I have been asked to discuss how beef is now graded for quality by USDA. There has been, and--I am sure--will continue to be, considerable discussion about the factors that should be used in grading. Dr. Carpenter is planning to discuss some of the recommendations for changes in the grade standards which have been made by various groups.

As you know, there are eight quality grades for beef: Prime, Choice, Good, Standard, Commercial, Utility, Cutter and Canner. The Prime, Choice, Good and Standard grades are restricted to beef from young cattle, and are the grades of interest to most people. However, the standards must apply to all of the beef that is produced. This being the case, beef produced from older animals cannot be ignored.

There are two primary factors which determine the quality grade of a beef carcass: (1) the quality of its lean, and (2) its conformation. The term "quality" is used to refer to the palatability indicating characteristics of the lean and is the primary factor affecting the quality grade. Conformation is included as a factor in determining the quality grade because we were not successful in getting it eliminated in the "dual grading" proposal of 1962. As you know, in that proposal we proposed to eliminate conformation as a quality grade factor, but the proposal failed to receive sufficient support for adoption. There is no factual information which indicates that variations in conformation are directly or indirectly related to palatability, but we still feel that conformation--as it relates to muscling--is an important factor affecting carcass merit. We are convinced, however, that its effect is much better included in our yield grades rather than as a factor in determining the quality grades.

Quality of the lean is evaluated by considering its marbling and firmness as observed in a cut surface in relation to the apparent maturity of the animal from which the carcass was produced. The maturity of the carcass is determined by evaluating the size, shape, and ossification of the bones and cartilages--especially the split chine bones--and the color and texture of the lean flesh. In the split chine bones, ossification changes occur at an earlier stage of maturity in the posterior portion of the vertebral column (sacral vertebrae) and at progressively later stages of maturity in the lumbar

USDA QUALITY GRADES FOR BEEF

Prime *
Choice
Good
Standard
Commercial
Utility
Cutter
Canner

* Cow carcasses are not eligible for Prime.
Quality

Maturity

Marbling

Firmness

Conformation

Quality Grade
and thoracic vertebrae. The ossification changes that occur in the cartilages on the ends of the split thoracic vertebrae are especially useful in evaluating maturity. The size and shape of the rib bones also are important considerations in evaluating differences in maturity. The color and texture of the lean flesh also undergo progressive changes with advancing maturity. In progressively more mature carcasses, the texture of the lean will become progressively coarser and the color of the lean will become progressively darker red. In arriving at the final maturity score slightly more emphasis is placed on the skeletal characteristics than on the lean.

It is generally acknowledged that fatness is positively associated with palatability. And, since it is obvious that the amount of external or intermuscular fat, as such, can have no direct effect on palatability, the amounts of these are given no consideration in grading. Our consideration of fatness in grading is limited to marbling--fat within the muscle.

Since marbling and maturity have opposite effects on palatability, for simplicity in applying the standards, we have elected to describe the quality aspects of the grades in terms of degrees of marbling for different levels of maturity. And to facilitate the combination of these two factors, we have established five maturity groups, designated as A, B, C, D and E, in order of increasing maturity and nine degrees of marbling. The lower limits of 8 of these 9 marbling scores are illustrated on this slide. The other marbling score is practically devoid.

The relationship between marbling, maturity, and quality is shown on slide 4. By plotting the marbling and maturity of a carcass on this chart you can see that its quality can be readily determined. For example, a carcass with A maturity and modest marbling would fall into the middle of the Choice grade.

I would also like to point out that these relationships are presumed to be straight-line—not stair-step—relationships. Graders essentially accomplish this by evaluating marbling and maturity in percentages. To arrive at the final quality grade of a carcass, its quality, as determined from the chart, is then combined with its conformation.

