is small at the end of the year when purchases are light and stocks are low. Accounts of elevators that store purchased grain in anticipation of higher prices would show quite a different trend. On the other hand, elevators that store very little grain and sell grain stored for farmers may even find this a source of capital, as will be pointed out later. Amounts due from commission merchants gradually increase as volume marketed declines because funds borrowed from this source are not needed to finance the smaller volume of business. Advances to farmers are largest during the fall and winter months when storage tickets outstanding are largest. The total amount of working capital represented in all these items of grain marketing is \$7020 the first quarter, \$10,060 the second quarter, \$8710 the third quarter, and \$4890 the fourth quarter. Cash on hand is not included in these totals because it is impossible to determine what proportion of cash is kept for buying grain and for selling supplies.

TABLE XVI
SEASONAL VARIATION IN CAPITAL REQUIREMENTS OF 20 FARMERS' ELEVATORS IN 1922-23
(Average per Elevator)

	First quarter	Second quarter	Third quarter	Fourth quarter
Current assets				
Cash	\$ 370	\$ 640	\$ 740	\$ 440
Accounts receivable	5050	4730	4280	3780
Notes receivable	1390	1270	1270	1330
Accounts due from commission firms	1090	1670	3080	3830
Advances	750	910	990	630
Margins	230	270	190	310
Stocks—purchased grain*	4030	5920	3360	100
Stocks—merchandise	1320	1740	830	1530
Miscellaneous	840	1180	1010	940
Deferred charges	80	110	80	80
	— \$15,150	— \$18,440	— \$15,830	— \$12,970
Fixed assets	14,850	14,860	14,860	14,740
Total	\$30,000	\$33,300	\$30,690	\$27,710
Percentage current assets to total assets		51	55	51
				43

* Includes grain in transit.

The amount of working capital required to finance the sideline business depends on the volume of sidelines handled and the credit policy. Seasonal variations in capital requirements depend chiefly on the combination of lines carried. However, the largest amounts of working capital are required in the fall, when the sales of coal, feed and flour, the chief supplies carried, are largest. Table XVI indicates that the amount of capital represented in accounts with farmers decreases from fall to spring. Notes receivable, which are chiefly frozen accounts that have been converted into a note obligation, show little seasonal variation. Stocks of merchandise, on the other hand, tend to increase from fall to spring. The total operating capital required to handle sidelines of these 20 elevators was \$7760 the first quarter, \$7740 the second quarter, \$6360 the third quarter, and \$7640 the fourth quarter. The chief cause for seasonal variation in the capital requirements of elevators therefore grows out of the marketing of grain and not out of the selling of supplies.

Table XVII shows that there is a wide variation both in the total capital required in the elevator business from year to year and in the requirements for grain and sideline business. The price of the fixed assets, grain, and sideline, is the principal cause for variation. Thus, capital invested in building and equipment increased from \$8570 in 1917-18 to \$11,850 in 1922-23 because building and equipment costs increased. Capital represented in stocks of merchandise varied from \$2700 in 1917-18 to \$3400 in 1919-20, to \$1180 in 1922-23 chiefly because of variations in the price of sidelines. The value of stocks of grain similarly varied from \$4620 to \$11,040, to \$940 for the same reason. Variation in volume of grain marketed is also an important factor affecting the amount of capital required, altho variations in marketing methods and credit policies are even more important. Thus, the tendency among farmers to store more grain at country elevators and to store it for a longer period has greatly reduced the investment in stocks of purchased grain since 1920 and it has increased the advances to farmers. The tendency of elevators to store grain when prices are rising also partly explains the large investment in grain in 1919-20. On the other hand, credit advanced for the purchase of supplies has increased considerably during the six-year period. Table XVII indicates that the elevators are more conservative in granting credit since the period of overextension of credit in 1919-20 and 1920-21, and that the increase in outstanding accounts is now due almost entirely to unpaid sales made to farmers in those two years and now represented in notes receivable.

TABLE XVII
CAPITAL REQUIREMENTS OF FARMERS' ELEVATORS, 1918 TO 1923
(Average per Elevator)

	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23
Current assets						
Cash	\$ 880	\$ 970	\$ 1,450	\$ 1,460	\$ 1,410	\$ 1,100
Accounts receivable	2,210	2,300	3,160	4,870	2,730	2,570
Notes receivable	1,750	900	2,160	2,700	2,650	3,020
Accounts due from commis- sion firms	600	3,090	870	960	1,260	1,770
Advances	240	160	300	1,090	450	510
Margins	0	250	110	800	330	160
Stocks—purchased grain..	4,620	3,370	11,040	—4,460*	200	940
Stocks—merchandise	2,700	2,650	3,400	2,710	1,440	1,180
Miscellaneous	970	610	560	1,080	650	1,710
Deferred charges	20	70	70	40	50	370
Fixed assets	8,570	9,870	10,800	9,670	10,810	11,850
Total	\$22,560	\$24,240	\$33,920	\$25,380	\$21,980	\$25,160

* Excess of storage liability over value of grain on hand. This represents a source of capital rather than a capital requirement.

FINANCIAL ORGANIZATION

Practically all farmers' elevators in Minnesota are organized as stock corporations. The joint stock company and the partnership forms of association are unsuited to the farmer elevator business because of the unlimited liability feature. Most elevators in Minnesota are incorporated under general corporation laws because they were organized before special co-operative laws were enacted. Many elevators organized since the first co-operative law was passed in 1913 are co-operative, and a few organized under the general corporation laws have reorganized under the co-operative laws. Many farmers' elevators nevertheless have one or more characteristics of co-operative organization.

The most common co-operative characteristic is restricting of the voting power to one vote for each shareholder. Fifty-one out of 55 elevators furnishing information on this point have this restriction. Limitation of the number of shares of stock each shareholder can own is also common. Out of 50 elevators, two limit the ownership of individual stockholders to 2 shares; three, to 4 shares; one, to 5 shares; three, to 8 shares; eleven, to 10 shares; five, to 15 shares; one, to 16 shares; four, to 20 shares; two, to 40 shares, while three simply reported that the number of shares was "limited," and fifteen have no limit. The effectiveness of this limitation to maintain a wide diffusion of control of the elevators among producers depends somewhat, of course, on the size of shares of stock. Six stockholders in more than 50 per cent of these elevators can own a majority of the stock of an elevator capitalized for \$10,000 and having stock at a par value

of \$50, unless there is the accompanying restriction of one member, one vote. Actually, however, there is a wide diffusion of ownership. Only 1 elevator out of 52 had less than 25 stockholders, and 39 elevators had 100 stockholders or more.

Few elevators limit stock ownership to farmers only. This limitation usually applies only to sale of stock by the elevator and does not apply to subsequent transfers of ownership, because the corporation generally does not reserve the right to compel all shareholders first to offer stock for sale to the elevator. Others than farmers may therefore ultimately become shareholders, altho the sale of stock first to farmers does tend to keep the control in the hands of producers to a greater degree than would otherwise be the case.

Many elevators also provide for limitation of dividends on stock and for payment of patronage dividends. Forty-four of the 55 elevators have paid patronage dividends. Thirty-eight have a limitation on dividends payable on stock. One elevator limits the rate to 3 per cent; two, to 5 per cent; five, to 6 per cent; six, to 7 per cent; seventeen, to 8 per cent; six, to 10 per cent; and one, to 20 per cent. Sixteen elevators provide for no limit and information is not available for one elevator. Relatively few elevators have paid dividends on stock or patronage in recent years.

Most farmers' elevators are therefore co-operative in principle and there is only a small possibility of a non-farmer group dominating the policies to the detriment of the producers' interest. A safe precaution against dominance by an outside interest is to adopt all the characteristics of a co-operative association and to require that stock offered for sale must first be offered to the association.

Farmers' elevators are financed by three kinds of organization. The first and most important kind of organization is a stock corporation that issues common stock and retains some of the profits in the business as surplus, sinking fund, or reserve for patronage dividends. The second kind of organization is a non-stock corporation that charges a membership fee and has most of the members' capital contribution in the form of surplus. The third kind is a non-stock corporation with a subsidiary stock corporation that owns the elevator and leases it to the grain marketing company. The usual policy of each kind of organization is to raise from members only the capital that cannot be borrowed on notes and mortgages.

