

sow a large quantity at the first. It should be tried everywhere. If it is better than the grasses that we now have we ought to know it, and we can only find out how it will grow on our soils by trying it. The seed may be had from any of the leading seedsmen — *The Northwestern Farmer, Minnesota.*

Reconstruction of Old Roads.

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Much that is written regarding the making of roads no doubt seems to many as applicable only to roads which are being newly constructed, roads which from the first survey have remained unused except as common sheep pastures or cow paths, on which the trunks and stumps of the old forest trees remain, and the hollows and hillocks are still covered with their native sod. Or the question is asked, Are we to tear up the old roads, throw away all the work already put on them, level them out from fence to fence and commence anew? There is no doubt that much of the work put on some roads, throwing the dirt from the sides to the center, grading them up to a dangerous height, had better be undone. But we must look at the matter in a practical light and see what for the present we can afford.

Roads which have received no gravel whatever had better be regarded as new roads, and all future construction carried on according to the best principles. There can be no doubt but that in a case of this kind the cost of grading is so small, compared with the other portions of the work, that the extra labor involved will be amply repaid by the greater durability of the roadway.

With an old road which has received coatings of gravel from time immemorial, the matter is different. Here we have a driveway usually too flat on top. During the summer it is hard and serviceable after the furrows created by the traffic of fall and spring have been worn away. The sides of the road are square shoulders and the open ditches frequently deep and dangerous. In very few cases can we afford to throw away this construction, nor is it necessary to do so, the question becoming one of how to make the best possible use of it?

Good roads are largely a matter of good drainage. We do not mean by this that the gravelling is unimportant, not that a hard, smooth, rounding surface is unnecessary, but that these are in a great measure a part of the system of drainage. The first thing to be attended to, then, is to see that the open ditches have a constant fall and are provided with outlets. Drains to be of any service to a road must carry the water away as rapidly as possible; if they are merely receptacles for water, the subsoil of the roadway absorbs it and is softened, and in the wet weather of fall and spring traffic forces the gravel covering downward and the mud to the surface.

To keep the subsoil or natural earth under the roadway as dry as possible is exceedingly important. As a rule, the open drains will not be deep enough to lower the water line sufficiently. In low land, or if the soil is of a retentive nature, it is absolutely necessary to provide a means for carrying away the water from the subsoil, and rather than deepen the present open drains, by far the best means is to use tile underdrains placed beneath the existing open drains. If the earth subsoil of a roadway is kept dry it will sustain any weight placed upon it. An ordinary dirt road is a good road while dry. The object of gravelling, draining, and other improvements is to make a good road for wet seasons.

As previously intimated, the majority of the existing roads are too flat on top, and the next step will be to cut off the square shoulders at the edge. On a recent visit to a municipality of the Province, noted for its good roads, the writer found that the road grader had been run along the sides of the road, the corners cut off and this material brought into the center of the driveway. Here we have a hard gravel surface buried under dirt, sand, and very light gravel which had washed down from the center. In this a very grave mistake was made, since by far the greatest use of a road covering is to shed the water to the side ditches and to protect the earth subsoil by preventing the water penetrating to it. The covering of this road is now of such a nature that water will be absorbed and retained instead of being at once shed off. Clean gravel and broken stone, when consolidated into a smooth, rounding surface, form such "roofs," but when mixed with sand the benefit to be derived from the covering is largely lost. This shoulder, instead of being brought to the center of the road, should have been thrown outside of the ditch and used in levelling the roadside, or otherwise dis-

posed of in such a manner that it would at least not be injurious to the road.

The driveway of the road will probably need still further crowning and rounding up. It will be advisable to first run a scraper over the surface to remove mud, sand, and the other soft, fine stuff. Then apply a coating of gravel, nicely spread and, by all means, if the municipality can afford a roller, thoroughly consolidated.

Besides scraping the road, it is advisable to pick up the surface lightly to permit the new covering to unite with the old. Municipalities owning steam rollers accomplish this very easily by the use of steel points projecting from the cylinders. With these attached, the roller is passed over the road and the entire surface loosened. A harrow is next used to further break up the surface. The

and so combine the different constituents in the best form to be applied to the land. Other absorbents are used. Among the most convenient and suitable may be mentioned sawdust, shavings, loam or dried muck, and peat, any of which serve a good purpose, but the last named has a special value in being able to retain soluble nitrogen compounds, which are very volatile under ordinary conditions.

Horse Manure is the most uniform of all manures made upon the farm, the reason for which is that the food given horses, being chiefly hay and oats, varies very little. It is estimated that the daily amount made by a horse, together with the straw necessary to absorb it, contains about .19 lbs. nitrogen and 1.15 lbs. mineral matter, or from 5½ to 5½ tons of manure per year, containing 69 to 73 lbs. nitrogen and 420 to 460 lbs. of mineral matter. In order to retain all its manurial constituents, drainage and volatilization must be avoided; therefore an impervious floor and a judicious use of litter are very important. Horse manure is particularly liable to rapid fermentation, which means a loss of the most valuable constituent, nitrogen, except a provision be made to fix it. Just here is where the use of a chemical "fixer" is particularly valuable. Gypsum and magnesium sulphate, if spread upon the heap or in the stable, form stable compounds. The former fixes the nitrogen, and the latter the soluble phosphoric acid.

