Packers discriminate against cattle which have had access to pasture as a part of their fattening ration. They claim that the use of pasture results in lower dressing percentages, higher cooler shrinks and lower quality beef. Packers and retailers state that pasture causes dark colored lean and yellow fat, either of which is objectionable to the consumer. To illustrate this in North Carolina last summer one of our larger local packers used a 5 cent reduction in carcass price to the producer that fattened his cattle on pasture. Our present U.S.D.A. grading standards do not penalize beef for having a yellow color to the fat. A third amendment (Amendment No. 3 to S.R.A. No. 99) in October 1949, eliminated all references to color of fat.

Bull et al. (1941) report: "The meat from a steer which has yellow fat and purple lean but otherwise grades as Choice is equal in palatability to that from his white-fatted and red-meatred brother of similar grade."

Louisiana State workers, Dowell and Bray, summarized 4 years of data collected from 1928-1931 on the effect of feeding grain and pasture on the quality of meat. They found by mechanical analysis of the rib that the grain fed cattle averaged 25% fat or 33% of the total edible portion. Grass fed cattle averaged 15% fat or 20% of the total edible portion. No difference was found in flavor of the fat or lean. Color readings indicated that the lean meat from the grass fed cattle was only slightly darker than from the grain fed cattle.

Hostetler et al., (1939) found that grain fed cattle improved in market grade while roughage cattle declined during the feeding period. The total edible portion from the 9-10-11 rib sample was 82% for the grain fed group and 77% for the roughage group. The roughage group was kept on pasture with lespedeza hay and shelled corn used as supplements during the winter grazing period.

Trowbridge et al., (1934) studied the performance of medium to good 2-year-old Hereford steers on short grass range pasture. During 135 days of grazing and 103 days of lot feeding the steers were finished from a very thin to a well finished condition. The hand-separable fat of the 9th, 10th and 11th rib cut increased from 4% to 24% at the end of the grazing period and further increased to 33% at the end of the dry lot feeding period.

Wilson (1931) reported a summary of 3 years work on fattening two year old steers on grass with and without a grain supplement. He found that the steers finished on grass alone yielded inferior dressed carcasses to like steers fed a supplement on grass. The supplement fed steers gained more and yielded a higher percentage of carcass per 100 pounds. The supplement fed steers yielded fatter carcasses. There was no significant difference in the palatability of the meat. The color of the lean meat was not significantly different for the grass alone as compared with supplement fed cattle.
The author of a Virginia Station report (1931) indicates that the results of feeding grain on Virginia grass pastures in the fattening of two year-old cattle failed to show increased gains, greater finish or those factors which would tend to make the cattle more valuable on the market. The writer states: "The results of this experiment leads the writer to believe that the feeding of grain on grass, where the grass pasture is good as it is in Virginia is uneconomical practice, and a practice that will not pay. Our chief problem is not feeding grain on grass but the making of better pastures and our time and thought should be centered on ways and means of producing a better pasture."

Kansas Station workers reported in 1930 that supplementary feeds increased the degree of finish of cattle grazed on bluestem pasture but seemed to have very little, if any, influence upon the color of meat. Both fat and lean color were described as desirable.

Missouri workers (1933) reported a slight yellowish tinge to the fat from steers fed on pasture for 140 days. There was no significant difference in the color of the lean.

Pasture is accused of producing dark lean and yellow fat. The Illinois workers draw the following conclusions from a series of feeding trials:

1. Because of their lower finish, pasture cattle dress materially lower than cattle fattened on grain and pasture, or on grain and roughage in dry lot.

2. Because of a lower fat content and a higher water content, the carcasses of pasture cattle shrink more in the cooler than the carcasses of cattle full-fed in dry lot.

3. There is more or less yellow in the fat of the carcasses of pasture cattle because of the transfer of carotene from pasture to body fat.

4. Well-bred cattle fattened on good pasture do not produce dark lean.

Barbella et al., (1942) compared the ripening of beef from grain-fattened steers and grass fattened steers. No significant difference was found in the rates of ripening of the beef from the two types of feeding. No difference was observed in the flavor and aroma or in the expressible-juice content of the two kinds of beef.

Carcasses of representative yearling steers from three feeding trials comparing beef produced by fattening on pasture alone with that produced by feeding grain on pasture, after pasture, or in dry lot were studied by Wanderstock and Miller (1948). Each year the steers receiving no grain or other supplements had significantly lower finish grades on foot, dressing percentage, and carcass grades than did those of any of the other lots. The averages of the individual observations for color of lean and external fat showed slight differences between lots. This also occurred in moisture and
pH content and in press fluid. The physical analysis of left ribs 9-10-11 indicated that the pasture only carcasses, which graded average commercial, had the smallest proportion of meat to bone. The correlation between the area of the rib eye muscle and cold carcass weight, in all lots, was highly significant. Cooking losses varied only slightly between lots.

