As I attempt to discuss this topic, I find myself a trifle confused over the exact meaning of two words in the title.

First, what do we mean by "type?" and secondly what are "carcass characteristics?"

When we mention type, what ideas immediately begin to pass through your minds. Does type mean the large, intermediate and Chuffy hogs as many folks used the terms previous to 1935, or are you thinking of the bacon and lard type of hog and comparing the carcass of a Yorkshire say, with that of a Duroc? Or are you thinking of the "meat type" of hog, regardless of breed as it is represented by a choice No. 1 grade as described by the Livestock grading branch of P.M.A.

The second part refers to "carcass characteristics" and just what is meant by these words:

1. Are you referring to cutting yield?
2. Are you including dressing percent?
3. Are you thinking of size of eye in the loin and plumpness and thickness of ham and shouldler?
4. Are you considering backfat thickness and grade?
5. And does it not overlap into quality of the carcass as influenced by several factors?

Personally, as I think of carcass characteristics, I would like to combine all of these ideas into one. But as I look over the material pertaining to this subject I am unable to find any reference to all phases of this subject in one single report. By that I mean, someone has reported on dressing percent or cut-out yield and shown certain results and painted rather a rosy picture but what was the shape of eye in the pork chop and what was the percent of lean in a slice of bacon - factors which definitely have consumer appeal.

These are the points which should be covered under carcass characteristics but a subject on which there seems to be very little printed information.

Fortunately, this conference is set up so that more time is left for discussion than is to be taken up in presenting this report. This is as it should be and if properly handled presents a wonderful opportunity for a frank, open discussion by everyone on this timely subject.
Now, I would like to review briefly a little of the work which has been done on this subject and then throw in a few ideas which may be stimulating to a later discussion.

One should not attempt to discuss swine type as related to carcass characteristics without referring to the work of the Illinois station which was conducted in 1922, 1923, 1924 and 1925, and reported on by workers of that station in Bulletins 321, 322, 323. Also, a report in the Illinois Station Bulletin 415 published in July 1935.

In their summary they reported on five major points as:

1. Dressing percentage.

There was no significant difference in the dressing percentage of hogs of the Chuffy, Intermediate and Rangy types when similarly fed and slaughtered at 225 pounds.

2. Carcass measurements.

Various carcass measurements showed that length of carcass varied with the type. The very Chuffy being shortest and the Intermediate being shorter than the Rangy. Type had little effect upon depth of chest. Length of body proper varied more within type than between types.

3. Cutting percentages.

There was little difference in cutting percentages between the Chuffy, Intermediate and Rangy types when self-fed in dry lot.

4. Physical Composition of carcasses.

When hogs are hand-fed or self-fed, the percentages of lean on the Chuffy, Intermediate and Rangy types were practically the same.

When hogs were self-fed differences in skin content were very small between types.

When self-fed or hand-fed the very Chuffy carcasses contained less bone than the Chuffy or Intermediate types while the Rangy contained a higher percentage of bone.

5. Grade of Carcasses.

When hand-fed, the very Chuffy type finished before reaching a market weight of 225 pounds. Most of the Chuffy and Intermediate were not too fat at this weight as judged by standards at that time. The Rangy were not finished at 225 pounds.

The Intermediate Type from the butcher's standpoint either hand-fed or self-fed proved the most desirable of the types studied. The Rangy however was quite acceptable if self-fed.
A later reference to, "Value of present-day Swine Types," was reported on in Bulletin 415, (1935) and I quote, "The current demand for pork is for a carcass that will cut out small, lean, firm cuts, a finished belly, and a minimum amount of lard.

None of the types of animals included in this study meets effectively the present pork market demands. The Intermediate type approaches the ideal most nearly with the Chuffy, the Rangy, and the very Chuffy following in order named. The ideal hog would have the quality and plumpness of the Intermediate type, the length of the Rangy type, and the early maturity of the Chuffy."

Further reference must be made to Purdue Bulletin 340, (1930) on the "Influence of the growth and fattening processes on the quantity and quality of meat yielded by swine." A range of 75.3 to 82% in dressing percentage was reported in these studies and they stated that the fatter a hog the higher is his yield, but that the depth of fat is not the only determining factor on dressing percentage.

There is a relationship between maturity and quality of meat in swine. Each length type of hog will yield first quality pork, but only when the proper stage of development or finish is reached. The medium type hog weighing 191 to 219 pounds produced a firm more desirable carcass.

No report of this kind would be complete without reference to the work of O. G. Hankins and others in B.A.I. "A Study of Carcass Characteristics in Relation to Type of Hog." - 33rd An. Proc. ASAP 1940 (p. 284-289.)


Ferrin (1939) reported that hogs measuring 29 to 31 inches in carcass length produced a higher proportion of desirable carcasses when slaughtered at 225 pounds live weight than hogs over or under this length.

