

106 lbs. for hard dirt roads is an average of 50 recent U.S. road tests over eight sections of roadway, the sections averaging 900 feet, or over  $8\frac{1}{2}$  miles of road tests. They give us the most recent and reliable tests of dirt roads.

On many high-class dirt roads, however, the draft per ton will be as low as 70 to 80 lbs. The draft on asphalt may vary 100% with a wide change in temperature. In tests made in Chicago over the same stretch of asphalt the draft at  $50^{\circ}$  was 37 lbs., and at  $84^{\circ}$  it rose to 70 lbs., a variation of 33 lbs. per ton for a difference in temperature of  $32^{\circ}$  F. Fifty pounds may be considered a good average for draft on a smooth asphalt surface.

Macadam in poor condition (and rapid auto traffic will soon bring it to that state) may have a draft equal to that of the good dirt road, and would also give a very jerky draft which will be hard on the horses. The use of tar or asphaltum surfacing should correct this objection, and will reduce the draft and dust to a minimum.

From the figures on gravel roads it is evident that this type of road, when in poor surface condition, will be one of the most expensive of roads to haul over. The figures 258 and 300 are averages of four tests each. On roads of this character the cost of hauling would be  $2\frac{1}{2}$  to 3 times that on good dirt roads.

Draft tests have given us very interesting information as to the effort necessary for starting a load on various types of roads. This increased draft required for starting the load is, contrary to one's first impression, relatively greater on the harder types of roads than on those softer types requiring a greater draft per ton. Mr. McCormack's recent tests show that on asphalt the starting effort is 3 to 4 times the average hauling draft (on the level), while on hard dirt roads it is seldom more than 2 to 3 times, and for loose sand it averages about twice the hauling draft. When the operating draft is excessive, as on loose sand, the starting draft may in extreme cases not be more than 25% greater than the average draft. From the figures given it is apparent that it is possible for horses to handle a greater overload on a dirt road than on harder materials. To make this point clear, let us consider a concrete example. If the average horse is made to pull .2 its weight, instead of the usual  $\frac{1}{10}$ ; for a dirt road the starting pull would be .4 to .6 his weight, but on the macadam it would be .6 to .8 the weight of the horse, which would be too great a strain.

Another and a more important result of recent road tests is that in regard to the effect of grade on draft. If has been a practice to consider that each one per cent. grade (or a rise of one foot in 100 horizontal) added 20 pounds per ton hauled to the draft on the level, regardless of the character of the road surface. Many have been inclined to question the accuracy of this practice, but Mr. McCormack's tests verify this theory, and make it possible to now figure, with certainty, the actual allowable grade on hills for different types of roads; and here too the softer surface has a relative advantage over harder ones, in that they will allow a steeper grade on hills before the same proportional increase in draft is reached. Taking 50 lbs. per ton for asphalt, a  $2\frac{1}{2}\%$  grade or  $2\frac{1}{2}$ -foot rise in 100, will double the draft; but for earth roads at 100 lbs. per ton, it would take a 5% grade to double the draft. In loose sand, where the average draft is 300 lbs., it would take a 15% grade to double the draft. Most country roads have a grade limit of 5%, except for very extreme conditions.

Until recently no comparative tests have been made of roads, before and after improvement, to determine by actual trials the real benefit of improved roads in the re-

duction of draft. The results of the first of such tests has only just been made known, though not as yet officially published by the U.S. Office of Good Roads. The tests were made on the Ames-Nevada road; those before improvement being made during the summer of 1913, and those after improvement were made last summer. A comparison of these tests furnish striking evidence of the benefit of good roads for hauling, and should settle once and for all the question as to whether it pays to improve roads:—

#### Draft to Pull One Ton.

*On Ames-Nevada Road (average both ways).*

Before improvement.	After improvement.
Black dirt, all grades.	Black dirt, all grades.
106 lbs.	68 lbs.
—average—	—average—
Average saving, 35.6%.	

*On Ames Hill.*

Sand	Sand clay
Grade, 5%	Grade, 5%
205.9 lbs.	139.5 lbs.
—average—	—average—
Average saving, 32%.	

*On Ogden Hill.*

Clay	Gravel
—9.6% grade—	—
274.5 lbs.	208 lbs.
Average saving, 24.2%.	

Where the farmer formerly could haul 60 bushels of wheat, he now can haul over 80 bushels with the same draft.

Let us now draw some conclusions for the rural conditions of Manitoba. It is safe to assume that the country roads in this province could be easily improved and kept in shape, without greatly changing the road materials, so as to effect a saving of 20% in draft. Granting this as a conservative estimate, let us estimate its effect on the hauling of produce to market. Taking wheat as an illustration, last year's yield was 52,491,000 bushels. Allowing  $52\frac{1}{2}$  bushels per load, for easy figuring, and two trips per day for a team costing \$5 a day, it will take 1,000,000 loads to haul out our wheat, or a cost of \$2,500,000 to market Manitoba's wheat crop—a little less than 5 cents a bushel. With a 20% decrease in draft over better roads 126 bushels could be hauled per day instead of 105. This would have resulted in a saving of over \$400,000 for last year in hauling our wheat crop alone.

#### MAIL TO MEN AT THE FRONT.

The Deputy Postmaster General has announced that the following is the correct method of addressing members of the Canadian Expeditionary Forces, and that in order to facilitate the handling of mail at the front and to insure prompt delivery it is requested that all mail be addressed in this manner:—

- (a) Rank .....
- (b) Name .....
- (c) Regimental Number .....
- (d) Company, Squadron, Battery or other unit .....
- (e) Battalion .....
- (f) Brigade .....
- (g) First (or Second) Canadian Contingent .....
- (h) British Expeditionary Force .....

Army Post Office,  
LONDON, ENGLAND.