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# TANKAGE

## ITS VALUE IN LIVE STOCK AND POULTRY FEEDING

BY

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EXPERIMENTAL FARMS BRANCH



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## TANKAGE

### ITS VALUE IN LIVE STOCK FEEDING

Through a newer knowledge of nutrition, the live stock feeder realizes that the coarse grains and roughages seldom make a complete ration. The value of these feeds is increased considerably when the ration, whether it be designed for the production of milk or meat, is balanced with additional protein and other essential elements. In swine feeding, where economy requires continued and rapid growth, the selection of the protein supplement is important. For this class of stock it has been found that high protein feeds of animal origin combine well with the cereal grains. Tankage is a product of animal origin, and its high protein content and supply of minerals in the form of calcium and phosphorus make it admirably suited for swine feeding.

#### **What is Tankage?**

Tankage is a packing-house by-product, and the two types generally used, digester and dry-rendered tankage, are distinguished by the process they undergo in production. In the digester method of producing tankage the fresh meat scraps, fat trimmings, and scrap bones are thoroughly cooked by steam under pressure. After the cooking is completed, the fat is skimmed off the top, the liquid is drained off, and the solid residue pressed in hydraulic presses to remove as much of the fat and water as possible. The residue is then brought to the proper consistency, dried and ground into a meal. This product is called "digester" or "feeding" tankage, the best grade being usually guaranteed to contain 60 per cent protein, about 9 per cent fat, and 20 per cent minerals. Other grades are guaranteed to contain 50 per cent and 45 per cent protein, the reductions in protein content being due mainly to the increased proportions of bone in the product. The value of any grade depends primarily on the protein content, unless the additional bone is actually needed in the ration.

Digester tankage is generally considered a swine feed, but has been used with other classes of live stock. The other type of tankage, called "dry-rendered" tankage or "meat scraps," is used mainly in poultry feeding, and will be discussed in the poultry section of this bulletin.

### THE FEEDING VALUE OF TANKAGE

The Dominion Experimental Farms are continually conducting feeding trials to compare the value of different protein supplements for various classes of live stock. Over the past ten years a large number of tests have involved the particular problem with which this bulletin is concerned, namely, the feeding value of tankage. The results of the experiments will be discussed in two parts. The first part will include those trials determining the supplementary value of tankage, that is, tankage versus no tankage; while in the second part tankage will be compared with other protein supplements such as skim-milk, buttermilk, fishmeal, linseed oilmeal, and alfalfa meal.

#### **Tankage vs. No Tankage**

Tests in which rations of grain and tankage were compared with grain alone for pigs showed that the groups which received tankage not only gained more rapidly, but made cheaper gains. A total of 197 pigs fed at various Experimental Stations on grain and tankage averaged 1.14 pounds daily gain, as compared to an average of 0.95 pound for a like number of pigs fed grain alone. This difference does not seem great, but over the complete feeding

period, weaning to market weight, it means that the tankage-fed pigs would be ready for market about a month earlier than those fed grain alone. In feed required per 100 pounds' gain there was a definite economy found in tankage feeding. The average of these trials showed that 100 pounds of tankage replaced about 300 pounds of grain. Summarizing, tankage added to grain in comparison with a ration of grain alone, produced faster gains, saved grain, and made better bacon hogs.

### **Comparison of Tankage and Other Protein Feeds**

The results of feeding tankage have definitely proven it a valuable feed. Under conditions where other protein feeds are not available for swine feeding, it is recommended that tankage be included in the ration at rates which are given in another section of this bulletin. Oftentimes, however, the feeder wishes to know which of the protein supplements will give him the greatest returns. A summary of the results of experiments in which tankage was compared with the dairy by-products shows skim-milk and buttermilk to be slightly superior to tankage for growing and fattening hogs. These milk products are particularly valuable during the early stages of growth, and if skim-milk is available in only limited quantities it is suggested that it be fed to the nursing sows and young weaned pigs. When tankage and fishmeal were compared on the basis of their protein content, there was little difference in the rapidity and economy of the gains. As fishmeal contains about 10 per cent more protein than tankage, slightly less is required to balance a ration. The results of the experiments conducted would, therefore, indicate that the choice between tankage and fishmeal as sources of protein for the swine ration depends upon the availability of the two feeds and their cost on the basis of protein content.

In addition to the high protein supplements already mentioned, two others of somewhat lower protein content, namely, linseed oilmeal and alfalfa meal, are at times included in the swine ration. However, in experiments comparing these feeds directly with tankage, the pigs fed linseed oilmeal or alfalfa meal did not make as rapid or as economical gains as those fed tankage. It is concluded, therefore, that linseed oilmeal and alfalfa meal should not be considered as complete substitutes for tankage, but rather as supplements to replace a portion of the tankage, thereby adding variety to the supplementary mixture and generally lowering its cost.

