

The End Product

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If not for the end product, why raise cattle—or any other domesticated meat-producing animal, for that matter? Beef, the end product of cattle production, comes in many forms and needs to satisfy the end user, the consumer. It is important that those involved in all aspects of the industry understand the basics behind beef as a food. A variety of end or salable products exists for cattle producers: seedstock—bulls and/or replacement heifers; cow/calf—weanlings and/or yearlings; backgrounders—yearlings; and feedlot—fed cattle. Today’s cattle producers realize, however, that the ultimate end products of the beef cattle industry are the steaks, roasts, and hamburgers consumed every day.

Each segment of the industry is responsible for doing its part to ensure a safe, healthy, and enjoyable eating experience. If there is a breakdown at any segment, the entire industry suffers. Therefore, under the umbrella of economic soundness, every effort should be made to provide the most desirable product to the eating public. There are many choices for consumers related to protein consumption. The more informed our industry is, the more we can help consumers make an informed decision about eating beef.

Beef Cattle Evaluation

Live animal evaluation is very subjective. Even those who do this for a living, such as cattle buyers, will inadvertently make mistakes and incorrectly evaluate the cutability and/or quality of an animal occasionally. However, it is important for producers to know the basic concepts of beef cattle evaluation from a marketing standpoint. To become proficient in evaluating live cattle, it is best to follow up with the ensuing carcass to determine how accurate your estimates are of the live animal.

When evaluating live cattle for market readiness, two aspects are observed to determine if an animal is a candidate for harvest: muscling and trimness. These two criteria will allow you to determine a “guesstimate” of yield grade, and the leanness factor is used as an indicator of quality as well.

First, to evaluate muscling, observe the contour and shape of the animal. Look for thickness as it relates to frame size through the rear quarter by evaluating width between the rear legs and plumpness of the outside of the legs. In addition, evaluate the width over the top of the back. Although these are the two best methods of determining muscle development, some individuals also include evaluation of the forequarter as well.

To evaluate animal finish, look for leanness between the rear legs, alongside the tailhead, over the back, and at the point of the shoulder. While muscling may be best evaluated when an animal

is standing still, leanness is often easier to determine as an animal slowly moves about in a pen. This movement allows the evaluator to determine if sufficient fat has been deposited to cover the skeleton, thus hiding any jagged movements. An animal that has deposited approximately four- to five-tenths of fat over the last rib will normally have sufficient finish to grade USDA Choice. An animal with this amount of condition will exhibit slight, flexible movements between the rear legs and have a noticeable amount of fat alongside the tailhead, and the movement over the point of the shoulder will be a smooth versus a jagged movement. In the event that the animal is overfinished, the shoulder movement will be obscured, the fat deposits alongside the tailhead will be very large, and the view down the back of the animal will be squared off as the fat fills in between the muscle.

Converting Cattle to Beef

- Must humanely stun with captive bolt (1958 regulation).
- Exsanguinate (bleed by cutting the throat).
- Remove the hide in the single largest piece (worth ~ \$80).
- Removal of hide, feet, head, viscera, etc., decreases yield to ~ 60% of live weight; a 1,000-pound steer yields a 600-pound carcass.
- Eviscerate to remove all internal tracts and vital organs (all vital organs are consumed in the United States except lungs).
- Attempt to recoup cost of slaughter through the value of by-products (often called the “Fifth Quarter”).
- Must be USDA inspected if meat is to enter commerce. Custom slaughter is only a service provided to producers, and product may not be sold.
- All animals must be inspected prior to and after slaughter for safety.
- Last step prior to chilling in the cooler is microbial intervention (hot-water wash, steam vacuum, acid spray, etc.).
- Carcasses chilled and aged for 48 hours in large industry (IBP, Excel, etc.) processors. Small processors age carcasses seven to 14 days to maximize tenderness and quality.

Once it is in the carcass form, we can discuss how beef differs from other animal protein sources. Cuts of meat from beef, pork, and lamb all have different characteristics, just as cows, pigs, and sheep have different characteristics. Three of the most obvious visual differences between the three species include the size of the cuts of meat, the coloring of the lean, and the color and appearance of the fat. At the time most animals are slaughtered, cows are generally bigger than hogs,

which are still bigger than lambs. Therefore, a cut of meat that comes from the leg of a lamb is going to be significantly smaller than a cut of meat that comes from the leg of a cow. For cuts of meat that come from corresponding areas of the animals' bodies, cows will have the largest cuts of meat, sheep will have the smallest, and the size of cuts of meat that come from hogs will be intermediate between the two.

