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Minnesota Farm Business Notes

FERTILIZER: Minnesota's Agribusiness Growth Industry

Dale C. Dahl

Dramatic increases in sales, encouraged by changes in manufacturing capacity and distribution methods, have marked fertilizer as an important growth industry in Minnesota. This article presents recent information regarding these developments and suggests their importance to the rural economy of the state.

Consumption

The amount of fertilizer sold for use in Minnesota averaged less than 15,000 tons per year before 1940. Since that year, sales trended upward at an *increasing rate* to over 700,000 tons by 1964 (see the figure, page 2).

Unlike many farm inputs, the price of fertilizer did not increase during the last 15 years. Improvements in manufacturing and distribution have made it possible to meet an increased demand for fertilizer at the farm level. This increase in demand is due, in large part, to better farm management. It is also the result of industry and university education and promotion programs proven through farmer experience.

In 1960 an important fertility gap was identified for Minnesota cropland.[1] The quantity of nitrogen and potash being removed from soils by crops was considerably greater than the amounts replaced by fertilizer.

Recent information suggests that this gap is being closed (table 1). Sales of such "straight materials" as anhydrous ammonia, nitrogen solutions, and solid potash have greatly increased. Furthermore, large increases in sales have been recorded for ratio mixtures containing both these elements.[2]

Distribution

Such a large growth in demand and sales does not occur without accompanying changes in patterns of primary material production, mixing, and distribution. The primary production of fertilizer nutrients — nitrogen, phosphorus, and potassium—has undergone some change in geographic source and number of firms. However, most of this change has occurred outside the state.

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[1] Robert D. Munson, "The Fertility Gap in Minnesota," *Minnesota Feed Service*, March 1962.

[2] Increases in ratios 1-2-0, 1-3-0, and 1-3-1 (table 1) may indicate increased blending plant activity.

Financial Indicators For Farm Supply Firms

Frank J. Smith and Robert J. Moeller

Recent studies of local farm supply businesses in Minnesota indicate that managers and boards of directors frequently lack appropriate information for evaluating their organizations' performance. This lack results partly from inadequate business records and partly from inadequate understanding and use of operating standards for these firms. This article is intended to fill part of this "knowledge gap."

A note of caution must first be sounded. Ratios may simplify the analysis of financial conditions. They allow easy comparison of the firm's performance from year to year, as well as comparisons between like firms in an industry. But such ratios are merely indicators. If a particular facet of the business is headed for trouble, a change in a ratio can sound a warning. However, the ratio change does not isolate the underlying cause of the problem. Additional analysis is usually required before appropriate corrective action can be taken.

Furthermore, financial ratios vary with accounting practices. Methods employed in asset and inventory valuation, as well as the rates of depreciation chosen, vary from firm to firm. As a consequence, interfirm comparisons are sometimes misleading. Therefore, casual comparisons are not recommended.

Finally, remember that balance sheet ratios are products of information recorded on only 1 day in the year. In many firms, these data are prepared just once annually. And they are prepared on a day when every attempt is made to be in the best possible financial condition. Ratios based on such data could lead to false conclusions about the business. One method of avoiding this problem is to make monthly balance sheets and operating statements.

For purposes of analysis, 79 firms were selected.[1] They were divided into three product groupings:

- Firms with two-thirds or more of their sales in petroleum and related products were classified as petroleum firms.
- Firms with two-thirds or more of their sales in feed, seed, and related products were classified as feed and seed firms.
- Firms were placed in a combination group if they sold petroleum, feed and seed, and related products but if no one of these classifications represented two-thirds of the sales.

Moreover, firms within each product group were selected to represent either "most profitable" or "least profitable" operations (as reflected in net operating margins and returns on net worth).

Table 1 summarizes selected operating statement data for firms in the three product groupings studied. Several conclusions can be drawn:

1. **Gross margins**—total sales less cost of goods sold (including losses from shrinkage, theft, or obsolescence) divided by total sales—were consistently higher in the "most profitable" firms. Gross margins are affected by prices received for merchandise sold, the particular combination of products handled, and the net prices of goods purchased for processing and/or handling and "leakage." Evidently, managers of the "most profitable" firms could control these variables effectively.

