Correct Speed of Farm Tractors

More work may be done at 2.5 and 3 miles an hour than at 6 or 8 miles per hour—a better class of work is possible at the lower speeds.

By B. J. PAULSON

VARIOUS "knowing" predictors and recommendors have said and written a whole lot during the past couple of years anent speeding up the farm tractor and incidentally the whole dadgummed farming business. This propensity seems to have developed mostly since automobile manufacturers, engineers and selling agents shoved their respective oars into the more or less placid waters of the tractor industry. A few brisk-paced tractors have followed in their wake.

The automobile, of course, is synonymous of speed. It follows quite naturally, therefore, that anyone connected with the manufacture or sale of this distance-annihilating commodity should become infected with the "speed germ"—a very virulent bug, be it known—and pass it on to the first critter with which they happen to come in contact even though it be the robust, hard-working farm tractor.

Perhaps a little injection of anti-tractor-speed vaccine might help in certain cases. And possibly we can prepare a limited amount of this preventive by mixing together a batch of speed figures and farm machine logic.

The chief trouble with the majority of the legion of "knowing" and entirely well-meaning accelerators of progress referred to in the opening paragraph seems to be that they are "knowing" mostly in one direction. They may have this business of designing and manufacturing tractors down pat from technical and theoretical standpoints—but how do they stand in the vital matter of farm-machine and mathematics? Tractor plowing speeds of six, eight or ten miles an hour sound fine on paper and smack loudly of progress. But there is such a thing as tying a tin can to the tail of progress, thereby creating a temporary acceleration of pace, but with no beneficial results. The contrary perhaps.

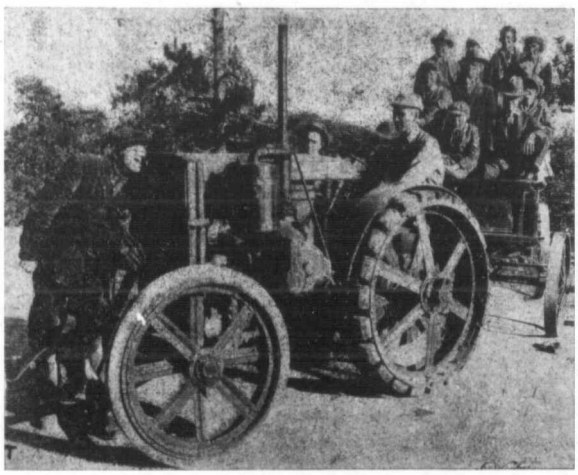
Let us mix up that batch of figures and see if we can absorb two or three shots without growing too dizzy:

The first problem is to figure out whether or not there is any particular advantage in having a tractor prance along at speeds of from six to ten miles an hour, taking it for granted that the tractor and co-ordinating farm machines will stand the racket. The average farm horse ambles along at the soothing pace of two miles an hour and the majority of the leading tractor manufacturers have accepted this speed or a slight increase, as the most desirable operating pace. But b yond two or three miles an hour —well, that's where we're going in a jiffy.

First we'll consider the matter of drawbar power at different speeds:

As most of us know, 1 mechanical horsepower equals 33,000 foot-pounds per minute. In order to determine the drawbar draft of a tractor at different speeds it is necessary to multiply the rated drawbar horsepower by the time by 33,000 and divide by the distance of travel in feet, during the specified time. To make the point clear and to facilitate operations and mathematics further along, we will commandeer a 10-20 horsepower tractor and demonstrate.

Speed	Drawbar Lbs. draft
1.75 miles per hour	2,142
2.00 " " "	1,880
2.25 " " "	1,670
2.50 " " "	1,500
2.75 " " "	1,360
3.00 " " "	1,250
3.50 " " "	1,070
4.00 " " "	940
4.50 " " "	835
5.00 " " "	750
6.00 " " "	625
7.00 " " "	535
8.00 " " "	470
9.00 " " "	417
10.00 " " "	375



CLIMBING MOUNT WILSON (CALIFORNIA) WITH A TRACTOR

For the first time, this "stunt" was pulled off by a Case 10-18 on 30th November. The alarmed expression of the mechanic in the foreground means nothing more than that he is merely holding his face to the radiator just as the machine reached the top to show how little heat had been developed. Full particulars of the incident will be found on page 45.