The coloring of the lean meat, the muscle tissue, can also indicate which species a cut of meat came from. Beef generally has lean that is bright cherry red, while the lean of lamb will be a darker pinkish red, and pork will be light reddish pink or a grayish pink if it has been smoked.

Cuts of Meat

The four major primal cuts on a beef carcass are round, loin, rib, and chuck. These cuts comprise approximately 75% of the weight of a carcass but about 90% of the carcass value. (Table 8-1 illustrates the breakdown by weight and value of the primal cuts.) The remaining 25% of the weight and 10% of the value come from the brisket, foreshank, plate, flank, and kidney knob.

Steaks and roasts come from the primal cuts of meat (Figure 8-1). Each primal cut has its own characteristics in terms of tenderness, fat content, preferred cooking methods, and price (Table 8-2). The loin and rib are considered the

Table 8-1. Percentage of total carcass weight and value of each of the major primal cuts.

Primal Cut	Percent by Weight	Percent by Value
Round	23	29
Loin	17	29
Rib	9	11
Chuck	26	21

Adapted from Boggs and Merkel, *Live Animal Carcass Evaluation and Selection Manual*. Third Edition.

Table 8-2. Ranking of the primal cuts for tenderness, leanness, and price.

Primal Cut	Tenderness	Leanness	Price
Round	3	1	2
Loin	1 (tie)	2	4
Rib	1 (tie)	3	3
Chuck	4	4	1

most desirable in terms of tenderness and are suitable for any type of cooking method (grilling, pan frying, dry roasting, etc.); however, these cuts are generally the most expensive on a per pound basis. The round is intermediate in terms of tenderness, desirability, and affordability. Cuts from the round are usually the most desirable from a leanness standpoint, but greater caution must be taken in cooking methods. Many cuts from the round must be moist cooked or mechanically tenderized to be considered acceptable (sirloin tip—slow, low dry heat roast; top, bottom, and eye of round—cubed steaks, moist cook roast, etc.). The most economical cuts of beef generally come from the chuck. Cuts from the chuck often have excess seam fat (large amounts of fat between the groups of muscle) and are tougher, especially if not prepared correctly. Cuts from the chuck require moist cooking (pot roast, stews, etc.).

A leading cause of bad eating experiences with beef is improper preparation. When a consumer buys a low-budget cut of meat (eye of round) and prepares it as a high-quality cut (grilled), the result is usually an unacceptable eating experience. Consumer education in beef preparation is necessary if our industry is to gain greater acceptability and win back market share.

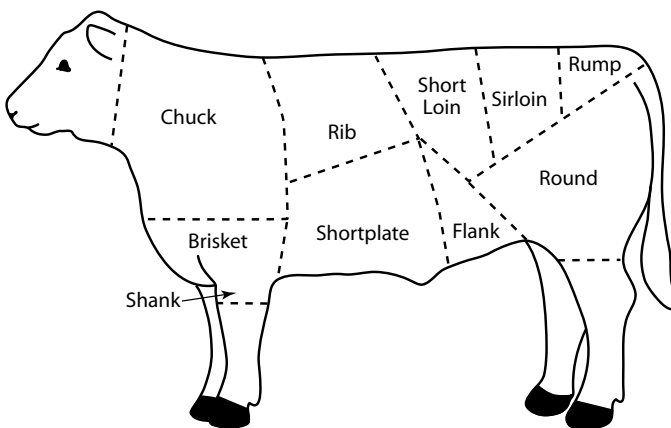
Beef Fabrication

Beef cattle yield only about 35 to 40% lean edible meat. However, there are numerous useful by-products in the other 60% that we utilize. From a conversion standpoint, a 1,000-pound live steer will yield or "dress" about 62% to the carcass form. In other words, there will be 620 pounds of carcass and 380 pounds of by-products. The following is a breakdown of where some of this weight loss is accounted for. The 620-pound carcass will yield approximately 60 to 70%, depending on the amount of fat and bone removed from the carcass. In most cases, the 620-pound carcass will ultimately yield about 400 pounds of edible retail cuts.