### **SUGGESTIONS ON FEEDING TANKAGE**

Tankage is a concentrate feed, and while it is often said that only a small amount is required to balance the swine ration, nevertheless, the quantity of tankage should be sufficient to allow the most economical conversion of basal feeds into meat.

It is recommended that the weanling pig receive a ration in which the essential elements are present in proportions approximating those of sows' milk. The protein level should be high at this stage, and if only cereal grains are available they should be mixed with tankage at the rate of 86 pounds grain (34 pounds oats, 26 pounds wheat, 26 pounds barley) and 12 to 14 pounds tankage. This mixture should be fed from weaning until the pigs reach about 50 pounds. During the growing stage, from 50 pounds to 125 pounds, a medium level of protein is needed, that is, about 90 pounds grain (27 pounds oats, 18 pounds wheat, 45 pounds barley) with 8 to 10 pounds tankage. In the finishing period, from 125 pounds to market weight (200 pounds) the percentage protein in the ration may be materially decreased and a higher proportion of finishing feeds included. At this stage, about 5 per cent tankage is sufficient, that is, 95 pounds of grain (10 pounds oats, 28 pounds wheat, 57 pounds barley) with 5 pounds of tankage. If the basal grains mentioned above are not available, other suitable growing and finishing mixtures may be used.

The cereal grains with green feed or pasture will generally maintain boars and brood sows in breeding condition. During the nursing period, however, sows require large amounts of nutritious feeds containing a sufficient quantity of protein for the production and maintenance of the milk supply. At this stage, a mixture of the grains should be supplemented with about 10 per cent of tankage.

#### TANKAGE IN CATTLE RATIONS

A number of experiments conducted in the United States have shown that high-grade tankage can be satisfactorily fed to dairy and beef cattle. Little difficulty was experienced in having the animals consume the small quantities of tankage required to balance the ration, and the products were not adversely affected. However, until more is known about its suitability it is recommended that tankage be used as only a partial source of protein in cattle rations.

## TANKAGE

### ITS VALUE IN POULTRY FEEDING

Feeds of animal origin have been considered to be of value for the production of growth and eggs as well as for the general well-being of poultry for some years. While the bulk of feeds fed to poultry is composed of cereal grains or their by-products, at the present time a very definite portion of the rations used upon commercial poultry farms and to a lesser extent for the general farm flock is composed of meat in some form, fishmeal or milk products. These feeds are all available especially prepared for poultry feeding purposes and their value as an essential part of the ration is well established. This condition has come about almost entirely as a result of the recommendations of research institutions based upon the results of experiments indicating the cereal grains to be deficient in certain amino acids and relatively low in minerals both of which fractions are essential for normal growth or sustained production of eggs.

#### **Dry Rendered Tankage (Meat Scraps)**

In poultry feeding dry rendered tankage or meat scraps are more commonly used than the digester tankage. The distinguishing feature of the processing of the former consists in the cooking of the waste meat material in open tanks instead of steam cooking under pressure as is the case with digester tankage. Meat scraps also differ from digester tankage by reason of the fact that usually no blood or stick is added to the dry rendered product. It is considered to be a superior product to the digester tankage, is lighter in colour and is not so strong in odour. Although showing only about 55 per cent protein as against 60 per cent for most digester tankage it has proven to be equal to high-grade digester tankage containing 60 per cent protein. Meat scraps are further defined in that any scrap containing more than 10 per cent of phosphoric acid ( $P_2O_5$ ) is considered to be high in bone and must be designated as meat and bone scraps. The fact that certain ingredients of meals made from slaughter-house products may contain portions of the carcass which are low in nutritive value is definitely designated in the definitions in the Feeding Stuffs Act (Canada 1929) as follows: "Meat scrap and meat meal are the ground residues from animal tissues exclusive of hoof and horn." Under this section of this publication meat scraps only are considered as being the form of tankage most suitable for and most used in poultry rations.

#### **Nutritive Value of Meat Scraps**

Meat scraps being a high protein concentrate are purchased upon that basis, the price range following the protein content closely. According to research work reported from Texas, the protein of meat and bone meal is 91 per cent digestible to poultry. Although definite information is not available the protein of meat scraps would be expected to be at least as available to poultry as that of the meat and bone scraps. For purposes of comparison the digestibility of the protein of some other animal feeds may be cited as follows: Blood meal, 91.4 per cent; buttermilk (dried), 81.6 per cent; fishmeal, 90.7 per cent; bone-meal, 83.5 per cent, and tankage (digester), 85.3 per cent. It will be appreciated therefore that meat scraps are a high protein product whose proteins have a very high nutritive value. It should also be pointed out that meat scraps contain a large assortment of amino acids, some of which are not present in cereal grains but which are required by the body for growth and production, hence the efficiency of this product in supplementing cereal grains in the poultry ration.



