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MINNESOTA
farm business NOTES

NO. 399 ST. PAUL CAMPUS, UNIVERSITY OF MINNESOTA September 29, 1958

LABOR REQUIREMENTS DECREASE WITH LARGER HERD

R. G. Johnson and T. R. Nodland

Many cattle feeders are considering using mechanized feeding methods so they can handle larger numbers of cattle with their available labor supply. Cattle feeders who are planning to expand their operation need to know how much additional labor is needed as they increase the number of cattle fed.

A labor study was conducted during the 1956-57 cattle feeding season to determine the amount of labor used for various numbers of cattle. Fifty-nine farmers from the Southeastern and Southwestern Minnesota Farm Management Associations with a total of 70 lots of cattle participated in the study. These farmers sent in monthly reports on the time they actually spent on each major task in their cattle feeding operation.

Some of the results of this study are in table 1. The labor used is divided into the different tasks in cattle feeding. The methods or procedures followed are the conventional hand feeding methods. Labor is given in hours per week for each task. For those tasks in which labor varies with the number of head, the time spent is given in hours of fixed time per lot plus additional time for each head in the lot. The hours spent per week are multiplied by the number of weeks the task is performed to get the formula for the labor used for the entire feeding period.

The number of weeks each task is performed in table 1 is for a typical program of long fed calves. For example the total labor needed to feed silage to 40 head in this case would be $41.50 + 1.08 \times 40$ which is $41.50 + 43.20 = 87.70$ hours. At the bottom of the table the labor required for all tasks has been added to obtain the formula for total labor for the feeding period.

The hours per week formulas can be applied to different lengths of feeding periods by adjusting the number of weeks each task is performed. Results of the study indicate there is no significant difference for the major tasks in the labor used per week among cattle of different ages; therefore, the hours per week formulas can also be applied to yearling or 2-year-old cattle feeding programs.

A farmer considering expanding his cattle feeding operation can use the data in table 1 to determine the number of additional hours of labor that will be required. Table 2 gives the labor requirements by tasks for lots of 40 and 80 head. The figures in this table are derived from the formulas in table 1.

Table 1. Labor Requirements for Long Fed Calves Using Conventional Hand Feeding Methods

Task	Equipment or procedure	Hours per week	Number of weeks	Hours for entire feeding period
Care on corn stalk pasture		1.14	6	6.84
Hay feeding	Baled with limited grain and silage	.87 + .0087 per head	31	26.97 + .2697 per head
Hay feeding	Baled with full feed grain	.69 + .0087 per head	18	12.42 + .1566 per head
Silage feeding	Fed twice each day hand methods	1.66 + .0432 per head	25	41.50 + 1.08 per head
Grain feeding	Limited amount fed once each day	.63 + .0117 per head	25	15.75 + .2925 per head
Grain feeding	Full feed, fed twice each day	.50 + .0471 per head	18	9.00 + .8478 per head
Bedding	Bedded 2 or 3 times each week	.02 + .0165 per head	26	.52 + .4290 per head
Watering and observation	Done—Nov.-March	.72	22	15.84
Grinding feed (50 bu. per head)		.0246 hrs./bu.		1.23 per head
Manure disposal	Manure pack tractor loader used	.89 + .0072 per head	49	43.61 + .3528 per head
Care of sick animals		.12	49	5.88
Buying and selling	(15 hours per lot for feeding period)			15.00
Miscellaneous labor		.13 + .0075 per head	49	6.37 + .3675 per head
Total				199.70 + 5.0259 per head

Table 2. Labor Requirements for Long Fed Calves Using Conventional Hand Feeding Methods, 40 and 80 Head Lots