Beef Carcass Grading

The quality and cutability of beef is an important issue for today's cattle producers. Over the past 20 years, beef has consistently lost market share to poultry. While Americans are eating more total meat (beef, pork, and poultry), they are consuming less beef than 10 years ago. Just recently, beef consumption's decline leveled off and actually increased slightly again. With consumer concerns over the lack of consistency in beef tenderness and excess fat, beef producers must be interested in making the changes necessary to provide a more acceptable product. To make changes, it is important to understand the USDA grading system and how management and breeding practices affect those grades.

Figure 8-1. Cuts of meat.



USDA Quality Grades

The beef quality grades, from most desirable to least desirable, are USDA Prime, Choice, Select, Standard, Commercial, Utility, Cutter, and Canner. The USDA quality grade is an indicator of the palatability or eating quality of beef. Meat from carcasses with superior quality grades (USDA Prime and Choice) are expected to be the tenderest, juiciest, and most flavorful.

USDA quality grades are determined by two factors:

- maturity of the carcass and
- amount of marbling (intermingling or dispersion of fat within the lean) in the ribeye.

Maturity

Maturity in beef is based on the physiological appearance of the carcass: amount of cartilage remaining in the vertebrae, flatness and color of the ribs, and color and texture of the muscle. The maturity range is from A to E, with A being the youngest, most desirable carcasses. Maturity is further subdivided into degrees ranging from 0 to 100 in increments of 10, which is necessary for determining the final quality grade. For a carcass to receive an acceptable quality grade, it must have no greater than a B maturity, which relates to a 42-month or younger steer or heifer. Carcasses of C maturity or older receive grades of Commercial, Utility, Cutter, or Canner, based on the amount of marbling they possess, and are typically used in processed meat products (hamburger, hot dogs, etc.). Younger carcasses (A) are eligible for quality grades of Prime, Choice, Select, and Standard, which are usually cut into steaks and roasts. However, recently it has been shown that a high percentage of Standard and even low Select carcasses have unacceptable eating quality without processing, and many of these carcasses are now used in processed foods.

Marbling

Marbling scores are determined by the amount and distribution of the flecks of fat within the lean of the ribeye. The marbling scores, from lowest to highest, are: practically devoid, traces, slight, small, modest, moderate, slightly abundant, moderately abundant, and abundant.

Marbling is considered to be an indicator of palatability, with higher scores indicating better eating quality. Therefore, higher marbling scores result in higher quality grades (USDA Prime and Choice) than lower marbling scores (USDA Select and Standard) (Figure 8-2). Marbling scores are further subdivided into degrees ranging from 0 to 100, which is necessary for determining the final quality grade.

Figure 8-2. Photo examples representing the minimum marbling requirement for the most common marbling scores with their corresponding USDA Quality Grade in parentheses.



Source: The above illustrations are reduced reproductions of the official USDA Marbling photographs prepared for the U.S. Department of Agriculture by and available from the National Cattlemen's Beef Association.

Determining the Final Quality Grade

Once the maturity and marbling scores have been determined, a USDA quality grade is assigned, with younger, higher-marbled carcasses receiving the superior grades. USDA quality grades can be further subdivided into high (+), average (0), and low (-), based on the degree of maturity and the marbling score (Table 8-3 illustrates this within A maturity).

Other factors that influence the final quality grade of a carcass are the color and texture of the muscle. If a carcass is determined to be a “dark cutter” (dark, often coarse ribeye muscle), it may be reduced one full quality grade (i.e., from USDA Choice to Select). This condition is usually associated with extreme excitability or stress prior to slaughter.

USDA Yield Grades

Beef yield grades refer to the cutability of the carcass and range from 1 to 5. These grades are based on the yield of boneless, closely trimmed retail cuts from the round, loin, rib, and chuck. Yield grade 1 indicates the highest-yielding carcasses, and yield grade 5 indicates the lowest (Table 8-4). Official USDA yield grades are calculated to the nearest tenth (i.e., yield grade 2.7); however, only the whole number is placed on the carcass (i.e., yield grades 2.0 to 2.9 are assigned yield grade 2—the decimal is not rounded, but dropped).