Foster and Miller (1933) report that carcasses from cattle fed roughage only were decidedly less palatable and that the percentage of lean, bone and moisture decreased with increased finish.

Black et al., (1940) states that cattle fed grass alone yielded the highest percentages of rib eye, total lean, and bone, but the lowest percentages of fat and total edible portion, in the ninth - tenth - eleventh rib cut.

McCon (1951) found that the average carcass grade of the cattle finished on grass was not as high as the carcass grade for cattle finished in the dry lot. The most undesirable feature of the pasture-finished cattle was the yellow color of the fat, and in addition they were not so evenly and thickly covered and the inside rib showed less finish than the dry lot cattle.

At North Carolina last year we initiated a study of the effects of different wintering methods followed by different levels of grain feeding during summer grazing on the finishing of steers purchased as calves. Our carcass study includes live weight out of the feed lot, shrunken live weight, live grade, cold carcass weight, carcass grade, color of fat, dressing percentage, head weight, hide weight, weight of viscera, weight of liver, weight of heart, length of carcass, length of round, width of carcass, area of the eye muscle and physical separation of the fat, lean and bone in the 9, 10 and 11 rib cut. Data on 50 carcasses were collected last summer. The following is a summary of the gains and carcass grades by method of feeding:

<table>
<thead>
<tr>
<th>Ladino Clover Pasture:</th>
<th>Av. Daily Gain (lb.)</th>
<th>Carcass Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>No corn</td>
<td>1.21</td>
<td>0  5</td>
</tr>
<tr>
<td>Limited corn</td>
<td>1.72</td>
<td>4  1</td>
</tr>
<tr>
<td>Med. level of corn</td>
<td>2.00</td>
<td>4  1</td>
</tr>
<tr>
<td>Liberal corn</td>
<td>1.38</td>
<td>4  1</td>
</tr>
<tr>
<td>Deferred corn</td>
<td>1.46</td>
<td>2  2 1*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ladino-Fescue Pasture:</th>
<th>Av. Daily Gain (lb.)</th>
<th>Carcass Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>No corn</td>
<td>1.23</td>
<td>2  1  2</td>
</tr>
<tr>
<td>Limited corn</td>
<td>1.47</td>
<td>2  3</td>
</tr>
<tr>
<td>Med. level of corn</td>
<td>1.86</td>
<td>4  1</td>
</tr>
<tr>
<td>Liberal corn</td>
<td>1.87</td>
<td>4  1</td>
</tr>
<tr>
<td>Deferred corn</td>
<td>1.45</td>
<td>2  3</td>
</tr>
</tbody>
</table>

* Chronic bloater - marketed early

Because of the limited amount of data no analysis has been made on detailed carcass measurements. However, from observing the carcass there appears to be very little difference in the color of the external fat. This study will be continued for several more years.
To summarize the research work that has been reviewed concerning the
effects of pasture on the beef carcass we can draw the following conclusions:

1. Beef produced on pasture alone has a lower proportion of
meat to bone due largely to the additional fat in the grain
fed beef.

2. No consistent differences can be detected in the cooked
product.

3. The color of the lean is not adversely affected. The color
of the fat may be slightly yellow in some instances from
feeding grass alone to the beef animal.

References

Comparative Ripening of Beef from Grass-Fattened and Grain-Fattened

1940. Beef Production and quality as Affected by Method of Feeding
Supplements to steers on Grass in the Appalachian Region. U.S.D.A.
Technical Bulletin No. 717.

Quality as Affected by Grade of Steer and Feeding Grain Supplement on

Bull, S., R. R. Snapp and H. P. Rusk. 1941. Effect of Pasture on Grade of

Dowell, C. T. and C. I. Bray. 1932. Effect of Quality of Meat of Feeding
Grain on Grass to Fattening Steers. Louisiana State University Mimeo-
graphed Report.

Foster, M. T. and J. C. Miller. 1933. The Effects of Management and Sex on

Investigations Conference. Mimeographed report from North Carolina
State College.

Investigations.

McConic, W. C. 1931. Fattening Yearling Beef Cattle on Pasture. South Dakota
State College Bulletin 407.

Missouri Ag. Exp. Sta. 1933. Pasture vs. Dry Lot for Full Feeding Yearling
Steers During the Summer. Conference on Cooperative Meat Investigations.
MR. ADAMS: Thank you, Bill. It is a very good paper.

Now I should like to call on Verne Cahill, from Ohio State, to come up and lead the discussion on this paper.

MR. CAHILL: Isn't it interesting to note how comparable the results are of those papers which Bill has reviewed for us? He said that the color of the lean is not adversely affected as the result of grass feeding and that the fat may be slightly more yellow. Second, no consistent differences can be detected in the cooked meat product. The other conclusion was that beef produced on pasture alone has a lower proportion of meat due largely to the additional fat in the grain-fed beef.