The first mentioned organization is best suited to the local elevator business because it provides at the outset capital as a basis for buying and selling grain and for borrowing. It thus keeps down large interest costs of the non-stock method of financing. This type of organization also has a decisive advantage over the non-stock marketing com-

pany with a subsidiary warehousing corporation in being simple. There is no important reason why two organizations should be formed to conduct a local grain business. The chief advantage of a subsidiary corporation is to provide a method of raising capital by selling stock to non-patrons, and at the same time to keep the control of marketing in the hands of producers. The same purpose may be accomplished in a single stock corporation, however, by issuing common and preferred stock and limiting the sale of common stock, which carries all the voting power, to producers.

Shares of stock are generally \$25, \$50, or \$100. The smallest shares found were \$10; the largest were \$100. The number of shareholders varied from 12 to 400 per elevator, the average for 55 elevators being 165. Members of elevators having shares of \$25, the most common size, owned on the average 2.5 shares each and there was an average of 170 members per elevator.

Proceeds from the sale of stock are therefore inadequate to furnish all the necessary capital. In many instances provision is not made for all the capital needed for plant and equipment. The capital stock issued by 108 elevators in 1922-23 ranged from \$3500 to \$43,000. Table XVIII shows that most elevators have from \$5000 to \$10,000 of outstanding stock. The average for the group was \$10,120 or approximately \$1500 less than the value of buildings and equipment as given in Table XVII. Under such circumstances, mortgage indebtedness is frequently incurred to build the elevator and sometimes to provide part of the working capital.

TABLE XVIII
DISTRIBUTION OF CAPITAL STOCK ISSUED BY 108 FARMERS' ELEVATORS, FOR 1922-23

Amount of stock issued	Number of elevators
Less than \$2,500.....	0
\$2,500 to 5,000	12
5,000 to 7,500	20
7,500 to 10,000	35
10,000 to 12,500	16
12,500 to 15,000	6
15,000 to 17,500	6
17,500 to 20,000	7
20,000 and over	6
	108

Such obligations are generally considered temporary, for members generally expect eventually to pay off all or a large part of the indebtedness by selling additional stock, keeping profits in the business, assessing patronage, and the like. Sixty of the 108 elevators had accumulated surpluses ranging from a few dollars to \$31,900 and averaging \$9650 for the 60 elevators. Stockholders of most of these

elevators had thus contributed more than enough capital to pay for buildings and equipment. Table XIX shows, on the other hand, that 48 elevators were unable to preserve the stockholders' investment chiefly because of losses incurred in recent years. Deficits varied from a few dollars to \$28,980 and averaged about \$5900. Eighteen elevators, or 38 per cent of the number having deficits, it should be noted, had a deficit of less than \$2500.

TABLE XIX
DISTRIBUTION OF SURPLUS AMONG 108 FARMERS' ELEVATORS, FOR 1922-23

Amount	Number of elevators	
	Surplus	Deficit
Less than \$2,500	16	18
\$2,500 to 5,000	8	7
5,000 to 7,500	9	5
7,500 to 10,000	8	5
10,000 to 12,500	4	4
12,500 to 15,000	5	3
15,000 to 17,500	1	2
17,500 to 20,000	0	1
20,000 to 22,500	3	1
22,500 to 25,000	1	1
25,000 and over	5	1
Total	60	48

Eleven elevators out of 108, or 10 per cent, were insolvent (see Table XX). The net worth of the remaining 97 elevators ranged from a few dollars to \$47,240. Twenty-seven elevators had a proprietorship of less than \$7500 and thirty-four had a proprietorship of over \$20,000. The average stockholder's contribution of capital for the 108 elevators was \$13,560. This includes stock issued, surplus, sinking fund, stock-purchasing coupons, stock purchased but not paid for, and any other items such as reserves for patronage dividends which represent earnings retained in the business.

It is now apparent that elevators secure a large proportion of their capital from other sources than sale of stock and surplus. Forty-six per cent of the entire capital was provided by other sources in 1922-23. Audits do not give sufficiently complete information to classify these sources of capital, but we know that there are in general three methods of providing it, namely: (1) to borrow the capital; (2) to sell stored grain and use the proceeds as working capital; and (3) to defer payment of grain until the proceeds from the sale have been received.

TABLE XX
DISTRIBUTION OF NET WORTH OF 108 FARMERS' ELEVATORS, FOR 1922-23

Amount	Positive	Negative*
Less than \$2,500	8	4
\$2,500 to 5,000	7	2
5,000 to 7,500	12	3
7,500 to 10,000	9	1
10,000 to 12,500	7	..
12,500 to 15,000	7	1
15,000 to 17,500	10	..
17,500 to 20,000	3	..
20,000 to 22,500	7	..
22,500 to 25,000	9	..
25,000 to 27,500	3	..
27,500 to 30,000	2	..
30,000 to 32,500	2	..
32,500 to 35,000	5	..
35,000 to 37,500	4	..
37,500 to 40,000	1	..
Over 40,000	1	..
Total	97	11

* These elevators are insolvent.

Borrowing Capital

The principal method of raising the working capital is to borrow it. The principal sources of loans as discovered by this study and also by the investigation of the Federal Trade Commission include commission merchants, local banks, and individuals in the order of their rank.¹⁹ Most elevators use two of these sources and many use all three. Available information does not indicate the amount of capital borrowed from each source.

The relative importance of the different sources for a given elevator depends on many conditions, chief of which are amount of capital to be borrowed, rate of interest, opportunity to sell in different markets, relation of elevator to the local bank, and other conditions, such as length of the loan, control of marketing grain, etc.

Large amounts of working capital can generally be obtained most easily and at the lowest rate of interest from commission merchants, because they are able to establish large lines of credit at city banks at low rates of interest. Keen competition keeps the interest rate charged by the commission firms generally to 1 per cent over the rate they pay. On the other hand, it is often difficult or impossible in the Northwest to borrow money locally from banks or individuals owing to the scarcity of local capital. Moreover, banks are frequently under such limitations in regard to the amounts which may be loaned to a single organization as to render their resources inadequate to finance the country grain business. Under these circumstances local rates of

¹⁹ Report on the Grain Trade, Vol. 1, p. 233.

interest are high and in Minnesota average about 1 per cent higher than that charged by commission merchants. Local bank and commission merchant financing rates were 7 per cent and 6 per cent, respectively, in Minnesota in 1923.

Commission merchant financing also meets the needs of the elevator business, as regards the seasonal fluctuations in the demand for capital, better than other agencies. An analysis of Table XXI shows that wholesalers, from whom sidelines are purchased, and commission merchants are the most variable sources of capital. Obligations to these agencies are included under accounts payable. When financing is done by drawing drafts on commission merchants against grain bills-of-lading (called the closed account method of financing) there is no idle capital borrowed because the shipper pays for the use of the capital from the time the draft is drawn until proceeds from the sale are remitted. If financing is done by the open account method, in which a definite sum is borrowed, usually for one year, interest is generally allowed on daily credit balances. The rate allowed is generally the rate received by commission firms for funds at city banks altho it varies with competition for an elevator account, financial condition of the elevator, and relation of the elevator to the commission firms.

TABLE XXI

SEASONAL VARIATION IN SOURCES OF CAPITAL FOR 20 FARMERS' ELEVATORS, FOR 1922-23
(Average per elevator)

	First quarter	Second quarter	Third quarter	Fourth quarter
Current sources				
Notes payable	\$5,270	\$4,130	\$4,190	\$4,170
Accounts payable	9,090	10,510	7,870	4,580
Miscellaneous	520	650	460	930
Proprietorship				
Stock issued	10,320	10,540	10,480	10,700
Surplus	3,730	6,370	6,610	5,620
Sinking fund	120	120	120	120
Stock-purchasing coupons ...	130	140	120	400
Stock subscribed	160	160	160	110
Reserves	670	670	690	1,100
Total	\$30,010	\$33,290	\$30,700	\$27,730

Elevators heavily indebted to a commission firm obviously cannot receive as favorable terms as those financially independent. The latter, for example, occasionally receive a higher rate on balances, so dealers maintain, than can be secured by commission firms at city banks. Local banks and individuals, on the other hand, do not have easily available short-time investments for surplus funds as do city banks, and therefore they lend only for a stated period, the length of the loan being generally one year for loans from individuals and six months and one year for loans from local banks. Six-month loans give a fairly

close relation between amount of capital available and amount required, providing they are made to correspond to the heavy fall movement of grain, altho the loans occasionally made for a two- or three-month period reduce even further the possibility of idle surplus funds.

