

these, we should purchase duck eggs in preference to using fresh eggs from the hens, unless the latter are exceptionally plentiful. Only as much of the egg and bread crumbs should be prepared as will serve two or three times, as it soon loses its freshness, and if sour, will cause scouring. It should be slightly moistened with milk, but very slightly, just sufficient to damp it. Much depends on the way in which the bread crumbs are prepared. The way I have always adopted has been to rub the bread—stale bread is to be preferred—through a fine sieve, turned upside down. In this way they are not only speedily made, but are fine and even, which is almost impossible to secure, if simply rubbed in the hands. On cold or wet mornings it will do good to add a little seasoning to the mixture, and the same thing is desirable with the soft food afterward. The egg and bread crumbs should be continued for about a week, when the alternate feeds may be given of some such food as Spratt's poultry meal, which, without hesitation, I have found to be the best thing for rearing chicks that has come under my notice - that is, as a soft food, for I should never think of giving that or any other soft food alone.

When the chicks are eight or nine days old, they may have the egg and bread crumbs discontinued, in place of which can be given a little boiled rice, but not much of that, and some oatmeal mixed with barley or wheat meal, or, if it can be obtained, in place of the oatmeal, some ground oats. When they are about a fortnight old, a little crushed buckwheat may be put down to them, as they will not be able to manage the whole corn until they are older. From the time I have already stated they may be gradually accustomed to a plainer diet until four months old in the case of the more rapid growing breeds, and five months in the others, when they will require no different treatment for the older fowls. There should always be mixed with the soft food a little bone meal, which I regard as an invaluable thing for chicken rearing. I like that best which is about as coarse as ordinary oatmeal.

An important matter to be considered is the times of feeding, for the most inexperienced will see that young animals and birds need smaller quantities, but at shorter intervals, than adults. The following may be regarded as a very good table for the periods at which chickens should be fed: For the first week or ten days, every two hours; from ten days to a month old, every three hours; after that time five times a day; and when two months old, four times a day. It is most desirable that the times of feeding be as equally divided as possible, and be strictly observed. Doctors say that there is nothing worse for children than irregular meal times, and this is just as necessary in the case of chickens. The first feed should be early in the morning, say about an hour after daybreak. This may necessitate early rising on the part of some one, but that grace is a most essential one for the chicken-raiser. It can scarcely be expected that chickens will thrive properly which have to run about hungry for hours after they are astir. Some feeders leave a little hemp seed over night so that the birds can help themselves in the morning. This is undoubtedly better than nothing, but they will be more likely to do well if they have a warm feed first of all. Then, until the chicks are a month old, they should have a feed about 9 or 10 o'clock at night. This entails trouble, but it will repay any trouble involved. Food should be fed sparingly and never left for long. The system of feeding I found best of all is to only give as much as is eaten readily. Lately there have been those who have written in favor of always having food so that the birds, both old and young, can help themselves, but I do not believe it is the better method. A hungry chick is a thriving one. Much contention has been raised as to whether chickens should have water or not. As to whether they can be raised without liquid, needs no discussion. That has been proved possible often. But what is possible is not always ad-

-visible, and I think it is most desirable that the chickens should have access to water. They will only drink as much of it as their system requires.

One most important thing in the feeding of chickens is a supply of green food. If they are being reared on a nice piece of juicy grass, they can do without anything else, but even then a supply of fresh lettuces will be to their benefit. Should there not be good grass, the lettuces become indispensable.

It is necessary to remind the reader that the directions given here for the feeding of chickens refer to those that are intended to be kept as layers or as stock birds. If to be fattened as speedily as possible and killed off, then another course should be adopted. Under those circumstances the food should be such as will develop flesh and not bone. For this purpose boiled rice, and Indian corn should form the staple food.

STEPHEN BEALE.

FOOD.

BY SIR J. B. LAWES, BART., L. L. D., F. R. S.

In an article on *Ensilage* by Mr. Easdale published in this journal on the 14th of last month, it is suggested that I should compare silage with mangels in a series of experiments with cows. Mr. Easdale tells us "he would have given a diet solely of mangels, morning, noon and night, for one, two, or three consecutive weeks, nothing else given but water, and ensilage dealt in the same manner." I venture to think that I shall be able to satisfy your correspondent, and I hope most of your readers, that an experiment of this sort would be altogether worthless as a test of the merits of these two foods. A very interesting paper might be written upon the use, and abuse of food for stock, and I could not desire a better illustration of the abuse of a food than that of feeding a cow which was yielding milk, with mangels.

Milk is a highly nitrogenous substance, while mangels—though they contain a large amount of most valuable food in sugar—have a low percentage of nitrogen, and a considerable proportion of what they do possess is incapable of producing the nitrogenous compounds which we find in milk—How then is milk to be obtained from mangels? The cow would for a time furnish the necessary nitrogenous compounds from her own body, but at the same time would be losing condition. Whether a cow could go on yielding milk from a mangel diet alone, I do not pretend to say, but if she could, the result would only be obtained by a great waste of respiratory matter.

In one of my articles on *ensilage* I pointed out that an animal for sustenance purposes alone—that is to say an animal which yielded no product, and neither increased or diminished in weight—required a considerable amount of respiratory food, and a very small amount of nitrogenous food. Let us assume 100 lbs. of mangels to be the daily sustenance food of a cow not yielding milk, and that the supply of mangels was increased in order to obtain milk, the result would necessarily be a large destruction of non-nitrogenous matter.

Bran very closely resembles milk as regards the relation of its nitrogenous and non nitrogenous matters, but bran and mangels differ very much in the respective amount they contain of these substances. If you asked a chemist to produce out of a given weight of mangels a substance having the same proportion of nitrogenous and non-nitrogenous matter as he finds in bran, his first operation would be to get rid of a large amount of sugar. A diet of mangels to a cow yielding milk, (1) would be an abuse of the roots. A similar abuse often occurs when too many roots are given to ewes. A lamb which when born is little more than a lump of nitrogen and phosphates,

(1) Of mangels alone, Lawes means.