Identifying an efficient feed distribution system
in the Midwest

Marty J. McVey
AGRI Industries
West Des Moines, Iowa
Phone: 515-223-5162
Fax: 515-223-7770
E-mail: marty@agri-industries.com

C. Phillip Baumel
Iowa State University
Ames, Iowa
Phone: 515-294-6263
Fax: 515-294-1700
E-mail: pbaumel@iastate.edu

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Introduction

The changing structure of the U.S. livestock industry is having a profound impact on the feed manufacturing and distribution system. Large-scale confinement animal production has facilitated the construction and operation of low cost, high volume mega-mills, many of which are owned by integrators[1]. The shift to large-scale confinement feeding has also enabled feed mills to capture savings from delivering large – 24 ton – quantities of feed up to 50-miles to one production location in low-cost semi-trailer truckloads. The construction of mega-mills, the expansion of some older relatively efficient mills, and the failure to close older, less efficient mills, has resulted in excess feed manufacturing capacity, placing substantial downward pressure on feed manufacturing margins.

Many old, less efficient mills have remained in production for two reasons:

- Most of these mills are nearly or fully depreciated, so they can remain in operation as long as margins exceed variable costs.
- While most of the poultry and swine are produced in large, integrated confinement feeding operations, a substantial number of small traditional livestock producers buy feed from small, less efficient mills. These traditional producers buy in small volumes and are unable to receive feed in semi loads. The number of traditional livestock producers is declining. Other small niche feed markets exist that can also be served by small, less efficient feed mills.

Even though these older, less efficient mills continue to operate, these mills are unlikely to be upgraded to compete with the larger, efficient mills. Over the long-run, most of these small, inefficient mills will likely close as their equipment wears out.

[1] An integrator is a company that controls more than one phase of hog production, feed manufacturing, processing and distribution.

The decisions facing large-scale integrators and the owners of small inefficient mills are clear. Integrators will build new feed mills unless the same volume and quality of feed is available from existing mills at a cost equal to or lower than that from a new integrator-owned mill. Owners of older, less efficient mills will operate as long as margins exceed variable costs and no large investments are required to keep the mill operating. Relatively efficient mills, however, face several options, including:

- Build new efficient mills to keep integrators from invading their trade areas.
- Upgrade their mills to compete with existing and potential new integrator mills.
- Buy or merge with nearby competing mills to generate enough business to operate efficient mills at full capacity and close inefficient mills.
- Form joint ventures to capture the cost savings from full utilization of efficient mills and reduce or eliminate cross-hauling and cross-sales efforts.
- Do nothing. Hope that integrators do not build in the market area and that small, inefficient mills wear out and close faster than expected.

This paper presents the results of an evaluation of these options for three farmer-owned cooperatives in the Midwest. We refer to these three organizations as "**The Cooperatives**." The purposes of this study were to:

- Develop a model to replicate the 2001 manufacture and delivery of feed in the 12-county area included in the study,
- Evaluate the impact of alternative investment strategies on the quantity of feed sold and profitability of The Cooperatives.

Theoretical framework

The feed manufacturing and distribution system profit maximization problem has the following characteristics. Each feed mill has the opportunity to sell feed to every farm in the 12-county study area. For simplicity, feed can be delivered in tandem-axle trucks or semis. Feed is typically purchased on a "cost plus" basis; that is, the cost of feed to the livestock feeder is equal to the cost of feed ingredients plus a fixed margin to cover feed manufacturing and delivery costs and feed mill profits. The model maximizes total system profits expressed as:

$$\pi = \sum_{m=1}^{M}\sum_{l=1}^{L}\sum_{v=1}^{V}\sum_{f=1}^{F} (GM_{ml} - mfg_m - t_{mlvf})Q_{mlvf} \tag{1}$$

subject to the following constraints:

$$\sum_{m=1}^{M}\sum_{v=1}^{V} Q_{mlvf} \leq \overline{Q}_{fl}, \forall f, l \tag{2}$$

$$\sum_{l=1}^{L}\sum_{v=1}^{V}\sum_{f=1}^{F} Q_{mlvf} \leq \overline{Q}_m, \forall m \tag{3}$$

$$\sum_{l=1}^{L}\sum_{f=1}^{F} \alpha_m Q_{ml1f} - \sum_{l=1}^{L}\sum_{f=1}^{F} \beta_m Q_{ml2f} = 0, \forall m \tag{4}$$

where π represents total system profits, GM_{mi} is the gross margin received for a ton of feed from mill *m* for livestock class *l*, mfg_m is the manufacturing cost for feed at mill *m*, t_{mlvf} is the transport cost of feed from mill *m* to farm *f* in vehicle *v* for livestock class *l*, Q_{mlvf} is the amount of feed sold and delivered to farm *f* from mill *m* by mode *v* for livestock class *l*, $\overline{Q}_{fl}$ is the quantity of feed required to feed all livestock of class *l* on farm *f*, $\overline{Q}_m$ is the quantity of feed currently produced at mill *m*, α_m and β_m are parameters requiring feed shipments by vehicle type in proportion to current distribution patterns for feed mill *m*.