In choosing between financing agencies, elevator managements must also consider the different restrictions imposed on marketing grain. In general, local banks and individuals permit greater freedom of operation than commission agencies. An exception is the financing of grain in transit. Commission firms generally permit shippers to draw drafts against them for 70 or 80 per cent of the market value of grain without any restriction, providing the drafts are secured by proper shipping documents. On the other hand, in lending funds to an elevator to carry on the general grain and sideline business, commission firms expect to receive a share of the elevator's grain business and generally specify in the financing agreement that a certain percentage of the grain, usually 60 to 80 per cent, depending on the financial standing of the elevator, the volume of grain handled, etc., shall be consigned to the commission company. Occasionally no percentage is specified, it being only orally agreed that a given proportion of the grain shall be assigned to the commission company. Investigators of the Federal Trade Commission found elevators that had thus agreed to ship all grain to one commission company.²⁰

Commission firms generally require more detailed reports of the elevator's business and are more likely to require an elevator to adopt specified business practices, such as hedging, insuring, etc., than the local bank, because, (1) they are not able to observe the business as regards receipts and shipments of grain, advances of credit to farmers, and the like, as does the local banker, and because, (2) they appreciate more fully than the average country banker the value of complete protection from hedging and insurance. Many elevators submit daily reports of purchases and sales; others report their business in sufficient detail daily that the commission firm may have a complete operating and financial statement. Under these circumstances hedging and insuring are generally handled by commission firms. These latter elevators are generally heavily indebted to the commission companies.

Just how far an elevator can afford to go in accepting these restrictions is difficult to say. Commission firms generally do not require information that should not be readily available in every elevator's records. Complete hedging and full insurance are reasonable requirements of any lending agency. A more serious disadvantage is the restriction on selling, particularly in selecting the market to which to ship. Elevators in southern Minnesota and southeastern South Dakota

²⁰ Report on The Grain Trade, Vol. 1, p. 237.

borrow a large proportion of their funds from local sources to enable shipping to several markets that are generally available. Incidentally, these elevators are located in the older sections of the Northwest that are best supplied with local capital. Moreover, the greater use of "track" and "to arrive" selling by these elevators reduces their capital requirements. In other sections of the Northwest, the chief disadvantage is the restriction in selecting a selling agency. The close relations of commission agencies at Minneapolis and Duluth, the principal markets to which grain is shipped, permits sufficient freedom in choosing a market, but elevators are generally bound to sell a large proportion of grain through a single selling agency for a whole year.

Obtaining Capital through Sale of Stored Grain

This method of obtaining working capital has only limited possibilities, partly because of the relatively small amount of stored grain sold, and partly because proceeds from the sale of stored grain are not always readily available to pay for purchases of stored grain. The latter is especially important if the proceeds are used to finance the sideline business. Such use of stored grain often makes borrowing more difficult because lending agencies generally consider it a bad practice.

Storing grain for farmers indirectly aids in financing the elevator business by reducing the bin space that is available to store purchased grain and thus shortening the time that capital is invested in purchased grain. Moreover, the seasonal fluctuation in working capital requirements is much reduced by storing grain, because the receipts of stored grain are generally largest during the heavy movement.

Raising Capital by Deferred Payment

The method of raising working capital, by deferring payment to producers, is now adopted in principle by farmers' elevators when a buying margin is allowed that permits paying a patronage dividend. Funds that are usually thus accumulated do not finance much of the business, however, but there is no reason why they cannot provide a large proportion of the working capital. The only limitation on providing all the working capital by this method is the unwillingness of producers to wait for payments of grain. The attitude of patrons in this matter may be a difficult obstacle to overcome because grain producers are accustomed to being paid cash for the entire value at the time of sale, altho it should be pointed out that wheat pools advance only 70 to 75 per cent of the market value of grain at the time of receipt. Moreover, the deferred payment of only 25 or 30 per cent of the value of grain, say, for four weeks, would probably provide

sufficient capital, in addition to what funds can be raised on shipping documents, to finance grain marketing under most circumstances. The percentage of the payment deferred or the length of time payment is deferred may need to be increased if grain is stored for longer than the necessary period to accumulate carlot quantities for shipment. Likewise, producers should probably expect to receive a smaller proportion of the value at the time of the sale if sidelines were financed from capital raised in this manner.

To defer payment for grain also reduces the amount of capital the elevator must raise, altho one must not overlook the fact that it does not reduce the amount of capital required to market the grain. The grain producer, instead of the elevator, is furnishing this part of the capital.

Experience of local elevators with this method of financing is too limited to draw definite conclusions as to its merits. Successful Danish co-operative bacon factories have found it a practical method of marketing. Moreover, the experience of a small group of farmers' elevators in the Northwest during the present season of 1924-25 indicates that it has possibilities of eliminating some of the disadvantages of the prevailing method of borrowing a large proportion of the working capital.

Providing Adequate Capital Essential

The above discussion raises the important question as to what constitutes an adequate financing program. In general, a financial policy should provide for the contribution of sufficient capital by stockholders to permit borrowing at reasonable rates and without restriction of the marketing program. The proportion of capital thus raised will vary between elevators because credit rating depends only partly on the financial policy—efficiency of management is an important factor. The volume of sidelines handled is also an important factor because risks of this part of the business are greater than those of financing grain marketing, especially if sidelines are sold for credit.

Such a policy should provide for the accumulation of reserves during prosperity to meet the losses of adversity. Farmers' elevators are open to criticism on this point. Surpluses are often built up during prosperous years, as the war-time period from 1917 to 1919, (see Table XXII) but many individual elevators do not accumulate sufficient reserves to meet the losses. The period from 1917 to 1925 is no exception. Records of individual elevators show that deficits and insolvency could often have been avoided if the patronage dividends paid in the years immediately before 1920 had been available to meet the losses of that year.

Such a policy should also provide enough capital to permit borrowing in the usual manner of giving the corporation's note. Limited amount of capital contributed by stockholders has often made it necessary, however, for an elevator to offer as security its note endorsed by members of the board of directors or any other prominent stockholders who are willing personally to assume responsibility for the loans. An elevator that is organized on the basis of limited liability for all stockholders thus practically adopts unlimited liability for its large stockholders and patrons without providing any compensation for additional responsibility. This frequently results in inequitable distribution of losses and is contrary to the co-operative principle of distribution of profits and losses on the basis of patronage. The wide prevalence of the practice among farmers' elevators in recent years in an endeavor on the part of grain producers to save their elevators has resulted in such large losses to individual farmers that the situation calls for serious consideration of better methods of emergency financing.

To meet the requirements of such a financing policy, an elevator should provide enough capital to finance the elevator buildings and equipment and provide part of the working capital. Commission merchants generally maintain that owners should provide enough more than the capital requirements of the fixed investment to finance the sideline business.

Whether the owners of elevators should furnish capital in excess of this minimum depends on the effect which such a policy would have on the terms of borrowing and the relative profitableness of farming or other local enterprises. Generally, borrowing can be done on more liberal terms, as the amount of capital furnished by an elevator organization increases altho commission firms occasionally provide practically all of the working capital of an efficiently managed elevator with very liberal arrangements as to proportion of grain that it shall sell. Under such circumstances, a commission firm expects to receive a large share of the elevator's business but it relies on its selling efficiency, and not on its financing service, to get it.

Occasionally stockholders provide all the necessary capital because the elevator business is more profitable than farming. A more economical policy is to borrow the capital required to finance the peak loads, unless arrangement is made with commission merchants, as is often done, to allow interest on surplus funds left on deposit with them. Otherwise there will be idle funds several months of each year that cannot be advantageously invested in a local market.

An important aspect of any plan that accumulates capital by retaining the profits in the business or by sinking fund assessment of patronage is, who owns the surplus? Theoretically surplus belongs

to stockholders. Yet, members do not own stock in proportion to their patronage, nor do elevators generally keep any record of assessments and profits of individual patrons. Members with large patronage, therefore, frequently contribute large sums which they rightfully own but never recover, and all patrons contribute large sums to non-patron stockholders who have never produced grain or who have marketed through competing elevators.

