

The Composition and Use of Cattle Foods

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THE DIGESTIBILITY OF CATTLE FOODS.

A portion of every cattle food is dissolved by the fluids with which it comes in contact in the stomachs and intestines. This solubility, or digestibility, varies greatly with different foods. Of oat straw perhaps only forty pounds in a hundred would be dissolved, whereas of corn meal eighty-five pounds in a hundred would be taken into solution. That part of the food which is dissolved passes through the walls of the stomach and other portions of the digestive tract into the blood and is there used for the various purposes which have been mentioned. The undissolved or undigested portion of the food is rejected by the animal as useless. The grains, potatoes and roots are much more digestible than hay, corn fodder and the straws. The amount of food which is digested may be influenced in various ways. For instance, an animal will probably digest more of a food which is eaten with relish than of one which is unpalatable. The amount of digestible matter in hays and other fodders may be diminished by the fermentation caused by wetting and in other ways. Late cut hay is less digestible than early cut, and in general the younger the plant tissue the more digestible it is.

FEEDING STANDARDS.

These aim at an economical use of food nutrients by prescribing not only the amount but the composition of the digestible material which an animal shall consume in a given time. The feeding standards chiefly in use in this country are those formulated by German scientists. They recommend definite amounts of definite kinds of nutrients for each class of farm animals. For instance, the standard for a thousand pound animal at rest, neither doing work nor making growth, is 8.85 pounds of digestible material in one day's ration, .7 of a pound of which shall be protein. The standard for a milch cow is 15.4 pounds of digestible matter daily, the amount of digestible protein being 2 1/2 pounds. Standards are also given for horses, sheep and swine and fattening animals of all kinds.

These formulæ should not be regarded as rules to be blindly followed independently of the available supply and the market prices of feeding stuffs, but they are suggestions for rations that are undoubtedly efficient and economical, provided market conditions render it advisable to follow them. A few of these standards are given in this connection.

In making up a ration which shall correspond to one of these standards, two main facts must be kept in view. First, the amount of digestible food ; second, the nutritive ratio.

In making a mathematical calculation both of the nutritive ratio and the amount of digestible food, we must take into consideration both the composition of the foods which we wish to use and the digestibility of their several classes of nutrients. Tables of composition and digestibility are now available to farmers, and the mathematical operations involved in the necessary calculations are simple. These are illustrated in this connection.

Nutritive Ratio.—By the nutritive ratio of a food or ration we mean the relation of digestible carbohydrates to digestible protein. The amount of protein is expressed as 1. Thus the nutritive ratio of wheat bran is expressed as 1:3.5 ; that is, the carbohydrates are present in 3.5 times the quantity of protein matter. For milk production the nutritive ratio should be, roughly, 1:5 or 6.

To find the nutritive ratio of a food or ration, add together the amount of digestible carbohydrates, and of fat multiplied by 2 1/4, and divide the sum by the total amount of digestible protein.

For example, to find the nutritive ratio of corn meal we find from the table following that corn meal contains 6.5

per cent. of digestible protein, 65 per cent. of digestible carbohydrates, and 3.3 per cent. of digestive fat.
3 3 lbs. (amount of fat) multiplied by 2 1/4 equals 7.4 lbs.
7 4 added to 65. lbs. (amount of carbohydrates) equals 72.4 lbs.
72.4 divided by 65 (amount of protein) equals 11.1.
Hence the nutritive ratio is 1:11.1 ; that is, in corn meal the carbohydrates are 11.1 times as great in quantity as the protein.

To find the nutritive ratio of a ration or mixture of several foods requires more work, but it is accomplished in a similar manner. To illustrate : suppose we desire to find the nutritive ratio of the following mixture :

- 20 pounds corn silage,
- 10 pounds clover hay,
- 5 pounds corn meal,
- 5 pounds wheat bran,
- 2 pounds cotton-seed meal.

(1) Multiply the amount of each food contained in the mixture by the per cent of each digestible nutrient (protein, carbohydrates and fat) in each food.

(2) Add together the several products to obtain the total amount of each nutrient in the ration.

(3) Then proceed as in case of a single food ; that is, add the carbohydrates to the fat multiplied by 2 1/4 and divide the sum by the protein.

The total digestible fat (0.84 lbs.) multiplied by 2 1/4 equals 1.89 lbs., and this added to the total amount of digestible carbohydrates (12.4 lbs.) equals 14.3 lbs. This divided by 2.73 lbs., the total amount of digestible protein, equals 5.3. Hence the nutritive ratio of such a ration is 1:5.3.

TABLE FOR FINDING THE NUTRITIVE RATIO AND AMOUNT OF DIGESTIBLE NUTRIENTS IN A MIXTURE OF SEVERAL FOODS.

Kind of food.	Pounds of food in ration.	Protein.		Carbohy- drates.		Fat.	
		Per cent. digestible.	Pounds digestible.	Per cent. digestible.	Pounds digestible.	Per cent. digestible.	Pounds digestible.
Corn	Lbs.						
silage	20	1.1	.22	13.	2.60	.7	.14
Clover hay	10	8.4	.84	32.5	4.25	1.4	.14
Corn meal	5	6 5	.33	65.	3.25	3.3	.16
Wheat							
bran	5	12.	.60	38.9	1.94	2.9	.15
Cotton- seed meal ...	2	37.2	.74	18.8	.37	12.7	.25
		2 73i		12.41			.84

(To be continued.)

The Western Canned Meat Trade

There is some agitation in the Eastern States owing to the allegations that preserved beef and mutton shipped in from the Western States and sold in the markets of the East has previously been treated chemically and tastes and smells of the laboratory. Before the production of cheap meats in the West and the opening up of the canned beef trade large herds of beef cattle were produced by the farmers of the New England States, who made money by supplying the New York and other markets. But since the introduction of the cheap Western meats, Eastern farmers have had to go out of the business and many farms which twenty years ago were worth \$100 per acre are now not worth \$50 per acre.

There is some hope on the part of the farmer of the Eastern States that there may be a large amount of truth in these allegations and that the consumer in New York and other large centres will come again to prefer fresh beef grown near his own door to the dressed article sent in from the West, when cattle-raising will again be a profitable business for the Eastern agriculturist.