Equation 2 constrains the model to ship only enough feed to meet the nutritional needs of the livestock feeder's herd. Equation 3 constrains the mills in the model to produce feed up to the levels they produced in 2001. Equation 4 constrains the feed mills in the model to deliver feed in the same vehicle proportions that they delivered in 2001.

The linear programming model is solved using the Cplex algorithm in the GAMS software. By maximizing system profits, the model treats the optimization as if there is a single decision-maker for all of the feed mills in the study. The following simulations approximate the possible benefits to the entire system:

I. Base solution: Maximize total system profits for the year 2001.

II. Expand/abandon: Expand the capacity of two efficient feed mills owned by The Cooperatives by adding a third working shift. This third shift increased the capacity of the two mills by 50 percent. Then, these two mills were allowed to produce up to mill capacity. In addition, two smaller, older feed mills owned by The Cooperatives were closed.

III. Expand only: Expand the capacity of the two efficient feed mills of The Cooperatives by 50 percent by adding a third working shift. These two mills were allowed to produce up to mill capacity.

IV. Compare distribution costs: Compare the actual distribution costs for five feed mills owned by The Cooperatives with their costs from the base solution.

V. Integrator challenge: Add a newly constructed 300,000-ton mega-mill to the model in the heart of the trade territory.

Data

A small number of chicken layers, grain fed cattle, dairy cows and horses are located within the 12-county study area. However, most of the feed for these animals comes from specialty mills, bagged feed, or feed manufactured on farms. Most of the 31 mills included in the model tend to exclusively manufacture bulk hog feed. Therefore, this study was limited to bulk swine feed production.

Map 1 shows the boundaries of the 12-county study area, the finisher hog densities per square mile and the locations of the 31 mills included in the study. Nine of the 31 mills are located outside of the 12-counties, but deliver feed into the study area. The data for the hog densities per square mile, feed rations, feed mill locations, capacities, utilization, and costs were provided by an advisory committee consisting of one representative from each of The Cooperatives.

Farm data

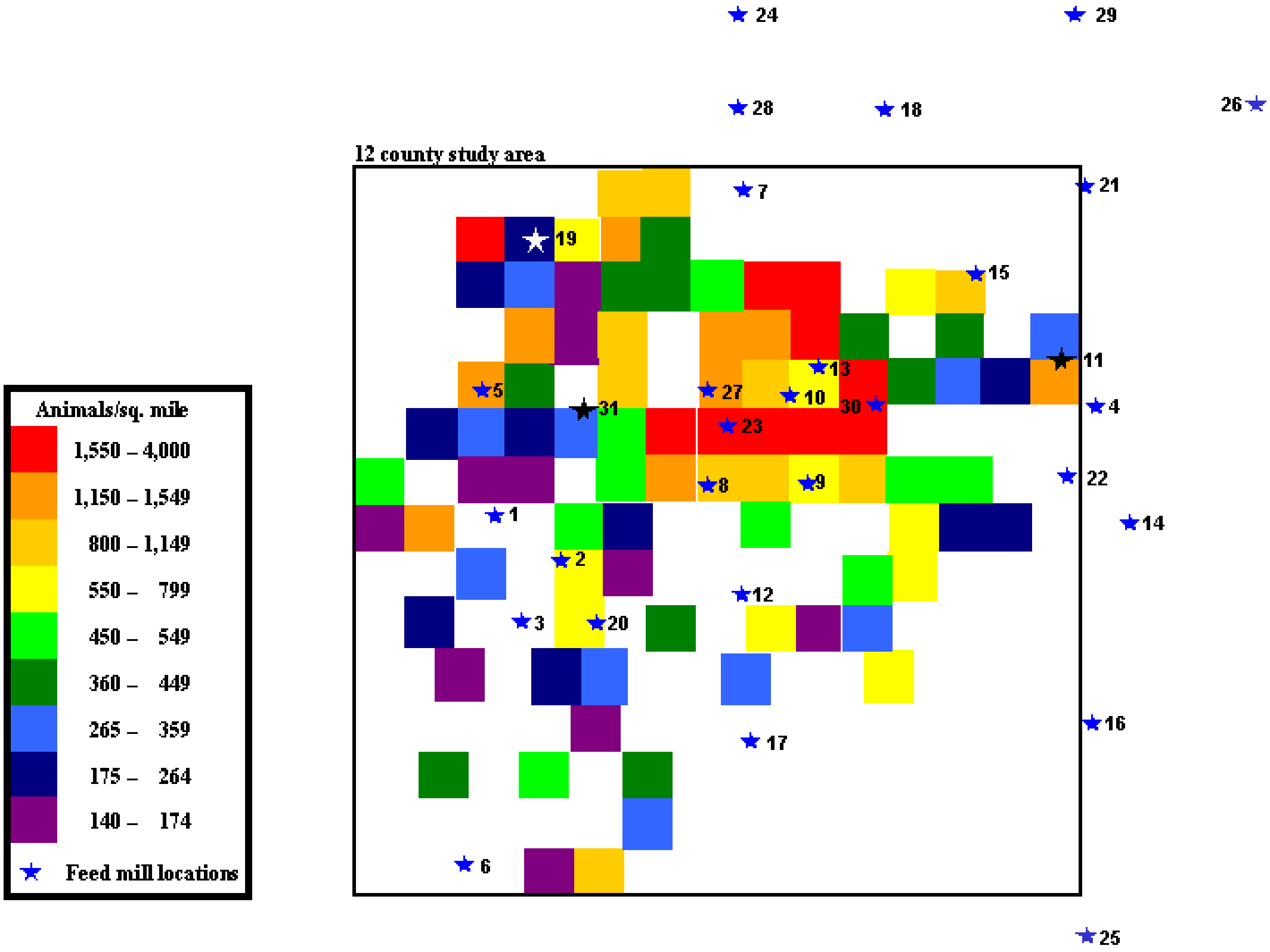
The 12-county study area was divided into 2-mile by 2-mile farms. Using road surveys, informal customer surveys, and local feed mill surveys, the advisory committee estimated the number of sows, nursery pigs, and grower-finishers on each farm in 2001.

