A METHOD FOR REMOVING FAT SAMPLES FROM LIVE HOGS[1]

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INTRODUCTION

In studying variations in the properties of fat as the fattening process advances it is often advisable to take successive samples from live animals. An experiment at the Purdue University Agricultural Experiment Station, conducted for the purpose of determining the influence of the degree of fatness of hogs on the quality of pork, provided the incentive for devising the sampling method described in this paper.

In early studies of fat development investigators used the method of killing "representative" individuals at different stages of development. In recent years workers have come to recognize the importance of the individuality factor. Scott [3] in 1920 emphasized specifically the great variation in the properties of the fat from different individuals kept on the same ration. Hankins and Ellis,[4] using the method of killing representative animals, also recognized individual variation and attempted to overcome its effect by using three animals at each killing.

Ewing and his coworkers [5] in 1919 described a method of removing fat samples from live hogs by means of a twisted clock-spring bit fitting inside a cannula. Later Scott [3] reported work in which he had removed fat samples from the rear part of the ham by making a slit about 2 inches long and taking out a piece of fat. A modification of this process in which the fat was removed through an incision in the back has been used recently at the University of Illinois.[6]

In agreement with the early work of Henriques and Hansen [7] it was found at the Purdue Agricultural Experiment Station [8] that the different layers of the adipose tissue of hogs yield fat of different constants. It was realized therefore that special precautions should be taken to insure proportionate amounts of the different layers in the sample when developmental studies are being made. This factor was considered of such importance as to warrant a careful study of the sampling process. It was felt that a sampling method should meet the following requirements: (1) Samples showing development of fat should come from the same individual; (2) they should be large

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[2] Appreciation is expressed to Dr. F. P. Mathews of the Veterinary Department of Purdue University for his helpful suggestions in connection with the technic of the operation.
[3] SCOTT, J. M. SOFT PORK STUDIES. PRELIMINARY REPORT. Fla. Agr. Expt. Sta. Bul. 157, p. [67]–75. 1920.
[4] HANKINS, O. G. and ELLIS, N. R. SOME RESULTS OF SOFT-PORK INVESTIGATIONS. U. S. Dept. Agr. Bul. 1407, 68 p., illus. 1926.
[5] EWING, P. V., WRIGHT, L. H., and BURK, L. B. COOPERATIVE SOFT PORK INVESTIGATIONS. PART IV.—METHOD OF EXTRACTING FAT SAMPLES FROM LIVE HOGS. Tex. Agr. Expt. Sta. Bul. 226: 15–18, illus. 1918.
[6] CARROLL, W. E., BULL, S.
[7] HENRIQUES, V., and HANSEN C. VERGLEICHENDE UNTERSUCHUNGEN ÜBER DIE CHEMISCHE ZUSAMMENSETZUNG DES THIERISCHEN FETTES. Skand. Arch. Physiol. 11: [151]–165, illus. 1901.
[8] BLOCK, H. W. CHEMICAL ASPECTS OF FAT DEPOSITION IN SWINE. (Thesis, Purdue Univ.) 1929.

enough for the necessary chemical determinations; (3) they should be uniform in width and should extend clear through the fat tissue; (4) they should be taken from the same region, or from fat tissue of similar properties; (5) the sampling should be done in such a way as to cause the animal as little discomfort and setback as possible; (6) the incision should be made in a place where the chance for infection is slightest, and in such a way that the resulting wound will not be subjected to excessive strain; (7) the sample removed should not contain injected materials.

PRELIMINARY WORK

That the variation in the properties of the fat from samples taken at different locations on the fat backs of slaughtered hogs is so small as to be insignificant was the conclusion reached as a result of preliminary work at this station.[9] It was therefore considered that samples properly taken from the part of the back corresponding to the fat back would give comparable results.

At the beginning of an experiment conducted at Purdue University 80 pigs were sampled and the greater number of these were again sampled at intervals of 30 days for four successive samplings. Because of the results obtained in this and other experiments it is believed that the method herein described meets all of the requirements set forth above.

THE METHOD

PREPARING THE HOG

The hog is confined in a restraining crate of the hyperimmunization type, which is so designed as to hold him firmly in position. The top of the crate is open to permit the operator access to the back of the hog. A spot about the size of a man's hand directly over the loin is shaved, washed, and disinfected. By means of mercurochrome an oblong about 6 inches long and 2 inches wide is drawn on the shaved skin.