Task	Hours used for feeding period		Hours increased
	40 Head	80 Head	40 to 80 Head
Care on corn stalk pasture	6.8	6.8	0
Hay feeding	56.4	73.5	17.1
Silage feeding	84.7	127.9	43.2
Grain feeding	70.4	116.0	44.4
Bedding	17.7	34.8	17.1
Observation	15.8	15.8	0
Grinding feed	49.2	98.4	49.2
Manure disposal	57.7	71.8	14.1
Care of sick animals	5.9	5.9	0
Buying and selling	15.0	15.0	0
Miscellaneous labor	21.1	35.8	14.7
Total labor	400.7	601.8	199.9

(Continued on page 3)

MAKE YOUR MACHINERY PURCHASES PAY

Paul R. Hasbargen

Farm records from throughout the state indicate that machinery investments represent between 10 and 20 percent of the total capital invested in most Minnesota farms. However, the proportion of annual cost made up by machinery and power costs is much higher than these investment figures would indicate. A USDA study[1] showed that in 1955, power and machine costs were 41 percent of the total costs on Western Wisconsin dairy farms. They constituted 44 percent and 66 percent of the annual costs on corn belt cash grain farms and spring wheat-small grain-livestock farms, respectively.

Farmers are continually adding newer and larger machines in an effort to save labor and/or increase farm income. Care must be exercised, however, lest the additional machinery detract from net income rather than add to it. **In order to make sound decisions the farmer must calculate differences in labor requirements as well as differences in costs and returns when considering additional machine investments.**

Estimates of labor and fuel requirements with different sizes of machines were obtained from about 100 farmers in the Red River Valley in the fall of 1957. Some of the data obtained from these farmers are shown in table 1.

Since these requirements vary considerably with different tractors, with different soil types, and under different working conditions, individual farmers might find that their requirements differ somewhat from these averages. The farmer, therefore, should use his own figures whenever possible.[2] However, these data can be helpful in making decisions as to machine investments.

An illustration of the use of this data is given in the following example. A farmer who annually has 40 acres of corn for grain wonders if he should buy a 1 row corn picker. If the machine that he is considering were to cost him $1,000, an analysis of the annual cost could be made as shown in table 2.

Other detailed cost studies show that the annual ownership cost for this ma-

[1] Farm Cost Situation, Nov. 1956, USDA.

[2] Gas consumption per hour can be calculated for a particular tractor or it can be obtained from the Nebraska Tractor Tests. Performance rates can be estimated by using the formula $\frac{\text{width in feet} \times \text{speed in MPH}}{10} = \text{acres per hour.}$

Table 1. Machinery Performance Rates in the Red River Valley

Machines		Number of cases	Hours per acre*	Fuel per acre†
		number	hours	gallons
GENERAL MACHINERY				
Plow	3 bot	36	.78	2.3
	4 bot	29	.57	2.1‡
	5 bot	12	.50	1.2d
Field cultivator	10-12′	46	.30	.8
	14-16′	22	.23	.8‡
	17-29′	15	.14	.4d
Tandem disk	11-12′	9	.23	.7
	14-15′	11	.22	.7‡
Harrow	20-29′	45	.13	.2
	30-39′	32	.09	.2
	40-45′	10	.06	.2
GRAIN MACHINERY				
Grain drill	10′	13	.33	.6
	12′	64	.29	.6
	14′	14	.19	.5
Weed sprayer	24-40′	33	.10	.2
Swather	9-10′	9	.40	.4
	12′	76	.23	.4
Combine	6′	17	.68	2.0
Pull type	12′	42	.41	1.8
Self-prop.	12′	12	.32	1.4
CORN MACHINERY				
Corn planter	2 row	7	.50	.9
	4 row	7	.30	.6
Corn cultivator	2 row	18	.50	.8
	4 row	11	.29	.7
Corn picker	1 row	4	1.40	4.0
SOYBEAN MACHINERY				
Soybean planting				
Corn planter	4 row	24	.30	.6
Beet drill	6 row	9	.40	.6
Bean cultivating—See corn cultivators or sugar beet cultivators.				
Bean combining	6-7′	9	.60	2.5
Pull type	12′	14	.51	2.5
Self-prop.	12′	7	.33	1.6
POTATO MACHINERY				
Potato planter	2 row	38	.82§	1.7
	4 row	6	.44§	1.3
Finger weeder	12-13′	8	.21	.3
	26′	24	.18	.3
Cultivator	2 row	39	.40	.7
	4 row	5	.21	.6
Duster	6 row	23	.15	.2
	8 row	9	.09	.1
Roto beater	2 row	40	.40	.9
Potato digger	2 row	30	1.12	2.1