2. **Merchandising expenses** — wages, commissions, truck expenses, and advertising divided by total sales—were uniformly lower on a relative basis in the "most profitable" firms. Table 1 indicates that differences occur primarily in merchandising wages. Less profitable firms probably are underutilizing their labor force. This conclusion suggests a need for careful evaluation of total labor requirements and adequate labor supervision.

3. **Administrative and general expenses**—heat, lights, power, manager's or owner's salary, and other expenses

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[1] All firms included were cooperatives.

Fertilizer . . .

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Table 1. Fertilizer sold for consumption in Minnesota by ratio composition, 1960 and 1964

Fertilizer	1960	1964	Percent change 1960-64
	thousands of tons		
Phosphate and potash only	28.9	36.4	+ 26
Nitrogen and phosphate only			
Ratio 1-1-0	13.5	14.2	+ 6
Ratio 1-2-0 and 1-3-0	16.5	47.5	+ 188
Ratio 1-4-0	26.4	13.0	— 51
Complete mixed dry fertilizers			
Ratio 1-1-1	22.3	29.3	+ 32
Ratio 1-2-2	16.5	19.9	+ 21
Ratio 1-3-1	8.1	21.4	+ 163
Ratio 1-4-2	79.4	85.7	+ 8
Ratio 1-4-4	110.8	151.7	+ 37
Other ratios	59.9	80.7	+ 35
Straight materials			
Solid nitrogen materials	20.7	31.0	+ 50
Anhydrous ammonia	6.3	19.4	+ 206
Nitrogen solutions	16.8	70.1	+ 319
Solid phosphates	29.1	41.0	+ 41
Solid potash	10.4	36.7	+ 253
Liquid mixes	15.2	16.3	+ 7
Other	1.8	3.0	+ 69
Totals	482.8*	717.7*	+ 49

* Totals are from unrounded figures.
Source: Minn. Dept. of Agr.

Prior to 1955, several centrally located fertilizer mixing (manufacturing) operations in Minnesota purchased fertilizer nutrients from primary producers. They mixed them into grade formulations, bagged them, and sold them at wholesale to smalltown feed, seed, and fertilizer stores or grain elevators.

About 95 percent of the fertilizer sales were made in bag form prior to 1955 with the remainder sold in bulk. This method of fertilizer mixing and distribution is still the dominant means of getting fertilizer to Minnesota farmers. Some estimates suggest that 80 percent of fertilizer sales are still made in this way.

However, 1955 was the birthdate of a new distribution method in Minnesota that is revolutionizing the state's fertilizer industry. The concept of bulk blending at decentralized locations became a reality in Minnesota that year.

Basically, bulk blending is the mixing of two or more dry, and usually granular, ingredients according to farm specifications. In essence, these small decentralized manufacturing plants are not greatly unlike the larger centralized mixing operations discussed earlier.

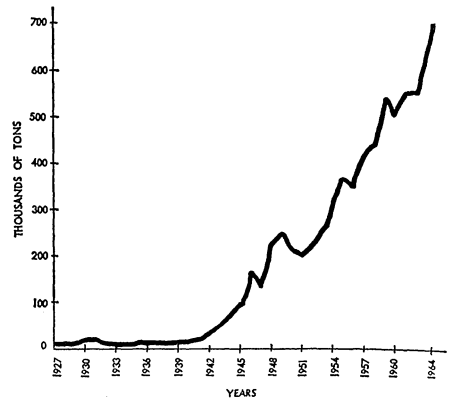
These plants are located in geographic areas of high fertilizer consumption (frequently small towns in farming areas). Their special feature is the mixing of fertilizer to the needs of the individual farmer rather than in general grade ratios.

Bulk blenders usually provide many services to the farmer: soil fertility programs, soil samples, farm soil maps, crop records, fertilizer recommendations, mixing ingredients in ratio desired, and delivering and spreading fertilizer on the farmer's field.

Farmers have responded with increased purchase of this "fertilizer-service" package. So many companies have been encouraged to locate bulk blending plants throughout the state but mostly in the southern and central agricultural areas. In 1955 Minnesota had only one bulk blending plant in operation; by May 1965 (just 10 years later), 163 such blending plants were in the state.