The components used to calculate the USDA yield grade are hot carcass weight, fat thickness over the ribeye at the 12th rib (Table 8-5), ribeye area at the 12th rib, and percentage of kidney, pelvic, and heart fat. The equation to calculate yield grade is as follows:

$$\begin{aligned} \text{Yield grade} = & 2.5 + (0.0038 \times \text{hot carcass weight}) \\ & + (2.5 \times \text{adjusted fat thickness}^*, 12\text{th rib}) \\ & - (0.32 \times \text{ribeye area}) \\ & + (0.2 \times \text{percent kidney, pelvic, and heart fat}) \end{aligned}$$

*The fat thickness may be adjusted up or down from the actual measurement if the carcass appears to have more or less total fat than a typical carcass with that actual measurement. This actually allows an extremely lean carcass to have a negative adjusted fat thickness value.

Yield grades of 1 to 3 are usually considered acceptable; grades of 4 and 5 are considered to be too fat and unacceptable. Even when yield-grade-4 and -5 carcasses are closely trimmed, there are large amounts of seam fat, which results in plate waste after cooking.

Factors That Affect USDA Grades

It is a long process from the seedstock producer to the cow-calf commercial cattle producer to the background/finisher to the slaughter plant, and each of these steps can have an effect on the final yield and quality grade of the carcass. At some points, the influence is genetic (seedstock producer); some, management (background/finisher and packer); and others, both (cow-calf producer). Some mistakes made in genetics can be compensated for through proper management, but mistakes in management usually result in inferior carcasses.

Breeding

The breed of the animal can have an influence on carcass characteristics, and different breeds or breed types should be managed differently. Smaller breed types usually require less time on feed to reach an acceptable quality grade (refer to Tables 5-2 and 5-3 in Section 5, “Planning the Breeding Program”). If they are fed beyond that point, the result is an unacceptable carcass from a cutability (yield grade) standpoint. On the other hand, large breed types, particularly extremely lean breeds, require a much longer period of time on feed to reach an acceptable quality grade, which may result in the carcass having an unacceptable hot carcass weight (greater than 850 pounds).

Another breed consideration is the influence of zebu breeding in the cattle. A high percentage of Brahman breeding in fed cattle results in tougher, less desirable carcasses. These cattle often have acceptable yield and quality grades, but feeders and packers often discount prices for high percentage Brahman cattle because of the potential tenderness problem. However, with the proper mix of Brahman breeding and good management, the result is a lean acceptable carcass.

Table 8-3. USDA quality grade with corresponding marbling score, assuming A maturity.

USDA Quality Grade	Necessary Marbling Score
Prime +	Abundant 0-100
Prime o	Moderately abundant 0-100
Prime -	Slightly abundant 0-100
Choice +	Moderate 0-100
Choice o	Modest 0-100
Choice -	Small 0-100
Select +	Slight 51-100
Select -	Slight 0-50
Standard +	Traces 34-100
Standard o	Practically devoid 67-100—traces 0-33
Standard -	Practically devoid 0-66

Table 8-4. Corresponding percent closely trimmed retail cut from the chuck, loin, rib, and round for several yield grades.

Yield Grade	% Retail Cut ¹	Yield Grade	% Retail Cut ¹
1.0	54.6	3.5	48.9
1.5	53.5	4.0	47.7
2.0	52.3	4.5	46.6
2.5	51.2	5.0	45.4
3.0	50.0	5.5	44.3

¹ Calculated from the formula:
 % retail cuts = 51.34
 - (0.0093 × hot carcass weight)
 - (5.78 × adjusted fat thickness, 12th rib)
 + (0.74 × ribeye area)
 - (0.462 × percent kidney, pelvic, and heart fat)

Table 8-5. Fat thickness in inches at the 12th rib with corresponding PYG.

Fat Thickness	PYG	Fat Thickness	PYG
0.00	2.00	0.70	3.75
0.10	2.25	0.80	4.00
0.20	2.50	0.90	4.25
0.30	2.75	1.0	4.50
0.40	3.00	1.1	4.75
0.50	3.25	1.2	5.00
0.60	3.50	1.4	5.50

Some breeds offer expected progeny differences for carcass traits, allowing seedstock and commercial producers to select cattle with superior genetics for carcass characteristics within that breed. Other breeders progeny-test herd bulls by slaughtering their offspring and collecting carcass information. This information also can assist in making selection decisions for improved carcass performance.