(continued)

Table 1. (Continued)

Machines		Number of cases	Hours per acre*	Fuel per acre†
SUGAR BEET MACHINERY				
Beet planter	6 row	15	.45	.8
	12 row	12	.20‖	.5
Rotary hoe	14-16'	15	.15	.3
	20-21'	8	.10	.2
Beet cultivator	6 row			
	First cult.	28	.40	.7
	Other	27	.30	.5
Beet thinner	6 row	19	.30	.6
Roto beater	4 row	6	.78	2.2
Beet harvester	2 row	12	1.65¶	5.7

* Man hours and machine hours were the same except where footnotes indicate that extra labor was reported.
† Fuel is gas except where indicated with a "d" for diesel fuel.
‡ Some diesel tractors were reported for these operations. Diesel consumption per acre was about 75 percent as much as gas.
§ Two men were reported for each potato planter. Thus, man hours would be twice as high as the machine hours.
‖ One half of the reports on the 12 row beet planter showed two men.
¶ A crew of three men was usually reported with the beet harvester. Some reported two.

Table 2. Costs of Owning a Corn Picker Compared to Costs of Hiring Custom Work for 40 Acres

	Full ownership	Custom work	Half ownership
		dollars	
Ownership (18 percent)	180.00	.....	90.00
Operating costs (fuel)	32.00	.....	32.00
Labor costs (1.25/hr.)	70.00	.....	70.00
Custom work ($4/acre)	.....	160.00	.....
Other considerations	.....	40.00	.....
Total annual cost	282.00	200.00	192.00

chine would average about 18 percent of its original cost.[3] Ownership costs include depreciation, interest, repair, taxes, and shelter. The annual cost of fuel is calculated on the basis of the gas requirements per acre, with gas charges at 20 cents per gallon ($4.0 \times 40 \times \$.20 = \$32.00$). Labor is valued at $1.25 per hour ($1.40 \times 40 \times \$1.25 = \$70$).

If labor were plentiful at this time of year so that family labor could handle the corn picking without extra help, the labor might be valued at a lower figure.

A number of other considerations often influence decisions pertaining to machinery investments. These should be studied and evaluated by the farmer. Effect of the machine on quantity or quality of the crop is one factor that must be considered. This is the important one in making a hay dryer pay out.

Another consideration is that of timeliness of operation. In the above example, the farmer felt that he lost about a bushel per acre due to the somewhat later harvesting when he hired custom work. This charge would vary greatly between farmers depending upon the availability of custom operators in the area.

Other factors to consider would include the need for associated machines or equipment (a picker sheller necessitates a crop dryer), the adaptability of the machine to other uses (a hay drying unit may be used for corn and beans), and simple labor saving or convenience aspects.

The above analysis indicates that the farmer would reduce his net income by purchasing the particular machine. The analysis also shows that joint ownership with another small volume corn producer is worthy of consideration. Another method of spreading the ownership costs over more acres would be to do custom work for others if the demand exists.

In today's high cost agriculture, few farmers can afford to own machines that don't more than pay their way. Decisions on proposed machine investments should, therefore, be based on an objective analysis of the expected changes in costs and returns. Ask yourself: Will the new machine work for me—or I for it?

[3] Information on annual ownership costs for various machines can be obtained at county Extension offices or by writing to the Agricultural Extension Service, St. Paul 1, Minnesota.

