

# Horse or Tractor Power?

*The choice of the power used must be determined by individual conditions rather than by the unquestioned advantages of one power or the other for all kinds of work*

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Since the farm tractor has actually invaded a field of operations at one time held almost exclusively by horses, it might be well to inquire wherein horse power was deficient, that other power found an opportunity to establish itself. An examination of the development of the use of tractors in farming operations reveals this very gratifying and significant fact. That the tractor found a place because of the scarcity of horses, the lack of volume of horse power, not the lack of its quality. So much new land was suddenly brought within the scope of farming operations about the end of last century and the first ten years of this one that a great shortage of tractive power to do certain well defined work confronted those who were anxious to get land into crop in the shortest possible time. To wait for the horse supply to increase seemed to impose too much delay, so the then available mechanical traction, such as the large steam engines, were pressed into operation, also an unprecedented number of oxen were employed. In this state of affairs it became inevitable that the merits of horse traction, altho established by hundreds of years of farm experience, should be challenged. The big steam tractors were doing a very extensive and very hard job, even with their admitted unsuitability for their work. Hence the birth and growth of the idea that there was, or is, a place for mechanical traction on the farm. There was no doubt as to the demand for such power, but it appears now in the light of later events that the nature of that demand was not fully understood, that it was not as permanent as at first appeared. However, there was a demand, and manufacturers set about not only supplying it but of increasing it, a thing which horse breeders have not done to a very great extent.

The methods of farming which gave rise to the demand for big tractors, however, were not a permanent feature of our agricultural endeavor. Breaking large areas is not an endless job, and about the time tractors had received a thorough trial the nature of the work had changed. Practices became less extensive and more intensive, which afforded less opportunity to the tractor to be of outstanding service. Hence, we now have tractors of very different type to those generally recommended ten years ago. The big tractor has been found unsuitable for the general farm, but has found a place on the extensive grain growing ranch. I have in mind a farm near Gleichen, some two and a half sections, where two tractors are kept and do practically all the work, there being only four horses on the place. On such farms, by reason of the nature of the work and extent of land to be covered, also the mechanical knack of the men in charge, tractors—big tractors—are the most satisfactory power. In other places small tractors are at least doing the work ordinarily done by horses and sweeping claims are made for them for most farm operations.

## Cost of Upkeep of Horse Power

The use of tractors, while not exactly making headway, finds many advocates, so it might be well to examine the defects in horse power as a farm traction. The big tractor had its vogue on the wide prairie and recommended itself chiefly for breaking, but the small tractor is being used in well-settled farming districts, actually displacing horses. The increase in the use of small tractors may, or may not, be due to definite information upon their efficiency. Very probably it is due to their theoretical advantages. Horse breeders and users of horses may not be aware of the terrible indictment that can be, and is being made, against

horses as motive power. Very few people realize just what the keep of a horse involves in the way of expense. Paying horse board in town helps to bring home the cost of horse power. In 1914, Manitoba had 316,707 horses with an average value of \$131 or a total value of \$41,634,000. Saskatchewan had about twice the number and value and Alberta about one-quarter more. It costs a lot of money to keep this amount of power, and the cost has been going up. The United States government has tabulated from thousands of reports the average cost of keeping a horse a year. It runs as follows for 1914:—

Interest on investment value of \$150.....	\$ 6.72
Depreciation at 8 per cent.....	10.90
Harness, depreciation.....	2.30
Shoeing.....	.80
Feed—3 tons hay at \$11.12.....	33.36
Grain, 106 bus. (2½ gals. per day) at 53c.....	56.18
Labor and care.....	19.53
Miscellaneous.....	.54
<b>Total.....</b>	<b>\$129.43</b>

In Manitoba the actual cost would be a little under this amount for various reasons, but not a very great deal. For the years 1908 to 1912, the average cost in Minnesota was \$96.21, and 1904 to 1907, \$79.80. On the basis of 1914 costs our expenses for horse keep, allowing one in seven for colts, would be over thirty million dollars or nearly the total value of our wheat crop or a cost about equal to their total value, and it is in this steady rise in the cost of keeping horses that one finds much of the argument for the use of the small, handy tractor.

Horse power is expensive relatively for certain definite reasons:—

- (a) He is a small motive power unit.
- (b) The unit of power in which he can be worked requires a man to operate.
- (c) The horse is a low efficiency motor.
- (d) The horse's work is seasonal.