When we think of the things that have been said here in the last two days we remember that last night it was said that one of the things the consumer objects to is fat. So perhaps with this interpretation we can say that this proportion of meat to bone is really in favor of the grass-fed cattle because there is less fat there. I also gathered from this that consumers are quite undecided as to what they like. They just are not skilled in the appraisal and selection of meat, especially before it goes to the table. Then most of us have some ideas when we are eating the product about whether or not we like it.

If the consumers can't make up their minds I think I would like to go to the defense of the producer about whom we have heard very little the last few days and say that perhaps he has a few more definite ideas than does the consumer.

We just finished a project in Ohio last month in which a study was made of cattle fed corn cob meal and of cattle fed corn silage with grain and grass silage with grain, in an attempt to study the rate of gain and also the pounds of beef which would be produced from an acre of these various feed substances. Perhaps we should put a couple of things on the blackboard. Lot 1 was half corn silage - corn cob meal. Another lot that I would like to compare with it was straight corn cob meal.
These cattle were sold by bid. Armour and Company happened to be the successful bidder on these cattle. This lot 1 sold for $24.25, and this other lot was an even $25. I thought it was interesting to note that after the carcasses were hung in the cooler the grader came along and put choice on all 20 cattle. If you are further interested, the lot with the corn silage and corn cob meal went five high, choice, average choice. Those with the straight corn cob had five high, one average, and four low.

Then the producer determined what it cost him to produce that product. This gain was put on at $17.12 per hundredweight as opposed to the straight gain of $20.15. If you want to do some quick subtraction you have $7.13 as opposed to $4.85.

If we are thinking about grass and roughage production in this country perhaps we might say that the cattle that were fed corn cob meal and grass silage were an in-between lot. These happened to be the two extremes.

I will be glad to have some comments from those of you here in the room regarding this paper of Bill's or any work that you folks may have on tap at your own institution.

MR. BRAY: What was the dressing percentage?

MR. CAHILL: The dressing percentage was 61.05 and 61.13. Add to those to the second decimal to get the difference between them.

Any other questions or comments?

MR. BREIDENSTEIN: Did you do anything to these cattle beside that or just simply grade dressing?

MR. CAHILL: This was a carefully controlled project on one of the outside farms, a county farm and the carcass data obtained in the plant was all checked.

MR. BREIDENSTEIN: Any noticeable yellow color in the fat?

MR. CAHILL: Nothing appreciable on that.

Maybe I did not answer your question fully, Burdette. In these two lots, no. When we got into the grass cattle there was a tinge present.

CHAIRMAN WALTERS: Verne, how much corn was there in that corn silage? I mean was it a heavy corn crop along with the silage?

MR. CAHILL: When it comes to a technical analysis I cannot give you any definite figure. It was an average Ohio corn crop. Just loaded with corn. (Laughter)

MR. DYNES: This feeding on grass interests me because we are interested in our western mountain valleys in feeding on irrigated pas-
Agricultural Sciences

205.

tures. In some work that we have done at the college we have found that you can make a pretty fair profit by self-feeding these cattle on pasture. Last year we had 24 head on pasture, self-fed. They were self-fed a ration of two-thirds barley and one-third beef pulp by weight. When these 24 head went to slaughter all the carcass data we got was the carcass grade, but out of the 24 there were 15 choice and 9 good.

Along with those we had a few that were just on grass alone. There are 10 head and they were not ready to go to market at the time. They were just well-grown feeders, but even at that they still returned a profit per acre. That is counting what gains they had put on.

MR. BROWN: We were planning to feed these cattle to low choice grade. We believe that with good pasture we can get them up maybe into the lower end of choice grade. Last summer it was dry, as most of you know, down in our section, and we marked the entire lot that were not up to the choice grade on September 9. Had we been able to carry these along a little further the result might have been different.

MR. ACKER: Do you remember what your silage was? We have been wondering about that.

MR. CAHILL: Corn silage was priced at $10 a ton.

I thought perhaps O. D. Butler would have some comments. I recall very distinctly that two years ago he let everyone know that grass is not an obscene word down in Texas.

If there are no further comments we will turn it back to the chairman. (Applause)

MR. ADAMS: Thank you, Verne.

We want to be a little careful about all this pasture and roughage business. You know we still have a lot of corn in bins.

The next person whom we have on our program is someone whom I think we are very fortunate to have with us. He is Dr. R. T. Clark, National Coordinator, Beef Cattle Breeding Research. He is from Denver. At least that is his headquarters. We are, indeed, fortunate to have him with us to talk to us on "Heritability of Beef Carcass Characteristics." Dr. Clark. (Applause)