

The further improvement of dairy cows has been often treated of from every point of view: it should be our aim to make them still more suitable for the dairy without injuring their other qualities, and to bear in mind that—all things being taken into consideration—one breed is perhaps as good as another; but much depends on the circumstances under which they are kept, and the ability of the owner to manage skilfully.

Ag. Gazette.

Straw as Food for Stock.

BY SIR JOHN B. LAWES, BART., LL.D.

Mr. Hunter Pringle appears to be anxious to make two great changes in the agriculture of the country—one is to reduce greatly the acreage of the root crop, and the other is to consume the whole of the straw produced on the farm, instead of consuming a portion, as is the custom at present, and using the remainder and larger portion as litter. Mr. Hunter Pringle quotes successful and intelligent farmers who, having grown thirty acres of roots in place of ninety, invariably say that they keep more stock, they are in better health, and are kept at greater profit with the thirty acres of roots than with the ninety. Assuming that the ninety acres were grown in a four-course rotation the reduction to thirty acres would bring the land into roots once in every twelve years, instead of every fourth year; it is, I think, almost certain that a farm could not be kept so clean when the root crop occupies so small an area of the farm, and a considerable number of years must elapse before the change of system could be fairly tested. With a reduction in the acreage of roots it is probable that more corn crops would be grown, and, as a necessary consequence, more straw will be available as food. The object I have in writing is to point out the difficulties which are likely to arise in carrying out Mr. Hunter Pringle's views, viz., to reduce the area of roots, and to consume all the straw as food. If we adopt the feeding value of straw as given in our tables, published in the Journal of the Royal Agricultural Society, there certainly appears to be a great money value loss when the straw is used as litter. I may observe, however, that in order to obtain the full feeding value of the straw as it given in our tables, it must be consumed with the other foods in such proportions as will utilise to the fullest extent the food ingredients contained in the straw. If we look at the composition of roots and straw we see that their properties are totally distinct and opposed to each other. In the roots we find an immense quantity of water, varying from eighty-eight to ninety-two per cent., and it is very remarkable that this water is so intimately combined with the solid matter of the root that even when cut up into small pieces no water runs from it; milk, which is perfectly fluid, contains less water than the solid root; the solid matter of the root is chiefly sugar, and what is not sugar is almost entirely digestible. Straw, on the other hand, is hard and dry, and the digestible matter is largely mixed with substances which are not digestible; the two foods when used together correct each other's defects, and if anyone undertook experiments in feeding to test the correctness of our figures, I should say that the results would be of but little value unless a considerable proportion of roots were used with the straw. I confess that I have not followed closely the various new systems of farming which have been suggested or adopted for the purpose of meeting the great decline in the profits of farming. The root crop is the great cleaning crop, and some considerable part of the cost of producing the roots should be charged to the corn crops. To give some idea of the importance of cleanliness in the growth of a wheat crop, I may refer to the Rothamsted soil, which has received no manure of any sort for forty-eight years, and has yielded a crop, which is probably equal to the average acreage yield of

the world. We cannot doubt that soils generally are far more fertile than the soil of our wheat field, but this fertility is not available for the wheat, owing to the large amount of other vegetation which grows on the land. The small amount of nitric acid liberated from the Rothamsted soil each year is entirely at the disposal of the wheat crop owing to the cleanliness of the land. Freedom from weeds is of far more importance to the British farmer than to the farmers of other countries, as his acreage yield is larger, and a considerable portion of his crop is derived from fertility due to the consumption of cattle foods or purchased manures. To squander the fertility of your soil in useless vegetation is bad enough, but to feed thistles and couch-grass with nitric acid at 6d. per lb. is wasteful extravagance. If land can be kept clean with a largely reduced acreage of roots I see no reason why such a course of cropping should not be adopted, but Mr. Hunter Pringle advocates at the same time a very much larger consumption of the straw of the farm. I fear that he must adopt some other standard for the food value of straw than that which is given in our tables.

J. B. LAWES.

Growing Mushrooms.

Your correspondent "M.," page 930, asks; "How can I grow mushrooms successfully in winter without the aid of artificial heat?" Also information on other practical points in connection with it.

I am very much interested in the cultivation of mushrooms, and grow them extensively, and I often wonder why it is that farmers, who have such good facilities for growing mushrooms, so completely ignore this crop.

In answer to M., I may say that in a shed, cellar, or any other frost-proof structure which is dry overhead and on the floor, mushrooms can be grown successfully all winter long; in fact, it is not necessary that the building be quite frost-proof, but it is imperative that it be a snug, warmish place, and not an open, airy, drafty one. Although for two years—1872-3—I was identified with mushroom-growing in the open fields in the London market-gardens, I never considered that method feasible enough to be profitable in this country. Here, in winter, mushroom growing must be practiced indoors.

In order to get mushrooms, we must maintain a surface temperature of 50°: 55° to 57° is regarded as the best temperature. I get capital crops at a temperature of 60°, and the only harm I find in 65° is that it draws up and hurries off the crop quicker than would a lower temperature. And as we cannot maintain an equable temperature of 50° or 55° in a shed or cellar in winter without artificial means, such as a stove or hot-water-heater, we must cover over our beds with hay or straw, and preserve the heat that is inside the beds. When well covered with hay, the surface of the bed is nearly as warm as the inside of it, and the temperature equable, and the mushrooms come up as well under the heavy mulchings as they would were no mulching used; furthermore, under a heavy mulching the beds do not get so dry as they are apt to do when not mulched, and the mushrooms are whiter, and last a little longer in good condition before cutting, and they are less liable to disease. The great drawback to this system is the bother of uncovering and covering in gathering the mushrooms, and the likelihood of breaking off or pulling out a few good buttons that may get tangled in the hay. But if a European market gardener, with an acre of out-door beds, covered over in this way, can uncover, gather and cover up again three times a week and make money by it, we, with a few beds in a shed or cellar, should not have much cause of complaint.

While capital mushrooms can be grown in totally dark cel-