



FATS AND PROTEINS RESEARCH FOUNDATION, INC.

2720 DES PLAINES AVENUE • DES PLAINES, ILLINOIS 60018
(5 MINUTES FROM CHICAGO'S O'HARE AIRPORT)
TELEPHONE AREA CODE 312 827-0139

THE DIRECTOR'S DIGEST

Werner R. Boehme
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PIGS THRIVE ON TALLOW-FORTIFIED RATIONS

According to Drs. Dale R. Romsos, Elvyn R. Miller and Gilbert A. Leveille of Michigan State University, finishing pigs can utilize dietary tallow efficiently. With grant support from FPRF these investigators fed practical corn-soybean meal diets in which protein to calorie ratios were kept constant. Supplementation of the feed with 3% tallow brought about an increase in daily weight gains of 7% compared with those fed un-supplemented diets. These improvements in gain rates compare very favorably with those achieved by medicating feeds with antibiotics, arsenicals and other growth promoters whose use is regulated by the Federal Food and Drug Administration. Feed efficiency, the weight gain in pounds per pound of feed, was also improved by about 4% and no adverse effects on carcass quality were noted.

Hydrogenated flaked tallow, a harder fat, blends more readily into feeds than tallow itself, but is not an efficient replacement for tallow in swine feeds. Finishing pigs fed diets containing 3% hydrogenated flaked tallow gained less weight per day than those fed diets supplemented with 3% regular tallow. Feed efficiencies were also reduced in animals fed the hydrogenated tallow.

Baby pigs who are ordinarily weaned from high fat sow milk to a high carbohydrate diet can also utilize added dietary fat effectively. High fat diets containing 24% fat as tallow or as safflower oil were compared with high carbohydrate diets containing 62% glucose or sucrose. As in the earlier experiments with finishing pigs, protein to calorie ratios of the baby pig diets were kept constant.

Both high fat diets gave better daily weight gains than the high carbohydrate diets. Daily feed intake of carbohydrate rations was considerably greater than that of fat rations. The feed efficiency, however, of the tallow-containing diet was essentially the same as that of the two carbohydrate diets and superior to the efficiency of the diet containing safflower oil.

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Dietary Fat and Performance of Pigs

Dale R. Romsos

Michigan State University, East Lansing, Michigan

Sow's milk contains 30 to 40% fat on a dry matter basis and young piglets are able to rapidly increase their body weight when allowed to nurse. Thus it was rather surprising when it was reported a number of years ago that young pigs could not efficiently utilize dietary fat. It is, however, now well established that the young pig is indeed able to utilize dietary fat as efficiently as dietary carbohydrate as a source of energy. In the earlier studies dietary fat and carbohydrate were often interchanged on an equal weight basis. Because fat has 2.25 times as much energy as an equal weight of carbohydrate, substitution of fat for carbohydrate on a weight basis would lower the protein:energy ratio as well as the ratio of other essential nutrients to energy. The failure to interchange fat and carbohydrate on an equal energy basis invalidated earlier conclusions regarding the utilization of dietary fat by the young pig.

Another factor which would limit the utilization of dietary fat by the young pig would be the poor acceptability of some lower-quality feed-grade fats. Pigs will reduce their food intake if fed low quality feed fats. We have noted a rather marked difference in performance of young pigs fed fancy tallow versus lower grade animal fats. It would appear that the young pig, at least, might be more sensitive to off-flavors in the diet than are other commercial farm animals such as chickens. Promotions to increase the use of animal fats in diets for young pigs should stress the importance of selection of a high-quality product.


A goal of commercial swine producers is to produce maximal amounts of muscle and minimal amounts of fat. Animals accumulate body fat by several mechanisms. It is possible for the animal to store fat obtained directly from the diet; alternatively, dietary carbohydrate and to a lesser extent dietary protein may be converted to fat in the body of the animal and then stored in adipose tissue. Thus, animals can accumulate body fat even if fed low-fat diets. An important observation made a number of years ago demonstrated an interrelationship between dietary carbohydrate and dietary fat in the control of body fat. Dietary fat is able to "feed back" and reduce the conversion of dietary carbohydrate to fat. Thus, addition of fat to the diet does not necessarily indicate that the carcass will contain proportionately more fat. This is especially true today because the modern pig has a much greater genetic capacity to produce muscle than did the pig of 15-25 years ago.

Approximately 10 years ago a research effort was initiated to evaluate the site of fatty acid synthesis in the pig. It was found that the pig converts dietary carbohydrate to fatty acids in adipose tissue. This is in contrast to results obtained in the chicken where the liver is the major site of fatty acid synthesis or in the commonly used laboratory rat where both liver and adipose tissue are important sites. With this information on the major site of fatty acid synthesis in the pig, further studies were conducted to evaluate the role of diet in the control of de novo fatty acid synthesis in the pig.

Addition of large amounts of fat to the diet markedly depressed the ability of the pig to convert dietary carbohydrate to fatty acids; however, carcass fat content was also increased. We, thus, postulated that diets containing moderate additions of fat might still inhibit dietary carbohydrate conversion to fat without adversely affecting carcass composition. Subsequent experiments demonstrated that addition of 3 to 6% tallow to a corn-soy based diet of pigs improved feed efficiency and reduced the time to market. These changes occurred without any adverse effects on carcass composition. In fact, back-fat thickness was slightly reduced in the pigs fed tallow.

Incorporation of animal fat into swine diets at commercial feed mills is relatively easy. The amount of fat which can be incorporated is limited by the stability of the pellet. Many pig starter diets do contain added fat. Growing-finishing pigs are often fed diets prepared on-the-farm; however, facilities are frequently not readily available to melt and add animal fats to diets under these conditions. A hydrogenated flaked tallow is available commercially; this product can easily be dry-blended. In an attempt to increase the ease with which animal fats might be incorporated into swine diets under "on-the-farm" conditions we evaluated the utilization of flaked tallow by pigs. Unfortunately, this hydrogenated product was poorly digested and therefore was not well utilized by the pig.

In summary, dietary fat is well utilized by the pig. Inclusion of fat in the finishing rations of pigs has usually been associated with increased feed intake, a faster rate of gain and an improved feed efficiency without an adverse influence on carcass composition.



Dr. Dale R. Romsos was born and raised on a dairy farm near Cameron in Northwestern Wisconsin where he spent many hours hunting and ice-fishing. He obtained a B.S. degree in Agricultural Education from Wisconsin State University at River Falls and a Ph.D. degree in Animal Nutrition from Iowa State University in Ames. After spending a year at the University of Illinois he moved to Michigan State University in 1971 where he is now Associate Professor in the Department of Food Science and Human Nutrition.

He enjoys the outdoors and spends time camping and canoeing the rivers of Northern Michigan whenever possible. This past summer he spent 2 weeks in Norway enjoying the magnificent scenery and tracing family history.