

quantity it will in some cases interfere with the breathing apparatus. It is better feed than other hay, consequently less at a time is sufficient. In feeding cattle, we find common clover will not compare with it. Our breeding cows are wintered on lucerne hay and corn ensilage, without meal, and their condition does not seem to indicate a lack of anything required.

Any man on a hundred-acre farm should have at least ten acres of lucerne, if the land is suitable, and the chances are that as he learned its value the acreage would be increased. I have never grown it for seed, as it appears to me to be more profitable to secure the second and third crops for hay or pasture than to take chances on the seed crop. HUDSON USHER.

Lincoln and Niagara, Ont.

Business Farming.

There never was a truer saying than that the only true farming is stock farming. Growing crops to sell is soil robbery. Taking this position then, it is our aim to grow such crops as will yield us the largest profit, with a view to feeding as much as possible to stock. It has been wittily said, "that nothing will lie like figures, excepting facts." Still for all that, I think it would be wise for farmers to do considerable figuring to know just what their crops are costing them. A plowman is likely to strike out a straighter furrow if he has some stakes to go by. If the furrow is not straight, it may be due to the lack of his skill instead of the stakes. The figures that I am now about to submit are as near as I can come to actual facts in producing crops under favorable conditions. It will be noticed by these figures that considerable of the work has been done by 4-horse and 3-horse teams, which materially reduces the cost. I have also taken the 20-acre field, and a field that size can be worked somewhat more cheaply with three and four horse teams than smaller ones. Still, that is the kind of teams we are working here, so that the figures are taken from actual conditions.

Another point I desire to emphasize in giving these estimates is what I consider the most economical rotation of crops for a large portion of Southern Ontario. By putting the wheat after the corn it will be seen that a very small charge is necessary for putting in the crop. Of course the whole thing hinges upon having enough stock to consume the produce. We would not have the manure unless we had the stock. We could not convert the corn crop into cash unless we had the stock to feed it to. We could not put the corn ground into wheat unless we had a silo to put the corn in which clears the land at once. The idea of growing the wheat is to take advantage of this saving of labor in putting it in after the corn. A stock farmer should grow about all his crops. Of course we cannot grow bran, but we can grow wheat and convert it into bran. Besides, as the fellow said of his dog, "A certain amount of fleas is good for a dog, to keep him from forgetting he is a dog," and it is just as well for us to grow some wheat when we have the conditions favorable, and especially when we can get as good a showing as they can in what is styled the great Northwest wheat belt. It will be noticed that after making very liberal allowances for everything, the wheat is grown at 40c. a bushel. That is, of course, figuring on a yield of 30 bushels to the acre. If land will not produce that with the manure and work we put upon it, it is not worth charging \$4 an acre rent and \$2 for the manure. In fact, the finest piece of wheat, 25 acres, that I have ever grown is where I had a corn crop last year. The rotation here given provides for heavy manuring during the winter right from the stable, as we are doing, and I have made allowances on the four crops during the rotation of a charge of \$5 to the acre.

I have not made any allowance for the straw, as that would be used on the place, and about all other crops fed we have the manure on hand. The prices quoted—\$2 for ensilage per ton; hay, \$6—is not more than it is worth for feeding to the stock. In detail, the four-year rotation is as follows:

Corn crop on oat stubble, well manured—

Plowing 20 acres, 4-horse outfit, 7 days, at \$3.50.....	\$21 50
Rolling " " " 1 1/2 " " 2.50.....	3 75
Disking " " " 3 " " 3.50.....	10 50
Harrowing " (twice) " " 2 " " 3.00.....	6 00
Drilling " " " 4 " " 3.50.....	3 50
Harrowing " " " 3 " " 3.00.....	3 00
Weeder (2) " " " 2 " " 2.50.....	5 00
Cultivating " (twice) " " 4 " " 2.50.....	10 00
Cutting corn " " " 3 " " 3.00.....	12 00
Drawing corn to silo " 5-teams " 2 " " 2.50.....	25 00
	\$103 25

Four extra men, at \$1.50, \$12.00; blower, engine and two men, at \$8.00 per day, \$16.00; 100 lbs. twine, at 12c., \$12.00; rent of land, \$1.00 per acre, \$80.00; proportionate charge for manuring, \$2.00 per acre, \$40.00.

Total cost of 20 acres of ensilage corn placed in silo, \$263.25.

Feeding value of 20 acres of ensilage corn, 15 tons to acre, at \$2.00 per ton, \$600.00.

Profit of 20 acres of ensilage corn, \$336.75.

Cost price of ensilage per ton, 88c.