Most blending plants have come into existence within the past 6 years. In 1959, 29 blending plants were in Minnesota; in 1961, there were 58; in 1964, 99. By May 4, 1963 this number increased to 163.

Nevertheless, this growth in one phase of fertilizer industry activity should not disguise the importance of other manufacturing operations in the state. Most plants engaged in custom dry blending also dry mix to grade. Therefore, this fertilizer manufacturing activity has dramatically increased as well (see table 2).



Total tons of fertilizer sold for use in Minnesota, 1927-64.
Source: Minn. Dept. of Agr.

Other significant increases include liquid grade manufacture and liquid blending to customer request. Increases in specialty grade formulation are indicative, in many respects, of the expanding urban market for lawn and garden fertilizer.

Conclusion

If fertilizer usage trends continue, the fertilizer industry of Minnesota can play an increasingly important role in the economic development of the state's rural areas.

Continued expansion in numbers of fertilizer plants will provide new opportunities for smalltown industrial growth that have been difficult to find. However, such plants do not provide much increased employment—one or two men are able to handle the whole operation. But, these plants provide some additional source of wages, building funds, and normal small plant manufacturing expenditures.

Increases in fertilizer usage by Minnesota farmers, if crop prices remain reasonably stable, will also bring increased returns due to greater yields. These increased returns will be beneficial not only to the state's farmers but also to communities where farmers normally purchase other input items and farm consumption goods. ■

Table 2. Fertilizer manufacturing activities by Minnesota and out-of-state* plants, July 1, 1964 and May 4, 1965

Activity	As of July 1, 1964		As of May 4, 1965	
	Minnesota plants	Out-of-state plants	Minnesota plants	Out-of-state plants
Dry blending to customer formula	99	7	163	12
Dry mixing to grade	83	35	152	37
Chemical formulation to grade	20	32	28	35
Ingredient manufacture	6	30	8	34
Liquid grade manufacture	19	23	34	27
Liquid blending to customer request	9	2	24	4
Specialty grade	5	2	12	25

* Plants not located in Minnesota that sell to Minnesota farmers.
Source: Minnesota Department of Agriculture.

Minnesota Farm Business Notes

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Financial Indicators . . .

(Continued from page 1)

not included under merchandising expense, divided by total sales—were also lower in the "most profitable" firms. The manager's salary is the largest item under administrative expense. Only in feed and seed firms was the manager's salary as a percent of sales relatively lower in the "most profitable" firms.

4. **Net operating margins**—total sales less cost of goods sold, merchandising expenses, and administrative and general expenses, divided by total sales—were from 2 to 30 times higher in the "most profitable" firms as compared to the "least profitable" firms studied. This result was due to effective control of factors influencing gross margins and merchandising expenses.

Table 2 presents a summary of selected balance sheet and balance sheet-operating statement ratios designed to indicate the liquidity, solvency, efficiency, and profitability of the three categories of farm supply firms.

The current and acid test ratios are liquidity measures. They indicate whether or not the firm can meet its current obligations. A firm could conceivably be "debt free" but not have sufficient working capital to take advantage of quantity and purchase discounts, to meet emergencies, or even to pay current bills. Liquidity ratios for the "most profitable" firms were, on the average, considerably higher than for the "least profitable" firms.

The net worth/total assets ratio is a measure of solvency. This ratio reflects the amount of permanent capital requirements of the business supplied by the owners.[2] It is an important ratio in evaluating whether creditors or owners are likely to control the firm. From a lender's point of view, this ratio indicates problems they would have in recovering their money in the event of failure. Therefore, it influences the availability of outside capital to the business. In this study, the net worth/total asset ratios were from 9 to 20 percent higher for the "most profitable" firms than for the "least profitable."

Two efficiency ratios are also presented in table 2. The cost of goods sold/inventory ratio is a measure of inventory turnover. It indicates the efficiency with which working capital (tied up in inventory) is utilized. In petroleum and feed and seed firms, inventory turnovers of the "most profitable" were one and one-half times greater than for the "least profitable" firms; for combination firms, one and one-fourth times greater. These significant differences stress the importance of developing and executing appropriate inventory control policies in farm supply firms.