Turning attention to the fat of meat and bone meal the digestibility is 89.5 per cent and 46.3 per cent, 78.6 per cent, 95.7 per cent, 95.8 per cent, and 95 per cent for the other animal products in the order of naming stated above. Since storage of meat scraps under conditions of high temperature (above 55°-60° F.) increases their free fatty acid content to the detriment of growth in chicks, meat scraps should be used as soon as possible after manufacture and if storage is necessary such storage should be at low temperatures.

In so far as minerals of meat scrap are concerned they consist predominantly of calcium and phosphorous owing to the relatively high percentage of bone material present in most grades. In the nutrition of poultry these minerals are of critical importance and the requirement for both for growth, and of calcium particularly for egg production, is exceedingly high. Consequently this fraction of the meat meal is not in any way undesirable providing the proportion of bone is not too high. It will be appreciated that the occurrence in quantity of a relatively low-priced ingredient such as bone meal in a high-priced protein concentrate such as meat scraps is not compatible with economy in feeding when bone meal can be purchased separately in the required quantities at a much lower price. This fact forms justification for the use of meat scraps in poultry feeding almost to the exclusion of the meat and bone scraps product.

### **Meat Scraps for the Production of Growth**

A great many experiments have been reported over a period of years indicating meat scraps, when supplementing a ration of cereal grains, to be very much more efficient in growth production than the mixture of grains alone. Where a high protein cereal grain such as soya bean meal is used to supplement the commonly used cereals and a satisfactory mineral mixture added, results similar to those found with meat scraps have been obtained in some instances.

In considering the comparative value of meat scraps and other sources of animal protein a great mass of data is again available which necessarily cannot be reviewed within the scope of this publication. It is evident from a study of these data, however, that fish meal, particularly when properly processed in manufacture, is at least the equal of meat scraps with a strong suggestion of superiority for growth production. Sufficient reliable data are not available to indicate definitely the comparative values of meat scraps and milk products.

### **Meat Scraps for the Production of Eggs**

A great deal of research work has been carried out to determine the value of meat scraps for egg production. As was the case with growth considerably greater production can be gained by supplementing the ordinary cereal grains with meat scraps or other animal feeds.

In contrasting different sources of animal feeds for their value as supplements to a cereal ration it has been shown that meat scrap and fish meal are of approximately equal value for this purpose. For example, an experiment carried out at the Experimental Station at Morden, Manitoba, covering the three years, 1930, 1931 and 1933, indicated an average production per bird for the winter months of 85 eggs with meat scrap and 87 eggs with fish meal, this difference being entirely unimportant. A mixture of equal parts of meal scraps and fish meal was similarly contrasted with buttermilk powder at the Agassiz Experimental Farm in British Columbia for egg production, the result indicating a superior production with the meat scraps-fish meal combination of 6½ per cent. It should also be mentioned that experiments conducted at the Poultry Division of the Central Experimental Farm at Ottawa indicate that the addition of meat meal to a fattening mash of cereal grains increases the gain in fattening.

It would appear therefore that meat scraps form a valuable supplement to a cereal ration for the production of eggs or for fattening of stock.

## Methods of Using Meat Scraps in Poultry Rations

*Growing Stock.*—Animal feeds when used to supplement ground cereal grains or their by-products usually make up in the neighbourhood of 12-15 per cent of the mixture. Of this 12-15 per cent usually 2 per cent will be bone meal the other 10-13 per cent being made up of meat scraps, fish meal and milk powder product. For reasons which cannot be gone into in the space of this publication a mixture of animal feeds is preferred to using one type only. The mixture is of course predominantly meat scraps or fish meal and equal proportions are often used. Such a mash is fed alone up to eight to ten weeks of age from which time a gradually increasing amount of a scratch grain mixture is fed during the rearing period.

*Production Stock.*—For the production of eggs approximately 17-20 per cent of animal feeds is used in the mash mixture. Bone meal will again make up only 2 per cent of the mash mixture, the other products being used as mentioned above under the heading of growing stock. Scratch grain is fed in such quantity that approximately equal amounts of mash and scratch grain are consumed. Stated differently the animal products are fed at such level that the protein content of the total ration (scratch grain and mash) ranges from 13-15 per cent.

*Fattening Stock.*—Meat scraps may be added to a ground grain mixture at a level of 10 per cent, the whole being fed moistened with skim-milk or buttermilk.