The conformation requirements for the various grades are described in terms of (1) thickness of muscling, or (2) an overall degree of fullness and thickness of the carcass. A carcass may qualify for a grade if it meets either of these requirements. It is not required to have both. Permitting conformation to be evaluated on muscling alone was incorporated into the standards when they were revised in 1965. This approach permits some well-muscled carcasses with relatively little external fat to qualify for a higher conformation grade than formerly was the case.
ILLUSTRATIONS OF THE LOWER LIMITS OF CERTAIN DEGREES OF TYPICAL MARBLING REFERRED TO IN THE OFFICIAL UNITED STATES STANDARDS FOR GRADES OF CARCASS BEEF

Illustrations adapted from negatives furnished by New York State College of Agriculture, Cornell University

1—Very abundant  4—Slightly abundant  7—Small
2—Abundant  5—Moderate  8—Slight
3—Moderately abundant  6—Modest  9—Traces

(Practically devoid not shown)

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
LIVESTOCK DIVISION

NEG. NO. DN-1594
RELATIONSHIP BETWEEN MARBLING, MATURITY, AND QUALITY

DEGREES OF MARBLING

ABUNDANT
MODERATELY ABUNDANT
SLIGHTLY ABUNDANT
MODERATE
MODEST
SMALL
SLIGHT
TRACES
PRACTICALLY DEVOID

MATUREY

A
B
C
D
E

DEGREES OF MARBLING

ABUNDANT
MODERATELY ABUNDANT
SLIGHTLY ABUNDANT
MODERATE
MODEST
SMALL
SLIGHT
TRACES
PRACTICALLY DEVOID

*Matuerity increases from left to right (A through E)
**The A maturity portion of the Figure is the only portion applicable to bullock carcases.
---represents midpoint of Prime and Commercial grades.

Figure 1
Slide 5 illustrates differences in conformation. Carcass A has average Choice conformation. Carcass B has average standard conformation. Notice the differences in muscling evident in the two carcasses. The carcass with Choice conformation is moderately plump and thick, while the other carcass is thinly muscled and somewhat angular.

The final quality grade of a carcass is based on a composite evaluation of its conformation and quality—expressed in terms of grade. Since relatively few carcasses have an identical development of conformation and quality, the standards also indicate, for each grade, the extent to which these are compensatory. The principles governing these compensations are as follows: In each of the grades a superior development (grade) of quality is permitted to compensate for a deficient development (grade) of conformation, without limit, through the upper limit of quality recognized in the standards. The rate of this type of compensation in all grades is on an equal basis—a given degree of superior quality compensates for the same degree of deficient conformation. The reverse type of compensation—a superior development of conformation for an inferior development of quality—is not permitted in the Prime, Choice, and Commercial grades. However, in all other grades, this type of compensation is permitted but only to the extent of one-third of a grade of deficient quality. The rate of this compensation is also on an equal basis—a given degree of superior conformation compensates for the same degree of deficient quality.

If the quality level is minimum Good grade or higher or in the Commercial grade, the final grade cannot be higher than the quality level even though the conformation grade is considerably higher. This rule is also applicable to Utility in the C, D and E maturity groups. In Standard, young Utility, Cutter and Canner, the final grade may be raised 1/3 of a grade above the quality based on a superior development of conformation. In all grades, when the conformation of a carcass is relatively less well developed than the quality, the final grade is a simple average of the quality and conformation grades.

Examples of how conformation and quality are combined into the quality grade are shown on slide 6.

As you can see, marbling, maturity, and conformation are the primary factors influencing the quality grade of a beef carcass. Conformation usually affects the grade only when it is lower than the quality. In our fed beef, this happens relatively infrequently. Also most of our fed beef supply falls within a relatively narrow range of maturity. Therefore, variations in marbling have the greatest effect on quality grade of any of the factors.
<table>
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<th>QUALITY</th>
<th>CONFORMATION</th>
<th>QUALITY GRADE</th>
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Question: Zerle, in your opinion, what would be the effect of including the upper one-third of the Good grade in the U.S. Choice Grade?

Z. L. Carpenter: As I've reviewed the research literature during the last year, I think we can include the upper one-third of the Good grade in the Choice grade and not make a detectable difference in the eating quality of the end product. I also think you can flatten out the lines from A minus to A plus maturity and as nearly as I can tell based on Dr. Bradford Berry's work and others, we will not affect the eating quality.

Roger West, Florida: Why are the packers and western states people opposed to the new grade proposal?

