Will the commission please note the attempt to make the same old annual slump this fall? But it did not materialize. Why? The local killer must be supplied. That is the only competition the packer has ever had. What will signify the higher price at other seasons, when the farmer has sold all his hogs?

I think it is fair to assume that the farmer understood how he was being treated by the packer. T. B. SCOTT.

Middlesex Co., Ont.

Feeding Questions: Compounding a Ration.

1. Define protein, hydrocarbonates and potash, stating the part of an animal each supports. What is a balanced ration?

2. I would be pleased to have you inform me regarding the feeding value of following feeds: Silage, dry corn-straw, timothy, clover, straw, oat, barley and pea hash; also bran and roots.

3. Suggest a balanced ration, using any or all of the above foods to produce growth, milk and flesh.

4. Mention some reliable book on feeds and feeding.

We get "The Farmer's Advocate," and like it well. ROSETTA READER.

Ans.—1. Protein is composed of two classes of nitrogenous substances, namely: albuminoids and amides. The amides are found in immature plants, and are not so valuable as the higher proteid materials. The albuminoids are the flesh formers, as they are the only element in the food which the animal can construct into muscle. They are also the source of such materials as hair, wool, hoof, horn, etc. Further, by the combustion of the albuminoids in the body, heat and mechanical force are developed, and under certain circumstance they may be split up with the production of fat, but carbohydrates and vegetable fats or oils, especially the carbohydrates, are the cheapest materials for this purpose. If one element may be regarded as more important than another, that element is protein, and it is the one most commonly deficient in the ordinary farm-grown ration.

By hydrocarbonates, our inquirer means what are usually known as carbohydrates. These are chiefly the starches, sugars and celluloses, and constitute the largest proportion of vegetable foods. The carbohydrates are not permanently stored in the animal body, but serve when burnt in the system for the production of heat and mechanical work. They are also capable of conversion into animal fat.

The vegetable fats, or oils, found in food are similar in chemical composition to such substances as lard, tallow, etc. They may be either oxidized (burnt) in the animal system to furnish heat and energy, or may be deposited in the body tissue as fat. As a heat-and-force producer, fat has a greater value, pound for pound, than any other ingredient in the food. In fact, it has about 2¼ times as much efficacy for this purpose as have the carbohydrates. The fats are commonly spoken of by chemists as ether extract, which signifies simply the oils, wax, resin and other substances of that class, dissolved out of a sample of dried fodder by treatment with ether.

Potash is an element of plant food. It is a chemical compound, called potassium hydroxide, or potassium hydrate, being composed of potassium, hydrogen and oxygen. Potassium is one of several ash constituents, found in greater or less quantities in plant tissue. As a rule, these are present in sufficient quantity in any ordinary ration, so that the feeder pays little attention to them, content if he can combine the other elements in correct proportions to make a "balanced" ration. Occasionally, however, a ration may be deficient in ash material, especially one used for a growing animal, which needs considerable ash to build up its bone. Wheat bran is well supplied with mineral matter, and also contains a goodly percentage of protein. It is, therefore, particularly adapted for feeding to young growing animals.

A balanced ration is a combination of foods containing the various nutrients in such proportion and amount as will nurture the animal with the least waste of nutrients. A ration is understood to signify the quantity fed per day. The correct balance of a ration depends somewhat upon the purpose for which it is to be used. For illustration and suggestions, see answer to question 3.

2. To answer these questions fully would be a large order. Our inquirer's best plan will be to purchase a book, as proposed in his last question. Perhaps we had better submit a table, giving the percentage of digestible constituents in each of the several feeds about which information is sought, also some others. It must be understood, however, that the figures given are averages of such analyses as have been made. Many of the feeds vary in composition—corn silage varies greatly. The figures, however, will serve as a basis of comparison. It should be remembered that silage and roots contain a low percentage of nutrients because of their succulence or high content of water. Not being clear what is meant by "hash," we give the composition of the several grains mentioned.

