The Draft of Plows

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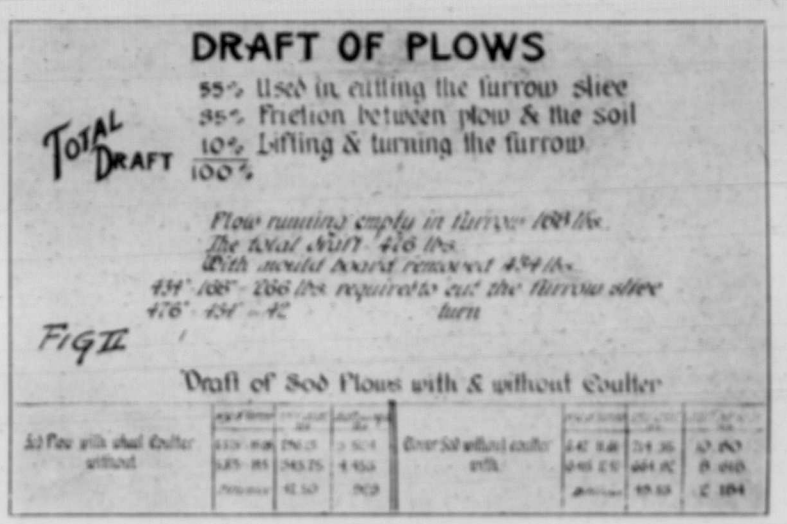
The plow having been brought to its present standard of perfection we find ourselves, not so much, perhaps, from humane motives, as from a sense of financial loss thru wasted powers, studying this interesting topic—the draft of plows.

The total draft will be influenced by numerous factors, including: Shape of moldboard; condition of plow, sharpness of shares and scouring qualities; various adjustments; character and condition of the soil; presence of various attachments, coulters, gauge wheels, etc.; size of furrow; weight of plow and angle of the line of draft.

According to Sanborn, "the plow shows the lightest draft when set to cut the widest furrow of which it is normally capable." This is probably accounted for by the remarkable results of an experiment at the Utica trials, which showed that 55 per cent. of the draft of the plow was caused by the cutting of the furrow slice, 35 per cent. by the friction of the sole and only 10 per cent. by the work of lifting and turning the furrow. The average draft of a number of plows running in the empty furrow was 168 lbs. The whole draft was 476 lbs., and the draft with the moldboard removed 434 lbs. The difference between 168 lbs. and 434 lbs. was taken to be the draft required for cutting the furrow slice. Sanborn states later that 42 per cent. of the draft is used by the share and landside, and another writer put the moldboard friction at only 2 per cent. These figures will not hold for all conditions, but even an approximate idea of the division of draft explains many frequently observed facts.

> Do you know how much power it takes to pull your plow or any other farm implement for that matter? In any manufacturing plant careful records are kept of the amount and cost of the power required to run the machinery. This cost is very closely watched so that the work done is as economical as possible, thus keeping operating expenses at a minimum. Why should not farmers keep the same careful check on operating expenses? If it pays manufacturers it will pay farmers, who are also manufacturers. As outlined in this article, municipalities could profitably invest in a dynamometer to be used at the plowing matches which ought to be held in every locality. Every pound saved in draft is as good as a pound earned, and this year particularly all reasonable economy is the duty of every true citizen.



Small Cutting Edge

In relation to the size of the furrow, the cutting edge should be as small as possible. A furrow 4x12 inches has a line 16 inches long, which must be cut, and an area of cross-section of 48 square inches, a proportion of 1 to 3. One 6x14 inches has a cut surface of 20 inches and an area of 84 square inches, a ratio of 1 to 4.2. The larger the furrow cut, therefore, the less the influence of the cutting edges on each square inch of cross-sectional area, which is a commonly accepted unit of comparison. Sanborn found a constant decrease in draft per square inch as the furrow was deepened and widened up to the normal capacity of the plow. When made to cut wider, narrower, shallower or deeper than the adjustments of the plow ordinarily permitted there was an increase in draft of 15 to 20 per cent., much harder work for the plowman and a poorer quality of plowing.

