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How to Choose Commercial Feeds

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In the feeding of livestock there are certain fundamentals that must form the basis of the feeder's choice of commercial products to supplement the feeds produced on the farm. It is to emphasize these fundamentals, rather than to discuss the many special cases and exceptions encountered in livestock feeding, that this circular is published.

COMPOSITION OF FEEDS

One of the important fundamentals is the analysis of the feeds used, and a few examples are given below, in Table 1.

TABLE 1.—COMPOSITION OF REPRESENTATIVE FEEDS

Feed	Water	Protein	Nitrogen-free extract	Fiber	Fat	Ash
	%	%	%	%	%	%
Corn	11.4	9.2	71.9	2.1	4.0	1.4
Oats	10.0	11.6	59.4	11.2	4.3	3.5
Wheat	10.0	12.8	70.4	2.8	2.1	1.9
Soybean meal	10.0	39.6	31.1	5.0	9.0	5.3
Cottonseed meal	10.0	40.2	26.4	10.4	7.3	5.7
Tankage	8.4	61.8	3.1	2.2	7.1	16.4
Alfalfa hay	8.0	15.4	37.5	27.7	2.0	8.4
Timothy hay	11.5	6.6	44.5	29.6	2.5	5.0

Water.—Feeds always contain a small amount of water. In an air-dry condition the amount is about 10 per cent.

Ash (minerals).—All feeds contain mineral matter, and certain minerals are essential for life and well-being. The greatest importance is customarily attached to calcium and phosphorus.

Protein.—This substance is of primary importance because protein is the structural unit of the body. It makes up the greater

part of the organic matter of the muscles, internal organs, skin, and other tissues. There may be more fat than protein in certain regions but this visible fat is merely attached to the various organs, and is not a part of them. Protein is one of the constituents of milk, and of eggs. All animals must have protein and they have no source of supply except the feed they consume. It is usually the most expensive nutrient and the one most likely to be supplied in insufficient amount.

Nitrogen-Free Extract.—This term includes a variety of carbohydrates, and other substances, but ordinarily the only important one is starch. The most important cereals, such as corn, contain more starch than they do of all other constituents combined. This substance is the chief nutrient used for fattening, and is the one ordinarily consumed in largest amount.

Crude Fiber.—This is the constituent that gives to forages their property of being woody and resistant. It is because of this substance that hay or other forage is said to add bulk to a ration. Crude fiber is not highly digestible. Every ration should contain a certain amount, but its value as a feed is low, and it has little or no commercial value. Usually a feeder could not afford to pay anything for crude fiber.

Fat.—This substance is used by the body for about the same purposes as is nitrogen-free extract, but it may be regarded as a more concentrated nutrient. One pound of digestible fat is worth about as much as 2.25 lbs. of digestible nitrogen-free extract. Fat is a valuable nutrient, but since most feeds contain only a small quantity, its importance is not stressed in the feeding of livestock.

PURCHASE HIGH-PROTEIN CONCENTRATES

It will be observed that the more common home-grown concentrates, such as corn or oats, are low in protein, and are high in nitrogen-free extract. As would be expected then, the more common purchased feeds, such as cottonseed meal, soybean meal, and tankage, are high-protein feeds. As a rule then, the feeder may and does grow corn, and other cereal grains, and in order to provide his livestock with the required amount of protein, he should purchase high protein concentrates, to be combined with the cheaper low-protein cereals. There is no way to decide with certainty which protein concentrate should be purchased. There is a simple rule, however, that is very helpful, though not infallible, that is, buy the protein concentrate that supplies the most protein for the money,

and not the one that supplies the most feed for the money. As a rule, purchased feeds should be high protein feeds. A little reflection will show also that purchased feeds should be low in crude fiber, not over 12 per cent. A high fiber content shows at once that the feed contains ground roughage, and the feeder usually has more roughage than he can use. If not, it should be purchased separately. As a rule then, purchased commercial feeds should be high in protein, containing as a minimum not less than 14 or 15 per cent. They should be low in fiber, containing as a maximum not more than 10 or 12 per cent.

THE GUARANTEED ANALYSIS

We have seen that the chemist reports six different analyses for a feed, but the Missouri Feed law requires that only four of these be guaranteed. These four are protein, fat, fiber, and nitrogen-free extract. Moisture and ash are usually omitted.

The purpose of the guarantee supplied by feed manufacturers is to enable the feeder to decide which feed he should purchase. It may happen that there is available to the buyer no information concerning a feed except the description on the tag. The guaranteed analysis may be very helpful then, and it is important to know how to use it.

Two typical analyses are shown in Figures 1 and 2, comparing the feeding values of two commercial mixtures, which are called for convenience the "Jones Brand" and the "Smith Brand." (These names are entirely fictitious and do not refer to any known brands of commercial feeds.)

The sample feed tags shown in Figures 1 and 2 may simplify the comparison of values and the resulting choice of the feed to buy. Probably the first item an informed feeder would look for is the percentage of protein. There are many exceptions to most statements about feeding, but the most important single feeding problem in Missouri is probably that of supplying sufficient protein. Livestock must have enough protein if they are to use their feed efficiently, and this constituent is the one most likely to be deficient. Protein feeds are also usually the most expensive. The protein content then is a very important factor in deciding which feed to buy.

