D R A F T P R O B L E M S.

by

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Every modern agriculturist of today should have a fairly accurate knowledge of the draft required for pulling the different implements on the farm under varying conditions. That this question should be seriously considered by all farmers can easily be proven by a large number of experiments which show that some machines require more draft power than others for the accomplishment of the same kind and the same amount of work.

Before giving any data obtained by the writer or by others, it may be well to give a description of the instrument, which is called the dynamometer, by means of which the draft is determined, and also give some general facts about the subject.

The dynamometer is an instrument for measuring the force or weight required to pull a load on a wagon or draw a machine as it works in the field. The dynamometer is made a link in the draught chain and thus subjected to the tension which it is desired to ascertain. The kind of instrument which is used mostly today, especially where the draft is variable as with all agricultural implements, is a self-recording dynamometer.

According to the Michigan Agricultural Experiment Station report the earliest notice that we have that horses were used in field labor is from the figure on a piece of tapestry woven at Bayonne in the time of William the Conqueror, 1066 A.D. On this tapestry was a figure of a man driving a horse attached to a harrow.

Up to within the last century or two it has been the practice in Briton to hitch horses to the plow or harrow by means of withes tied to the tails of the animals. McDonald in his Survey of the Hebrides in 1808, says, "the common practice was to fasten horses and colts by the tail to the harrow," although in 1634 a law was passed against this custom. Another law of the early Britons was "that no

one should guide a plow until he could make one and that the driver should make the traces by which the plow was drawn of withes or twisted willows."

At the present time collars or breast straps are universally used on draft animals, the latter being used only when a light conveyance is to be drawn.

In the act of plowing, thirty or forty per cent of the draught power required is spent in the traction of the implement and only sixty or seventy per cent on the labor which it performs. The small amount of agricultural labor performed compared with the effort of horse power exerted for its accomplishment may be accounted for in several ways, namely, "from the draught animals not being arranged so that each shall bring its full strength to bear; from there being useless labor to execute, such as to overcome friction etc., between the performance of the machine and the point in which the united force for its accomplishment is finally accumulated; and lastly, the construction of the machine itself is such as often not to be perfectly adapted to the purpose for which it was intended."

The right arrangement or the proper attachment of the draft animals is very important in the hitching to get the best pull. It is generally considered that animals arranged abreast can pull a larger load than animals arranged in line or tandem fashion, since the driver can then better manage every animal and see that each one is doing its share of the work. Another reason for this preference depends on the fact that each horse has its own proper line of draft, depending on the height and general build of the horse, in which the force it exerts is most effective.

The Utah Experiment Station bulletin for 1890 states that "twenty million days of horse work is used annually in plowing for the staple

crops of this country" and this work is constantly on the increase. It is not surprising then, that special attention should be centered on how to make the draught of all implements as small as possible and to secure the best hitch and line of draught.

No useless or extra tax can be put upon the horse without an unavoidable extra cost of either food or decrease in the weight or in the vigor of the horse. When heavy draft power is required, this is an important factor to be taken into consideration.

In addition to the recorded extra draft found as the result of the changes recorded, there are other losses liable to be involved. These will be found in the character of the work done, extra exertion to the plowman and extra wear to the plow.

The Missouri and Utah Stations have performed a large number of draft experiments with the plow and other farm implements and some space will now be devoted to these tests.

A. A. Mills of the Utah Station conducted a number of experiments with the coulter and since the use of the coulter on plows for breaking up grass land is now universal, this attachment should be considered in relation to what effect it has on the draft of the plow. This experimentor found that the "sliding coulter" increases the surface friction, since it cuts by the sheer force of straight pressure, while the share lifts and cuts at the same time. With the rolling coulter, the coulter is only prevented from running out of the ground by an opposing force in the sharper angle to which the plow is set in the ground. By a law of Physics a resulting loss of force necessarily occurs.

In bulletin No. 7 of the same Station we learn that sulky plows gave less draft going down hill and much greater draft up hill than walking plows. Trials in Missouri and Utah showed that the sulky

plow drew slightly harder than the walking plow, but only very slightly harder when the sulky plow was properly adjusted.

From bulletins No. 32 of the Missouri Experiment Station and No. 2 of the Utah Experiment Station, we learn that the draft of plows decreases for each inch of soil turned, both with an increase of width and depth.

Several conclusions from experiments conducted at the Utah Station will give the results of tests along draft lines. It was found that trucks or small wheels under the end of a plow beam decreases the draft by about fourteen per cent; a furrow 7 X 14 inches on timothy sod required over five hundred pounds draft or more than the normal pull of three horses; a share sharpened by a blacksmith increased the draft thirty-six per cent over a new share. The job was done badly but was the blacksmith's usual method.

In some experiments conducted at this Station, the same general results were found. The coulter was quite a labor-saving device on the plow, making a difference of from twenty to twenty-five per cent in the draft. With the use of the jointer, there is not as much difference in the draft, the main use of this attachment being to help turn under stubble and green crops.

Judging from what has been the result with the different types of plows and the jointer and coulter attachments at the different experiment stations, it is readily seen that with a little skill and foresight, there may be a saving in the draft power,which is a very important item where there is much plowing to be done. Besides being possible to reduce the draft, there may also be a saving of machinery and of men and animals.

It is for us, the young men who have taken the agricultural course at the agricultural college, and are therefore familiar with

the question at hand and other very important ones, to spread the knowledge of the importance of certain needed reforms in the art of farming, since the farming class as a rule are rather slow and suspicious of adopting new ideas and new methods. The phrase "anyone can farm" is getting to be obsolete. It requires as high a class of intelligence to succeed at the farming business as it does to succeed in mechanical, mercantile, or professional life.