The B.A.I. workers report that extensive studies have been reported on the relationship of such factors as type, conformation, and degree of finish to carcass quality in swine. Few attempts, however, have been made to determine the value of individually recorded body measurements for predicting the quality and quantity of a hog carcass.

Their work in the fall of 1947 was used to determine the relative value of certain body measurements for predicting (a) the combined yield of ham, loin, bacon, picnic shoulder, and shoulder butt, and (b) the yield of lean meat in the hams. The eight live hog measurements studied were: length from ear to tail, height at shoulders, width at shoulders, width of middle, width at hams, depth of chest, depth of middle, and circumference at chest.

For both barrows and gilts, depth of middle was the most important item in determining the yield of the five cuts.

From the analysis of the yield of lean meat in the hams, it was found that width at hams was the most important of the measurements for barrows and gilts.
Predictive value of measurements studied was low but it offers possibilities of being a valuable tool in estimating carcass yields from the live animal.

In the National Provisioner - March 14, 1953, pages 34-40 - appears an article by Hankins, Hiner and Sloane on "A New Look at the Significance of Fat and Hog Dressing Yields." The yield of the dressed carcass in relation to the live weight of meat animals is a factor of obvious importance.

Results of their study show that it is entirely possible through breeding and selection to reduce the fatness of hogs without sacrifice in dressing percentage.

The latest item in print to come to my attention pertaining to this report is Oklahoma Bulletin No. B-398, May 1953 "Meat Type Hog Production" by Whatley, Gard, Whiteman and Hilleer. It deals with the influence of breeding and energy content of the ration on pork carcasses.

A brief summary of this report indicates that the identification of meat-type strains of hogs and the selection of individuals of desirable meat type is the best procedure for improving meatiness of pork carcasses. Reducing the energy content on a self-fed ration during the latter part of the fattening period reduced this rate of gain and resulted in a leaner carcass. However, the reduction in dressing percentage of pigs on restricted energy rations offset the advantage of a leaner carcass; consequently, the carcass value of the live hogs were not improved.

Comparisons of the breeding lines showed there were considerable hereditary differences in the ability to produce lean, well-muscled carcasses. Differences in carcass quality were not associated with differences in dressing percentages. The lines which produced the best carcasses also had high dressing percentages.

In the May issue of the Hormel Farmer, Hazel of Iowa State refers to three types of hogs as found by his colleagues Kastelio and Kline, that is the Meaty, Intermediate and Fat type and he states that the carcasses of these three types showed 30, 45 and 55 percent fat respectively.

Dr. Hazel makes one statement in this article that might be questioned. Quote "The percentage of lean cuts increases as the length of the body increases."

What do these workers mean by a Meaty type hog as compared to an Intermediate type hog? Is it just a question of degree of fatness or not?

Now to come back to the topic assigned me, "The effect of type on carcass characteristics." After calling attention to some of the various references which I have given, you may well realize why there is so much confusion regarding type.

How many of you as you look at a live hog feel that you can select the hog with the most desirable carcass? By desirable carcass, I mean the one that is going to meet with consumer desirability. One that has a high proportion of lean to fat in the bacon. One with a large circumference of eye muscle in the chop and one with a well muscled ham that is plump without much exterior padding of fat.
Which, of two live hogs, having the same outward dimensions and contour is the hog with the heavy muscling and a minimum of padding, and which is narrow framed with under-developed muscling and yet is a well padded animal?

How many of our livestock judges, or we as individuals, have judged a class of four barrows and with a close pair may have made the following comment to justify our placing: No. 1 will hang up a more desirable carcass and will yield a higher proportion of the preferred cuts in that it has more spring of forerib, is fuller in the loin and is deeper in the body with a plumper ham showing more muscling?

Have we special insight that justifies our making such a statement?

Is there any one measurement or group of measurements that can be taken on the live animal which will give us a reliable index as to the muscling that will be found in the carcass of the hog. So far as I know at present, there is not.

One cannot tell what is muscling and what is fat. The measurement of backfat may give us a yield of preferred cuts but it doesn't tell us the whole story. What is the size of type of muscling in the loin and ham, and the proportion of lean to fat in the bacon?

All of the carcass contests or type conferences I have attended have given out information on the yield of preferred cuts and the dressing percentage of the hogs but very few of them have broken a loin so that you could see the shape of eye muscling. Eye muscling is what influences consumer preference.

Packers put all loins in the trade channels without breaking them so that they never see the shape of muscle in a loin. They sell on weight, and use firmness as an indication of quality.

I hope that in the discussion which follows we can devise methods by which we can attack this problem in a constructive way.

In closing, I would like to show you a few slides which illustrate some of the points I have referred to.