The experienced feeder examines the protein content of a feed because protein increases its value.

The second item on the tag that an informed feeder would probably examine, is the crude fiber content. Crude fiber has no market value, and as a rule the feeder is unwilling to pay anything for it. Furthermore, the digestibility of a feed falls as the percent-

100 Lbs. Net
**PIG
 SUPPLEMENT**
 "JONES BRAND"

GUARANTEED ANALYSIS

Protein.....	Min. 12.0%
Fat.....	Min. 3.0%
Fiber.....	Max. 15.0%
N.F.E.....	Min. 55.0%

INGREDIENTS: Ground yellow corn, wheat bran, standard wheat middlings, oat feed, tankage, soybean meal, corn gluten, cottonseed meal, alfalfa meal, blackstrap molasses, 2% calcium carbonate, 1% bone meal, 1% common salt.

MANUFACTURED BY

**JAMES JONES
 FEED MILLS**

Fig. 1.—Guaranteed analysis of the "Jones Brand" Pig Supplement.

100 Lbs. Net
**PIG
 SUPPLEMENT**
 "SMITH BRAND"

GUARANTEED ANALYSIS

Protein.....	Min. 30.0%
Fat.....	Min. 3.0%
Fiber.....	Max. 5.0%
N.F.E.....	Min. 47.0%

INGREDIENTS: Ground yellow corn, wheat bran, standard wheat middlings, oat feed, tankage, soybean meal, corn gluten, cottonseed meal, alfalfa meal, blackstrap molasses, 2% calcium carbonate, 1% bone meal, 1% common salt.

MANUFACTURED BY

**JOHN SMITH
 FEED MILLS**

Fig. 2.—Guaranteed analysis of the "Smith Brand" Pig Supplement.

age of fiber rises. A high fiber content in a mixed feed means that it contains a considerable amount of some ground forage.

The experienced feeder examines the crude fiber content of a feed, because crude fiber decreases its value.

In making a rough approximation then of the value of the "Jones"* Pig Supplement, the experienced appraiser would note that it contains a little more protein than corn, which would add from 10 to 15 cents per 100 lbs. to its value. It contains less nitrogen-free extract than corn, which would subtract 10 to 15 cents from its value. It contains 13 per cent more crude fiber than does

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corn, and as this means a reduction in digestibility of the other nutrients, the "Jones" Pig Supplement is worth less than corn.

When the experienced feeder looks at the analysis of the "Smith" Pig Supplement he would note that it contains about 20 per cent more protein than does corn. This larger quantity, and greater variety of protein, makes it worth considerably more. The crude fiber is a little higher than in corn, but not enough to be of much significance. Under most practical conditions the Smith Pig Supplement would be much more useful to the feeder. The price would determine whether or not this experienced feeder would buy it. The simplest way to decide would be to compare it with other feeds of somewhat similar composition. Soybean oil meal for example contains more protein, and more fat. Under average conditions soybean oil meal would be worth more than the "Smith" Pig Supplement.

There is one item on the tags that may confuse the inexperienced feeder, and that is the large number of constituents listed under ingredients. A little reflection will show the amount of protein supplements in the "Jones" Pig Supplement, such as tankage, soybean meal, corn gluten, and cottonseed meal, must be very low, or the protein content of the mixture would be higher. It is equally clear that the "Smith" Pig Supplement must contain a considerable quantity of these protein concentrates or the total protein content in the mixture would not be as high as 30.0 per cent.

A variety of feeds may be desirable, but in no case can variety be substituted for protein content.

The provision of the law that the ingredients of a feed be named has some usefulness, as it may discourage the occasional indifferent manufacturer from including an ingredient that is objectionable, or from omitting an ingredient that is declared. Aside from this feature, however, the usefulness of the provision is very limited. The ingredients declared may all be present, but some of them may be present in such small quantity as to be of no consequence. This possibility is illustrated by the two sample feed tags used as examples. The declared ingredients in the "Jones" and "Smith" Pig Supplements are the same, but the analyses and feeding values are quite different.

It will be observed that these feeds contain mineral ingredients. There are so many exceptions to any statement about minerals in feeds that it is difficult to make definite recommendations. As a rule, however, the only minerals in which we are much interested

are calcium and phosphorus. Whether or not the amount in a purchased feed is of any importance depends on the rest of the ration. For example, if livestock are on good quality pasture, or if they receive liberal amounts of legume hay, they will certainly receive enough calcium, and in this state, still assuming they are on good quality pasture, there is every reason to suppose they will also receive enough phosphorus. If livestock are receiving enough minerals from homegrown sources, it is of course immaterial whether the purchased feed contains any or not. However, if swine are being fed in dry lot, or on very poor pasture, the mineral content of purchased feed may be an item of importance. It would be equally satisfactory, however, to supply the minerals separately in a self-feeder.