A 10-20 tractor has a drawbar rating of 10 horsepower. At a speed of 1.75 miles an hour the drawbar draft in pounds of this tractor would be as follows: 10x60 (minutes in an hour) gives us 600 which, multiplied by 33,000, according to the most approved rules of mathematics, nets us 19,800,000 which we now proceed to divide by 9,240 (number of feet traveled in an hour), giving us as the final result 2,142. This represents the pounds draft of a 10-20 tractor at a speed of 1.75 miles an hour.

In order to relieve the reader of the tedium of successive identical calculations and to simplify the next problem, we will tabulate the drawbar draft of this same tractor at different speeds. The following table gives the drawbar pounds draft for speeds from 1.75 to 10 miles per hour for this 10-20 demonstration tractor.

Now then, suppose we have a field of clover sod to plow and have an assortment of varied-speed 10-20 tractors at our disposal. The average soil resistance per square inch of the furrow slice against the cross section of the plow in this particular ground is 8 pounds. We are going to use fourteen-inch plows and will plow at a uniform depth of six inches.

We will get our slow tractor started first—the fast ones can undoubtedly catch up without any trouble! Now, let us see how many plows we can pull at 1.75 miles an hour:

The cross section of the working surface of one plow will be 14x6 (width of plow multiplied by depth of plowing) or 84 square inches. The soil pressure is 8 pounds per square inch. The draft of one 14-inch plow turning a six-inch furrow will therefore be 84x8 or 672 pounds.

The draft of our tractor at 1.75 miles per hour is 2,142 pounds as will be noted from the foregoing table. This tractor will therefore pull three 14-inch bottoms easily without overloading, the soil draft being 3x672 or 1,916 pounds, which, deducted from 2,142, leaves a surplus of 226 pounds, or a trifle more than one horsepower in reserve for the hard places. Plowing at the rate of 1.75 miles an hour, each plow will turn .247 acres an hour or .741 acres for the three bottoms. For a 10-hour day this would make a total of 7.41 acres plowed during that time.

We will now start a tractor of the 2.75 miles an hour class. This tractor has a drawbar draft of 1,360 pounds and will therefore pull two 14-inch plows without overloading, leaving a small margin for emergency pulls. Each plow bottom working at 2.75 miles an hour will net .388 acres in that time or .766 for the two plows, making 7.66 acres for a ten-hour day.

All ready for the 6 miles an hour speed king:

Referring again to our table we find that this tractor has a drawbar draft of 625 pounds—and the soil resistance against one 14-inch plow is 672 pounds! But we must hang at least one plow to this tractor—wouldn't look well if we didn't—so we overload it a bit and send it on its merry way with one 14-inch plow. It rambles along at the magnificent rate of six miles an hour, turning .852 acres of ground during each 60-minute interval of time, netting us 8.52 acres for our 10-hour day!

As for the 8 and 10-miles-an-hour tractors—unfortunately we haven't any plows in stock small enough to accommodate these speedsters so they will have to take a vacation until we can find a field of nice, loose, sandy soil in which to put them at work.

No more work can be accomplished at six miles or more an hour than at 1.75, 2 or 2.75 miles an hour, for as the speed of the tractor increases, the drawbar draft decreases in proportion. True, in the examples stated, the tractor plowing at a speed of six miles an hour plowed 8.52 acres in ten hours as compared to 7.41 acres in the case of the tractor creeping along at 1.75 miles an hour with three plows. But in the latter case the tractor had a generous margin of reserve power whereas the fast tractor was overloaded—and nothing affects the life of a tractor more seriously than overloading.

It is apparent, therefore, that there is no advantage to be gained by speeding up a tractor insofar as the amount of work accomplished is concerned. Very well; that disposes of one problem.

The next question is whether or not a better quality of work can be done at increased speeds? I asked a tractor expert this question—a "trouble-shooter" who has had ten years' field experience