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MINNESOTA FARM MANAGEMENT SERVICE NOTES

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FARM POWER

The Horse Situation

During recent years there has been a rather rapid decrease in horse and mule population both in Minnesota and in the United States. Shortly after 1910 the prices of horses were high and a period of over-production occurred.

NUMBER AND VALUE PER HEAD OF HORSES AND MULES ON FARMS

	Jan. 1, 1910*	Jan. 1, 1920*	Jan. 1, 1925**
Minnesota	744,000 - \$120	943,000 - \$89	853,000 - \$75
United States	24,000,000 - 109	25,000,000 - 102	23,000,000 - 67

or 1918

The climax in production was reached about 1917/^{or 1918} and since then there has been a continual decrease in the number of colts raised per 1000 horses. This indicates there is now a larger percentage of old horses than would ordinarily be the case. The use of tractors, trucks and automobiles has reduced the amount of work required of horses and has made this decrease in number of horses less significant than the figures show. However, a point may be reached beyond which there may be a real shortage of horses. The number of colts foaled per thousand horses and mules for the United States has dropped from 95.1 in 1920 to 44.5 in 1925, and for Minnesota from 76 to 32 for the same years. The rate of decline was much less in 1924, which indicates that the decrease has been checked. Evidently the need of replacing old horses with younger horses is being recognized. Even though there may be enough horses of working age at the present time, if the low rate of reproduction continues it may not be long before there is a real shortage of good work stock. Since it takes four years to produce a horse of working age, farmers may delay the raising of colts too long.

Horse Labor Costs

Total feed cost	\$74.54	Feeds - Roughage(lbs.)	5646
Man labor cost	17.08	Grain "	2922
Shelter	8.02	Pasture (days)	64
Harness	3.99	Man hours	81½
Depreciation	6.32	Hours of work performed	891
Interest	4.72	Cost per hour of horse labor	11.9¢
Taxes, insurance & misc. cash	1.44		
Total cost	116.11		
Manure credit 10 loads @ \$1.00	10.00		
Net cost	106.11		

The foregoing table shows the average cost of maintaining a work horse in 1924 on the Steele County statistical route. 133 horses on 22 farms are included in the average. The average cost of horse labor in 1923 was 11.3 cents. This increase in cost per hour has resulted largely from higher feed costs which in 1924 were 21 per cent greater. During 1924, however, the horses were used more efficiently, each horse averaging 42 more hours than in 1923. For this reason the increase in cost per hour was not as great as the increase in the total cost per horse.

<u>Range of hours per horse</u>	<u>Number of farms</u>	<u>Average hours per horse</u>	<u>Total cost per horse</u>	<u>Cost per hour</u>
Under 800	7	713	100.66	14.12
800 - 1000	9	904	107.17	11.86
Under 1000	6	1106	112.32	10.20

That a low rate for horse labor depends on the number of hours of work the horse does is very convincingly shown in the above table. It will be noticed that the rate per hour of labor decreases as the average number of hours of work per horse increases. This occurs in spite of the fact that the total cost per horse becomes greater as the number of hours worked increases. In attempting to get a low horse labor rate the horse work should be planned in advance so that as few horses as possible will be kept and then the horses should be used productively as many hours as possible even tho this increased number of hours may raise the total cost per horse.

A.T.H.

The Place of the Tractor in the Farm Power Supply

There were 15,503 tractors on Minnesota farms in 1920 according to the federal census. By 1923 the number in use had increased to 19,714. This increase of 27 per cent in three years would seem to indicate that farmers are finding a definite place for them in their farm power supply. The following table shows the amount of work actually done by tractors on representative diversified farms in southern Minnesota.

	Tractor Utilization					
	1920	1921	1922	1923	1924	5 yr. avg.
No. farms	17	16	15	15	15	78
Total acres per farm	207	210	196	195	187	199
Crop acres per farm	150	147	139	147	124	141
Belt hours	38	70	66	74	100	80
Drawbar hours	270	198	173	148	119	184
Total hours	358	268	239	222	219	264

One farmer used a tractor 834 hours in one year and another averaged 608 hours annually for five years. On the other hand one farmer used his tractor only 50 hours in one year and another averaged only 130 hours annually for five years. Of the 78 tractor years included, 34 tractors were used less than 200 hours annually, 18 from 200 to 300 hours, 13 from 300 to 400 hours and 5 over 500 hours. The question naturally arises as to how much use a farmer must make of a tractor in order to justify its purchase and what other factors tend to make it a profitable investment.

It is generally conceded that the tractor may only partially replace horses as a source of farm power. The problem of the individual farmer then is to determine whether a combination of tractor and horses is more economical than horses alone. Some of the considerations involved are suggested in the following statements of power costs on two farms included in the above study.

<u>Farm A (365 acres)</u>		<u>Farm B (240 acres)</u>	
Cost of maintaining 11 horses	\$1355.09	Cost of maintaining 8 horses	\$792.00
Cost of maintaining 6 horses	739.14	Cost of maintaining 6 horses	619.62
Cost of tractor maintenance	562.34	Cost of tractor maintenance	333.93
Total annual power cost	1301.48		953.55
Decrease in power cost	53.61	Increase in power cost	161.55
Hours of tractor use(drawbar)	429	Hours of tractor use(drawbar)	217

These costs have been computed on the basis of 1924 prices for horse feed, tractor fuel and other items of cost so that they are directly comparable. 270 acres of Farm A are in crops and 195 acres of Farm B. Both farms are well stocked and Farm A is much more heavily stocked than Farm B. A 3-plow tractor was used on Farm A and a 2-plow on Farm B.

Before the tractor was purchased 11 horses were used to operate Farm A. Six are now used. In addition to the drawbar work the tractor is used for 139 hours of belt work such as feed grinding, silo filling and corn shredding. This belt work by sharing part of the fixed tractor costs, thus reduced the amount chargeable to the drawbar work. In addition to the direct saving indicated less man labor was required to operate the farm after the tractor purchase and it was possible to speed up crop work at certain seasons so as to take advantage of favorable weather conditions.

Farm B was operated first with a tractor and six horses. The tractor was later sold and the farm was operated as successfully with eight horses with no change in crops or livestock. No more man labor was required than before. Only 36 hours of belt work was done with this tractor so the drawbar work had to carry 86 per cent of the fixed costs instead of 69 per cent as was the case on the other farm. This belt work was hired after the tractor had been sold for no more than it cost to perform it with the tractor. The eight horses were not worked as heavily proportionately as the six so the feed cost per horse was slightly less.

These examples illustrate some of the following factors that affect the profitability of a tractor as a supplement to horse power in farm operation.

1. Possibility of displacing sufficient horses so as to reduce the net cost of farm power. If nearly as many horses are kept as before, a tractor purchase may only add to the cost of farm power.
2. Amount of work for which a tractor might be used. Since interest, shelter, taxes and, to a certain extent depreciation, are fixed annual costs the larger the number of hours over which they can be distributed the less will be the cost per hour. Some of the ways in which the tractor use may be increased are:

- (a) Adapting it to a wider variety of field operations.
- (b) Be It work such as feed grinding, silo filling, sawing wood, threshing, corn shredding, etc.
- (c) Custom work off the farm.

3. Saving man labor. A tractor may save enough hired man's wages to more than offset an increase in the cost of farm power. Obviously the 2-plow tractor doing approximately the work of five or six horses will not save as much man labor as the larger tractor altho this may be compensated for by the lower investment and lower cost at operations not demanding a larger power unit.

4. Improving quality of work. The tractor may speed up the work sufficiently to enable the farmer to take full advantage of the most favorable soil and weather conditions. It may also make possible deeper plowing and faster work in hot weather.

5. Mechanical ability of operator. Most farmers and farm hands have had life long experience in caring for and handling horses. Similar familiarity with tractors would undoubtedly result in their more efficient operation. Until this experience is gained high operating costs, rapid depreciation, expensive repairs and costly delays may be incurred.

6. Suitability of equipment to tractor use. It is quite obvious that the tractor can be used most effectively with equipment designed especially for it. Most farms are now equipped with machinery designed especially for horses. Unless this equipment can be adapted to tractor use a considerable investment in special tractor machinery may be required in order to get full use of the tractor.

7. The relative price of horse feed and tractor fuel. Horse feed is relatively bulky and is expensive to ship considerable distances. Hence in surplus producing areas such as the developed farming sections of Minnesota, it is likely to prove much lower in price relative to gasoline and kerosene than in areas where feed must be shipped in from outside. Then, too, horses utilize much pasture, straw, corn stover and other non-marketable roughage and by-products. Tractor fuel always represents direct cash outlay.

Farmers considering the purchase of a tractor may save themselves needless expense and subsequent dissatisfaction by first carefully studying these points in determining whether they can utilize a tractor profitably, the size best adapted to their needs, and the adjustments in their equipment and power application that will secure the most effective employment of both horses and tractors.

G.A.P.