Z. L. Carpenter: They felt that the "new" grade would be unworkable, Roger. It was felt that it would just put another factor in our system and really questioned that they could make this grade work. Since there are strong feelings about not reducing the line in the Choice grade, I felt that the "new" grade concept was worth a try. I couldn't see how we'd lose anything by it since we would still have choice where it was. I'm certain it would be difficult. But, generally I didn't find enthusiasm for it in the packing industry.

Verlin Johnson, North Dakota: Why did the AMI or NIMPA packers feel their proposal was any different kind of problem?

Z. L. Carpenter: I guess I would answer it this way. We've had about three meetings this year with the packers and they said really what they needed was more Choice carcasses. I visited with some of our economists about this and they tell me pretty much that our beef prices are based upon the supply and demand for the various grades and that we're going to eat all of it at some price. Of course, the thing that holds the packers attention and also really a concern of mine is the great demand for Choice beef by the retail trade to supply to the consumer to the extent that we have almost gone to a one-grade system. I'm not sure that's what the consumer really wants universally. But whatever the case, Choice is the demand grade. Right now we have a very serious market structure on Choice vs. Good, $6-$7 a hundred weight alive in some markets this week.

Question: What has been the experience of those using "no-roll" beef? Isn't it as desirable to the consumer as those on a "Choice" beef program?

Z. L. Carpenter: I think that's possible and we don't know really the kind of grade width with which these markets are working. We see others using upper half of Choice for some reason. Some retailers using "no roll" cattle report that they seldom ever have a complaint, that their meat volume is what it was projected to be from their stores and that their meat vs. other goods in the stores are at the projected levels so you know they make the pitch 'Well, it's really as good if not better' plus they get 5% more cutout on that beef.
Bob Kauffman, Wisconsin: Zerle, since you have been studying the standards during the last year do you have a suggestion on how ideally carcasses should be graded? Do we have the information which will allow us to reach an unbiased, non-political position?

Z. L. Carpenter: First, Bob, I am convinced that we have an imperfect system. But before casting stones, we need some fruitful suggestions. I hope if nothing else, we might, through our reciprocation here, stimulate some ideas. I am concerned and I believe somewhere, somehow, we will find more desirable criteria than we are presently using in our quality system. I am convinced, within our normal supply of cattle, that maturity and marbling are superficial measures to indicate eating quality--I have no better ones to offer now, Bob. But I think it's really a reflection on those in the group assembled here that we really don't have something better. You just said that we're a scientific group--can't we come up with something to identify beef quality better than the present system. A lot of people are pretty critical of USDA. I really think it's important that the group of us here commit our efforts to development of improved methods for implementation into the grading system. We're hoping that there are some people that will contribute to this important phase of agriculture. What kind of grading system would we have today if we didn't have our previous history? If we started anew it would be interesting to see what kind of system we'd have. It might be the same. Conformation? I feel that our yield grading system accommodates conformation in terms of muscling and that conformation is not really precise enough or accurate enough in measuring value and so could be deleted from our system without losing a value segment.

Dale Anderson, USDA: What have consumer groups said about changes in the quality grades?

Z. L. Carpenter: The recent Nader Report generally supports the AMI proposal but for the wrong reasons. This organization supports the AMI proposal from the standpoint of reducing the fat content of meat. If we really wanted to satisfy this concern, the grading system should probably be revised. So, I'm not sure that we really need that kind of uninformed support for the grade changes.

David Stroud: One of the thoughts from the so-called Consumer advocate groups is the feeling that greedy cattlemen are putting cheap feed in the form of fat and selling it to the consumer at a high price.

Z. L. Carpenter: Well, we had a brief session with a consumer group in San Francisco. In their minds, the primary thing our industry is trying to do is lower the quality of the meat and sell it at a higher price. How do you combat this kind of opinion? Well, in my opinion, the best way is if you have a sound basis to approach standards and good research documentation, we then have a basis for an educational program to them. You must approach it on a basis that a group such as ours and other informed groups can support the system with indisputable evidence.
Barbara Green, Georgia: What is being done about misuse of the "Choice" word in merchandising beef? Why aren't retailers providing both "Good" and "Choice" in their stores?