INJECTING THE ANAESTHETIC

With a metal hypodermic syringe the anaesthetic is injected intradermally along the mercurochrome line. The needle is inserted between the layers of the skin and is gradually pushed in to its full length while small amounts of the anaesthetic are being injected. When the entire skin oblong has been deadened a small quantity of the anaesthetic is injected between the fat tissue and the muscular layer at each end and side of the oblong and this completes the anaesthesia.

REMOVING THE FAT SAMPLE

When the skin is no longer sensitive the incision is made. An oblong piece of skin and fat about 4 or 5 inches long and thick enough to provide an adequate sample is removed. In making the incision it is advisable to keep well within the swellings caused by the injected liquid. Figure 1 illustrates the sampling method, gives a diagram of the sample removed, and shows the method of closing the wound. Care should be taken that the entire fat tissue is sectioned clear through to the muscular layer, and that the incision is so made as

[9] BLOCK, H. W. Op. cit.

to insure uniform width of the fat layers. If the layer of fat is thick the strip of tissue removed may be comparatively narrow, affording sufficient sample and yet permitting the wound to be closed easily.

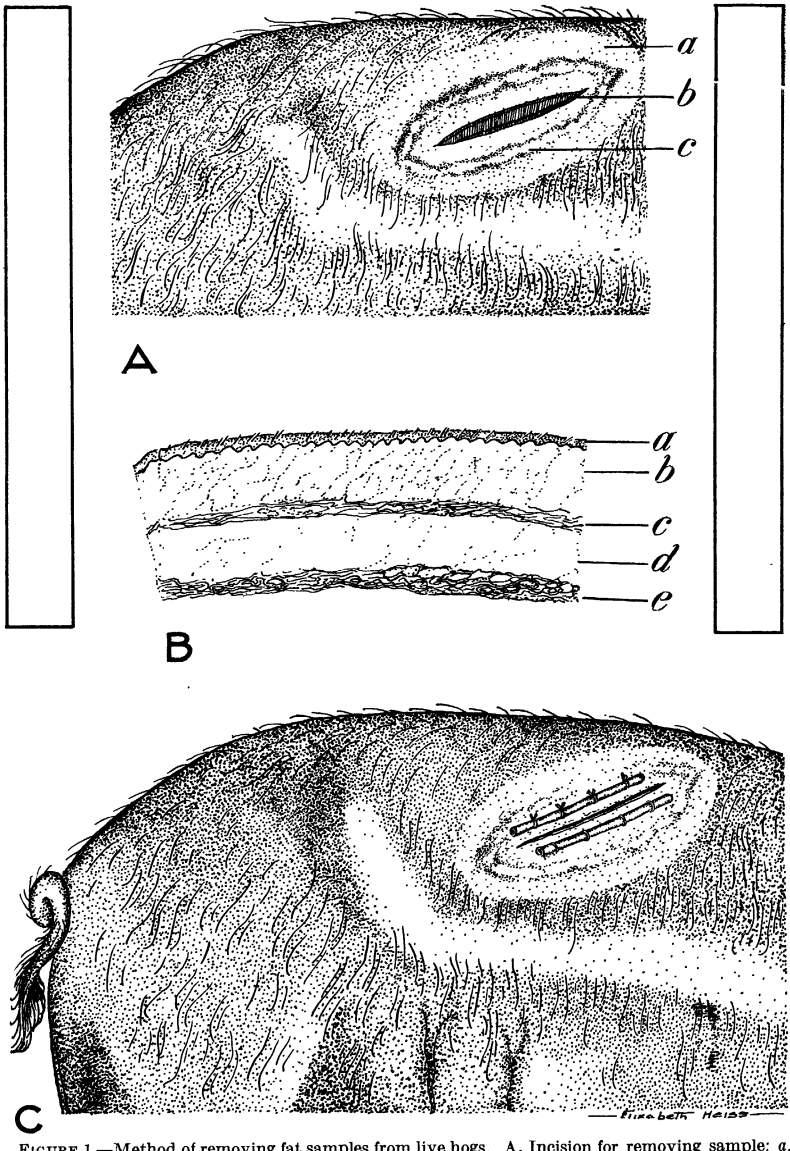

FIGURE 1.—Method of removing fat samples from live hogs. A, Incision for removing sample: *a*, Shaved area; *b*, incision; *c*, swellings where anaesthetic was injected. B, Diagram of removed tissue: *a*, Skin; *b*, subcutaneous fat layer; *c*, connective tissue; *d*, inner fat layer; *e*, connective tissue and blood vessels. C, Method of closing wound

CLOSING THE WOUND

By means of four quilled sutures, using half-curved cutting-edge suture needles and aseptic machinist's thread, the wound is closed. A thick-walled, 3/16-inch rubber tubing on each side of the wound

proved effective in providing anchorage and in preventing the stitches from cutting through the skin. The wound is disinfected with 50 per cent alcohol and is then covered with pine tar. A little fish oil mixed in the tar renders the antiseptic dressing fly repellent.

