Rational Feeding of Livestock.

By

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Contents.

The greatest question that confronts the practical stock feeder of to day, is, what must he feed his stock inorder that they may make the greatest possible gain at the least possible cost.

Kansas annually sends to the markets millions of dollars worth of live stock. The question now arises, is this stock fed and marketed to the best advantage? When so large an amount is involved the saving of a small percent would in the aggregate foot up to an enormous sum.

In Europe, where land is dearer and competition closer, the relative merits of the different foods have been tested and feeding has been reduced to a science. This is what we must come to here in the west and the sooner we appreciate the importance of

this fact the better it will be for us.

Composition of the Animal Body.

The first step in scientific feeding is to become acquainted with the composition of the animal body; and then give food that will furnish the required elements in the proper proportions.

The animal body is composed of five elementary substances of nutrition. They are: fats, carbohydrates, proteids, mineral matter, and water.

The fats do not vary much in composition, being about 76.5 carbon, 12 hydrogen, and 11.5 oxygen in 100 parts.

The carbohydrates have a wider range of substances, but the carbon always unites with hydrogen and oxygen in the proportion to form water. They make up the bulk of the feeds, as, cellulose, starch, sugar, etc.

but do not enter into the composition of the animal body; they help to keep up the heat.
The term protein is used to include all the albuminoids, as albumen, casein, fibrin, etc, they all have essentially the same composition — in 100 parts protein these are 53 carbon, 7 hydrogen, 16 nitrogen, 22.5 oxygen, and 1.5 sulpher.
The following minerals are found in the bones: phosphate of lime, carbonate of lime, phosphate of magnesium, soda, potash, and salt
Water enters largely into the composition forming from 40 to 60 percent of the live weight.

Feeding Stuffs.

Having now ascertained what is needed by the animal we will turn our attention to finding out what the more common feeding stuffs are composed of.
The different foods can be

divided into two classes: coarse fodders and concentrated stuffs.

The most common coarse fodders are: corn fodder, prairie hay, tame hay, and straw. The composition of the different fodders vary with the fertility of the soil. The proportion of protein and fat increasing with the fertility.

The method of curing is also of importance for if they are permitted to mould, decomposition will take place, and if they get wet the soluble portions will be washed out. The perfectly cured fodder is practically the same as if it was green. As plants become older the proportion of proteids and fats decrease, while the fiber, ash, and carbohydrates increase. So the same weight of the older growth is not as valuble as the younger, but what is lost in quality

is often made up in quantity.

The concentrated stuffs are grains, bye-products, and roots. The principal advantage in concentrated fodders is that you get a large amount of nutrition in a small space.

The grains are composed of three groups of nutrients, namely: proteids, carbohydrates, and fats. Some of the grains have an excess of one, as, corn for instance, is highly carbonaceous, oats is more nitrogenous, while wheat comes in between them and is almost a perfect theoretical feed for fattening cattle.

Of the bye-products, bran, brewers grain, oilcake, and cotton-seed meal have the greatest percentage of proteids of all other classes of feeds. In fact they are far richer in proteids proportionately than the substances from which they made.

Roots are composed largely

of water, yet some of them as turnips, beets, and carrots, and including the potato, which is a tuber, have considerable quantities of starch stored up in them. Their principal merit lies in the fact that they are easily digested and furnish non-nitrogenous food for the system.

Feeding Standards.

Thus far we have considered the requirements of the animal body and the composition of the more common feeding stuffs. We will now direct our attention to the consideration of the most economic ~~in which to~~ proportions in which to combine the various foods. The idea will not be to lay down any rule, or give any ration, that will do to follow under all circumstances. But rather to give the principles which underlie the science and then

any one familiar with the subject will have no difficulty in mixing his feeds.

Since the proportion of the various constituents of the animal body remain about the same at all times, it is evident that the food should contain these constituents in just the right proportions to supply the demands. If too much of one is given it will be worse than wasted as it is a burden to the digestive and excretory organs to get rid of it.

The nutrient elements vary in the different foods, as do the digestible parts of each nutrient in the same food. The ratio of the digestible protein to the sum of the digestible carbohydrates and fats is called the nutritive ratio and is the basis of all feeding standards.

The feeding standard is a

statement of the amount of digestible nutrients required daily by the different animals so as to use the food to the best advantage for the purpose in view – be it to produce growth, milk, or fat. They have been computed to suit animals weighing 1000 pounds, but other weights can be reduced to this basis

In the table on the following page will be seen the relative proportion of the nutrient elements required daily for different animals. It will be seen that an animal requires different food under different conditions.

The table is an extract from one prepared by professor Georgeson in the Seventh Biennial Report of the State Board of Agriculture, which through his courtesy we are permitted to use.

Per Day and Per 100 lbs Live Weight

	Total organic substance, lbs.	Nutritive (digestible) substances. Protein	Carbo-hydrate	Fats	Total nutritive substance, lbs.	Nutritive Ratio. Lbs.
Horses moderatly worked	22.5	1.8	11.2	.60	13,60	1:7
" heavily "	25,5	2.8	13.4	.80	17.00	1:5,5
Milch Cows	24.0	2.5	12.5	.40	15.40	1:5,4
Fattening Oxen 1st period	27.0	2.5	15.0	.50	18.00	1:6,5
" " 2nd "	26.0	3.0	14.8	.70	18.50	1:5,5
" " 3rd "	25,0	2.7	14.8	.60	18.10	1:6
Fattening Sheep 1st. period	26.0	3.0	15,2	,50	18.70	1:5,5
" " 2nd "	25.0	3.5	14.4	.60	18.50	1:4,5
Fattening Swine 1st period	36.0	5.0			32.50	1:6,5
" " 2nd "	31.0	4.0	27.5		28.00	1:6
" " 3rd "	29.5	2.7	24.0		20.20	1:6.5
			17.5			
Growing Cattle:						
Ages Mo. Wt. lbs.						
3 - 6. 300.	23,4	3,2	13,5	1.0	17,7	1:5
12 - 18. 700.	24.0	2.0	13.0	.40	15.4	1:7
Growing Fat Pigs:						
Ages Mo. Wt. lbs.						
2 - 3 50	42.0	7.5	30.0		37,5	1:4
5 - 6 125	31.5	4.3	23.7		28.0	1:5,5
8 - 12 250	21.0	2.5	16.2		18.7	1:6.5

In calculating the nutritive ratio the fats and carbohydrates are added together - the fats being first multiplied by 2.5 because one pound of fat produces as much heat as two and a half pounds of starch - and the sum of the two divided by the protein. This always gives the result in the proportion of one of protein to some other number of carbohydrates.

It is necessary to know the composition of the feeding stuffs we propose to use before we can intelligently compound a ration.

The table on the following page, taken from Wisconsin Agricultural experiment Station Report, shows the composition of some of our common fodders in pounds of water and of digestible matter in one hundred pounds.

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Composition of Feeding Stuffs

	Water	Protein	Carbo-hydrate.	Fat.
Pasture Grass	80	2.6	10.6	.5
Green Alfalfa	71.8	3.6	11.4	.4
Corn Ensilage	73.5	1.3	14.0	.7
Prairie Hay	11.5	5.0	40.0	.8
Alfalfa Hay	8.4	7.6	37.8	1.3
Corn Fodder	28.0	3.7	40.4	1.2
Oats straw	9.2	1.6	41.4	.7
Linseed meal	9.2	28.3	32.8	7.1
Wheat Bran	12.0	12.6	44.1	2.9
Wheat	10.5	9.2	64.9	1.4
Sorghum seed	12.8	7.0	52.1	3.1
Indian corn	10.9	7.1	62.7	4.2
Oats	11.0	9.1	44.7	4.1
Soy Beans	10.0	30.1	30.7	15.8
Sugar Beets	86.5	1.1	9.3	.2
Shorts	12.1	12.2	47.2	2.9
Rye	11.6	8.3	65.5	1.2
Sunflower seed	8.0	13.0	23.9	23.6

The subject of stockfeeding is so extensive that it is impractible to treat each kind separately here, and as no rule can be laid down that will apply to all, I will just take up one class - the swine - and consider them briefly.

There is no other domestic animal whose sanitary condition is so much neglected and at the same time there is none that will appreciate good treatment more highly or give better returns in a financial way for the same than the hog.

It is of first importance that the hog should be in good health. This is best secured by giving him a good variety of food, fresh water, and comfortable quarters. Be on friendly terms with him as he is more easily managed thus; if in driving he appears contrary, give him time to meditate - other animals would probably go no better than he, if they had not been

handled so much more.
The prevalent idea that anything is good enough for a hog, is wrong. Their stomach is quite similar to a man's and it is only by taking advantage of their appetite that they are induced to eat things that they are often required to.

The object for which you are feeding will govern the ration given. In growing pigs where large amounts of muscle and bone are to be developed the food should consist largely of proteids and mineral matter.

The following will serve as an example of ration for a fifty pound pig.

Kind of Food.	Total Organic Sub.	lbs. Protein.	Carbohydrates + fats
Oilmeal	.5	.194	.248
Bran	1.3	.168	.799
Corn	.5	.035	367
Total	2.3	.397	1.414
Required by Accepted Standard	2.1	.38	1.50

A one hundred pound pig could be fed:

Wheat	2.	.196	1.25
Corn	.75	.053	.571

Oilmeal	.75	.2025	.374
Total	3.50	.4515	2.195
Required by Standard	3.4	.50	2.50

More wheat could be added to the above ration to bring up the carbonaceous part.

As the pig becomes more mature the nutritive ratio should be widened — have greater percent of carbonaceous matter.

A simple ration for a two hundred and fifty pound hog would be:

Wheat	5.	.475	3.04
Shorts	2.	.216	.98
Total	7	.691	4.02
Requirement		.64	4.10

Conclusion.

The hog may be considered as a machine for turning feeding stuffs into meat. He is the most economic of all animals for he gains more in weight in proportion to the food eaten, and eats more according to his weight than any other. This latter fact is of importance as the extra food

all goes to weight, as so much food is required for the support of the system.

In feeding one should have clearly in mind the object for which he is striving. If for breeding none but the very best should be kept and they should be fed so as to develope a rangy body and strong bone. The greatest drawback to the industry is the tendency to deteriorate in constitutional vigor. The fat hog is in an abnormal state which is a result of his domestication. This special tendency to lay on fat is a result of a lack of variety in his diet. As corn is our principal crop and the hog undoubtedly relishes it, he has been confined too closely to it. Experiments have shown that as a single diet it does not produce as strong a bone, furnish as great a supply of blood, or produce as well marbled meat as when the food was varied so as to

give a nutritive ratio of 1:5.6 instead of 1:9 as it is in corn. It has also been shown that ashes and bone dust add greatly to the strength of the bones as well as to the supply of blood, and to the tone of the system in general.

In conclusion then I would say that the swine industry is one of the most important industries of the United States as well as our own state. And at the present rate of improvement the day will not be far distant when we will be marketing meat exclusively where we now send grain.