Management

Management practices that influence carcass grades and acceptability start with the cow-calf producer. Proper injection sites are critical to the overall acceptability of the carcass. Blemishes resulting from injections can result in damage to the high price cuts of meat; therefore, be certain to avoid the round, loin, rib, and chuck (for proper injection techniques, see Figures 6-1, 6-2, and 6-3 in Section 6, “Health and Management Techniques”). If an injection site blemish is detected in one of these cuts, it often results in the condemnation of that cut and possibly the entire carcass. It is never too soon to practice proper injection site techniques because even the first injection a calf receives can result in a blemish in the carcass.

Backgrounding cattle can have an influence on carcass grades, particularly quality grade. It has been determined that calves entering the feedyard as yearlings have a higher percentage of Choice, or better, carcasses than those entering the feedyard as weanlings. Also, calves not grown properly during the backgrounding phase can result in unacceptably heavy carcasses.

To produce cattle with acceptable carcasses, management considerations when the cattle enter the feedlot are critical. Most cattle fed in the United States are brought to the feedyard and sorted into pens based on their anticipated slaughter dates. Therefore, cattle expected to reach the proper slaughter endpoint are penned together. When it is determined that the pen, on average, is ready for slaughter, the entire pen is slaughtered. This is called an “all in, all out” system. If the feedyard management does a poor job of sorting cattle into their respective pens, a large number of unacceptable carcasses can result. On average, the pen might be slaughtered at the appropriate time, but there might be a large number of underfed cattle offset by a large number that are overfed. Therefore, sorting the cattle going into the feedyard is an important management practice.

Many feedyards now depend on sophisticated machinery (including ultrasound) to determine expected slaughter dates and sort the cattle accordingly. Most large feedlots do a good job of determining when the average of the pen is ready to slaughter, but if mistakes are made, the entire pen could be either underfed or overfed, resulting in a large number of unacceptable carcasses.

Handling of the cattle in the feedyard, during transport to the slaughter plant, and while at the slaughter plant is important. Use extreme caution to avoid bruising the cattle since bruises are condemned and must be removed from the carcass. Also, overstressed, excited cattle can result in “dark cutters,” lowering the final quality grade.

Dressing Percent

Many producers and packers are interested in the dressing percent of their cattle. This makes sense because most cattle are bought on a liveweight basis, but the packer has the carcass to sell. Therefore, the higher the dressing percent, the more pounds there are to sell. Factors that affect dressing percent are condition (fatter carcasses have higher dressing percents), amount of fill (more fill means lower dressing percent), and pregnancy status (pregnant heifers have low dressing percents). Dressing percent is calculated as hot carcass weight divided by the liveweight of the animal prior to slaughter times 100. Typical dressing percents for beef cattle are from 60 to 65%.

Using Carcass Information

Pricing of beef carcasses is based on USDA yield and quality grades, with higher-quality, higher-cutability carcasses commanding the highest prices. Although the economic benefit of producing high-quality, high-yielding carcasses benefits the packers, there is also some trickle-down economics to producers, and producing better beef will result in increased market share, resulting in more demand and high prices all the way back to commercial and seedstock producers.

If a producer is retaining ownership and being paid by the packer based on how his or her cattle perform on a carcass basis or is selling to a buyer that rewards for carcass performance, appropriate emphasis should be placed on carcass trait selection.

Determining the Yield Grade of a Carcass

What Are Yield Grades?

Yield grades are based on the following factors: carcass weight, ribeye area, fat thickness opposite the 12th rib, and kidney, pelvic, and heart fat. Descriptions of the different yield grades are as follows:

Yield Grade 1

- Muscle is visible through many of the fat-covered areas.
- Yield Grade 1 carcasses have a thin layer of fat over the rib, loin, rump, and clod.
- They have a very thin layer of fat over the outside round, top of shoulder, and neck.
- There is a slight deposit of fat in flank and clod/udder region.

Yield Grade 2

- Yield Grade 2 carcasses are nearly completely covered with fat.
- They have a slightly thin layer of fat over the loin, rib, and inside round.
- There is a slightly thick layer of fat over the rump, hip, and clod.
- Lean is plainly visible through the fat over the outside round, top of shoulder, and neck.
- Finally, there is a small deposit of fat in the flank and clod/udder region.

Yield Grade 3

- Yield Grade 3 carcasses are completely covered with fat.
- They have a slightly thick layer of fat over the loin, rib, and inside round.
- There is a moderately thick layer of fat over the rump, hip, and clod.
- Lean is only visible through the fat over the neck and lower outside round.
- There is a slightly large deposit of fat in the flank and clod/udder region.