FEED.	Digestible Protein. %	Digestible Carbohydrates. %	Digestible Ether Extract or Fat. %
Dent corn	7.8	66.7	4.3
Flint corn	8.0	66.2	4.3
Sweet corn	8.8	63.7	7.0
Gluten meal	25.8	43.3	11.0
Wheat	10.2	69.2	1.7
Wheat bran	12.2	39.2	2.7
Wheat shorts	12.2	50.0	3.8
Wheat middlings	12.8	53.0	3.4
Rye	9.9	67.6	1.1
Barley	8.7	65.6	1.6
Brewers' grains (wet)	3.9	9.3	1.4
Oats	9.2	47.3	4.2
Buckwheat	7.7	49.2	1.8
Buckwheat bran	7.4	30.4	1.9
Buckwheat middlings	22.0	33.4	5.4
Flaxseed	20.6	17.1	29.0
Oil-cake meal (old process)	29.3	32.7	7.0
Cottonseed meal	37.2	16.9	12.2
Peas	16.8	51.8	0.7
Corn stover, field-cured	1.7	32.4	0.7
Timothy hay	2.8	43.4	1.4
Orchard grass hay	4.9	42.3	1.4
Kentucky blue grass hay	4.8	37.3	2.0
Wheat straw	0.4	36.3	0.4
Rye straw	0.6	40.6	0.4
Oat straw	1.2	38.6	0.8
Barley straw	0.7	41.2	0.6
Red clover hay (medium)	6.8	35.8	1.7
Red clover hay (mammoth)	5.7	32.0	1.9
Alsike clover hay	8.4	42.5	1.5
Alfalfa hay	11.0	39.6	1.2
Corn silage	0.9	11.3	0.7
Potatoes	0.9	16.3	0.1
Sugar beets	1.1	10.2	0.1
Mangels	1.1	5.4	0.1
Flat turnip	1.0	7.2	0.2
Ruta-bagas	1.0	8.1	0.2
Carrot	0.8	7.8	0.2
Artichoke	2.0	16.8	0.2
Pumpkin	1.0	5.8	0.3
Cow's milk, whole (average)	3.6	4.9	3.7
Cow's milk, colostrum	17.6	2.7	3.6

3. A fairly good ration for a 1,000-pound steer under full feed would be as follows:

FEED.	Amount. Lbs.	Digestible Protein. Lbs.	Digestible Carbohydrates. Lbs.	Ether Extract or Fat. Lbs.
Silage	40	.36	4.52	.28
Turnips	20	.2	1.62	.04
Oat straw	2	.024	.772	.016
Clover hay	10	.68	3.58	.17
Bran	2	.244	.784	.054
Barley meal	4	.348	2.624	.064
Pea meal	3	.504	1.554	.021
Totals	81	2.36	15.454	.645

This ration would contain, as the totals show, 2.36 lbs. protein, 15.454 lbs. carbohydrates, and .645 pounds ether extract or fat. As a pound of ether extract is equivalent to 2¼ pounds of carbohydrates, and serves similar purposes in the animal economy, it is customary to reduce this element to terms of carbohydrates, and express the two quantities together. Thus .645 pounds of ether extract equal 1.451 pounds of carbohydrates. Adding 15.454 and 1.451 gives us 16.905 pounds of carbohydrates and fat expressed in terms of carbohydrates. The nutritive ratio, or the ratio of protein to carbohydrates and fat, is therefore as 2.36 to 16.905. Dividing, we find that for each pound of protein in this ration, there are 7.16 pounds carbohydrates and fat, the ratio being commonly expressed as 1 : 7.16. This is a reasonably well-balanced ration for beef production. For milch cows in full flow a somewhat "narrower" ration would be desirable, say 1 : 6. This might be most economically accomplished by substituting a pound or so of oil-cake meal for three pounds of the barley. This change, if figured out, will be found to represent a net increase of .032 pounds of protein and a net decrease of 1.5915 pounds of carbohydrates and fat (in terms of carbohydrates), giving us 2.392 pounds protein and 15.3135 pounds carbohydrates, which works out to a nutritive ratio of 1 : 6.4. Observe that the nutritive ratio is narrowed; or in other words, the disproportion between the percentages of protein and carbohydrates is lessened because the one pound of oil-cake meal contains a fraction more protein, but about one and a half pounds less of carbohydrates and fat than the three pounds of barley meal which it displaced. If we were to use 1½ pounds instead of 1 pound of oil cake, as above figured on, the ratio would be still further narrowed and improved, bringing it down to somewhere about 1 : 6. Using mangels instead of turnips would also tend slightly, though very slightly, towards narrowing the ration.