Z. L. Carpenter: This is what I was referring to a moment ago. Many retail organizations only sell a single grade because of the apparent difficulties in quality and inventory control. In response to your other question, I think that if they say "U.S. Choice" it must be U.S. Choice. If not, they can be prosecuted through the Justice Department. A number of cases indicate that prosecution in such instances has resulted in indictments.

John Secrest: We haven't been at odds with the USDA for a long time, but the armed services don't buy what they want to buy; they buy what they're told to buy. They're told to buy Choice because that's the way to buy it. And they buy it because they believe that's the way to buy it because somebody told them that's the way to buy it. That's not because Choice is better than Good. Back in 1965, the military was on Choice grade beef, and lo and behold, in 1966 the USDA made a grade change which took us down about a half a grade to Good grade. Anyway, the military lost about half a grade on that and they didn't like it very much at all. They came to Natick Laboratories, which I represent, the R. and D. Development Area for the military, and they said 'Justify the fact that we can go back to Good grade. So, we made a study of the new Good grade vs. the new Choice grade in 1966, and we found as much animal to animal variation in the Choice grade as we found in the Good grade or as we found between Choice and Good grade. So, as much as we like to help the military services out, there's no way we can justify the decision to go back to the Choice grade because the Good grade was just as good as Choice as far as we were concerned. And that was true of the upper half of the old Standard grades. So, we went on for quite a few years and the military in their voluntary service had to justify to the military men that they're giving the same quality product today to their military men as their mothers would buy them on the commercial market before they went into service, which is Choice grade. Now, do they need the Choice grade? They need the Choice grade because that's what their mothers were buying them, before they came into the service, so the military says, 'OK, we'll buy you Choice grade. We also pay about 3 or 4 cents a pound for Choice grade, which when one considers that over 2 billions pounds of beef a year this amounts to a lot of money, for something we don't know if they really need. We need to measure physical appearance, color, odor, flavor and texture. Now, even though we're not too sure right now that the Good grade vs. the Choice grade makes that much difference as far as texture is concerned. We can use a mechanical tenderizer on a bottom round roast and make a "top round roast" out of it in three times passing through the tenderizer. Tenderness doesn't make much difference to us because we can make it tender. So, we end up with one thing, and that's flavor. We challenge USDA to say "Where are we on flavor?" Does marbling make a difference on flavor? What we would like to have from USDA is a different evaluation of grade acceptance, not politically oriented, but honestly oriented to the
consumer's benefit. We spend a lot of money for buying Choice beef over Good grade beef. We don't want to pay any more money than we have to, because you see it costs the taxpayers every time we pay another dollar for beef. We don't want to pay anymore money than we have to. Do we need to have the Prime, Choice, Good and Standard? Do we need that? Or do we need something like two grades of beef—acceptable and not acceptable? I just wanted to give you my opinions on the way the military feels about this thing. As to what we do about grading, let's get down to brass tacks and get it down to a real evaluation. We just got through with a study in which a Warner Bratzler type device was compared with consumer acceptance for tenderness. And one of the things I wanted to offer to the USDA is that we have just completed a study with the Instron Instrument using a special adapter for the instrument and we came up with about .98 correlation between tenderness by the Instron Instrument and tenderness as evaluated by the consumer acceptance.

**Question:** Is that on raw meat, John?

**John Secrest:** That's on raw meat. On consumer acceptance. So, why don't we do something like that? And buy it on something like that for tenderness. And that's why I say just worry about flavor because we have its worth on tenderness. We can take a biopsy on an animal and take tenderness vs. consumer acceptance.

**Z. L. Carpenter:** I think you'll be swamped with people after this session to ask about your adaptation of the Instron, John.

**Dale, Huffman, are you in the room?** Rather than me quoting your recent work, what was the difference in unacceptability in your recent paper within the Good grade as compared to Choice? (Slides of Huffman work were shown).