A necessary corollary of this method of handling surplus is the payment of larger taxes by many elevators that are co-operative than is otherwise frequently necessary. The surplus as thus handled appears to be similar to the profit of any other business enterprise and is therefore subject to an income tax. If equities of patrons are maintained in accordance with sound co-operative practice, however, they appear on the balance sheet as indebtedness instead of surplus and are exempt from the federal income tax. Elevators may profit from the experience of co-operative creameries and milk producers' associations in converting the surplus into certificates of indebtedness that mature in 3, 5, or 7 years, thus creating a revolving surplus fund which is provided by those members using the elevator.

Table XXII shows yearly variation in methods of financing farmers' elevators from 1917-18 to 1922-23. These data are all based on audits made at, or near, the close of the year's business. Accounts payable is the chief and most variable item among current sources of capital. The price of grain and sidelines is the principal cause for its variation, and volume of business seems to be only a secondary factor.

TABLE XXII
SOURCES OF CAPITAL OF FARMERS' ELEVATORS FOR THE CROP YEARS, 1917-18 TO 1922-23
(Average per elevator)

	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23
Current sources						
Notes payable	\$3,800	\$3,400	\$2,830	\$4,850	\$5,500	\$4,260
Accounts payable	6,970	5,950	14,350	7,570	5,170	6,560
Sale of stored grain.....	0	0	0	4,460	0	0
Miscellaneous	40	130	590	940	320	780
Proprietorship						
Stock issued	6,330	7,810	8,470	8,510	8,830	10,120
Surplus	4,420	6,370	6,910	—1,390*	1,680	2,590
Sinking fund	380	80	260	110	230	80
Stock-purchasing coupons	380	70	70	70	70	160
Stock subscribed	240	330	140	70	80	450
Reserve-patronage dividend	0	100	300	290	100	160
Total	\$22,560	\$24,240	\$33,920	\$25,380	\$21,980	\$25,160
Net worth	11,750	14,760	16,150	7,660	10,990	13,560

* Deficit.

The policy of holding grain is a third factor that probably explains the large outstanding accounts in 1919-20. These accounts are due chiefly to commission merchants. Notes payable are much larger since 1920-21, the increase being due primarily to meeting losses incurred in 1920-21 by giving notes to commission merchants who had provided working capital. In only one year out of six were there any proceeds from the sale of stored grain for these elevators as a group.²¹ In 1920-21, when farmers stored unusually large quantities of grain, elevators realized an average of \$4460 from sales of stored grain. Thirty-one elevators of the 46 included in the analysis for that year obtained amounts varying from \$360 to \$92,460 from this source when audits were made near the close of the year's business.

The net worth of these elevators increased during the prosperous years of 1917-18 to 1919-21 from \$11,750 to \$16,150. The heavy losses of 1920-21 reduced the item to \$7660. The average surplus of \$6910 was completely wiped out by losses of that year and an average deficit of \$1390 appeared in its place. Since 1920-21, however, deficits are disappearing and surpluses are gradually increasing. Capital stock has also been sold to care for the increasing investment occasioned by the rising value of building and equipment and the higher price of merchandise and grain. In some instances additional stock has been issued to help meet a difficult financial situation. Keeping trading profits in the business and selling stock are, therefore, the two principal means by which elevators are regaining their former financial standing.

BUYING POLICIES

Grain may be handled for farmers in three ways: (1) it may be bought for cash; (2) it may be pooled; and (3) it may be sold for the producer and the proceeds returned to the producer less the fixed charges established for the handling and selling service.

Buying for Cash

More than 95 per cent of grain marketed by farmers' elevators in the Northwest is probably bought for cash. Most of it is bought at the time of delivery or shortly thereafter; a rather large quantity is bought after having been stored in the elevator; and a small amount is contracted for in advance of delivery. Only 21 elevators out of 55 from which information was secured on this point were using the contract method. Where grain is bought on contract it is generally

²¹ Proceeds from the sale of stored grain represent difference between storage tickets outstanding and stocks of grain in store and in transit.

contracted for only a few days in advance of delivery. This is done primarily to assure farmers a market for grain at threshing. Prices prevailing at time of delivery are usually paid so there is no unusual cost or risk involved in the method of purchase. Thirty to 60 day or even longer contracts are sometimes made, but they are usually avoided on account of the difficulty of collecting penalties and enforcing contracts when a turn of the market favors the farmer.

Gross trading profits, or the outcome of buying for cash by 109 elevators for 1922-23, are given in Table XXIII. The average is 6.7 cents per bushel and most of them fall within the range limits of 2 to 10 cents per bushel. These gross trading profits are not quite the same as margins, because they include income from sidelines and other sources, but they are nearly the same as margins and will be considered so in this study. Included in this 6.7 cents per bushel is 1.7 cents per bushel of income realized from sidelines and elevator services rendered for patrons. It is proper to do this because nearly all their costs have been charged to grain handling.

TABLE XXIII

RANGE AND DISTRIBUTION OF GROSS TRADING PROFITS OF 109 COUNTRY ELEVATORS, 1922-23

Cents per bushel	Number of elevators
Over 16	1
14 to 16	3
12 to 14	4
10 to 12	9
8 to 10	14
6 to 8	37
4 to 6	26
2 to 4	12
0 to 2	2
Less than 0	1
Total	109

Margins vary for different reasons: (1) They vary because costs vary. In general, those with higher costs have higher margins. (2) They vary because marketing policies differ; for example, elevators that do not hedge are liable to realize large gains or losses. Those that store are, likewise, liable to have larger gains or losses. (3) Those that misgrade, misweigh, or misdock have either gains or losses in consequence. (4) Certain types and grades of grains normally carry wider margins than others because of greater marketing costs or uncertainties. Elevators handling large quantities of flax and wheat ordinarily have larger margins than those handling chiefly corn and oats. Those handling low-grade grain have wider margins than those handling high-quality grain. The Grain Bulletin "Card," for example, allow elevators 5 cents for local market costs of operation in marketing No. 1 and No. 2 wheat, 7 cents for No. 3 and No. 4, and 9 cents

for No. 5 and poorer. (5) Buyers have varying degrees of success in determining the terminal market value of the grains they buy. Conservative buyers generally realize the largest trading profits.

There is, however, a good deal of the accidental in gross trading profits of individual grains. Wheat trading profits of the 109 elevators varied between elevators from a gain of over 14 cents per bushel to a loss of over 6 cents. Flax and rye trading profits had an even greater variation (see Table XXIV). In general, trading profits vary most widely for grains handled in small volume, because of the difficulty of estimating terminal grading and prices. This is the principal reason for the large gains and losses on Wheat and Durum in Table XXIV. The grains handled in large volume are generally marketed within narrower margins of profit. Wheat trading profits, for example, varied mostly from 0 to 12 cents per bushel, Durum from -2 to 10 cents per bushel, flax from 0 to 12 cents per bushel, rye from 0 to 8 cents per bushel, oats from 0 to 8 cents per bushel, barley from 2 to 8 cents per bushel, and corn mostly from 2 to 4 cents per bushel. These variations are sufficiently large, however, to indicate that an adequate trading profit on the whole amount of grain marketed is frequently dependent on the successful buying of one or two grains.

TABLE XXIV

DISTRIBUTION OF GROSS TRADING PROFITS OF INDIVIDUAL GRAINS FOR 109 FARMERS' ELEVATORS,
1922-23

Cents per bushel	Number of elevators						
	Wheat	Durum	Flax	Rye	Oats	Barley	Corn*
Gain							
14 and over	6	3	24	1	0	0	1
12 to 14	3	5	6	1	1	0	0
10 to 12	11	5	10	0	2	5	0
8 to 10	15	7	6	1	6	4	0
6 to 8	21	14	6	17	9	13	1
4 to 6	17	25	4	37	14	23	5
2 to 4	20	18	8	23	23	22	12
0 to 2	9	8	7	9	17	5	4
Loss							
0 to 2	3	6	5	2	2	2	1
2 to 4	2	4	4	1	3	1	0
4 to 6	0	1	3	3	2	1	1
6 and over	2	1	12	6	2	3	0
Total	109	97	95	101	81	79	25

* Ten of these 25 elevators are in addition to the 109 elevators for which margins on other grains are given.

