PHYSICAL ANALYSIS FOR
DETERMINATION OF CARCASS FATNESS

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It is rather well known among meat research workers that the ninth-tenth-eleventh-rib cut is an excellent sample for use in estimating the fatness of the dressed beef carcass. This fact was brought out in BAI work, for example, in which it was found that there was a correlation of + 0.93 between the separable fat content of the rib cut mentioned and that of the dressed carcass.

The prime-rib cut is removed from the remainder of the carcass by a method adopted some years ago by the Conference on Cooperative Meat Investigations. The ninth-tenth-eleventh-rib cut is then removed from the prime rib by having the knife crowd the posterior edge of the eighth and eleventh ribs. After weighing the cut, the next step is careful separation into fat tissue, lean tissue and bone followed by the prompt weighing of the three portions. To keep moisture loss to a minimum, some investigators go to the extreme of keeping the sample under a damp cloth as much as possible during the separation process. If the sum of the weights of the fat, lean and bone components is appreciably less than the original weight of the sample it is probably best to apportion the difference on some logical basis and add the three components to the corresponding weighed components.

Three equations that make use of the percentage of separable fat in the ninth-tenth-eleventh-rib cut for estimating carcass fatness are as follows:

Steers

Separable fat of dressed carcass (%) = 3.54 + .80 times separable fat of 9-10-11-rib cut (%). S. E. 2.14%.

Heifers

Separable fat of dressed carcass (%) = 3.14 + .83 times separable fat of 9-10-11-rib cut (%). S. E. 2.89%.

Steers and Heifers combined

Separable fat of dressed carcass (%) = 3.06 + .82 times separable fat of 9-10-11-rib cut (%). S. E. 2.34%.

In similar Bureau work relating to dressed lamb, a correlation of + 0.98 was found between the separable fat content of the rib cut and the same component of the carcass. In fact, correlations exceeding 0.90 were also found between loin, breast, leg and shoulder on one hand and the dressed carcass on the other hand.

Cutting the carcasses was done by a method described in U.S.D.A. Tech. Bull. No. 944. This involved, among other steps, the preparation of a 3-rib shoulder and rib cut that included 9 ribs. The physical analysis was made with great care by experienced personnel and the different components were weighed to an accuracy of 0.01 pound.
The following estimating equation was derived:

Separable fat of dressed carcass (%) = 5.00 + 0.70 times separable fat of rib cut (%). The S.E. was only 1.59%.

Other analysis of the data showed close relationships between the fat content of the rib and that of the loin, breast, leg, shoulder and neck. The respective correlation coefficients were +0.94, +0.91, +0.89, +0.88, and +0.84. Through the use of equations that were developed, it is possible, for a given carcass, to estimate the separable fat content of each of the other 5 cuts mentioned from the same component of the rib cut.

Work with swine has not yielded results that make possible the estimation of carcass fatness from a carcass sample with the same degree of confidence as in the cases of beef and lamb. However, in a Bureau study involving 64 hogs of intermediate type that varied widely in weight, the percentages of separable fat in the bacon, shoulder, ham, head and loin cuts, as well as that of the dressed carcass, were determined. These results have been reported in U.S.D.A. Circular No. 731 and provide an opportunity for useful estimations. For example, with the separable fat of bacon at 60 per cent and that of the ham at about 28.5 per cent, there was about 41 per cent of the same component in the dressed carcass as a whole. When the fat content of the bacon was 65 per cent and that of the ham about 32.1, the carcass had 45 per cent. Numerous other similar comparisons can be made from the data reported. Moreover, the results are so presented that the mean fat content of the carcass, as well as that of each of the 5 cuts mentioned, may be estimated for an intermediate type hog of any live weight between 175 and 250 pounds.

Mr. Hall: Does this rib cut have all the outside fat it ever had?

Mr. Hankins: Yes, nothing is removed.

Mr. Galloway: Has anything been done to duplicate preparation evaluation or consideration for carcasses of different grades? I have seen your estimated equation for lamb and beef, but it seems that it is all on a composite estimated basis.

Mr. Hankins: No. We did get the idea of using a factor of weight per unit of length. That isn't exactly a physical analysis, but it is of interest. The weight of the beef carcass per unit of length. Our set of data gave us very nice correlations of grades. We have done some similar work with lamb carcasses, but at the moment I cannot give you the details of it.