Referring to Fig. 1, we find when we pull thru the line AB we have the easiest line of draft, i.e., parallel to the roadbed. This condition is found in the railroads, but very seldom in our farm implements. It is very clear that if we swing our line of draft to the position AC we exert a lifting as well as a pulling action, and in the position AD we are pulling down as well as along, in both cases adding to the draft. Here is a question and answer which may interest some readers:

Long Hitch or Short Hitch?

"Does a plow with a long beam pull harder than one with a short beam? I have heard it claimed that it does.

"On the contrary, a long hitch to a plow will make it pull some easier than a short hitch. A plow is different in this respect from a log or a wagon. Here a short hitch causes the horses' tugs to have a lifting effect on the load which tends to keep it from digging into the ground, which helps to lighten the pull. But when the horses' tugs pull on the beam of a plow, it tends to lift the plow out of the ground and something must overcome this lifting or the plow will not stay in the ground.

"If the 'suck' of the plow nose is not strong enough to overcome this lifting action of the tugs, then you must set the beam clevice or lift on the handles enough to overcome it. This is setting one force to overcome another, and that always means lost energy.

"Tests made at one of the agricultural experiment stations showed that hitching a nine and a half foot chain between the end of the plow beam and the evener made a saving of 6 per cent in the draft of a fourteen-inch walking plow, while a thirteen and a half foot chain made a saving of 8 per cent in the pull. You see when you increase the length of the hitch, you decrease the lifting action of the tugs, and so reduce this energy that is lost in overcoming that lifting action. The line of pull from the point of the horses' shoulders to the center of the load of the plow should be as nearly parallel with the bottom of the furrow as is practicable."

The power absorbed in severing the furrow slice demands that shares be not only sharp but properly sharpened. Sanborn reports a difference of only 6.7 per cent. in favor of an old point resharpened over a dull point on the same plow, but an advantage of 36 per cent. in favor of a new point over the old point resharpened. At all events, farmers should not waste power on dull shares. The Winnipeg motor contests have shown a difference of almost 50 per cent. in the draft of different makes of plows, plowing the same depth and width of furrow in the same land. Is this not worth consideration? But to get to the point in a practical way: How much does it take to pull your plow—400 lbs. or 2,000 lbs.? If this question were asked at a meeting of practical men, answers would be given covering even a wider range than the figures suggested above.

Test the Draft of Plows

The season of the plowing match is almost with us, and there is no better incentive to better farm practice than an active interest in this kind of demonstration work. There is a splendid opportunity afforded at such a gathering to demonstrate some important factors in the operation of our most important implement—the plow. When a man is between the handles of a walking plow he carefully adjusts it to work as easily as possible, but he sometimes forgets when he is sitting on a bag of hay on a sulky, and his horses suffer. If too little power is supplied the teams lose in condition, or worse still the quality of the work done is lowered.

A municipality might very profitably purchase a dynamometer (shown in Fig. 3); it is simply a strong spring balance, and loan it to any man at a nominal fee. This is not an extraordinary proposal, and the writer has had this suggestion made to him by several farmers. If this is not possible, arrangements should be made to have the agricultural colleges supply demonstrators to test the plows right in the field. Seeing is believing, and one practical demonstration is worth a hundred articles on the subject. What effect do dull shares and coulters have on the draft? How much does the lead team pull when plowing tandem? Do the different makes vary to any extent? Questions like these should be answered at the local plowing match. I feel sure implement men would co-operate and the writer's experience has been that such a demonstration is highly profitable and instructive to all. Readers wishing to go further into this question can get valuable information from "Power and the Plow," Ellis Rumely, and in King's "Physics of Agriculture."

KEEP AWAY RUST

When machines are laid up for a time, such as farm machinery, the parts not actually painted should be coated with a rust preventative. Such a substance should have the qualities of cheapness, ease of application and removal, and not be injurious to the coated surface.

A good and inexpensive coat may be made by mixing flour with common machinery or lubricating oil. This mixture should have a consistency of thin paste. It may be applied with a paint brush. The flour keeps the oil from drying hard, and the oil will prevent the air and moisture from coming into contact with the surface of the parts treated, thereby preventing rust or corrosive effects.