The range in net operating gains or losses is equally significant. Of the 109 elevators, 21 had net losses ranging upwards of 4.6 cents per bushel and 21 had net gains of 4 cents and over, ranging as high as 10 cents (see Table XXV). Gains or losses for 99 elevators varied from a net loss of 2 cents to a net gain of 6 cents. The average of all elevators was a net gain of 2 cents per bushel.

TABLE XXV
DISTRIBUTION OF NET OPERATING INCOME FOR 109 FARMERS' ELEVATORS, 1922-23

Cents per bushel	Number of elevators
Gain	
8 and over	2
6 to 8	2
4 to 6	17
2 to 4	23
0 to 2	44
Loss	
0 to 2	15
2 to 4	4
4 and over	2
Total	109

Table XXVI shows the gross trading profits of these same groups of country elevators by years, and also their net profits and losses. In five years out of six, the elevators had an adequate net profit, and the heavy loss of 1920-21 was entirely offset by the large profit of the previous year if the difference in volume handled is taken into consideration. The net profits of 1918-19 and 1922-23 are really large when one considers the large volume of grain handled in these years. In general, margins are high in years of short crops, as in 1917-18, 1919-20, 1920-21, and 1921-22, but especially so in 1919-20. Market conditions are an even more important cause of fluctuation in margins. It was advancing prices that principally produced the margin of 15.0 cents in 1919-20, and declining prices that produced the low margins of 2.5 cents in 1920-21.

TABLE XXVI
GROSS TRADING PROFITS, EXPENSES, NET PROFITS AND LOSSES OF COUNTRY ELEVATORS BY YEARS, 1917-23, IN CENTS PER BUSHEL

	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23	All years
Gross trading profits.....	8.8	5.9	15.0	2.5	7.8	6.7	7.8
Expenses	5.5	4.1	9.0	7.4	6.5	4.7	6.0
Net profits	3.3	1.8	6.0	-4.9	1.3	2.0	1.8

In ordinary years, margins and expenses seem to be fairly well adjusted to each other, and leave a fairly regular net profit not far from 2 cents per bushel. Table XXVII substantiates the above statement that there is a good deal of the accidental in this after all, for margins vary greatly from year to year for different kinds of grain. Thus, after throwing out the abnormal years of 1919-20 and 1920-21, flax margins vary by years from 6.2 to 22.0 cents per bushel, oats from 2.8 to 6.6 cents, barley from 3.3 to 12.0 cents, and corn from -3.8 to 11.7 cents. It is only the circumstance that these elevators handle several kinds of grain that keeps their average margins somewhere nearly regular—this and the fact that wheat, the main crop of

this region, has rather regular margins. In a major corn-growing region no doubt corn margins are more regular than indicated here.

TABLE XXVII
AVERAGE OPERATING INCOME OF FARMERS' ELEVATORS BY SOURCES OF INCOME—
IN CENTS PER BUSHEL

Source of income	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23	All years
Grain trading profit.....	6.5	4.8	11.5	1.1	6.0	5.0	5.8
Wheat	5.0	5.3	16.7	1.6	6.5	5.8	6.8
Durum	1.5	2.7	10.8	6.0	5.7	4.9	5.3
Flax	22.0	8.9	4.8	-21.1	6.2	8.8	4.9
Rye	9.3	4.6	9.0	3.2	5.5	4.4	6.0
Oats	6.6	4.7	7.0	-1.5	4.8	2.8	4.1
Barley	12.0	6.5	10.5	-4.4	3.3	4.4	5.4
Corn	-3.8	-1	9.7	-1.7	11.7	2.9	3.1
Sideline trading profit.....	1.8	.7	2.5	.6	1.0	.7	1.2
Miscellaneous trading profit*....	.5	.4	1.0	.7	.8	1.0	.7
Total trading profit	8.8	5.9	15.0	2.4	7.8	6.7	7.7

* Consisting chiefly of income from elevator services.

It is evident from the above discussion that the success of buying for cash depends on all conditions and practices affecting costs and income, including competition; costs of elevator operation and selling; gains or losses from grading, weighing, docking, and hedging; the income from storing and other elevator services; and the accuracy of market information. The most difficult aspect of determining what an elevator can afford to pay in the Northwest is to get information that accurately reflects price changes in the central market. This is particularly true of wheat prices. Corn, oat, and rye prices usually vary only 1 or 2 cents per bushel for grain of the same grade. Price quotations by grade are therefore a good index of changes in market value. The chief problem is to select a quotation that most accurately reflects the price changes and that is most suitable to the elevator business, i. e., to choose between an opening or a closing of the market quotation, or a cash, or a "to arrive," or a "future" quotation.

Wheat prices, on the other hand, have a wide range within a grade, at the present time, often 30 or 40 cents per bushel, chiefly because protein content is not a grade factor altho it is an important price factor, especially when there is a scarcity of wheat containing a high percentage of protein. Under these circumstances, the usual grade range quotation loses much of its value. If closing cash prices of No. 1 Dark Northern range from \$1.40 to \$1.80, for example, a quotation giving this range is likely to be inaccurate either as a basis of purchase or as a check against sale prices for the elevator that is buying wheat that falls anywhere within the extremes of quality on which the quotation is based. A shipper may have discovered that No. 1 Northern from his station has been selling at about 20 cents over the low quotation, but this is no assurance that it will continue

to sell at prices that have the same relation to prices of low quality No. 1 Northern. Changes in supply of, or demand for, different qualities within a grade frequently cause changes in price of one quality within a grade without changing the price of other qualities.

Grain exchanges have simplified, altho not entirely solved the problem of using quotations based on such ranges in prices by issuing price quotations for the "fancy," "choice," "good," and "ordinary" qualities of principal grades of the Dark Northern subclass. This affects about 65 per cent of the Hard Red Spring wheat marketed and greatly reduces the spread in price of each quotation. Durum wheat of the Amber varieties is similarly quoted. The Grain Bulletin, whose service is subscribed for by approximately 90 per cent of the country elevators, has also tried to improve the accuracy of its quotations by including quality of grain as a factor in arranging reporting districts. Quotations of the Grain Bulletin, it should be noted, are distinctive from other market quotations reporting services in giving prices that an elevator can afford to pay, after deducting freight, average terminal selling expenses, and local costs of elevator operation.

The country buyer is still uncertain as to what should be paid for a large quantity of wheat, however. Official quotations do not break up the price spreads for grades of Northern and Red Spring subclasses. For example, only the prices of the ordinary quality are quoted for these grades. The Grain Bulletin cannot account for all the differences in quality of grain from the 13 different producing districts into which the Minneapolis-Duluth market area are divided on a basis for its reporting service. In some cases, more than the "card" prices can be paid, in others less, if the Grain Bulletin service is used. Out of 71 Minnesota elevators subscribing for this service in 1922-23, 53 were paying over "card" prices for wheat; 29 were paying over "card" prices for corn; 45, for oats; 36, for barley; 41, for rye; and 33, for flax. A few elevators were paying under the "card" prices. Probably not more than 50 per cent of all grain was being bought at "card" prices by elevators in the central and Red River Valley sections at the time the elevators were visited in the late fall and winter months of the crop year, 1922-23. Quotations of other reporting agencies are even more difficult to use because they do not reflect market conditions at the time quotations were made. The continuous quotations put out by these reporting agencies give the trend of prices over the daily trading period, but they probably do not reflect market conditions as accurately as quotations issued by an experienced reporter who has personal contacts with central market agencies and who advises country buyers what they can afford to pay. Moreover, quotations issued at frequent intervals are much more expensive than other types.

Under these circumstances, country buyers must use a great deal of discretion in buying. They must necessarily receive price information from more than one source. Of the 85 elevators visited in this study, 71 received the Grain Bulletin's daily "card" service; 46 of the 47 elevators in the Central and Red River Valley sections receiving it. Seventy-seven were subscribers either of price currents, the Commercial News Department (C. N. D.) service of the Western Union and Postal Telegraph companies, or they were receiving quotations telephoned from local mills. Practically all elevators receive telephone news of important market changes from commission firms with which they do business. Many subscribe for the special service of the Grain Bulletin which reports promptly important price changes. Others have an agreement with commission firms to telephone or telegraph sharp breaks or advances in prices. Radio receiving sets are also becoming more common for obtaining market reports. A few elevators are finding that the introduction of farm radio receiving sets is forcing them also to install radio receiving instruments to protect themselves against unknowingly buying large quantities of grain after central market prices have declined. Price quotations from these various sources thus supplement, and, in some cases, check each other, thus providing a better basis on which to buy.