Mr. Kemp: Our work at Kentucky was done under the supervision of Ken Phillips. He took numerous measurements of lamb carcasses, and that was the one that had the highest correlation of weight with length. But he still said it was less than .25, I think.
MR. HANKINS: I realize that we are not talking about physical analysis now, but in the case of beef the correlation was much better than that, between .8 and .9.

MR. KLINE: Do you use both sides of the rack or do you split the rack and use just the ribs from one side?

MR. HANKINS: My recollection is that this work involved the two sides. We recognize the error that may creep in if you split the two sides. There is more possibility of error in the case of bone than in the case of either fat or lean tissue, due to off-center split.

MR. PEARSON: There is one method of determining degree of fatness in the live animal which is relatively new, namely the use of radio isotopes. By determining in dilution you can get the degree of fatness. There is an article in the last Journal of Animal Science on this subject.

MR. HALL: The ether extraction or any other extraction procedure for meat, which I described, requires a little longer time than ordinarily is prescribed by the AOAC method. AOAC says 16 hours continuous extraction, and it does not describe any particular method of extraction. With the Bailey-Walker it has been our experience that 16 hours is inadequate for meat samples prepared as I described. The technicians who did the work ran them 48 hours and then after running them 48 hours, ran them another 24 hours and kept getting more. Whether or not it was all fat, I do not know. The increase in the last 24 hours, of course, was small and it might be considered negligible. You had better double the amount of time required for extraction for meat over what is ordinarily recommended for beef. It is more difficult to get the fat out of the meat after it has dried up into a hard, composite meat than it is out of a friable powder consistency.

MR. HENRICKSON: We have been using a method for determining fat in which we use anhydrous ether, washing a macerated sample of dried meat with anhydrous ether and then drawing the ether off under vacuum, 24 inches of vacuum, 100 degrees. We are able to do this in two hours. Is our method any good?

MR. HALL: I am sure I would not know.

One thing about the Miller apparatus I mentioned. It is necessary to use a dehydrating agent. I use anhydrous silicate sulfate with the ether as a solvent. You have to use some sort of a drying agent to get the fat out of the wet tissue.

MR. DOTY: In response to your question, I doubt very much if you will get an answer which is high enough by that procedure. While we have not used exactly that procedure in some collaborative work on fat determination, we have used a similar one and found that the results will run low by that technic. It depends on the accuracy that you want. Your samples will line up accordingly. If you want only comparative results, okay, but if you want a precise answer, it will be wrong, I am sure.
MR. HENRICKSON: It is an AOAC method for meat and meat products to which I am referring.

MR. HALL: Is it an official method?

MR. HENRICKSON: It was proposed in 1941.

MR. DOTY: I doubt if it is an official method. There is only one official method for fatness in the AOAC at the present time. They discontinued all the tentative methods in 1950. I think that may have been a tentative method prior to that time.

MR. PEARSON: I wish to make especial mention of three men who I think had the most to do with the selection of our topics this year, and I feel that the topics were well selected and well received. They are Fred Deatherage of Ohio State; Mr. Hankins who is with us tonight; and Dan Brady who is absent. I think those three men were largely responsible for the selection of these topics which I feel are very timely.

As a committee, we move the adoption of this report, realizing that we do not have the final answers and that anyone should feel free to make improvements of any methods.

(Seconded, Carried)

CHAIRMAN COLE: I think this presentation of the Research Methods Committee has been very good. On some of the information, like on these methods, we hear papers quite often giving results, but we don't get any of the inside details.

Tomorrow we will probably give you a five or ten-minute opportunity to express your desires for next year's conference. It may be that you will want to hear more about methods. We will leave that up to the new Executive Committee.

By the way, that committee has been selected. The new members are E. A. Kline, E. D. Farwell, and J. J. Wanderstock.

MR. KERR: I should like to raise one question. Was there any thought in connection with the meat contest of having the live animal tied in with it? I am thinking particularly as I plan for the Eastern National.

CHAIRMAN COLE: That was discussed and again we are going to leave that for suggestions tomorrow. I think it is the consensus, in talking with the members of that committee, that it would be almost an impossibility to incorporate it this fall. I think we probably want to decipher these results. I think from this we are going to learn a little about how to score. We might want another trial run. If you want to bring it up tomorrow or to put it with your suggestions tomorrow, we will welcome it.

Are there any other announcements or questions? If not, we will recess until 8:30 in the morning.

(The meeting recessed at 9:00 o'clock.)