HANDLING THE SAMPLE

After the sample has been removed it should be blotted free of blood, the skin taken off, and the network of blood vessels and connective tissue dissected from its ventral surface. Samples should be promptly placed in refrigeration and kept there until they can be delivered to the chemistry laboratory.

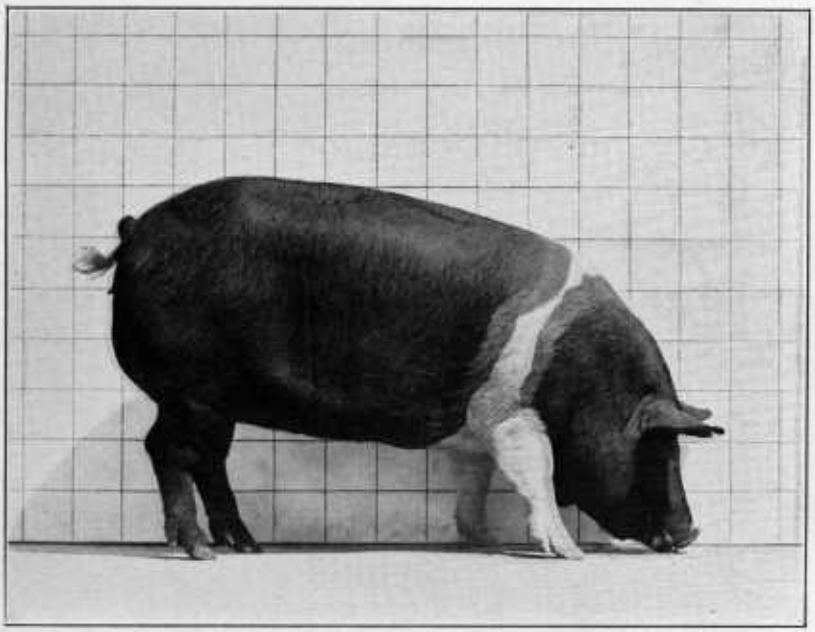

FIGURE 2.—An experimental hog from which four fat samples have been removed

ADDITIONAL OBSERVATIONS

Sterilization of instruments and materials was accomplished by boiling them in water. Fifty per cent alcohol proved to be a satisfactory antiseptic. An occasional case of infection occurred, but the hog invariably recovered.

Several different anaesthetics were tried. With magnesium sulphate the writers were unable to get proper anaesthesia. Administration of novocaine caused swelling and the animal would not resume feeding for about two days. The use of benzyl alcohol caused sloughing of the tissues. Finally a 1 per cent solution of apothesine (the hydrochloride of γ-diethylaminopropylcinnamate) was adopted as a convenient, efficient, and inexpensive anaesthetic.

The effectiveness of the anaesthetic depends upon the success of the operator in injecting intradermally. Black hogs (Poland Chinas and Hampshires) have a much thicker and less pliable skin than do

Yorkshires, for example. The latter are more difficult to anaesthetize, but skill in injecting the solution overcomes the difficulty.

Samples from the experimental hogs were taken adjacent to but on opposite sides of the backbone. In the early part of the experiment the incisions were made parallel to the backbone. Later it was found that if the incisions were made on the back running posteriorly and ventrally at an angle of approximately 45° to the backbone, good drainage was afforded and the healing was somewhat facilitated.

In the course of 8 to 10 days the wound appears to be healed, and most of the threads will give way and fall off with the rubber tubing. An individual from which four samples have been removed and the wounds healed is shown in Figure 2.

With one attendant to prepare the hogs, one operator to administer the anaesthetic and care for the samples, and another to remove the samples and dress the wounds, about 25 or 30 hogs can be sampled in eight hours.

This method has given good results with swine. With slight modifications it may be used in studying progressive fat development in other classes of meat animals.