REVIEW OF CALF CARCASS RESEARCH

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The Reciprocal Meats Conference was begun in 1948 and has grown tremendously in size. Due to its increase in size and in order to enable it to work more efficiently and to get more people to work the committee system was started in 1951. These committees included the Lamb Carcass Evaluation Committee. In 1955 this committee became the Lamb and Veal Carcass Committee and in 1956 it became the Lamb, Veal and Calf Carcass Committee.

The first papers at the conference that dealt in any way with Calf was in 1956. Mr. K. A. Poggi of Armour and Company presented a paper on "Merchandising Lambs and Calves". He dealt mostly with veal and not with calf as usually defined. R. F. Kelly presented "Proposed Procedures in Cutting and Measuring Veal and Calf Carcasses", and R. W. Bray presented "An Analysis of the Problems in Evaluating Veal and Calf." In this paper he also dealt mostly with veal. At the 1957 conference Mr. I. Rinehart of the Godfrey Company presented a paper. "Merchandising Veal and Calf at the Retail Level". Again it was mostly about veal. R. F. Kelly presented for approval "Procedure in Cutting and Measuring Veal and Calf Carcasses", (8).

Other than the cutting and measuring procedures which dealt with both veal and calf little material has been presented dealing with calf.

Perhaps this is due in part to the lack of a good definition for calf. The U.S.D.A. (14) has this to say: "Differentiation between veal, calf, and beef carcasses is made primarily on the basis of color of lean although such factors as texture of lean; character of fat; color, shape, size and ossification of the bones and cartilages; and the general contour of the carcass are also given consideration. Typical veal carcasses have a grayish pink color of lean that is smooth and velvety in texture and they also have a slightly soft, pliable character of fat and narrow, very red rib bones. By contrast, typical calf carcasses have a grayish red color of lean, a harder, flakier type of fat, and somewhat wider rib bones with less pronounced evidences of red color. Calf carcasses with maximum maturity for their class have lean flesh that is usually not more than moderately red in color, their rib bones usually have a small amount of red and have only a slight tendency toward flatness, and such carcasses are not noticeably "spready" or barrelly in contour. Such carcasses, when split, have cartilages on the ends of the chine bones that are entirely cartilaginous, there is cartilage in evidence on all vertebrae of the spinal column, and the sacral vertebrae show distinct separation. Carcasses with evidences of more advanced maturity than described in this paragraph are classified as beef". This official U.S.D.A. definition does not mention size, therefore it is logical that as many carcasses of the bovine species as possible will either be classed as veal or beef and perhaps not graded since calf usually sells for less than either veal or beef. So even the word calf has a bad connotation. If ungraded it is often sold as heavy veal or baby beef.
In searching for material for this paper I wrote to many of you and several other people - I was very pleased with the response I received but not very well pleased with the aid you gave me as very little has been done with calf. I also looked through the Report of Review Committee of the Conference on Cooperative Meat Investigations and found little help. So I came back home to start my reading.

During World War II the production of beef by the so-called cow-and-calf plan became popular in Kentucky and many other states. The plan is described by Garrigus (2). In this plan cows of milking ability are bred to beef bulls so that the calves are dropped in the winter or very early spring and then sold off the teat in the fall. If this plan is followed explicitly most of the resulting cattle will be light beef. However, many do not measure up in weight and fall into the calf class. In line with this program we conducted some research on the carcass characteristics of heavy calves produced by this plan (9). Seventy-two calves (24 by Hereford, 24 by Angus and 24 by Shorthorn bulls) were slaughtered and evaluated. The calves were compared by breed, sex, grade and weight. Only grade affected dressing percentage. Carcass measurements were affected by size as the lighter carcasses had significantly longer and thicker measurements per 100 lbs carcass weight. Fatness of the rib was greater as grades improved, was greater in heifers than steers, was greater in the larger cattle and was smaller in the Shorthorn group. Cutting percentages were affected in inverse relationship to grade as lower grades yielded more lean and less fat cuts and steers yielded more lean and less fat cuts. These were 73.1% major cuts, (round, loin, rib, chuck) for Choice, 75.0% for good: 74.3% for steers and 72.8% for heifers. There was little difference due to size. Lean from the milk fed calves was as bright and remained as bright as beef from grain fed beef when exposed under various conditions for 72 hours.

As a follow up of this work cooking and palatability studies and consumer preference studies were made (11). There seemed to be no preference among palatability panel members for one carcass weight over another. When subjected to a mass consumer preference study, consumers would accept it very readily if the price was slightly lower than conventional beef. Most preferred beef at the same price (11) This agreed with a statement by Heckler (5), of Armour and Company who said it usually requires a discount of five cents a pound or more to move the heavy calves.

The packing industry is very much interested in calf. Dr. Lindsey Horn of Swift and Company (6) had this to say. "Calf Carcasses will respond to aging the same as cattle except more care must be taken to prevent overaging and discoloration and drying out, as there is less fat protection. As to necessity for aging, it should be classified along with lamb. A few carcasses may need it, but in general it is more tender than beef. Cooking is the same as for veal or beef, and this should vary on the end of the weight range depending on whether it was closer to veal or beef.