The certainty of realizing anticipated trading profit would be much greater if prices could be quoted to a country buyer on the basis of grain shipped from his station. Such a development has not taken place in reporting, however, partly because it would be costly and partly because there are not always daily sales of grain from a given shipping point. Buyers marketing choice quality grain have therefore been obliged in the past to determine the premium on which their grain has been selling and on this basis assume that it has advanced or declined in proportion to the rise or fall of the premium, or spread in price for grain of that grade. This frequently results in loss, particularly on wheat, either from failure to properly calculate central market prices as mentioned above or from change in the demand for grain marketed from that shipping point. Terminal buyers have been buying spring wheats largely on the basis of their experience with grain shipped from a particular station, the reputation of the station being based chiefly on laboratory tests made after grain is purchased. The percentage of protein content varies, however, between lots of grain produced in the same community, the variation apparently being greater for some districts than others. For this reason buyers frequently become prejudiced against wheat from a given shipping point when they discover that they have bought some grain that has a lower quality than they had anticipated, and the country shipper loses on the grain that is in stock.

These losses are being gradually reduced since commercial laboratories are being established where protein tests can be made quickly and inexpensively. Some elevators marketing a wheat of high protein content are having protein tests made for a large proportion of shipments. Thus, frequent tests afford a better basis of sale than occasional tests often made by buyers. Other elevators have a large proportion of wheat shipments tested at the beginning of the crop movement and subsequently have only occasional tests made as a basis for sale, if the quality is uniform or low. Occasional elevators have a large proportion tested for protein content during the whole year, particularly if the percentage of protein is high. In this way, the grain all sells more nearly on its merit for this factor.

Pooling

All pooling of grain is done by central co-operative marketing associations—local elevators do not pool. Since pooling is a central market and not a local market problem, it will be discussed only briefly here.²²

Local co-operative associations pool products for various reasons. The chief reasons are: (1) to reduce the financial burden of the organization by having the producer wait for the payment of produce; (2) to shift risks of ownership of produce from the organization to the producer; and (3) to distribute risks of finding a market among producers by paying each producer the average net price received for all produce of similar grade and quality.

These reasons for pooling are relatively less important for grain elevators than for associations marketing many other kinds of agricultural products. Grain-shipping documents and warehouse receipts are first-class security for commercial loans. The risks of buying for cash can be almost completely shifted if hedging is practiced and properly done. Risks of price changes can be thus shifted so completely for no other product, except cotton. Moreover, risks of finding a market are less for grain than for most farm products. Farmers may sell grain, like most farm products, at the wrong time, but there is much less uncertainty in selecting the right market than when selling fruits, vegetables, and, to a somewhat lesser extent, dairy and poultry products, because grain is sold at comparatively few large central markets whose prices keep in line and whose exchanges disseminate comprehensive market information.

The important disadvantages of pooling are: (1) the farmer's inconvenience in waiting for the payment of grain; and (2) the difficulties

²² For a more complete discussion of the nature and problems of pooling see Black, J. D., Robotka, Frank, and Miller, P. L. "Local co-operative potato marketing in Minnesota." Minn. Bul. 195, pp. 32-36; also Black, J. D. and Price, H. B. "Central co-operative marketing organization." Minn. Bul. 211, pp. 41-53.

of equitably distributing expenses and price among producers. Farmers produce different quality grain in the same community. Nothing can be more inequitable than paying the producer of poor quality the same as the producer of high quality products. To distribute returns even on the basis of grade would not be just in many sections of the Northwest because variation in quality within a grade, particularly of wheat, is too great. Differentials for differences in quality should, therefore, be set up. But at the present time this is difficult because no simple measure of quality, especially protein content of wheat, is available. Grain producers have considered that these disadvantages of pooling offset advantages and have followed the policy of other local grain buyers with which they are familiar in buying for cash.

Farmers' elevators are frequently criticized as not being truly co-operative because they do not pool as other kinds of co-operative associations do. This point of view appears to be substantiated by the opposition of farmers' elevators to legislation designed to encourage pooling and to enforce membership contracts, and by the profit-making policy of some farmers' elevators. All that the authors can say on this point is that there is no difference in principle between buying for cash and paying 98 per cent of the purchase price and pooling, and paying 75 per cent of the market value when the grain is delivered. The co-operative character of a marketing enterprise is not determined by whether it has 2 per cent or 25 per cent of the value of product to distribute to patrons when the product is sold. It depends on many other considerations.

Shipping Service Basis

Shipping grain for the account of others consists in unloading the farmer's grain from the wagon, weighing it, elevating it into a bin for temporary storage, if necessary, and loading it into cars for shipment by the farmer. Cleaning, conditioning, and otherwise handling grain to improve its quality may also be done for others.

Marketing of grain in this manner is relatively unimportant. Only 40 per cent of Minnesota farmers' elevators elevate grain for farmers and then they elevate it only occasionally. The large number and distribution of farmer-owned and farmer-operated elevators gives producers confidence in the local price situation, and discourages direct shipment to the central market. Moreover, a relatively small proportion of producers find it convenient to market in carlot quantities, either because they do not produce in large quantity or because it is impossible or inconvenient to assemble grain for carlot shipment. The alternative to carlot shipping by such producers is to co-operate with neighbors in shipping a carload. The administrative difficulties of arranging for time of shipment and division of expenses and returns are so great,

however, that farmers have not undertaken co-operative shipping on a large scale. If the identity of each farmer's grain could be maintained, as livestock by a livestock shipping association, the problem would be much simpler but the expense and trouble of partitioning cars to maintain the identity of ownership offsets, in considerable measure at least, the savings to be obtained. The result is that this method of marketing is restricted chiefly to producers of carlot quantities of choice milling grains where local elevators do not pay as much as terminal market premiums would seem to warrant.

From the standpoint of the elevator, shipping for farmers has many of the advantages of pooling. It reduces the capital requirements and it shifts all risks from price fluctuations, from losses in transit and the like, discussed in previous sections. On the other hand, the typical American elevator is not properly constructed for handling grain in this manner on a large scale. Elevator capacity is consequently poorly utilized if grain is special binned. Such grain may be handled on warehouse receipts and better utilization of elevator space secured, but the producer thereby loses the chief advantage of shipping because he loses the identity and hence the premium that he would otherwise get for grain. Moreover, administrative difficulties of arranging for co-operative carload shipping of farmers who produce in less than carlot quantities are great and much dissatisfaction is likely to arise in assigning cars to shippers, prorating shipping expenses, dividing returns among shippers, etc.

An additional objection that is frequently made to this method of marketing is that the income would not maintain the present standard of management. Maximum legal charges allowed for elevating grain which includes receiving, weighing, elevating, loading out, and generally storing for 15 or 20 days, varies between grains and between states. The charge per bushel for wheat is 2 cents in North Dakota, 3 cents in Minnesota, $3\frac{1}{2}$ cents in South Dakota, and 4 cents in Montana.

Sufficient information is not available to indicate the adequacy of the charges. It is evident, however, that unless they do cover the cost of service that inequitable distribution of costs among producers marketing by different methods will inevitably follow. This is well illustrated from the experience of western Canadian elevators that elevate a large proportion of grain for farmers at charges of $1\frac{3}{4}$ cents and $2\frac{1}{2}$ cents per bushel, depending on whether or not this grain is special binned. These elevators earned a gross trading profit of only 3.3 cents per bushel on the grain handled for the account of others, including income from storing, cleaning, and other miscellaneous services, in 1922-23, and 7 cents per bushel on grain purchased. This appears to substantiate the contention of elevator operators that they

shift the loss on grain handled for farmers to purchased grain whenever possible. This is an important service which more spring wheat producers could probably profitably use. On the other hand, our discussion of the limitations and advantages of this method of marketing indicate that it cannot become an economical and satisfactory method for marketing a large proportion of the total supply under present local grain marketing conditions.

