The Dairy.

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Food for the Dairy.—*Continued.*

If the herd has been properly cared for while grazing, the flow of milk will be considerable upon coming to the stable for winter quarters, and it is advisable to keep it up as well as possible. The idea conveyed by the phrases, "a cow is a cow," and "it costs as much to keep a poor cow as it does a good one" is now discarded by intelligent dairymen. A good cow needs more food than a poor one, and the more milk she gives the more food she requires. But it will not pay the farmer, who is short of fodder, to dry up his cows early to save keeping. He will lose money in the end by doing so. A cow that is coming in the first of April may be milked till the first of February, if she is *well kept*. At the ordinary prices of keeping and of butter, she will make butter enough from the beginning of foddering to the first of February, to pay the whole cost of wintering, with the cost of all the extra feed counted in; and she will lose nothing in flesh or vigor by doing so. If the supply of food is insufficient, milking so late would be detrimental, as it would tend to debilitate the cow. It pays best to feed

Feed Well.

liberally and milk liberally. Hay alone, especially if it is cut after it is in blossom, will not be sufficient. When not in milk, a cow can get along well on good hay alone. But she cannot eat and digest enough to support herself and keep up a good yield of milk. Either her flesh or her milk will fail. Some feed rich in fat-forming material should be mixed with it. But if hay is cut early, before it is in bloom, and well cured it will do well alone. The difference between

Early Hay and Late Hay.

late and early cut hay is not generally appreciated. The later hay is cut the less is the per-centage of flesh-forming elements, the lighter colored its butter, and the more slowly does it digest. Grass cut a week before it is in blossom, and grass cut a week after it is out of blossom, are very different for feeding purposes. The later cut hay will contain about 40 lbs. in a hundred that will be made available for food, the fatty matter will be pale, and it will take six hours to digest a meal of it. The early cut hay, on the other hand, will contain about 55 lbs. in every 100 lbs. weight of available matter, which will be in better proportion and better color, and will digest in four hours as well as the other will in six. Horses and mules digest late cut hay very well, especially the mules; but if eaten in a dry state it is not well adapted to the bovine stomach, and they fail

Green Food most Nutritious.

to digest it thoroughly. This is proved by the fact that cattle will live and maintain themselves on a smaller amount of nutriment when given in green food, which is easy to digest, than they can if given in dry hay well matured. The following extract from the address of Dr James Law, of Cornell University, delivered before the American Dairymen's Association in January 1870, is in point:—

"A bullock may be kept in fair condition on 120 lbs, of turnips daily, but could not be so supported on 8 or 9 lbs of Timothy hay, though, as judged by their relative amounts of proximate principles, their nutritive value should be nearly the same. Again, cattle which are fed in Scotland on turnips and uncut wheat or oat straw, occasionally make as much as 2 lbs. increase of weight daily, on a diet of 180 lbs. Swedish turnips and 5 lbs. straw per day, yet no one would expect this daily increase on a diet of 20 lbs. of hay per diem, which would be a fair nutritive equivalent, as judged by its chemical constituents, and, moreover, is greatly superior to it in those fat-producing principles which are specially required in the feeding ox. The difference in result is unquestionably due to the abundance of water in the turnips in intimate union with their nutritive constituents, and which renders them more easily assimilated. The plentiful supply of liquid to the blood and tissues not only favors the destructive and reparatory changes in those, but maintains in full activity the various secreting organs, counteracting costiveness, suppressed, concentrated and irritating urine, inspissated bile, and the like. The same result follows in all cases when this finely divided and watery food is supplied; and however the condition may have been brought about, whether by cooking, macerating, germinating, or otherwise, other things being equal, the progress made in growth, in fattening, or in the yield of milk, testifies to the enhanced value of milk in this particular condition."

Dairymen in the States, especially in the older dairy districts, are every year cutting their food for winter a little earlier. In central New York, hay is cut 20 days earlier than it was twenty years ago.

Coarse Fodder.

But the reader is probably ready to ask, if it is advisable to milk cows up to within 8 or 10 weeks of coming in again, and common hay is not good enough to keep them on without extra feed in some form, what is to be done with the coarse fodder, corn-stalks, straw, &c.? Must it be thrown away? All the fodder that is grown on the farm can be profitably fed to the dairy if properly used. Before speaking of its use, however, a word in regard to the nature and purposes of food may not be amiss.

Composition of Cattle Food.

The food of animals is not one homogeneous mass or single composition. It is composed of several distinct parts, each of which performs a distinct part of the economy of life, and cannot be substituted for any other. One kind of food, having a definite composition, builds up flesh and restores its waste, and exists in several different forms and is known under different names, as albumen, fibrin, casein, gluten, &c. They are all included under, and are designated by the terms, albuminoids, or flesh-forming food. Another kind supplies the material from which are generated animal heat and force. This kind of food is made up of fats and oils, starch, gum, sugar, &c., and are called supporters of respiration, or heat-producing food. Besides these, water and certain minerals as soda, lime, phosphorous, iron, &c., enter into the composition of the bodies of animals, the latter chiefly to build up the bones. As the minerals, excepting salt, are usually in sufficient supply in all kinds of food they need not be considered here. What we wish to call the attention of the reader to, is the fact that the albuminoids and heat-producing foods must sustain certain relations to each other, and be supplied in certain relative proportions according to the condition and circumstances of the animals. If a cow is not in milk she may not need any more albuminoids in cold than in warm weather; but she would need more heat-producing food to keep her warm. In the summer for every pound of flesh-forming food she uses, she will require three pounds of heat-producing food, and in the winter 5 or 6 lbs.; a cow can live well on food in such proportions if she is doing nothing but living. Twenty-five pounds of hay per day would give her 2 lbs. of flesh-forming and 10 or 11 for producing heat, and this would supply her necessities. But it would not support her and a flow of milk too, in which albuminoids are in much greater proportion (2 to 5). Hence the necessity of some other food to go with it to furnish the albuminoids for the milk. A few pounds of meal, or bran, or early cut hay, or oil-cake (in all of which albuminoids largely exist), will supply just what was needed.