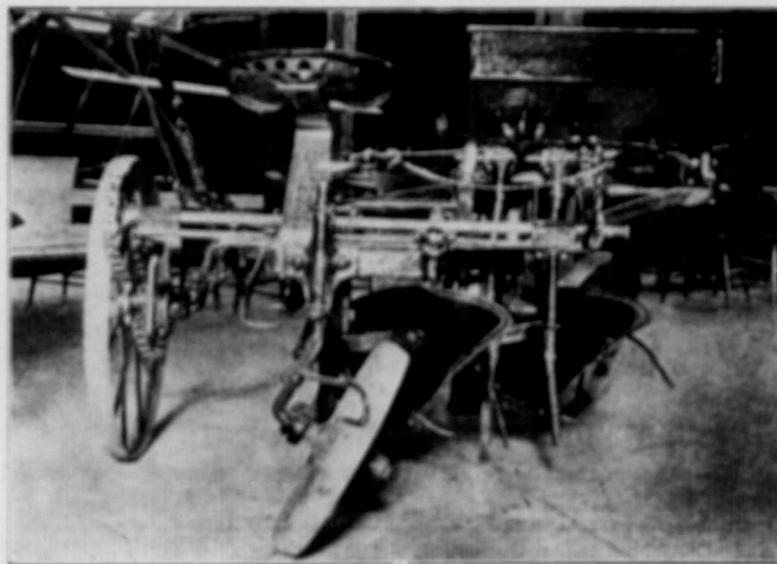
It is obvious that horse power units require more man labor to operate than the same units of mechanical power; from two to six horses make a team for one driver, whereas most motors will deliver as much and more power at the draw bar as two or more outfits of horses.

Generally we consider the horse a highly efficient tractive power. He moves easily over the land; he does not show much loss of power in changing from a solid footing to a soft footing. He can get himself out of almost any place he gets into; he is handy but not efficient in the sense of developing a large proportion of power to the energy producing power of food consumed. Actually about 70 per cent. of the energy from a horse's feed is required to maintain him before he can spare any for muscular power, and of his muscular force 23 per cent. is required to carry and propel his body, leaving only 7 per cent. of the original available energy delivered at the traces. Mr. Edison declares that a horse's energy is only 2 per cent. of the energy in his feed. The triple expansion steam engine is given an efficiency of 8 to 10 per cent., and a kerosene engine from 15 to 18 per cent. But of course these are arbitrary ratings; they do not and cannot take into consideration the ability of the horse to deliver reserve power and of the inability of the engine to even move itself in certain conditions; he roams at present, for instance, or upon soft plowing. It doesn't matter how much power an engine may deliver at the draw bar, when it gets on soft footing it not only has nothing to deliver but commits tractive suicide. But where the footing is firm the relative efficiency is about as stated.

As a matter of fact, experience, which is the real criterion of tractive values, is not wholly conclusive as to whether the tractor will supplant the horse or the horse the tractor. This, however, is plain, namely, that conditions have become so exacting that ever consideration must be given to the problem of reducing cost of production and making the spread between such cost and the selling price of farm products as wide as possible.

## Reduce the Cost of Production

In this connection I have pointed out some of the defects in the efficiency of horse power. I could have gone further and have shown that horse power requires expensive buildings, that on the average it works only three hours a day, that the feed used to maintain horses could be used to much better advantage with cattle or sheep, but I have criticized horse power enough to impress this point, that we should study how to reduce its cost. If we realize that it actually costs about \$200 worth of marketable material to keep a team, and that material could be converted into meat or milk and sold for more money, then we may expect to make a more economical use of our horses. Now for the indictment against tractors. Every horse breeder, no doubt, can make that. From what has been said about horses one may gather that certain objections cannot be offered against tractors, namely, that the units are small; that they do not waste so much energy; that they do not have to be fed when idle, etc. But the size of the unit means that there must be a big first investment. One cannot buy the horse power of an engine on instalments; there must be a big cash payment before a fraction of horse power may be obtained, and by the same token the slightest impairment of the unit means that the whole force must be idle. The tractor requires a man with special skill to operate it; it is not readily handled by the average farm hand or even farmer; it is made to run on firm ground under ideal



SEEDING ATTACHMENT TO PLOW

In many of the newer settled districts thru the West farmers quite frequently plow their cuts in in the Spring. The common practice is to run the seeder over the bare surface of the ground and then follow with plows set fairly shallow. This is by no means a practice to be encouraged and often yields are very disappointing, but sometimes it is the only way in which farmers can manage to get a crop of oats when the season is late. The Engineering Department of the University of Saskatchewan, recognizing that in some districts such a method would be followed at least for some time to come, have arranged a seeder attachment to the plow as shown above.

The attachment consists merely of three spouts of an ordinary seed drill box attached to the frame of the plow and driven thru a drive shaft which receives its power from a sprocket attached to the land wheel of the plow. An ordinary clutch controlled from the seat puts the seeder attachment in or out of gear. The main advantage of this arrangement is that the seed is sown at a regular depth right on to the moist earth; it is left uncovered while the plow is making the next round and then covered with the following furrow slice.