CLEANING

There is a wide variation in the practices of elevators with respect to separating foreign materials from grain. Thirty per cent of Minnesota farmer elevators do not clean grain at all. The others clean varying proportions of grain marketed. Little grain is cleaned for the account of others because handling and cleaning facilities are inadequate much of the time, particularly during the heavy movement of grain. Only 23 per cent of Minnesota elevators reported that they cleaned for farmers, altho it should be noted that a somewhat larger percentage were cleaning for others in the spring wheat sections.

Among the principal causes for variation in the extent of cleaning between elevators are variations in saving in freight by cleaning, value of screenings, effect of foreign materials on price received for grain, the kinds of foreign materials, and the kinds of cleaning facilities available.

Distance from market is an important consideration. An elevator whose freight rate is 40 cents per hundredweight can obviously afford to do more cleaning than an elevator with a rate of 20 cents. To a somewhat lesser extent differences in freight rates for the different grains also cause differences in the proportions of each grain cleaned. The value of screenings is a highly variable factor and depends largely on the value of feeds with which screenings compete. Some screenings are also more valuable than others. Wild oats, for example, are frequently nearly as valuable as the domestic varieties, whereas the seeds of kinghead generally have much less value. This means that the sale of screenings is not a dependable source of income for it varies between years and between local markets.

Grain that is cleaned may also be improved in grade and quality and therefore sell at a better price. In recent years this has been an important consideration because federal grades make foreign materials that cannot be separated from grain by usual commercial methods of cleaning, grading factors. Any elevator that could reduce the quantity of such foreign materials could thereby realize a profit from cleaning. Many elevators equipped with modern cleaners that remove such foreign materials have consequently been raising the grade of consider-

able quantities of wheat because the technique for making separations has developed more rapidly for flour mills and elevators than it has for inspection departments, with the result that much separable foreign material continued, until recently, to be a grading factor. The recent invention of the Perkins cleaner which is suitable for duplicating, on a small scale, in a laboratory, the methods of cleaning at elevators and flour mills greatly restricts the opportunity to raise the grade by cleaning, altho the quality of the grain may often be improved thereby.

Another factor that must be considered in formulating the cleaning policy is the effect of foreign material on the selling price of grain. Unpublished studies made by the division of agricultural economics show that materials that cannot be separated by commercial cleaning methods and that injure the quality of the manufactured product, as kinghead seeds in wheat, cause the price to be lower. If the supply of wheat with such admixtures is large, the price is likely to be lower by the full amount of the injury caused by foreign material. Otherwise, where there is only an occasional lot of grain with the infestation, such grain is frequently bought at, or near, the value of grain without the foreign material because it can be mixed with other grain that is commercially clean and thus lose its injurious qualities. On the other hand, foreign materials whose value exceeds the cost of cleaning and that can be commercially separated enhance the price of grain. The price is not always higher by the full market value of foreign materials because there are risks involved in cleaning grain and because there may not be keen competition among buyers for a particular kind of foreign material. The advice of the elevator's commission agent as to the premiums that are being paid for foreign materials is the best guide in this matter at the present time.

Cleaning machinery is not always adapted to separating foreign materials. Some kinds of foreign materials require special machines for cleaning as, for example, seeds that have the same diameter as the kernels of grain and that cannot be removed by the common method of running the grain over screens or sieves. This means that grain frequently cannot be cleaned with the type of cleaners generally installed when most elevators were built, or that new machines must be secured.

As an offset to these gains from cleaning there is the loss of grain, which is commonly estimated at 1 per cent, altho the loss varies between grains, types of cleaners, and methods of operating the machinery; and there is the extra cost of operation. Available data do not enable us to determine the cost of cleaning. Such information is obviously difficult to obtain because of the joint nature of elevator processing costs. However, it is clear that the cleaning requires power, labor,

management, space, and machinery. Frequently, it requires power, labor, and space that cannot be advantageously spared from the receiving and shipping of grain. The Minnesota Railroad and Warehouse Commission permits 2 cents per bushel as being a reasonable maximum charge for cleaning. Cleaning is undoubtedly more expensive when done for the account of others than for the account of the elevator, so that this charge may be higher than the cost of cleaning purchased grain. Nevertheless, it indicates that cost of cleaning is an important consideration in elevator operation.

The problem of cleaning grain is becoming increasingly important. The average amount of dockage in wheat received at Minnesota terminal markets has increased from less than 2 per cent to over 4 per cent in the last 20 years.²³ This does not adequately indicate increase in the percentage of foreign material in grain produced, because an increasingly larger amount of grain has been cleaned in country elevators. In 1923, for example, the average amount of dockage in wheat as threshed was 11.3 per cent in North Dakota, 7.7 per cent in South Dakota, 7.2 per cent in Minnesota, and 2.5 per cent in Montana. The average by counties in North Dakota ranged from 5.6 to 18.6 per cent. In Minnesota the average by counties in the important spring wheat sections varied from 3.9 per cent to 14.1 per cent. Most of this grain must be cleaned before it is milled. Members of farmers' elevators are in the peculiar position of being able to determine whether cleaning shall be done at the farm, at the local elevator, or at some later stage in the marketing process. It is not within the scope of this bulletin to discuss the relative merits of cleaning grain at the different steps in the production and marketing process, but it should be pointed out that there are some important problems of farm organization and terminal methods of marketing that must be considered in addition to the advantages and disadvantages of local elevator cleaning before a definite decision can be given as to where the cleaning should be done.

INSURANCE

Elevators insure against loss from fire, cyclones and tornadoes, and accident of employees. The most common insurance is against loss from fire. The average cost of insurance, as pointed out in an earlier section of the bulletin, was \$445 per elevator and 0.3 cents per bushel in 1922-23. The range was from less than 0.1 cent per bushel to over 1.0 cent per bushel. Approximately 50 per cent of the elevators had a cost varying from 0.2 cent to 0.4 cent per bushel.

²³ Black, R. T., and Boerner, E. G., "Report of the United States Department of Agriculture, Bureau of Agricultural Economics, on cleaning grain at the thresher." December, 1923, page 3.

The reasons for the variations in cost are differences in type of insurance carried, completeness of insurance, number of kinds of insurance carried, hazards, value of building and equipment, and sidelines carried, and combination of grains handled.

Elevators insure against loss from fire in two ways. The principal method is to insure buildings and equipment for a given amount, usually 80 per cent of the appraised value, and to insure grain and merchandise, on the basis of market value of stocks reported to the insurance company weekly. The other method is to insure for a fixed amount that covers loss of grain, merchandise, buildings and equipment; frequently separate policies are written for building and equipment, and grain and merchandise. Many elevators prefer this kind of insurance because it is not necessary to submit weekly reports or to keep records on which reports are based. On the other hand, elevators do not get as complete protection or as economical insurance as by the weekly-reporting basis because they do not take complete advantage of the cancellation features. Insurance companies generally permit elevators to cancel any part of a policy and they refund, prorata, the premium of the cancelled insurance. But managers are frequently careless in checking their insurance requirements, with the result that the business is often inadequately protected against loss or uneconomically provided with too much insurance. Either method of insurance may not give complete protection if care is not exercised to determine the insurable value.

Hazards vary widely among elevators because of differences in material used in construction, arrangement of elevator, and location. Brick, concrete, and ironclad elevators have a lower rate than all wood structures. A shingle-roofed elevator, for example, takes a 50 cent higher rate than an elevator with a metal or composition roof. Location of the fuel oil storage tanks, kind of belt covers, length of the engine exhaust pipe, kind of power, lightening protection, and other features of an elevator's arrangement, that affect the possible loss from fire, cause the rate to be higher or lower as they increase or decrease the hazards of fire losses. Many of these items, it should be pointed out, are easily controlled and the insurance cost frequently can, on that account, be reduced at small expense.

Elevators that are expensively built and equipped or that are not well adjusted to volume of business have high insurance costs because insurance is based on value. Elevators whose sideline business is large also have higher insurance costs because all insurance costs are charged to grain. Combinations of grains of small value have lower insurance costs than combinations of grain with large value. Elevators in southwestern Minnesota marketing oats and corn, therefore, have lower

insurance costs than elevators in the Red River Valley that market wheat and flax. Managers can exercise little control over these insurance cost factors for any particular year because the elevator is already built and equipped and kinds of grain produced and offered for sale must be bought. On the other hand, the range in insurance costs can be narrowed. Low costs can be raised if property is insured for its full insurable value and high costs can be reduced by preventing over-insurance, by using discretion in selecting an insurance agency, and by reducing fire hazards.