Fall wheat sown after corn crop—

Disking twice, 4-horse outfit, 6 days, at \$3.50.....	\$21 00
Drilling, 4-horse outfit, 1 day, at \$3.50.....	3 50
Cutting, 3-horse outfit, 2 days, at \$3.00.....	6 00
Drawing, 2-team outfit, 2 days, at \$2.50.....	10 00
	\$40 50

Extra men drawing, 3 men, 2 days, at \$1.50, \$9.00.
Stooking, 3 men, 2 days, at \$1.50 each, \$9.00.
Seed, 30 bushels, at \$1.00, \$30.00.
Twine, 60 lbs., at 12c., \$7.20.
Threshing, \$15.00 for machine; extra help, \$9.00.
Rent of land, at \$4.00 per acre, \$80.00.
Proportionate charge for manuring, \$2.00 per acre, \$40.00.

Total cost of 20 acres wheat, \$239.70.

If yield is 30 bushels to acre, or 600 bushels, at 75c., \$450.00; profit, \$211.00.

If yield is 30 bushels to acre, or 600 bushels, cost per bushel, 40c.

Wheat seeded for hay—

120 lbs. clover seed, at \$10.00 per bushel.....	\$20 00
96 lbs. timothy seed, at \$2.50 per bushel.....	5 00
Sowing, 1 day	1 50
	\$26 50

Rolling (spring), 2-horse outfit, 1 1/2 days, at \$2.50.....	3 75
Cutting, 2-horse outfit, 3 days, at \$2.50.....	7 50
Tedding, 1-horse outfit, 1 1/2 days, at \$2.00.....	3 00
Drawing, 2 teams, 3 days, at \$2.50.....	15 00
Hay loader and 2 extra men, \$8 per day, for 3 days	24 00
Rent of land, \$4.00 per acre	80 00
	\$133 25

Cost of producing 20 acres hay, \$159.75.

Cost of producing 1 ton hay, \$4.00 per ton, if yield is 2 tons to the acre.

Forty tons hay, at \$6.00 per ton, \$240.00; profit on 20 acres, \$80.25.

Oats after Hay—

Plowing 20 acres, 4-horse outfit, 7 days, at \$3.50.....	\$24 50
Disking 20 acres, 4-horse outfit, 3 days, at \$3.50.....	10 50
Harrowing 20 acres, 3-horse outfit, 1 day, at \$3.00.....	3 00
Sowing 20 acres, 4-horse outfit, 1 day, at \$3.50.....	3 50
Rolling 20 acres, 2-horse outfit, 1 1/2 days, at \$2.50.....	3 75
	\$45 25

Condensed as below:

Plowing, disking, harrowing, sowing, rolling, as charged for corn, \$45.25. Cutting, stooking, drawing, threshing, twine, seed, etc., similar to wheat crop, \$79.00. Rent, \$80.00. Proportionate charge for manuring, \$1.00 per acre, \$20.00. Total, \$224.25, cost of crop of 20 acres oats.

If yield is 40 bushels to acre; price, 34c. per bushel; crop is worth \$272.00.

Profit on 20 acres oats, \$47.75.

It will be seen from the above that the 20 acres of corn has cost \$263.25, but the profit would be \$336.75. Wheat, the charge being low for putting it in, the cost of the crop is still \$239.70, leaving a profit of \$211.00. Hay cost \$159.75; profit, \$80.25. The 20 acres of oats cost \$224.25; profit is only \$47.75. It will be seen that the corn crop, after making a very large allowance for the cultivation and care of it, still yields over eight times as much profit as the oat crop, and four times as much as the hay crop would. It will thus be seen that it is the most economical feed by far, and yet how very large a per cent. of farmers do not grow any corn for ensilage. This rotation is especially suited for light land, which is just as good for stock as any other kind of land, providing plenty of ensilage and clover is grown. The rotation here given leaves the land in just as good condition, or better, in regard to fertility, as when we started the rotation, as it is intended, of course, in growing these crops to feed them to stock, and a farmer should be able to manure a field every four years, so that it is a rotation that may be considered self-contained, and not soil-robbery. There are other rotations quite as good, but any rotation should include ensilage corn every third or fourth year, as it is the most profitable crop. GEO. RICE.

Experience with Lucerne.