Yields on the better grades run from 55 to 58%. Acceptability is strongest in the Middle West, South, and Southwest. In general the areas of production parallel the areas of production closer than any other meat.
The replacement demand for breeding stock and for cattle feedlots during the past two years has cut the supply to be slaughtered for calf. In years of normal movement and replacement demand, when a greater percentage moves into slaughter channels, there are probably close to one and a half million of this class of calves killed in the total M I D slaughter of seven million head.

As you know, the kill of this type calf has been quite seasonal because of the nature of production; however, during the past two to three years, there has been an increase in interest and actual practice of feeding calves, in dry lots to come out weighing 400/500 pounds or above during the season when slaughter calves are not available in sufficient numbers. This is being practiced largely in the West, but there is a growing interest in the South. One of the critical things in putting calves in the feedlot is to bring them out weighing 550 lbs or less in order for them to still be classified as calves." E. L. Heckler of Armour and Company (5) gave somewhat the same picture. In addition he stated that in times of an over supply in the normal areas of consumption it may find an outlet in Northern cities but it usually requires a discount of five cents a pound or more under beef of comparable grade in order to move satisfactorily. Northern markets also want better than average quality.

The Armed Forces buy a small amount of calf but consider it as veal up to 300 lbs carcass weight if the color of lean and character of fat are acceptable. In developing their 3-way boneless veal (1) different weight carcasses were boned out and evaluated for cutlets, roasts, and ground veal. Heifer carcasses of the following weights yielded as follows:

<table>
<thead>
<tr>
<th>Carcass weight (lbs)</th>
<th>128</th>
<th>178</th>
<th>230</th>
<th>288</th>
</tr>
</thead>
<tbody>
<tr>
<td>% cutlets</td>
<td>24.80</td>
<td>24.73</td>
<td>24.67</td>
<td>23.19</td>
</tr>
<tr>
<td>% roasts</td>
<td>25.78</td>
<td>26.96</td>
<td>27.28</td>
<td>23.70</td>
</tr>
<tr>
<td>% ground</td>
<td>15.63</td>
<td>16.85</td>
<td>19.13</td>
<td>20.83</td>
</tr>
<tr>
<td>Total edible</td>
<td>66.21</td>
<td>68.54</td>
<td>71.08</td>
<td>67.72</td>
</tr>
</tbody>
</table>

The yield of edible meat increased with weight through 230 lbs. After that there was a decrease, probably due to the increase in fatness of the larger, older heifers.

An extract from an Army field evaluation test as supplied by McSweeny (10) showed there was little difference in acceptability of the different weight groups or the different grades. All ranked from 7.6 to 8.0 on the 9 point Hedonic scale.

Some of the more technical work on beef has included some work on calf carcasses. Jacobson and Fenton (7) compared Holstein beef, some of which was from animals only 32 weeks of age and could probably be classified as calf, on three levels of nutrition and age, for different quality factors including palatability, cooking data, moisture, fat, nitrogen, iron content, pH, and vitamin B12 content. The muscles from the younger animals had more
moisture, but less fat and nitrogen. There was little difference in aroma or flavor due to age, although they tended to decrease after 48 weeks. Tenderness and juiciness decreased with age and shear force increased with age. Better feeding caused an increase in fat and a decrease in moisture. Cooking losses decreased with an increase in age. Redness of muscle (hue) increased with age and level of nutrition and was closely correlated with the iron content. No significant differences were noted in pH values. As age increased and nutrition improved the vitamin B

Hiner and Hankins (3) studied the tenderness of cooked meat from 9 muscles of animals ranging from 25 to 67 months of age. Tenderness as measured by Warner-Bratzler shear decreased with age. Meat from cattle weighing 500 pounds, probably classed as calf was less tender than veal but more tender than meat from older animals.

Hiner et al. (4) using the same animals worked with the relationship of muscle fiber size to tenderness. Some of the meat used was from 500 lb steer calves, 7 to 8 months old. The muscle fiber diameter was correlated with age. There was a slight increase in size from veal calves to 500 lb calves but the big significant differences occurred after 8 months. For example, for the short loin the increase from veals to 500 lbs steers was only 1.5%, from 500 lb steers to 900 lb steers, 44.0% from 900 lb steers to barren heifers 37 months old 52.3% and from barren heifers to aged cows 60.4%. The correlation between muscle tenderness by shear test and muscle fiber size was highly significant. The meat from the 500 lb calves was more tender than from the older animals.

As you can see by the material I have presented the data on calf are limited if I found what is available. Maybe we don't want to merchandise this type of meat but if there is to be one and one-half million head or more slaughtered each year it seems that some work could be done in this field to help improve cooking methods, merchandising methods and other research on proper utilization of so much product. If you are looking for research problems maybe this will stimulate some of you to work in an apparently wide open field.

References


10. McSweeney, Daniel R. Quartermaster Food and Container Institute. Personal Communication


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MR. KELLY: Thank you, Dr. Kemp. The last paper will be presented by G. R. Kean, Mutton -- Its Values and Its Uses.

MR. KEAN: Thank you, Bob. Members of the Reciprocal Conference: