analogy, we may adopt the same conclusions." An he adds: "These results, obtained by positive science, agree with the experience of the most observing, intelligent, practical men." Another thing: "If we cut early, we save more time for the second growth for another mowing or feeding." The whole of the article referred to is worthy of careful study.

I am not a chemist, nor have I made careful experiments to find the best time to cut hay, but in an address, January, 1872, printed in the Report of the Michigan Board of Agriculture, on theoretical grounds, with some observation, I stated that grasses should be cut earlier than is the practice with most farmers—a little before the plants were in flower. Several reasons were there given, some of which are the same as now given by Prof. Atwater.

Again and again the best English farmers have proven that it pays to drain wet land for the grasses. We have often seen the same thing done in different parts of this State, always with good results. Such fields stand the drouth better, and yield more and better feed, The sedges die out. There is always an improvement, notwithstanding the fears and cautions expressed before ditching. I cannot hear of a pasture anywhere that has been injured by tilling. I never expect to.

Two other customs may now be added in the treatment of English pastures. The droppings of cattle are often broken up and scattered to prevent rank spots, which are not eaten off by stock. It takes less time than might be supposed. They also mow off small patches of grass at a time where it is found running to seed. The small quantity at a time is readily eaten on the ground by the stocks, as it wilts and partially cures. Thistles and many other weeds are treated in the same manner. In place of the weeds and seeding, grasses will often spring up a fresh bite, very agreeable to stock of all kinds. In pastures in this country we very often see June grass and other grasses seeding early in the season, thus weakening the roots. The dead dry tops are left all summer, where, if cut off in time, or eaten off, there would be a good supply of fresh herbage all the season.

After getting a large number of replies from some of the best farmers of England last year (1875), in a summary given by Morgan Evans, he says:

"It appears to be the general practice of those who have laid down permanent pasture to select for the purpose the loamy, retentive portions of the farm, and to cultivate the lighter, more easily worked, as arable land. At the latest date the most popular grasses are timothy, alsike, several fescues, white clover, rye grass, and a few others. More seeds are sown to the acre than was formerly thought necessary; a brushing or light harrowing follows the sowing. Some mow and some pasture the young grass the first season, being careful not to cut or feed too close. The use of artificial foods for grazing stock is very highly spoken of as a most effectual way to improve pastures. There is no difference of opinion as to the great value of a top-dressing of farmyard manure on grass land."

The most valuable manuring substances are the following: First, nitrogen; second, phosphates; third, alkalies, especially potash.

Mr. Lawes, the high authority previovsly referred to, says: "You may be sure that the production of pasture is a most costly operation, and it takes a life time to convert arable land into pasture."

Alternate grazing and pasturing are highly recommend. Seeding by "inoculation" is rarely practised, on account of the great expense.

I have thus purposely devoted considerable time to grass-lands as treated in Great Britain, although we may not be able to adopt their practices in every particular. In England labor is much cheaper, land is more valuable. This makes hay, pasture, meat and grain higher. They can afford to pay more for artificial fertilizers. Their climate is cooler and damper in summer. On this account, grasses grow thriftier, and are not so likely to burn out in warmest weather. Their autumn, winter and spring are milder and more favorable to the better sorts of grasses. They have long tried and used many sorts.

Manure for Grasses.

The Michigan Agricultural College made careful experiments with different manures as top dressing for grasses, with the following results: The plots—half an acre each—of sandy, warm soil, exhibited the following facts at the end of three years: The top dressing was applied in 1864, and the grass was cut twice each season in 1865 and 1866. The proceeds of each cutting and each lot were weighed separately, and a perfect record kept. The results for the four seasons were as follows: On the plot to which no fertilizer or manure was applied, the total weight of hay yielded per acre was 8,740 lbs. Where two bushels of plaster per acre were applied, the yield per acre was 13,335 lbs., a gain of 4,484 lbs. Where five bushels of wood ashes were applied, the yield per acre was 12,007, a gain of 4,164 lbs. Where three bushels of salt were sown per acre, the yield was 13,957 lbs., a gain per acre of 5,227 lbs. Where twenty loads of muck per acre were laid on, the yield was 14,68 6 lbs., a gain of 6,524 lbs. These are results which indicate that there are fertilizers which will produce as good results as plaster. For instance, the plaster yielded a gain of 41 per cent., while the horse manure gave an increase of 71 per cent., or nearly a ton more grass per acre in the three years.—*Rural World.*

The Yield of Wheat.