Editor "The Farmer's Advocate":

I have been growing lucerne for about twenty years, and although using it largely for soiling, have made some into hay every year. I have at the present time ten acres, and expect to make hay of it all. We always cut two good crops a year, and, in favorable seasons, we sometimes get a third cutting, but I think it is better, as a rule, to leave the third growth on the ground, if it is not too rank, as it proves a good protection for the winter. I have found the first cutting the hardest to cure, as it usually is pretty rank, and the weather at that time is often showery. We get from four to five tons to the acre in two cuttings. A very important thing in handling lucerne for hay is to cut it at the right time, which is when the first blossoms begin to show, as, if it is allowed to get into full bloom, the stalks become woody, and the hay is not nearly so good. This applies to all the cuttings. The

first cutting is usually ready from the first to the fifteenth of June, and I have known it to show blossom as early as the 24th of May. The curing of lucerne is of the utmost importance. We always start cutting when the crop is free from moisture, from rain or dew. We allow it to wilt well, and then rake and put into good coils, and allow it to cure in the coil for two or three days, according to the weather. The coils are then opened out for a couple of hours when we start to draw in. The chief thing is to cure it without getting it so dry from sun or wind that the leaves break off. I have never tried curing it in the swath as the mower leaves it, as we never had a side-delivery rake until this year, when I intend to try this method. I am not in favor of using the hay tedder in lucerne, as you are apt to get it too dry sometimes. I have not found it much more difficult to cure than the common red clover, but it will not stand so much sun and wind, and you have to be careful in that way. I have never tried the Glendinning method of putting clover in without curing, and, as a matter of fact, I have never succeeded in having first-class clover hay without cooking it up and letting it sweat. We have occasionally put in a few loads that had not been properly cured, and it invariably turned out mouldy. As to the feeding value of lucerne, I may say we have never had any hay of any kind that would produce as much milk from our cows as lucerne. The cows always increase their flow as soon as we start feeding lucerne, and when the lucerne is done they fall off, and I am satisfied from my own experience that, with good ensilage and lucerne hay, cows can be kept up to a good flow of milk with little or no grain. The greatest mistake I have made in the growing of lucerne is in not sowing enough seed; twenty pounds to the acre is the least that should be sown. The land should be clean, and in a fair state of fertility, and made as fine as possible. I prefer sowing a light nurse crop of barley with it, and on no account allow any animals on it the year it is sown, and it never should be pastured by either sheep or horses, unless you wish to plow the field, as they will surely kill it. I have never grown any seed from lucerne, but from what I know of it, I think it is doubtful if it pays to grow seed in this country. Brant Co., Ont.

R. S. STEVENSON.

Soil Drainage, its Need and Value.

Editor "The Farmer's Advocate":

Every successful farmer fully appreciates the value of a thorough drainage system, whether natural or artificial, on his lands. So important is drainage that it may safely be said drainage and clover are the basis of successful agriculture. All our arable lands have been improved over their primitive conditions by drainage. A certain area had sufficient natural drainage for the pioneer to begin cultivation, while a larger area has since been converted from waste tracts to land of highest fertility by artificial drainage. Some soils, it is true, are so lacking in the elements of fertility that drainage alone will not improve them. Soils, however, that have been improved by an incomplete system of drainage, a thorough artificial system would further improve to an extent difficult to estimate. Before proceeding further, I wish to define soil drainage as the removal either naturally or by artificial means of the surplus water from the soil, hence a drained soil is one which may be moist but is not saturated with water. An excess of moisture in the soil we shall term "fill water," and our aim in draining should be to remove this extraneous water, leaving just sufficient to supply the plants produced abundance of moisture throughout their growth.

The detrimental effects of too much water in the soil are many, hence the need of drainage, and I will enumerate a few of them.

A soil containing too much water is not in a condition to permit the free access of air or oxygen and nitrogen to the extent that these elements should circulate through the soil. The importance of a circulation of air in the soil cannot be overestimated; where this is interfered with we cannot hope to raise the soil to a very high state of fertility. Too much water in the soil lowers its temperature. It also dilutes the plant food too much, thus retarding or entirely stopping the growth of the plant. It is also very unfavorable to the development of bacteria, by preventing the access of air, from which bacteria would receive the oxygen so necessary to their development. In its absence they attack the complete nitrogen compounds in the soil, taking away the oxygen and leaving ammonia, which passes off into the air, where it is wasted, carrying away much of the valuable nitrogen from the soil. The texture of clay soils is greatly impaired by the effect of excess water, and such soils generally become acid or sour, a condition very different from that of a very fertile soil.

We may sum all up by saying an excess of water in the soil excludes the air, reduces the temperature, dilutes the plant food, impairs the physical condition, thus retarding or entirely stopping the growth of the plants as effectively as is done when the soil is too dry. When we consider all the detrimental effects of a lack of drainage to the soil, and then remember that by a thorough drainage system we obviate all these undesirable conditions, we are assured that its advantages are many, and that in order to accomplish our ends in