Table 1 shows the feed ration used for each swine class. Corn is the major ingredient in bulk swine rations comprising 60- to 80-percent of the diet. Soybean meal, either 44- or 48-percent protein, was the next largest ingredient. Corn and soybean meal make up 85- to 95-percent of the total swine diet. Sows were fed 4.5-pounds per day when not lactating and 14-pounds per day when lactating. Sows were assumed to lactate 42-days per year. Thus, each sow consumed 2,041-pounds of feed per year. Nursery pigs were assumed to consume 42-pounds of feed per pig, and grower-finishers were assumed to consume 644-pounds per pig.

Table 1. Swine feed rations by class

Ingredient	Pounds per ton		
	Sows	Nursery	Grower-finisher
Corn	1,299	1,195	1,593
44% soybean meal	400	0	0
48% soybean meal	0	543	310
Dical	38	10	25
Salt	12	5	10
Dried whey	0	90	0
Limestone	0	5	15
Liquid fat	0	33	40
Pre-mix products	0	119	0
Vitamin	0	0	2
Trace minerals	0	0	2
Lysine	0	0	3
Other	251	0	0
Total pounds	2,000	2,000	2,000

Map 1. Finisher hog densities by square mile and feed mill locations



Feed mill data

Table 2 shows selected production and distribution characteristics of the 31 mills included in the study. Mill capacities, based on two fully staffed manufacturing shifts -- 16-hour days -- ranged from 8,000-tons to 300,000-tons annually. Annual mill capacity utilization ranged from 25-percent for mills 1, 25 and 28, to 100-percent for mill 19. On average, the 31 mills operated at only 55-percent of total capacity. The Cooperatives own feed mills 23, 27, 30, and 31.

Table 2. Manufacturing capacities and delivery vehicles of the 31 feed mills

	Thousands of tons		Percent delivered by	
Mill number	2001 annual tonnage	Annual capacity	Semi	Tandem-axle
1	4.0	20.0	0	100
2	5.0	10.0	0	100
3	4.0	8.0	0	100
4	16.0	24.0	0	100
5	6.0	20.0	0	100
6	10.0	20.0	0	100
7	35.0	70.0	25	75
8	40.0	80.0	20	80
9	12.5	40.0	0	100
10	50.0	120.0	0	100
11	20.0	40.0	0	100
12	30.0	120.0	0	100
13	12.0	40.0	0	100
14	20.0	80.0	0	100
15	16.9	50.0	0	100
16	30.0	70.0	0	100
17	100.0	150.0	70	30
18	50.0	200.0	30	70
19	80.0	100.0	70	30
20	20.0	20.0	90	10
21	160.0	300.0	70	30
22	25.0	30.0	0	100
23	20.0	25.0	0	100
24	120.0	180.0	70	30
25	160.0	200.0	70	30
26	140.0	300.0	100	0
27	135.0	168.8	50	50
28	225.0	300.0	100	0
29	140.0	300.0	100	0
30	90.0	112.5	90	10
31	20.0	25.5	70	30

Fifteen of the 31 mills owned and operated semi feed delivery trucks. The other 16 mills used a combination of single-, tandem-, and/or triple-axle feed delivery trucks. For simplicity, single-, tandem- and triple-axle trucks were represented by tandem-axle trucks in the model.