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Prepared by the Department of Agricultural Economics and Agricultural Extension Service.

Published by the University of Minnesota Agricultural Extension Service, Institute of Agriculture, St. Paul 1, Minnesota.

Labor Requirements—

(Continued from page 1)

Thus, a farmer considering doubling his size of lot from 40 to 80 head will need about 200 additional hours of labor if he used conventional hand feeding methods. If the additional labor is not available, the farmer should consider labor saving equipment or hiring the additional labor. The largest increase in labor and thus potential for labor saving in this case is in the silage feeding, grain feeding, and grain grinding operations.

Figure 1 which is based on table 1 shows how the labor used per head is related to number of cattle in the lot. As the number of cattle fed is increased the time required per head decreases. This is due to economies of size of operation obtained by spreading the fixed time in performing a job over a greater number of animals. For example, as lot size is increased from 20 to 30 head there is a 22 percent reduction in labor per head while an increase from 50 to 60 head results only in a 7½ percent decrease in labor per head.

It may be concluded that economies obtained by increasing the number of cattle are large even using hand feeding methods for lots up to about 50 head. To make substantial reductions in labor requirements per head for lots over 50 head, mechanized or self-feeding methods must be used.

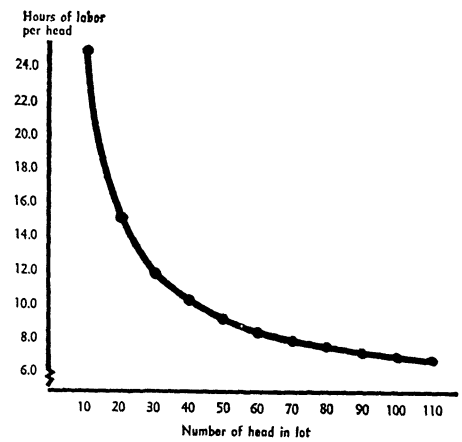

Figure 1. Relationship of number of head to hours of labor used per head.

Minnesota Farm Prices July and August 1958

Prepared by Larry Denison

Average Farm Prices for Minnesota July 1958, August 1958, 1957, 1956*

	July 1958	Aug. 1958	Aug. 1957	Aug. 1956
Wheat	$ 2.07	$ 1.79	$ 2.00	$ 2.09
Corn	1.05	1.04	1.10	1.38
Oats	.52	.48	.52	.64
Barley	.91	.85	.81	.95
Rye	.93	.91	1.02	1.10
Flax	2.86	2.79	2.92	3.03
Potatoes	1.32	.96	1.38	1.62
Hay	13.80	14.40	14.30	16.00
Soybeans†	2.03	1.98	2.16	2.37
Hogs	21.20	21.40	19.80	16.50
Cattle	22.20	21.80	18.60	16.40
Calves	26.20	26.70	20.90	19.00
Sheep-lambs	20.24	20.48	19.56	17.38
Chickens	.141	.132	.110	.139
Eggs	.300	.290	.320	.310
Butterfat	.62	.63	.64	.63
Milk	2.95	3.05	3.25	3.25
Wool†	.32	.32	.51	.38

* Average prices as reported by the USDA.
† Not included in the Minnesota farm price indexes.

Prices received by Minnesota farmers for all commodities declined 3 percent from July to August. This was due to a decrease of 8 percent in crop prices.

Comparison of August price indexes for the past three years reveals that crop prices were 14.5 percent lower in August 1958 than in August 1956. Livestock prices, on the other hand, were 31.3 percent higher in August 1958 than in August 1956.

Comparison of July and August Prices

Commodity class	Average August prices as a percentage of average July prices
Crops	92.1
Livestock	99.8
Livestock products	100.8
All commodities	97.8

The Outlook Corner—CATTLE CYCLE

The cattle cycle has started its expansion phase. Cattle on farms in January 1959 is expected to be 2 million head larger than January 1958. As shown in the table the big increase is expected in number of calves with little change in cow numbers this year.