Another commonly used efficiency measure is the average collection period for accounts receivable. It provides a rough indication of the amount of annual sales revenue tied up in receivables. Table 2 data reveal that the average collection period for "most profitable" and "least profitable" firms does not differ significantly. This fact, contrary to popular belief, suggests that perhaps a more precise measurement of the relation between receivables management and profitability is needed.

Finally, the net operating margin/net worth and net operating margin/total assets ratios are indicators of the overall profitability of the business in relation to the capital invested in it. These ratios provide a basis for evaluating opportunity costs (what could be earned by a similar investment elsewhere) of providing capital to the particular business. If return on investment falls below what could feasibly be earned in another investment over time, capital would be withheld or withdrawn.

In general, the "most profitable" firms had somewhat higher ratio values in all categories. An immediate question that comes to mind is whether one or more of these ratios tend to be more closely associated with variations in net margins than the others. Excluding ratios with *returns built-in* (net margin/net worth and net margin/total assets), variations in each ratio were studied in relation to variations in net margins.

Results of this analysis indicate that variations in net margins are not significantly associated with variations in any *particular* ratio value. So no one ratio discussed here may be considered a more reliable indicator of successful operation than the others. Apparently, good management of the liquidity, solvency, and efficiency areas of the business acts cumulatively to generate acceptable net return performance.

In summary, the various operating statement and balance sheet ratios discussed can be used as indicators of the overall health of a business. Furthermore, effective performance calls for a balanced look at each of the several aspects of the business. The manager who ignores any facet of the total organization surely cannot expect exceptional results. ■

Table 1. Comparative operating statements for farm supply firms

	Petroleum		Feed and seed		Combination	
	Most profitable (n = 17)	Least profitable (n = 16)	Most profitable (n = 10)	Least profitable (n = 8)	Most profitable (n = 14)	Least profitable (n = 14)
	percent of total sales					
Gross margin	23.60	20.22	18.43	17.66	21.85	18.90
Merchandising expense	8.22	11.41	8.90	9.80	10.93	11.06
Merchandising wages	*5.57*	*8.00*	*6.44*	*6.95*	*6.94*	*7.93*
Administrative expense	3.00	3.16	2.25	3.39	2.59	2.62
Manager's salary	*2.33*	*2.40*	*1.66*	*2.59*	*1.58*	*1.56*
Net operating margin	8.68	4.01	3.49	0.12	4.49	1.76

Table 2. Median ratio values of farm supply firms

	Petroleum		Feed and seed		Combination	
	Most profitable (n = 17)	Least profitable (n = 16)	Most profitable (n = 10)	Least profitable (n = 8)	Most profitable (n = 14)	Least profitable (n = 14)
Liquidity:						
Current ratio	6.3	3.3	4.6	2.9	4.3	2.5
Acid test ratio*	4.6	1.7	2.7	1.2	2.3	1.3
Solvency:						
Net worth/total assets	90%	82%	76%	63%	90%	76%
Efficiency:						
Cost goods sold/inventory	7.3	4.7	7.4	5.0	6.8	5.4
Average collection period† (days)	33.3	33.1	20.8	21.7	25.4	29.9
Profitability:‡						
Net margin/net worth	10.6%	4.9%	10.4%	0.4%	6.7%	3.6%
Net margin/total assets	10.1%	4.4%	8.2%	0.6%	5.7%	2.7%

* Cash, marketable securities, accounts receivable under 60 days old ÷ current liabilities.

† Accounts receivable × 300 ÷ sales.

‡ Net margins exclude dividend payments from outside investments as well as patronage refunds to the firm from related regional organizations.

[2] Other ratios commonly used for this purpose are net worth/total liabilities and net worth/fixed assets.

the outlook corner

FARM SUPPLIES

J. C. Chai and Henry Hwang

The total U.S. farm output increased nearly 30 percent between 1950 and 1963 while the total inputs used increased only 1 percent. This gain in farm productivity was brought about by changes in the kind and quality of the input mix and improved management practices.

An important factor affecting increased output has been the growing reliance of U.S. farmers on purchased inputs as compared to nonpurchased inputs. Purchased inputs made up 67 percent of all inputs used in 1963 as compared with 63 percent in 1957, 57 percent in 1950, and only 46 percent in 1940. Nonpurchased inputs—including operator and family labor, operator-owned real estate, and other capital items—continue to decline both in total amounts used and the relative share of the total inputs used.