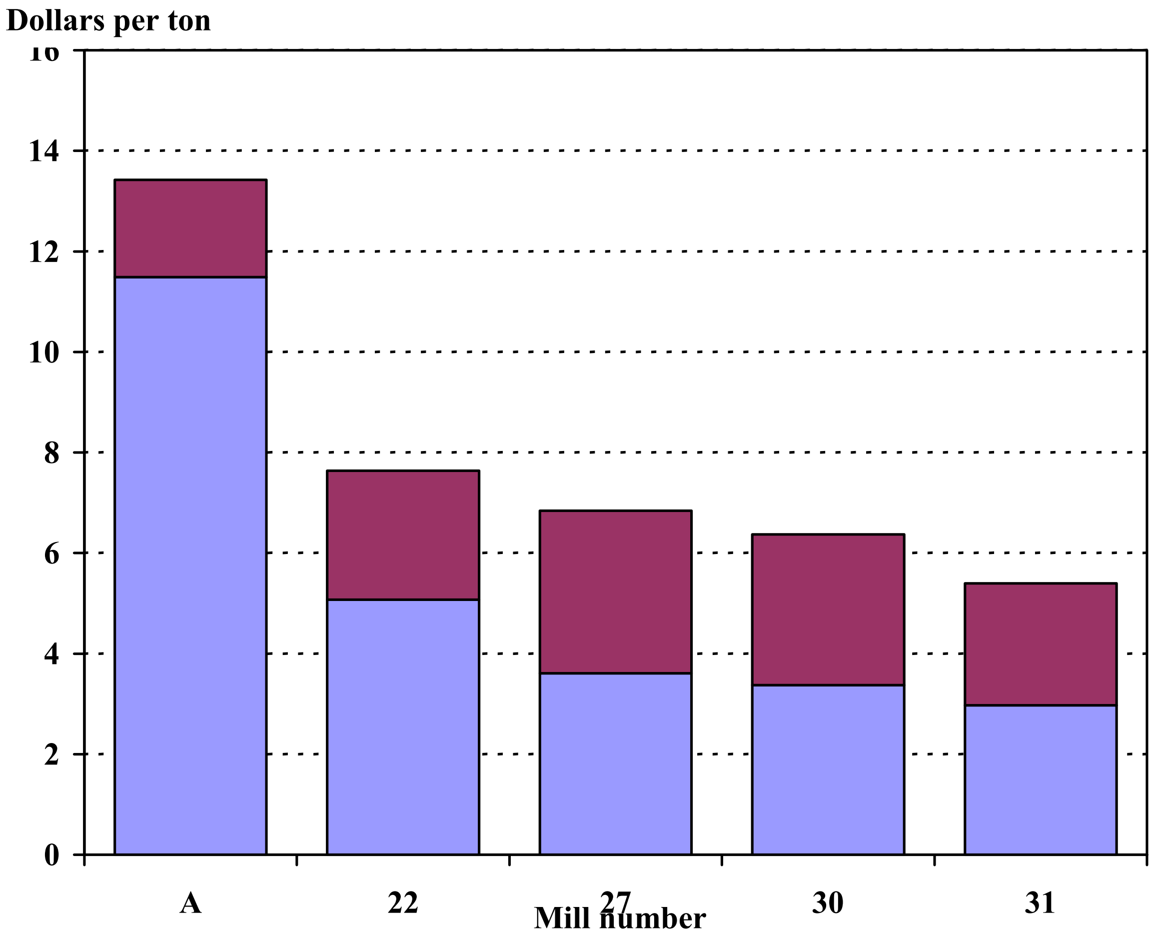
Table 3 shows the estimated feed trucking costs per mile and per ton-mile for 12-ton, 18-ton, and 24-ton vehicles. Vehicle costs mile and per ton-mile were calculated following the methodology in Hanson *et al.* (1985). These estimates were derived from actual trucking cost data provided by the advisory committee. On a ton-mile basis, a tandem-axle truck costs 2.2 times (120 percent) more to haul feed than in a semi, and 1.6 (60 percent) more than in a triple-axle truck. These vehicle costs were then used determine the least cost transportation routes from feed mills to prospective livestock feeders using a Geographical Information System (GIS) software.