The wheat crop, as the chief food grain of the world, ought certainly to be grown with profit. If this staple crop is by universal consent admitted to be an unprofitable one, there must necessarily be something wrong in its management. No other crop can take its place under our present system of farming, for it is, in the vast majority of cases, made the vehicle for bringing in grass and clover, and its place in the usual rotation cannot well be filled by any substitute. But there is a universal complaint that there is no profit in growing wheat. This is very generally true, but it does not follow that the blame belongs to the wheat, for with some farmers wheat is by far the best money crop they raise. But these farmers raise far more than the low average of 12 or 15 bushels per acre. It may be taken as a general rule that a yield of less than 25 bushels of wheat per acre is grown at a loss, at least in those localities where it is necessary to use manure to produce this grain. When the "virgin soil" is still unexhausted, and manure is left to rot idle in the yards, or to be washed into the streams, there may still be some little profit in 20 bushels per acre. But where 10 to 20 loads of manure per acre is used every four years, and lime, superphosphate or other fertilizers are applied periodically in addition, a crop of even 25 bushels is hardly profitable. Still, a larger yield than this is the exception rather than the rule upon well cultivated farms. An elaborate effort has been made recently by Mr. Klippart, the Secretary of the Board of Agriculture of Ohio, to ascertain how frequently 40 bushels of wheat per acre has been grown by farmers in that state. A circular was issued to the secretaries of the county agricultural societies, requesting the names of those farmers who had, within their knowledge, grown 40 bushels of wheat or over per acre. From Champaign County five names were reported, three of these farmers had grown 40 bushels, one 45, and one 51 bushels per acre. In Hardin County two names were obtained. Mercer County furnished six names; Morgan County, one; Putnam County, one; Shelby County, three; and Sandusky County, three names, one of which was that of a farmer who raised 61 bushels per acre. With these few exceptions, the yields reported where a few of 30 bushels or more, many of 25 bushels, and in many cases the latter yield was mentioned as an extraordinary crop. In some cases the yield was reported as being little more than the quantity of seed that had been sown. It is largely the custom in Ohio to sow the wheat upon the corn stubble, simply harrowing in the seed or covering it with one plowing or cultivating. Where this is done, a profitable yield cannot be looked for, even upon the rich bottoms of that generally fertile state. The few large crops reported are, without doubt, raised in a different manner from this, although we have no means of knowing the methods by which they were grown. It is the same in other states. Forty years ago, forty bushels of wheat per acre was very common in Western New York and Ohio, where now a third of that quantity is an ordinary crop, and a half of it is a good one. It is doubtful if any other state in the whole country could make a better showing than Ohio, although the average yield of wheat is slowly increasing in the older states. It is on the way to a minimum in the latest settled of the western states, California included, and there will be some years yet before it will reach a turning point. The incentive to a better management of the wheat crop is a powerful one. It is the necessity for the means of living in comfort. A farmer who raises 12 bushels of wheat per acre can hardly be said to live; he exists but cannot live in comfort upon such an income, nor can he make life upon his farm desirable to his children. Necessity must force him to improve his mode of culture, and to prepare the ground very much better than he has done heretofore. A low price for wheat relieves the American farmer from much foreign competition, and it is hardly probable that we shall see the price of wheat advance much above the present rates, unless as a consequence of a light yield. But a doubled yield is equal to a doubled price, and we can safely produce such a crop, inasmuch as with the high rents paid by English farmers, and the great profit in grazing, wheat growing in that country, which is our best customer for wheat, is yearly decreasing in extent. To produce this doubled crop is not impossible; the fact that some farmers do it, proves that others may do it also.

Cereals for Fodder.

"Must we raise our oats for the seed they contain? We certainly are at liberty to cut them for fodder before they are ripe, but we are so accustomed to the other way, that it seems almost wrong to do it. Yet it is done, and it is recommended." So says a correspondent of the *Country Gentleman*. His remarks on the subject have much to commend them. We have been too apt to consider the cash received in the market as the only profit from the farm. We are becoming educated to the true science of farming—that the feeding of stock for beef and dairy products is eventually a source of greater profit than relying on the bushels of wheat and oats. But, hear the writer for himself:

Now, the oat is just as much a hay (or grass) as timothy. It may be used to the same advantage, and in some cases is preferred. Sow thick, and get a dense, fine-stemmed growth, and cut just before the milk appears, or when it is present in the upper seeds. This is plenty late enough. Cure well, as you would clover. and instead of having a harsh stock, you have a tender, pliable hay, eaten with eagerness and great benefit to health as well as to perfect digestion, which is not the case with mature stocks, as you do not even get all of the little they contain. But cut with the substance of the juices in, you will get the benefit of this substance. There will be a good flavor to your milk and the products of the dairy.

The same remarks that apply to oats apply equally well to the other grains. Rye and some other cereals are richer in nutritious substances than the oat, but the oat affords more feed to the acre, and can be raised on poorer land. A heavy crop of rye haulm can be grown on a light sandy soil, if enriched. A crop thus gathered early for hay leaves the land less exhausted than if permitted to ripen, and so gets most of its strength from the atmosphere; it also leaves the land in a more mellow condition, and hence prepares it better for wheat or rye as a seed crop.

The benefit realized from grain hay over that of the common artic'e is in the larger yields per acre. The few experiments I have seen in the cutting of grain for hay induce me to believe that it is preferable to the grasses in general (clover always excepted) where properly treated. Oats, in two crops per annum, may be made to yield heavily, and an article that is probably superior to all kinds of haulm. Often the farmer can bring in advantageously a piece of grain for hay when the hay crop proper is light and the grain straw is heavy. This will pay. It will do to have an extra piece of oats for baiting, sowed early, so as to be used before the corn is advanced enough. What is left may be saved for winter feed, or ripened for the grain. There is this advantage, then, whether winter rye or oats, or any other grain is grown to fill out the summer feed, what is left can be ripened as usual, and if not wanted at all, which is rare, it can be treated as a regular crop of grain. There will thus in any event be no loss. As the summers are, you can hardly find one when this course would not be beneficial, and the more such forage is provided the more the profit, unless on the wild lands of the West and the South. Here in our cultivated Eastern States land is of too much value to have its product trodden under foot, as is the case with pasture, only realizing a third or more of the crop. The less this is done, and the more cut forage is grown, the greater the profit, especially when fed to milch cows in the shade, when the heat is greatest in the day, instead of leaving them broiling in the sun. This is partly soiling, and is being more and more practised, and by-and-bye soiling in full will be the rule. Why not now, or at least to a larger extent, and thus get the benefit at once?