The point of the paper is to show that there is quite a bit of variability within each grade. What we did was to arbitrarily say that five was an acceptable taste panel tenderness score. The bulk of our cattle were acceptable in tenderness regardless of marbling scores. This indicates that the grading system, as it presently is constituted, doesn't really divide the cattle into acceptable and unacceptable groups. I'd like to make one comment that this kind of session is what made the Reciprocal Meat Conference important and I'd like to see more of this kind of session, and fewer of the 1 person down here and 300 up there. I think this is great.

Thank you, Dale.

**Vernon Cahill, Ohio State:** If we changed Choice to the word Good, and had Choice on the present Good which do you think, based on your thesis, pick up more of the sales, Choice that's labeled Good or Good that's labeled Choice?

**Answer, from Audience:** The new group, that is labeled Choice. They merchandise the word rather than the product.
Question: What is the feeling on making the yield grade a dual grade on all cattle graded?

Z. L. Carpenter: As I've mentioned earlier, I think the primary reluctance from the standpoint of the packing industry is that of having another label on the products and take away some flexibility they might have on Choice yield 4 and 5 cattle. We've seen a tremendous increase in the use of yield grade and especially in the last 6 months because of the excessively fat cattle.

J. D. Kemp: Would the yield grade be of benefit to different levels of the industry?

Z. L. Carpenter: In my opinion, the yield grade system identifies our product into like segments throughout the marketing system. For value associated with cutability to be translated to the producer level, the grade must be identified for these value differentials in order to get values translated to various segments.

Question: If we get a new grade, a lower grade, are we going to get paid for it. What happens if we just include more in the Choice grade?

Z. L. Carpenter: I don't know. Some of our economists tell me that we are dependent on the dollars available for food and the desire for meat at the time. If there's a total number of dollars going to be spent on meat, we may just redistribute that for various carcasses. Some have suggested that this offers opportunity though, for greater efficiency in producing the product. It can best be defended on the potential savings in production rather than higher prices for our product. I've thoroughly enjoyed the discussion this evening and the reciprocity which I think has been real significant. At this point I'll turn the program over to Jim Christian.

Jim Christian: Zerle, we want to thank you and Herbert for the presentation. I'm sure that a good many of you who have been asking questions and some others have some good ideas. Jot them down in a letter to Zerle Carpenter. I'm sure that he would appreciate them and pass these comments on to the appropriate people who are studying the grade situation. With that, this evening update session is adjourned.

(Note: Due to difficulties with recording equipment, a portion of this discussion could not be transcribed for the proceedings).

*   *   *
Jim Christian: Thank you, Thane, and good morning, ladies and gentlemen. We had a program change announcement, but I am certainly glad to see most of you made it this morning. We have a full day's program coming up, and we will discuss that a little later.

We are privileged this morning, and it gives me a great deal of pleasure to introduce the first speaker, Mrs. Nancy Harvey Steorts. Mrs. Steorts was appointed this past July by the Secretary of Agriculture, Dr. Earl Butz, as a Special Assistant for Consumer Affairs, and she serves in a lot of capacities with her new position. She represents the consumers as they relate to all the USDA programs, and this is a large assignment. She advises the agency administration on issues and actions which have a bearing on the consumers, and this happens to be all of their issues and actions in most cases, because the work that USDA does and the programs they represent have a direct bearing on the consumer. She serves as a consumer's special representative to the USDA. Mrs. Steorts is very qualified. She received her Bachelor's Degree in Merchandising at the College of Human Development at Syracuse University, and she was awarded the Sylic Prize as the most outstanding graduate in her class. This is indeed a very high honor. Since graduation, she has worked with the public in public relations activities with a large department store in Washington, D.C. She was a home economist with the Washington Gaslight Company. She served as a USDA Survey Specialist on food evaluation projects. She has served as National Chairman for the American Association of University Women's national convention in Washington, D.C. She serves presently on the Montgomery County (this is in Maryland) Manpower Commission. She is a representative of the International Federation of University Women's Conference. She is a participant in the White House Conference on Children. She was chosen among the Outstanding Young Women of America, and I could go on and on and list many more of her honors and awards. She is very qualified in the position. She, I understand, is an excellent speaker. So it gives me a great deal of pleasure to ask Mrs. Steorts to discuss the subject of nutritive labeling of food from the regulatory viewpoint. Mrs. Steorts.