Table 3. Estimated feed trucking costs per mile and per ton-mile

	Cost per mile		
Cost item	Tandem-axle (12 ton)	Triple-axle (18 ton)	Semi (24 ton)
Interest and depreciation	\$0.456	\$0.344	\$0.366
Labor	0.833	0.750	0.652
Fuel	0.242	0.263	0.273
Oil	0.011	0.013	0.014
Maintenance	0.064	0.054	0.047
License	0.009	0.024	0.026
Insurance	0.015	0.016	0.026
Tires	0.064	0.096	0.012
Total cost per mile	\$1.695	\$1.559	\$1.516
Total cost per ton mile	\$0.141	\$0.087	\$0.063

Feed manufacturing costs were estimated for five mills owned by The Cooperatives. Figure 1 shows feed manufacturing costs for mills 22, 27, 30, 31 and A[2]. Manufacturing costs ranged from a high of $13.42 per ton for mill A to a low of $5.40 per ton for mill 30. Except for mill A, fixed and variable costs per ton were approximately equal. These five mills, provided a good cross-section of mill characteristics in the study area.

Figure 1. Estimated feed manufacturing costs for study sponsored mills.



The remaining 27 mills were categorized into five groups based on each of five cooperative mills with detailed cost data. The advisory committee, relying on their own costs, on other cost

[2] "A" represents a mill owned and operated by the Cooperatives but not included in the analysis because it is a high-cost mill, essentially dedicated to manufacturing cattle feed.

data obtained by telephone calls and from previous conversations with industry personnel, assigned feed manufacturing costs to the remaining 27 mills. Figure 2 ranks study mills from high costs to low costs. Sixty percent of the mills were estimated to have feed manufacturing costs of $10 or more per ton, with some as high as $17 per ton. Figure 2 shows that mill 31, a small old mill had the lowest cost per ton. The reason for this low cost is low variable cost combined with a nearly fully depreciated mill. Yet there are no plans to upgrade or expand mill 31.

The advisory committee set gross margins for feed at $14 per ton. However, gross margins at five feed mills located near a major railroad operating in the 12-county area, were reduced by the equivalent two cents per bushel of corn used in the feed rations. This reduction was made because grain elevators located on rail typically pay about two cents per bushel for corn above the prevailing price in the area. Therefore, feed mills located at or near these grain elevators must also pay an additional two cents per bushel for the corn manufactured into feed.

Results

Equation 1 of the model was used to simulate five scenarios that are labeled:

I. Base solution

II. Expand-abandon

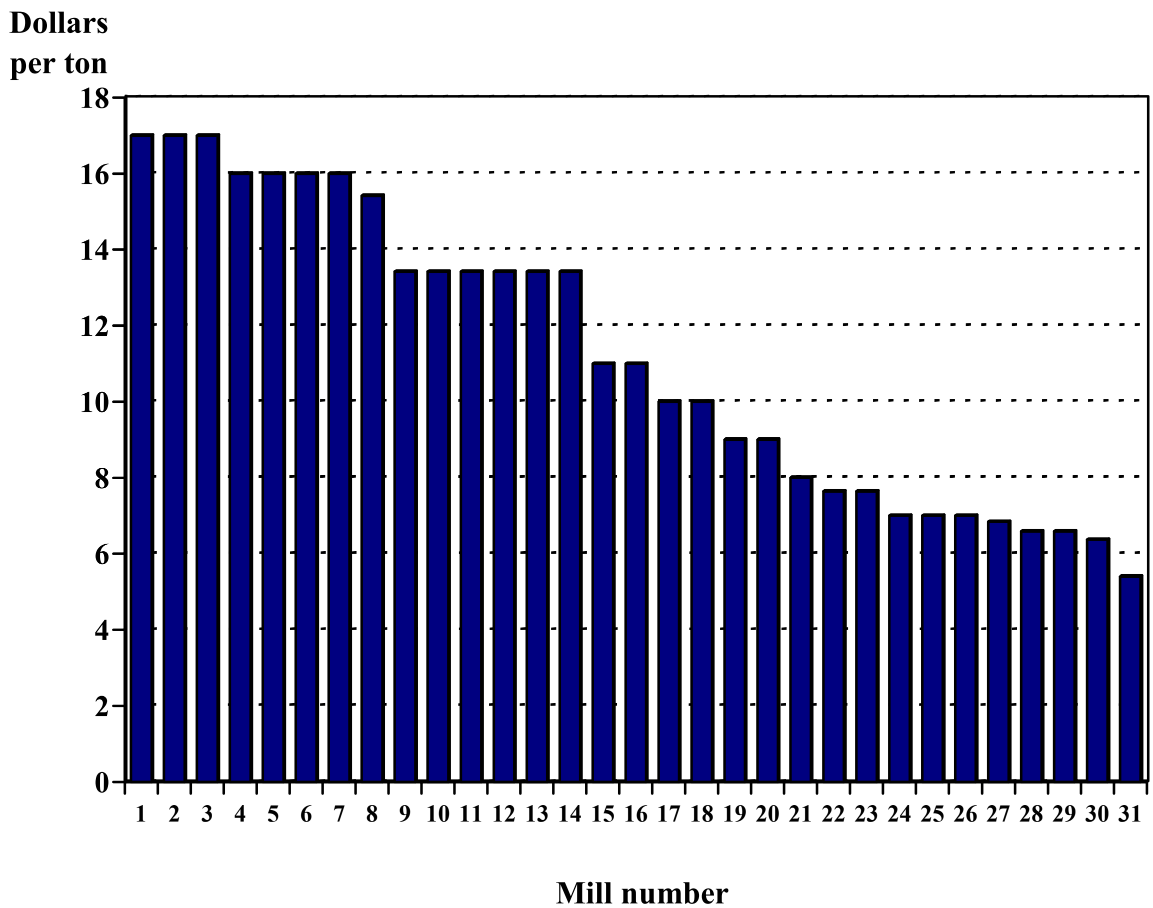
III. Expand

IV. Integrator challenge

V. The Cooperatives jointly build a new mill

The model objective was to maximize profits of feed manufacturing and distribution in the 12-county study area. Hence, the model only sold and delivered feed to those farms that increased total system profits. Farms with livestock that did not receive any feed in the model were assumed to manufacture their own feed or buy it from mills not included in the study.

Figure 2. Estimated feed manufacturing costs for the 31 study feed mills.



Results for The Cooperatives

Table 4 shows the tons of feed sold by vehicle type for The Cooperatives mills included in the study. Mills 23, 27, 30, and 31 were included in all solutions except in the expand/abandon solution. In the expand/abandon solution, mills 23 and 31 were assumed to have been abandoned.

The four mills of The Cooperatives sold and delivered 265,000 tons of feed in the base-solution -- exactly equal to their combined 2001 tonnage. This represents 51-percent of the total tons sold in the 12-county area by the 31 feed mills in the study.

Table 4. Comparison of The Cooperatives' tons of feed sold by vehicle type and solution.

Solutions	Delivered by Tandem-axle	Delivered by Semi	Total tons
Base (scenario 1)	103,400	161,600	265,000
Expand	171,125	290,750	461,875
Expand/abandon	145,125	276,750	421,875
Integrator challenge	103,400	161,600	265,000
Joint venture on new mill	103,400	461,600	565,000

In table 5, the combined profits of The Cooperatives, defined as $14 gross margin minus grind and mix, and trucking costs, was $1,604,322, almost 68-percent of the total system profits. This estimate excludes sales and overhead costs, and therefore, exceeds actual system profits.

Table 5. Comparison of The Cooperatives' gross revenue, feed manufacturing and distribution costs, and profits by solution.

Solutions	Gross revenue	Manufacturing costs	Distribution costs	Profits
Base (scenario 1)	$3,648,680	1,707,480	$336,878	$1,604,322
Expand	6,360,799	2,331,549	878,302	3,150,948
Expand/abandon	5,811,989	2,070,800	810,599	2,930,590
Integrator challenge	3,648,648	1,707,355	424,815	1,516,478
Joint venture on new mill	7,848,648	3,657,354	1,185,011	3,006,283

When a second shift was added to mills 27 and 30, tons sold increased 87.5 percent in both mills. Mills 23 and 31 sales remained unchanged at 20,000 tons each -- their 2001 sales. The increased tonnage at mills 27 and 30 came from two sources. First, competitor tonnage declined 24,000 tons. Secondly, the reduced grind and mix cost at mills 27 and 30 from spreading the fixed costs over more tons, permitted these two mills to sell almost 149,000 tons of bulk swine feed to producers who previously had been forced to buy from mills outside of the area, or to manufacture their own feed. This increased volume more than doubled the profits at the two mills. Profits at mills 27 and 30 increased 119 percent and 111 percent, respectively. However, profits at mills 23 and 31 declined by $1,736 and $10,345, respectively. The reason for reduced profits at mills 23 and 31 is that the increased output at mills 27 and 30 forced mills 23 and 31 to sell to more distant feed customers, thereby increasing delivery costs. Nevertheless, total profits for The Cooperatives increased over 96-percent to the highest profits from any solution in table 4.

When the expand solution – third shift added to mills 27 and 30 – was combined with the abandon solution – closing mills 23 and 31 – tons sold at mills 27 and 30 remained constant, but declined to zero at mills 23 and 31, reducing the total tons sold by The Cooperatives by 40,000 tons. Moreover, total profits of The Cooperatives declined by over $220,000. Total profits at mills 27 and 30 increased slightly – almost $14,000 at mill 27 and $7,100 at mill 30. However, profits at mill 23 and 31 declined from $114, 394 and $138,955, respectively, to zero.