Cow Manure is less constant in quality, due to more varied food and the large amount of water consumed. It is estimated that a cow consumes in winter four parts, by weight, of water to one of dry food, while in summer the proportion is as six to one. The daily excrement of a cow, together with necessary litter, is from .274 lbs. to .286 of nitrogen and from 2.046 to 2.278 lbs. of mineral matter, which in one year amounts to from 100 to 101.4 lbs. of nitrogen and 746.8 to 831.5 of mineral matter. Cow manure being watery and poorer than horse manure, is much slower in fermentation. When applied alone its action is very slow, its influence being felt for three or four years. If cows are richly fed, the manure decomposes more rapidly. The risk of loss of volatile ammonia is less than with horse manure, although the same preservatives can profitably be used.

There are advantages gained from allowing the manure to remain in the stall (box stalls) for a considerable time: 1st, the more thorough absorption of the urine by the straw, and consequently the more uniform mixture; 2nd, a certain retardation of decomposition effected by the treading under foot of the manure; 3rd, the protection of the manure from rain and wind and securing uniform temperature. Even in this case the judicious use of chemical fixers, previously referred to, may do much to save volatile gases and thus keep the atmosphere pure and healthful.

Pig Manure, like cow manure, varies in composition because of the varied character of the food given them. When the food of the pig is rich, then the manure may be quite equal in quality to the other manures. In 24 hours it is estimated that a pig makes, together with necessary litter, .06 to .074 lbs. nitrogen and .545 to .772 lbs. mineral ingredients, which amounts in one year to 22 to 27 lbs. nitrogen and from 200 to 250 of mineral matter. Pig manure, being poor in nitrogen, is cold and slow to ferment.

Sheep Manure (dung and urine), weight for weight, is the most valuable of all farm animal manure. A sheep's daily manure, with litter, contains .0429 lbs. nitrogen and .264 mineral matter, which in one year amounts to 15.66 lbs. of nitrogen and 96.36 lbs. of mineral constituents. Being rich in nitrogen it is particularly liable to ferment, although hardly as liable to heat as horse manure. Artificial fixers are strongly recommended for sheep manure.

Fermentation.—More than 30 years ago Pasteur showed that fermentation of urine was due to a minute organism which develops most rapidly in a plentiful supply of oxygen. Other organisms are also present which develop in the absence of oxygen, which too carry on the fermentation, internal and external, of the manure heap. The conditions influencing fermentation may be summed

up as follows: The higher the temperature the more rapidly will go on the fermentation; also, exposure to the air has a hastening effect. Dampness, too, has an important influence by lowering the temperature, thus hindering "fire-fanging." It also retards fermentation by limiting the supply of atmospheric oxygen in the heap.

The composition of farm-yard manure varies most from the different proportions of water contained at different times, and which may be at from a minimum of 65 per cent. in fresh to 80 per cent. in well-rotted. Total organic matter may be taken at from 13 to 14 per cent., containing .4 to .65 per cent. of nitrogen, .4 to .7 of potash, and .2 to .4



THREE REPRESENTATIVE LEICESTERS.

No. 61—Bred by E. Gaunt & Sons, St. Helen's, Ont.
No. 69— " Peter Thompson, Salem, Ont.
No. 70— " Watt Bros., Salem, Ont.

driveway is then shaped, the new gravel or other metal put on as required, and the whole again consolidated.

The greatest improvements needed on existing gravel and macadam roads, and which are within the reach of all municipalities, are tile underdrains, cutting away the shoulders, more perfect crowning, and better outlets and grades for the open drains.

Farm-Yard Manure.

(Compiled for the FARMER'S ADVOCATE from the popular treatise by Dr. C. M. Aikman, Lecturer on Agricultural Chemistry, West of Scotland Technical College.)

Farm-yard manure is the oldest, and is still, with the general farmer, undoubtedly the most popular



THREE REPRESENTATIVE COTSWOLDS.

No. 52—Bred by D. McCrae, Guelph, Ont.
Nos. 56 and 57— " Robt. Miller, Brougham, Ont.

of all manures. It has stood the test of long experience, and has proved its position as one of the most important of all our fertilizers. That it should prove a valuable manure is scarcely to be wondered at, as it is originally formed from vegetable substances, and it therefore contains all the elements present in the plant itself.

The composition of farm-yard manure varies with many conditions. It would perhaps be difficult to get two samples exactly alike. It is composed of solid excreta, urine and litter. The sort of litter most generally used and which answers the purpose admirably is straw, which should be used in sufficient quantities to absorb all the liquid manure