This prospective upturn in cattle numbers will end the cyclical downturn after only two years. This will be the shortest cyclical decline on record.

Reduced slaughter of cattle is characteristic of the early part of the expansion phase of the cattle cycle. During the first half of 1958 cattle slaughter was down 10 percent and calf slaughter was off 18 percent from year earlier levels. This results from holding back cows and calves for herd expansion, later placements on feed, and longer feeding periods. Total slaughter in 1958 is expected to be 9 percent below 1957.

Estimates on July 1 indicate that the 1958 calf crop is approximately one-half million smaller than the 1957 crop. This is due to fewer beef cows. However, calf slaughter in 1958 is likely to be cut back much more than the reduction of calf crop.

A comparison of 1958 to 1949—the low point of the previous cycle—indicates that the breeding herd is about the same size *relative to population.* The cow herd of 1958 is 18 percent larger than 1949. During the same period population has increased 17 percent. Thus cow numbers relative to population is less than 1 percent larger. Also the 1958 calf crop is only a little larger relative to population.

On the other hand, production of beef in 1958 is 45 percent greater than it was at the beginning of the last cycle. Thus beef supplies per person at this stage of the cattle cycle will exceed the 1949-51 years by 25 percent. This is largely due to the following. First, and of most importance, is less calf slaughter and a higher percentage of calves raised and fed to maturity. Slaughter of calves in 1958 will barely exceed the 1949-51 average but cattle slaughter will be almost 40 percent larger. Secondly, there has been a shift to beef type cows. In 1949 milk cows outnumbered beef cows three to two. In 1958 there were more beef than dairy cows on farms. Third, breeding of beef cattle has improved.

Cattle numbers will be expanding the next few years. Dairy cows will continue their gradual decline. Beef cow numbers will expand slowly. Therefore the number of beef calves and yearlings available for feeding will remain quite limited.

Slaughter supplies will not increase much in the next year or two because of larger withholding of calves and heifers for herd expansion.

For farmers this means that feeder and slaughter prices are expected to remain relatively strong for the next several years while herds are being expanded.

U. S. Cattle on Farms, Jan. 1

	1955	1956	1957	1958	1959 (est)
			million head		
Beef cows	25.7	25.5	24.8	24.4	24.5
Heifers	6.5	6.2	6.0	6.1	6.2
Beef calves	18.8	19.0	18.6	18.7	19.7
Steers	8.4	9.6	9.1	9.5	10.0
All cattle*	96.6	96.8	94.5	94.0	96

* Includes dairy cows.

Indexes for Minnesota Agriculture*

	Average Aug. 1935-39	Aug. 1958	Aug. 1957	Aug. 1956
U. S. farm price index	100	237.7	234.8	224.4
Minnesota farm price index	100	212.0	211.1	211.4
Minnesota crop price index	100	186.4	198.9	218.1
Minnesota livestock price index	100	277.0	243.7	211.0
Minnesota livestock products price index	100	195.6	201.6	200.0
Purchasing power of farm products				
United States	100	97.7	99.5	97.4
Minnesota	100	87.2	89.4	91.8
U. S. hog-corn ratio	13.5	17.9	16.3	11.2
Minnesota hog-corn ratio	15.9	20.6	17.8	12.0
Minnesota beef-corn ratio	14.0	21.0	16.9	11.9
Minnesota egg-grain ratio	20.7	13.0	13.1	11.2
Minnesota butterfat-farm-grain ratio	40.4	38.0	37.1	29.8

* Minnesota index weights are the averages of sales of five corresponding months of 1935-39. U. S. index weights are the average sales for 60 months of 1935-1939.

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Service and United States Department of Agriculture Cooperating, Skuli Rutford, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

UNIVERSITY OF MINNESOTA
Institute of Agriculture
Agricultural Extension
St. Paul 1, Minn.
SKULI RUTFORD, Director
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