The integrator challenge solution allowed an integrator to build a new 300,000-ton capacity mill at mill 8. Mill 8 was selected because it is south of mills 27 and 30, yet still in the high swine density area. The advisory committee believes that any future increase in hog production in the 12-county area will be to the south, rather than to the north of mills 27 and 30. The construction of a new 300,000-ton mill eliminated the third shift at mills 27 and 30.

There was no change in total tons of feed sold by The Cooperatives from the base solution to the integrator challenge. Each of The Cooperatives' four mills sold exactly the same number of tons under the base and integrator challenge solutions. However, The Cooperatives' profits declined $87,944 from the base solution to the integrator challenge solution. The reason for the decline in profits with no change in tons sold is that the new mill forced mills 23, 27, and 30 to shift some of their sales to more distant feed customers, thus increasing their transportation costs. Mill 27 suffered almost 65-percent of the total loss in profits. Nevertheless, these results strongly suggest that The Cooperatives could compete successfully with a nearby integrator mill.

The joint venture solution assumes that The Cooperatives build the new 300,000-ton mill 8. Under this assumption, The Cooperatives' total feed sales more than doubled to 565,000-tons. All of the increase came from the new mill. Tons sold at the other four mills remained at the base solution level. Total profits to The Cooperatives from the joint venture totaled $3.0 million dollars, a sharp increase from the base solution, but almost $150,000 below the profits from the expand solution, and only $55,000 above the expand/abandon solution.

The semi share of the total tons delivered by semi was 61 percent in the base solution. This share increased slightly in the expand solution. It jumped to 65.6 percent in the expand/abandon solution because mill 23, which was abandoned, has no semi delivery trucks. The semi share jumps to 81.7 percent in the joint venture solution when The Cooperatives build the new mill.

Impacts on competitors

Tables 6 and 7 shows the impacts of the four alternative solutions on the 27 competing feed mills. In the base solution, sales of the 27 competitor mills (31 mills minus four Cooperative mills) totaled 252,831 tons, about 49-percent of the total feed mill sales in the 12-county study area. Competitor profits totaled $741,620 – only 31-percent of the total system profits. In this solution, only nine of the 27 competing mills profitability manufactured and delivered swine feed within the 12-county area. Eighteen competitor mills had total manufacturing and delivery costs above the $14 gross margin allowed in the model. Thus, the model did not assign any feed volume to these high cost mills because they would have reduced total system profits. This strongly suggests that the number of feed mills within the 12-county area will decline as a result of two factors. The first is declining gross margins. The Cooperatives' advisory committee indicated that the $14 feed margins in the 12-county area in 2001 declined to about $11 in 2002, and are likely to continue to fall. Secondly, the large number of small, old, high-cost feed mills in the 12-county area suggests that they will likely close as their machinery wears out.

Table 6. Competing mill tons sold by vehicle type and competing mills with no swine feed sales

Solutions	Delivered by Tandem-axle	Semi	Total tons	Number of competing mills with no swine feed sales
Base (scenario 1)	78,202	174,629	252,831	18
Expand	67,120	161,713	228,833	20
Expand/abandon	67,119	173,986	241,105	20 [3]
Integrator challenge	65,915	433,110	499,025	19
Joint venture on new mill	65,915	133,110	199,025	19

Table 7. Competing mill gross revenue, feed manufacturing and distribution costs, and profits by solution.

Solutions	Gross revenue	Manufacturing costs	Distribution costs	Profits
Base (scenario 1)	$3,522,890	$2,077,818	667,774	$ 777,298
Expand	3,189,629	1,858,074	593,465	738,090
Expand/abandon	3,361,437	1,939,944	657,845	764,648
Integrator challenge	6,978,557	3,592,278	1,186,747	2,199,532
Joint venture on new mill	2,778,557	1,642,279	426,551	709,727

The expand solution – adding a third shift at mills 27 and 30 – reduced tons sold by competitors by almost 10 percent, to 228,833. Profits declined only $3,500, less than one percent below the base solution profits. The reason for the small decline in competitor profits is that the increased sales by mills 27 and 30 were at the expense of marginally profitable producers in the fringe of the competition's sales area. The expand solution also removed two additional competing mills from the hog feed market when mills 27 and 30 added a third shift.

The expand/abandon solution generated the largest profits for the 27 competing firms. Profits for the competing firms increased 3.1 percent on 4.6 percent fewer tons. No additional competing firms were forced out under this solution compared to the expand only solution.