Corn-Stalks and Straw.

In a similar way we can use the corn-stalks and straw. In corn-stalks for example, albuminoids and supports of respiration are as 1 to 13, the former being deficient; in pea and bean meal, in which are about 25 lbs. of the former, to 50 lbs. of the latter in a hundred-weight; we have the means of balancing the elements of food so that the excess of starch and sugar in one, and of flesh-forming elements in the other, shall be economized to the best advantage, nothing being lost. Straw may be made use of in the same way. The respirative elements of food in it are in the relation of about 1 to 15, supposing the grain to be ripe when the straw is cut. Different kinds of straw of course vary in value; and the value of each will vary with the time of cutting. If the grain is in the dough stage when cut, the relation of the two kinds of food will be about as 1 to 10. Coarse fodder generally abounds in heat-producing food, and is deficient in flesh-forming matter; and it is therefore best fed when the cows are not in milk. With 15 lbs. of straw or stalks cut and wet, a few pounds of bran or meal (say 4 lbs. of bran and 1 lb. of pea meal) mixed with it, will keep a common sized native cow in good condition, if she has the benefit of a comfortable stable. Larger cows, and those that are exposed to the cold, will require more. With a little more ground feed added, this same diet may be given to cows in milk. All the coarse fodder a dairyman has occasion to raise may thus be used in wintering his stock, and at a less cost, the fodder and grain being counted together, than he can winter them on hay.

Feeding Values.

We copy from the table of Wolff & Knop, as quoted by S. W. Johnson, the nutritive and heat-producing values of some of the different kinds of winter food in common use. It may be of some advantage in adapting the different values to each other. They are arranged in the order of their flesh-forming material:—

	Albuminoids.	Starch, Sugar, Gum, &c	Fat.
Oil Cake	28·3	41·3	10·0
Bean Meal	25·5	45·5	2·0
Pea "	22·4	52·3	2·5
Alsike Clover in blossom	15·3	29·2	3·3
White " "	14·9	34·3	3·5
Rye Bean	14·5	53·5	3·5
Lucerne in blossom	14·4	22·5	2·5
Wheat Bran	14·0	50·0	3·8
Red Clover in blossom	13·4	29·9	3·2
Oats	12·0	60·9	6·0
Orchard Grass	11·6	40·7	2·7
Rye Meal	11·0	69·2	2·0
Meadow Fox Tail	10·6	39·5	2·5
Corn Meal	10·0	68·0	7·0
Timothy Hay	9·7	48·8	3·0
Barley	9·5	66·6	2·5
Buckwheat	9·0	59·6	2·5
Common Hay	8·2	41·3	2·0
Pea Straw	6·5	35·2	2·0
Corn Stalks	3·0	39·0	1·1
Barley Straw	3·0	32·7	1·4
Oat "	2·5	38·2	2·0
Wheat "	2·0	30·2	1·5
Potatoes	2·0	21·0	0·3
Ruta Bagas	1·6	9·3	0·1
Carrots	1·5	10.8	0·2
Turnips	1·1	5·1	0.1
Beets (Sugar)	0·8	15·4	0·1

As a part of the heat-producing food must be fat, it has been placed in a separate column.

There are so many circumstances that vary the quantity of food required for the daily use of a cow, that no precise figures can be set down as representing the exact amount of the different elements necessary for her to subsist upon, but the following may be regarded as approximatively correct for an average sized cow of the common breed when not in milk. Her daily food should contain at least, albuminoids 1½ lbs.; starch, sugar, &c., 8 to 10 lbs.; fat 15 lbs. With a large flow of milk the albuminoids would need to be doubled; the starch, &c., increased one-half, and the fat doubled. From this it may be seen how to proportion the several kinds of food to adapt them to each other, so as to use them with economy. If the food is to be used dry, an allowance of one-fourth should be made for imperfect digestion. If cooked or steamed the digestion will be perfect and the whole amount may be

Comfortable Stables.

counted. This amount will be required for cattle provided with warm and comfortable stables and kindly cared for. If they have no other protection than an open yard or shed, one-half more should be added to the quantity named. This may seem a large allowance, but experiments made at the barn of the writer, and tested by actual weights, have demonstrated this difference between comfort and exposure, and the experience of hundreds of others have corroborated it.

In the early settlement of the western world, barns were built everywhere by siding up a frame with boards not fully seasoned, which shrank in course of time, leaving cracks between them half an inch or more wide. It was customary to arrange stables for the cows on one side of the barn, with their heads pointing toward the floor in the centre, the side next the floor not being boarded except at the bottom, to make a manger. The air streaming through the cracks in the side of the barn, carried the air warmed by the heat radiating from the bodies of the cattle, past their heads into the middle of the barn, and rising up, it went out through the cracks above. The cows were kept in a current of cold air but little different from being out of doors. As these primitive barns have been replaced by new ones with sides boarded with matched stuff, and with the exception of means for ventilation, the stables tightly boarded all round,