Farm supplies—including feed, fertilizer and lime, petroleum products, seed, and other miscellaneous items—constituted about 40 percent of total production expenses of farmers during 1950-62.

Feed was the largest expenditure item (see figure 1). U.S. farmers spent $3.91 billion on purchased feed in 1954 and $5.47 billion by 1962. Since prices of purchased feed remained relatively stable, the increase in physical volume was substantial during this period (see figure 2).

In 1962, fertilizer ranked as the second largest farm supply expenditure, followed in third place by petroleum products. Prior to 1961, these rankings were reversed.

Fertilizer and lime expenditures have increased more rapidly than petroleum products expenditures during recent years. Farmers spent $1.27 billion in 1954 and $1.54 billion in 1962. Since prices of fertilizer and lime were stable, the increased expenditure represents an increase in quantity purchased.

Farmers spent $1.36 billion on petroleum products in 1954 and $1.55 billion in 1960. But expenditures for this item dropped by $10 million in 1962. Increasing expenditures on petroleum products were partly absorbed by price rises without parallel increases in volume during 1954-62.

Expenditures on seed were $542 million in 1954 and $539 million in 1962, with substantial year-to-year variations.

Data on miscellaneous items—building materials, parts, tires, batteries, pesticides, miscellaneous hardwares, containers, veterinary medicines, binding materials, dairy supplies, greenhouse and nursery supplies, small hand tools, and harness and saddlery—are available only for 1954 and 1960. Expenditures were $1.79 billion in 1954 and $2.08 billion in 1960. Tires, batteries, parts, and pesticides accounted for most of the increase.

As for the United States as a whole, feed constituted the largest single expenditure for farmers in the West North Central Region which includes Minnesota. The rate of volume increase in feed purchased in the West North Central Region was smaller than the increase for fertilizer and lime. During 1950-62, the increase in volume of purchased feed was 75 percent whereas the increase in volume purchased of fertilizer and lime was 157 percent (see figure 2).

The volume of petroleum products purchased by farmers in the region remained about the same between 1950 and 1962.

The amount of seed used by farmers of the region also remained relatively stable but increased at a slightly greater rate than that of the nation during 1950-62.

These trends suggest opportunities for further expansion of fertilizer and feed sales in Minnesota and the United States. However, sales of petroleum products and seed probably have reached their plateaus. ■

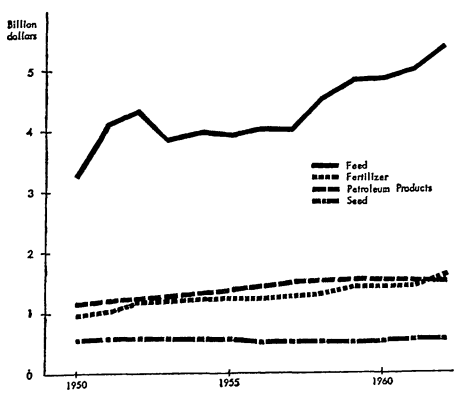

Figure 1. Expenditures for four major farm supplies, United States, 1950-62.
Source: *Farm Income*, FIS 191 Supp., ERS, USDA, Aug. 1963.

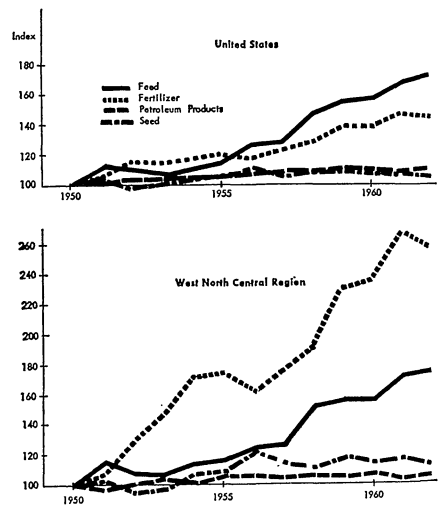

Figure 2. Index of sales of four major farm supplies, United States and West North Central Region, 1950-62 (1950 = 100).
Source: *Farm Income*, FIS 191 Supp., ERS, USDA, Aug. 1963; *Handbook of Agricultural Charts*, No. 275, USDA, 1964.

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