For producing growth a similar balance or nutritive ratio should be sought as for milk production, but it would be preferably obtained by employing rather less of the concentrated grains and less silage, using instead more clover hay (alfalfa would be even better) and more bran, with oats substituted for the barley meal. A smaller amount of pea meal or oil-cake meal would also be fed, although a small amount of oil-cake meal may be fed with profit to almost every animal upon the farm, particularly where the roughage consists mainly of corn, timothy or straw. Oats are an excellent feed for horses, cattle or sheep, but at present prices the economy of using them largely, except for horses and calves, is very doubtful. However, it is always wise to use a number of grains rather than one or two. Not only is the balance of the ration likely to be better, but it will be more appetizing and usually better digested.

4. Feeds and Feeding, by Henry, price through this office $2.15 postpaid, is the book you want. It is a splendid work, simple in language, yet complete and authoritative. The longer we use it the better we like it. This work should be in every feeder's library or home.

Digestibility and Productive Value of Foods—II.

By Prof. R. Harcourt.

It was pointed out that in foods with low proteid content the proteids were not so fully digested as when this substance is fairly abundant. The same is true with mixtures of foods or rations. Too much starchy food in a ration, especially if the proportion of nitrogenous to non-nitrogenous constituents is wider than 1 : 8 or 9, will cause a decrease in the digestibility of the nitrogenous materials. The coarse fodders grown on the farm are our cheap foods, but the digestibility of their proteids is improved when they are combined with some of the mill by-products that are rich in proteids. Consequently, the addition of these materials improves the digestibility of the whole diet. This is one of the advantages resulting from feeding properly-balanced rations. On the other hand, we must not go to the other extreme, and feed too great a proportion of the proteids, for foods containing large amounts of this substance are expensive, and, while the proteids improve the digestibility of the whole diet, and have certain functions to perform in the body which they alone can do, they must not be fed to do the work of the cheaper carbohydrate materials.

The amount of proteids required will naturally depend upon the kind of animal and the object desired. If an animal is being fed, maintaining it in its present condition during the winter, a very small amount of proteids is required. If the animal is young, and growing, building up bone and muscle, it must have a large amount of proteids in its diet. Nature provides that milk, which is the natural food of the young animal, is particularly rich in albuminoids. Mature animals that are being fattened do not build up much muscle and flesh, and consequently do not require so much proteids as the young animal, and cheaper gains can be made by using the starchy foods quite freely. Milk cows must have a large proportion of nitrogenous foods, as they must have proteid material to produce the casein of the milk. Horses doing fast work, or when spirit or vim are required, must have food rich in proteids; but if the work can be done slowly, a much smaller proportion of this expensive constituent will answer, and at the same time cheapen the ration.

It is not easy to make an accurate statement of the comparative nutritive value of foods. The quantity of digestible constituents which a food contains does not sufficiently indicate its nutritive value. This is owing to the unequal value of its various constituents, the unequal losses which take place during the process of digestion and utilization, and the unequal labor which the process of digestion requires with different foods, which must, of course, be done at the expense of the portion of the food digested. This is a point very often entirely overlooked in considering the value of foods. It is true a horse will digest a certain amount of wheat straw, but the energy obtained from the digested portion is not sufficient to do the work of digestion, and the animal must draw on the digested part of the other foods eaten to aid in digesting the wheat straw.

The most accurate method of ascertaining the nutritive value of any food is to experiment with it, but comparatively few foods have been fully