The final two solutions are the integrator challenge and the joint venture solutions. The integrator solution increased total tons to 499,025. However, 300,000 tons -- 60-percent -- were

[3] There were actually 22 mills with no sales in this solution, but two mills belonged to The Cooperatives.

sold by the integrator mill. Thus, the existing 27 competing firms sold only 199,025 tons, a decrease of 21 percent from the base solution tonnage. Profits for all competing firms totaled $2,199,532. However, the profits of the integrator were $1,489,805, leaving only $709,727 of profits for the original 27 competing firms, a decrease of 4.3 percent from the base solution.

The impact of the joint venture solution, in which The Cooperatives build the new 300,000-ton mill, on the 27 original competing firms, was almost identical to the results of the integrator challenge solution. The only change was that The Cooperatives enjoyed the 300,000 additional tons and the additional $1,489,805 profits. However, the results from the integrator solution could be different if the integrator tied up much of its business under contracts. This would remove any possibility that The Cooperatives, or any other firm, could compete for the contacted business.

Coordinated freight solution

One of the key issues facing The Cooperatives is the extensive amount of cross-hauling of feed among mills owned by The Cooperatives. An estimate of the net cost of the actual cross-hauling was obtained in the following manner: Each of The Cooperatives calculated their actual 2001 trucking costs to deliver feed to their customers. The estimated total actual feed delivery cost was then compared with the feed delivery cost from the 2001 base solution. Table 6 shows the comparison of the two sets of costs.

Table 9. Actual and base solution feed delivery costs, 2001.

Cooperative	Delivery costs	
I	$460,463	
II	101,272	
III	305,255	
Total		$896,989
Base solution		336,878
Difference		$560,111

The comparison suggests that The Cooperatives are spending over $560,111, or 166-percent more for feed delivery than the optimal base solution costs because of:

- a large amount of cross-hauling.
- less than full loads of feed delivered to individual customers. All loads in the base solution are full loads, each load delivered to one customer.

We are unable to determine the proportion of the $560,111 that resulted from cross-hauling and the proportion from delivering less than full loads. This suggests that there are large cost savings from coordinating the feed deliveries of The Cooperatives, and from shifting most or all feed customers to full loads. Other sources of reduced delivery costs include shifting more of the deliveries to semis rather than in single-, tandem- or triple-axle delivery trucks. This option would require incentives to encourage feeders to increase their feed storage capacities.

The advisory committee suggested that similar cost savings could be achieved by coordinating sales efforts. At the time this study was conducted, each of the three cooperatives had sales personnel calling on customers in the other two cooperatives' trade territory. The committee believes that significant cost savings could be attained by eliminating duplicate sales personnel, sales travel costs, and order handling and billing costs.

Summary

This study yielded the following conclusions:

- Swine production in the 12-county study area is highly concentrated in 3 counties. Swine production densities decline with distance from these three counties.
- Sixty percent of the 31 feed mills included in this study had an estimated grind and mix cost of $10 per ton or more, with some as high as $17 per ton.

- On a ton-mile basis, tandem-axle trucks cost 60-percent more than a triple-axle truck and 120 percent more than a semi to deliver swine feed.
- Grind and mix costs are the principal driver of feed profitability.
- The most profitable option for The Cooperatives is to increase production and sales out of mills 27 and 30 by adding a third shift at these two locations.
- The addition of a new integrator-owned feed at mill 8 had little impact on The Cooperatives' sales and profits.
- A new mega-mill built by The Cooperatives would reduce the profits of The Cooperatives by $145,000 under the option of adding of a third shift at mills 27 and 30.
- Coordinating and combining feed delivery for The Cooperatives would produce cost savings equal to at least 36-percent of the cost savings from expanding the production and sales at mills 27 and 30.
- Exploring the potential cost savings from coordinating and eliminating duplication of sales efforts of The Cooperatives is likely to add large cost-savings for The Cooperatives.
- All of these savings will be needed to increase sales at mills 27 and 30.
- In 2001, the 31 study mills, on average, operated at 55-percent capacity. Thus, over-capacity in the study area is a major problem that may be solved by declining margins, which will speed up the closing of old, high-cost feed mills in the area.
- An effort should be made to determine which feed accounts are currently profitable, to develop strategies to make unprofitable accounts profitable and to phase out those accounts that cannot be made profitable.

Strategies to increase The Cooperatives' profits

- Increase the utilization of existing feed mills to spread the fixed costs over more tons.

- Coordinate trucking to reduce feed delivery costs.
- Encourage a shift from small truck deliveries to semi deliveries.
- Encourage full load delivery to each account by developing a program to encourage increased feed storage capacities at feeding units.
- Coordinate sales force to reduce number of sales people, automobiles and miles driven.
- Identify, discuss and implement strategies for mills 23 and 31.
- Develop strategies for discouraging a potential integrator mega-mill from entering the trade territories and for how to compete with a mega-mill, should it be built in the trade area. All of the above strategies would contribute to discouraging integrator entry into the area.