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MR. COLE: I brought a chart to show you what an ideal hog looked like in 1915. That was made by an institution represented here today. I want particularly to call your attention to the squareness of this hog, the short legs, etc. -- a very compact square animal. I doubt if the people from the institution knew that this was in existence and I am pretty sure they did not help to design this hog, print and copyright it, etc.

I bring it up from this standpoint: we hear quite often in our type demonstrations throughout the country, "Oh, we are going to go back to that old razor-back type," or that rangy type, or "We are going to go too far one way or the other." I think they are expressing that opinion without much basis. Meats research is a pretty new science. Grading was established in the '20s and we haven't really correlated our types or our feeding versus carcass characteristic for a very long time.
A lot of us still use the terms chuffy, intermediate and rangy. Now Iowa has proposed the terms meaty, intermediate or lardy.

MR. KASTELIC: I should like to clarify our definitions a bit. We have Dr. Craft, Dr. Hazel, Ed Kline, myself and others, and we sometimes have arguments as to what we mean when we talk to one another about type.

It occurred to us, at least to Kline, myself and others, that in order to establish the validity of saying that a certain kind of pig had so much fat we had to start some place. Our meat type hog is not choice No. 1. It is a three star special and it has every evidence of heavy muscling. We have evidence that we can pick these hogs because up to date they have given us data which indicates a 53 per cent yield of lean cuts and that is high.

The intermediate, according to the measurements we have taken -- and we are taking every measurement in the book except the link of the tail, in the hopes of being able to get all this information on these kinds of hogs. I don't know what we are going to do with all the information when we finally finish getting it. But this intermediate type hog carries none of the connotation the term usually has. It is really choice No. 1 pig.

According to the measurements we have obtained on the carcass, this so-called fat type is not an extreme type. It is an animal that could probably best be described as fitting somewhere between a choice 2 and 3.

We are getting the fat content of the trimmed carcass and of the carcass itself; we have the measurements of the eye and all the regular carcass measurements.

MR. KLINE: Just a few comments on the measurements of these pigs. As far as body measurements are concerned, our fat pig is about 28½ inches long; just a little over 2 inches of backfat; about 2.1, as I recall on those in this group. Our intermediate is somewhere between 29 and 30 inches long. It has an average backfat thickness of 1.6. Our three star special or meat type pig is about the same length, just a little under 30 inches, and is just a little short of 1.5 inches of backfat.

MR. COLE: Does he have sufficient quality?

MR. KLINE: I think so. Here again we may be criticized for using this term quality rather loosely, but he is firm, with a lot of balance.

MR. COLE: Then you can broil his pork chops?

MR. KLINE: I don't recommend broiling any pork cuts that are fresh.

MR. ZIEGLER: You don't know what good pork tastes like.
MR. BRATZLER: Joe, how reliable is the fat content or how do you pin it down? You say this type has so much fat. Our chemists tell us after getting a composite sample it is just doing work for nothing.

MR. KASTELIC: We have spent a lot of time on that. You are using a chemical procedure, the regular fat fraction, and we think we have that solved. We take the half carcass for the fat in the carcass, bone it out and run it through a silent cutter until we have a really well mixed sample. Then we make three two-pound samples. We render the fat out in a hot air oven at 270° and press the cracklings out in a Carver press at its maximum pressure, about 20,000 pounds. We are left with a cake of cracklings which contains a rather constant amount of fat, 1 to 2 per cent. Then these data are checked and whereas we had difficulty in getting checks within plus or minus 10 per cent by ether extraction, because our sample for extraction is too small and we have to dry it, by this procedure our error among the triplicate samples runs from 1 to 2 per cent. We have done enough of them now so we are using only duplicate samples.

Similarly with the other cuts, the ham is boned after close trimming, cut in a silent cutter, and two samples are taken of about one and a half pounds rendered out and then pressed out in the Carver press. The fat is obtained, and we have checked the error within 1 and 2 per cent. It is improved because we are using a large amount. However, I think you probably will have trouble financing the experiment because every time you use a pig there is no recovery, just chopped up fat. It costs you the price of the hog.

MR. COLE: What do you think about the difference in terminology used, such as large type, small type, intermediate type, chuffy type, rangy type? Do we all understand what those types are or can we go back and use the USDA grades and grade them as a standard reference point? Speaking for the southeast, we definitely have chuffy, rangy and intermediate hogs. The hogs that we saw here as mill-run looked like pretty chuffy hogs to us. I think we definitely still have a very serious problem as to type. We have people who like those short ones because they are born fat and they stay fat and it doesn't take any feed to fatten them.

MR. HANKINS: I would suggest that you give thought to the term "fat type" as contrasted with "meat type." We used to use the three terms large, intermediate and small. We tried to prepare ourselves for future improvement by saying that further improvement would come about in hog types through refinement within the intermediate type. In our group we still hold the opinion that the refinement going to what we now call the meat type hog has actually been brought about through refinement within the intermediate type.

This thing has been confusing for years. Years ago, when we were showing at the International Livestock Exposition exhibits of carcasses and cuts from various state experiment stations, on one occasion we had in the cases six different types of hog carcasses and cuts at one time. It was hardly defensible at that time. I would suggest that we think about this thing in terms now of meat type and fat type. Within this group we ought to try to come to a common terminology.
MR. COLE: I agree with you, Mr. Hankins. That is why I brought the point up. Do you suggest that we abandon some of the terms we are using or just try to define the terms that are in use?

MR. HANKINS: If we could agree upon the terminology that we would use I think that would help greatly to clarify this thing. Your definition of the terms we are using would not accomplish that.

MR. KASTELIC: Your suggestion has nothing to do with breeds per se?

MR. HANKINS: Not at all. I am not getting into breed categories for the moment. I am trying to leave with you the thought that perhaps this present day meat type hog is simply a refinement of what we formerly called the intermediate type. Since we find this term "meat type" being used to a greater and greater extent, let's use it. We need something to take care of the rest of the pig at the same time and I am proposing "fat type."

MR. COLE: Where would you fit in the ones that don't fit into the meat type, those that are too rangy?

MR. HANKINS: Type and grade are two different things from my point of view. Let's not confuse type and grade.

I am trying to get a few ideas as I go along here. I am wondering if we are going to find ourselves needing a break down of meat type and perhaps even a break down of the subdivision, if you will, of the fat type. I don't know the answer to that, Bill.

MR. COLE: I think we have posed a definite problem here and one that we need to do something about.

MR. HANKINS: I would agree that in all probability we cannot settle this question here this afternoon. If it were not for the fact that this "meat type" terminology has come into the picture in recent years and is so acceptable, so expressive of what we are seeking, I would be inclined to urge that we stay with the old terminology of lard, intermediate and small. That is clear and it pretty well covers the full range of the types that we find, but I want to hang on to this "meat type" expression because I think it is good.

MR. KLINE: I wonder, Dr. Craft, would you like to say anything about yours? You have done quite a bit of thinking about types, and maybe you can take a minute or two to explain your thinking on categorizing these different types.

DR. CRAFT: The suggestion you and I were talking about, Ed, was what Mr. Hankins has proposed here, except I believe the terminology we were considering was lean and fat types. It may have been lean type and fat type. That would call for a division of your hogs first of all into a fat group and a lean group. Then we were proposing three grades under each group.

MR. HANKINS: That fits in with what I just said.
DR. CRAFT: No. 1, No. 2 and No. 3. That is essentially what we had.

MR. BUTLER: What worries me a little about defining types is if you take a meat type -- say we have one breed in the litter and the genetics are pretty much the same. We take two barrows and we feed one, one way and one the other. Do they come out two different types when we are ready to market them? Is it more feeding than breeding?

MR. COLE: I remember that the animal breeder whom we had two or three years ago said that half the breeding is through the mouth.

MR. KASTELIC: To clarify a point in your thinking, the Jersey cow produces beef and so does the Shorthorn, and yet no amount of feeding will ever make the Jersey cow into a Shorthorn steer. I am thinking about the same thing in terms of these meat type hogs and that animal that looks as though it were crossed with a weasel. I object to the idea of associating the meat type hog with a rangy one something like what we saw on the slide. I think it is an animal with a large, well developed ham, trim shoulders, strong loins. We like to see a big eye in the loin and you don't get it in those rangy, long pigs.

MR. ENGLAND: Am I right in presuming that these types would be based on carcass characteristics rather than live animals?

MR. KASTELIC: Yes.

MR. ENGLAND: Then these types would be set up on the basis of measurements of certain carcass traits?

MR. KASTELIC: We haven't gotten that far.

MR. KERR: Isn't it possible that some of the poor doers might be just the weasel type of hog Kastelic is talking about? I can visualize it with no belly on it or anything else. I don't think you can put it 1, 2, 3. You are getting into grades, how are you going to separate the grades from each other?

MR. KASTELIC: I think that is the point that Mr. Hankins made, that we should not confuse this type with a grade, because within a type we do have grades.

MR. KLINE: I don't believe our next speaker needs a great deal of introduction to this group. Wherever there is anything doing with swine breeding or even with hog carcasses, Dr. Craft is on hand to help out and offer suggestions, and I am sure his suggestions have been very well worth while to myself and others at our institution. We have asked Dr. Craft, who is Director of the Federal Regional Swine Breeding Laboratory, to discuss with us "Systems of Breeding as They Influence Pork Carcasses.

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