SIDELINES

Eighty-five per cent of the elevators included in this study are handling farm supplies. Supplies include, in the order of their importance, coal, feed, flour, twine, salt, seeds, implements, and other supplies necessary to farm operation. Table XXVIII shows that over 60 per cent of the farmers' elevators in Minnesota are handling coal, feed, and flour. Twine, salt, seeds, and implements are also common items of sale. Investigations of the Federal Trade Commission indicate that the percentage of elevators handling sidelines, the relative importance of the different kinds of merchandise, and the number of sidelines carried per elevator, are about the same in North Dakota and South Dakota as in Minnesota.²⁴

TABLE XXVIII
PERCENTAGE OF FARMERS' ELEVATORS HANDLING DIFFERENT SIDELINES IN MINNESOTA DURING
1924*

Sideline	Elevators
	Per cent
Coal	73
Feed	70
Flour	62
Twine	43
Salt	38
Seeds	34
Implements	20
Livestock	10
Tile	10
Wire	10
Lumber and building materials.....	6
Cement	6
Brick	4
Tires	4
Autos and tractors	3
Sand and gravel	1

* Data based on reports made by 385 elevators to secretary of Minnesota Farmers' Grain Dealers' Association.

²⁴ Report on the Grain Trade, Vol. 1, p. 172.

Grain elevators handle sidelines either because a large business can be done, because supplies do not increase the overhead cost, or because elevators can handle them more cheaply than other merchants. Handling bulky commodities which are sold at retail in comparatively large units is suited to the elevator business. Such commodities as coal, feed, flour, and lumber are generally hauled in grain wagons or trucks and are purchased when grain is delivered from the farm. Moreover, they are purchased in large quantities and therefore demand little time of the manager or his assistants. Such products are frequently loaded by the farmer himself and require only the extra time of weighing or measuring the load and making settlement. Extra labor is frequently needed to unload supplies when they are received and it is usually provided by employing day labor. Sidelines handled in small quantities are stored in unoccupied elevator space. Coal requires special sheds, also feed and flour when handled in large quantities; but these buildings are usually small and cheaply built. The two principal overhead costs, labor and building, are therefore not appreciably increased by the sideline business. Interest and insurance may be a little larger but the cost of marketing grain is not appreciably greater therefrom.

Sideline business constitutes a small percentage of the total business. It was only 8.6 per cent of the total business of all elevators in 1922-23. The volume of sidelines handled fluctuates between years, but its relation to the total business does not vary widely. Under these circumstances the management usually figures that since the elevator is organized primarily to market grain, it can afford to handle sidelines as long as the income pays the extra costs incurred and leaves a small amount to help defray overhead costs of the whole business. Occasionally the sideline business is as large as the grain business; long before this point is reached, it should begin to share in the fixed expenses.

Another method of handling expense is to make the supplies stand their proportion of the fixed expense. This method makes the grain business and the sideline business support each other. Grain can then be handled on a narrower margin. The difficulty with this distribution is that supplies may cost members so much that they can afford to buy elsewhere; and this may eventually force the elevator out of the supply business and lose an important source of income. A wiser policy would be to reduce the fixed expense enough to make the sideline business grow. This part of the business should not become so large, however, that it seriously interferes with the grain business. When it reaches this point a merchandising department or a separate supply business should be organized if it seems advisable for the grain producers to

engage in the supply business on such a large scale. Under these circumstances, the supplies should bear their proportion of all expense.

Table XXIX shows that the sideline income from 111 elevators varied from a loss for 2 elevators to a gain of over \$4000 in 1922-23. Seventy per cent of the elevators handling sidelines had a trading profit of less than \$1500. The average for the 111 elevators was \$970. Obviously, sideline business is important to the grain elevator business, and gains and losses from it often mean the difference between a profit or a loss on the elevator business. The chief reasons for variation in the sideline trading profit are: (1) differences in volume of sidelines handled; (2) differences in mark up; and (3) differences in the method of handling expense. Occasionally sidelines are charged their proportion of the fixed expense altho usually they are not. Moreover, the direct expenses of unloading sidelines, drayage, etc. are occasionally included as cost of merchandise and thus cause the trading profit to appear correspondingly smaller.

TABLE XXIX
DISTRIBUTION OF TOTAL SIDELINE INCOME OF FARMERS' ELEVATORS IN 1922-23

Amount of income	Number of elevators
Trading loss	2
No sideline income*	17
0 to \$500	30
500 to 1000	20
1000 to 1500	15
1500 to 2000	9
2000 to 2500	8
2500 to 3000	2
3000 to 3500	4
3500 to 4000	2
4000 and over	2
Total	111

* These elevators did not handle sidelines.

Table XXX indicates that coal is the most important and most dependable source of income from the sideline business. The income from flour and feed is almost equally important, but it varies widely from year to year, depending on the trend of prices of feed and flour, the production of locally grown feeds, and the price of locally grown and commercial feeds. Thus, in 1919-20, trading profits were large because prices of feed and flour were rising, while in 1920 they were small because prices were falling. Variations in income from flour and feed alone account for a very large part of variation in the total sideline trading profit. Other lines of merchandise handled are generally not important sources of profit.

TABLE XXX
 INCOME FROM SIDELINES OF FARMERS' ELEVATORS, 1917-18 TO 1922-23
 (Average per elevator)

Sideline	1917-18	1918-19	1919-20	1920-21	1921-22	1922-23
Fuel	\$ 430	\$ 350	\$ 680	\$ 460	\$ 410	\$ 520
Feed and flour.....	870	400	1120	70	330	160
Implements	100	170	150	70	60	50
Twine	70	80	-60*	20	0	110
Lumber	100	90	80	-30*	100	70
Miscellaneous	10	10	-30*	10	10	60
Total	\$1580	\$1100	\$1940	\$ 600	\$ 910	\$ 970
Cents per bushel grain marketed	1.8	.7	2.5	.6	1.0	.7

* Loss.

Another important problem is selling supplies for credit. Every elevator included in this study had accounts and notes receivable outstanding, the chief items of which were credits due from farmers. These accounts averaged \$5310 for all elevators in 1922-23. Large credit losses attending the agricultural depression beginning in 1920 have caused many elevators to grant credit less freely. Many elevators now sell supplies only for cash; others require that all accounts be approved by the board of directors; still others permit the manager to grant credit but only with the understanding that greater care be used in selecting accounts than has been exercised in the past.

Another difficulty of granting credit is the objection that commission firms and others financing elevators have to lending money to carry on the grain business and then have it used to carry on a supplementary enterprise in which the security is much less liquid and the risks much greater, particularly if credit is extended, than in the grain business. This may result in less favorable loans, unless an elevator provides its own capital to carry on the sideline business, or sells for cash.

ELEVATOR ACCOUNTS

Simple accounting systems suitable to the local elevator business have been prepared by the United States Bureau of Agricultural Economics and by commercial dealers in elevator supplies. These are discussed in other publications and need not be described here.²⁵ About 30 per cent of farmers' elevators in Minnesota use one of these systems; others use their own systems, which vary from a fairly complete double entry system to mere handbook entries kept in memorandum form for the manager's use.

²⁵ Mason, B. B., Robotka, Frank, and Swarthout, A. V. "System of booking for grain elevators." U. S. D. A. Bul. 811.

Humphrey, John R., and Kerr. "Systems of accounts for primary grain elevators." U. S. D. A. Bul. 362.

Humphrey, John R. "System of accounts for farmer elevators." U. S. D. A. Bul. 236.

Farmers frequently try to reduce expenses by cutting down on clerical help or not providing any at all. This policy is commendable if the manager has sufficient knowledge of accounting and time for bookkeeping. Otherwise, it is a false economy because it is likely to result in expensive audits or large losses that grow out of an inadequate check on operating policies by the manager and board of directors. Accounts that show the financial and operating position accurately on short notice are essential to elevator success.

Auditing the records is an important feature of elevator accounting that is now being given more consideration. Annual audits appear to be more common and a larger proportion of the audits are being made by disinterested parties, altho not more than 15 per cent of Minnesota farmer elevators and a smaller proportion of independent elevators are audited by public accountants. The tendency to employ experts in auditing is important, however, because more valuable financial and business analyses are made and more attention is given to setting up reserves for wasting assets and unexpected losses.