Yield Grade 4

- Yield Grade 4 carcasses are completely covered with fat.
- They have a moderately thick layer of fat over the loin, rib, and inside round.
- There is a thick layer of fat over the rump, hip, and clod.
- Lean is only visible through the fat over the neck and lower outside round.
- There is a large deposit of fat in the flank and clod/udder region.

Yield Grade 5

- A Yield Grade 5 carcass has excess fat over all parts. It also has smaller ribeyes with excess kidney, pelvic, and heart fat.

Table 8-6. REA required for each 8-pound range in hot carcass weight.

Hot carcass weight, lb.						
Wt. within each 100 lb.	400	500	600	700	800	900
0 to 8	8.6	9.8	11.0	12.2	13.4	14.6
9 to 16	8.7	9.9	11.1	12.3	13.5	14.7
17 to 24	8.8	10.0	11.2	12.4	13.6	14.8
25 to 33	8.9	10.1	11.3	12.5	13.7	14.9
34 to 41	9.0	10.2	11.4	12.6	13.8	15.0
42 to 49	9.1	10.3	11.5	12.7	13.9	15.1
50 to 58	9.2	10.4	11.6	12.8	14.0	15.2
59 to 66	9.3	10.5	11.7	12.9	14.1	15.3
67 to 74	9.4	10.6	11.8	13.0	14.2	15.4
75 to 83	9.5	10.7	11.9	13.1	14.3	15.5
84 to 91	9.6	10.8	12.0	13.2	14.4	15.6
91 to 99	9.7	10.9	12.1	13.3	14.5	15.7

Step 1. Determining the Preliminary Yield Grade

The Preliminary Yield Grade (PYG) is determined by measuring the outside fat thickness at the 12th rib at a point perpendicular to the outside surface, three-fourths the length of the ribeye from the chine bone end. In some cases, the fat on the outside surface is scarred to the point that it cannot be measured. In these cases, the PYG must be estimated based on the descriptions given previously. This is why it is important to be able to recognize a Yield Grade 1, 2, 3, etc., carcass based on its external fat characteristics.

Furthermore, once the PYG has been determined, it is usually adjusted to take into account unusual amounts of fat on other parts of the carcass. For instance, a carcass with a PYG of 2.5 can be adjusted to a 2.7 depending on the amount of excess external fat. The PYG can also be adjusted down if the carcass is trimmer than the PYG indicates. A good rule of thumb is not to adjust the PYG up or down more than 0.5 units. For example, a 2.5 PYG could be adjusted to a 3.0.

Step 2. Determining the Required Ribeye Area for a Particular Carcass Weight

Each specific carcass weight has a required size REA in tenths of a square inch. For instance, a 600-pound carcass has a required ribeye area (RREA) of 11.0 square inches. Carcasses that have REAs greater than the RREA are heavier-muscled, and carcasses that have REAs smaller than the RREA are lighter-muscled than other carcasses on the average.

Table 8-6 illustrates the relationship between carcass weight and RREA. This table should be memorized as you will be required to determine RREAs for certain carcass weights in a relatively short time. However, this is not as hard as it seems. There are some simple correlations between carcass weight and REA. Once these are memorized, determining RREA is easy.

Step 3. Determining the Actual Ribeye Area

Determining the actual ribeye area is probably the most difficult part in determining the yield grade of a beef carcass. No two ribeyes are the same, and you must learn to look for various things when determining the actual ribeye area.

1. Area is the relationship between both width and length.
2. See how symmetrical the eye is; a more symmetrical eye will be larger.
3. Be careful when the carcass is extremely fat. Excess fat opposite the ribeye will make it appear smaller than is actually is. The same is true for an extremely trim carcass. The eye might appear bigger than it actually is.

Step 4. Determining the Ribeye Area Adjustment to PYG

Now that you have determined the PYG, RREA, and actual REA, you must make adjustments to the PYG. In theory, carcasses with larger REAs than what is required will have more muscle and less fat. The opposite is true for carcasses with smaller REAs than what is required. They will have less muscle and more fat. Since lower yield grades are indicative of trimmer carcasses and higher yield grades are indicative of fatter carcasses, you adjust for REA.

The formula for determining the adjustment to the PYG is:

$$RREA - Actual\ REA = Difference \times 0.3 = Adjustment$$

Examples

$$12.5 - 12.0 = +0.5 \times 0.3 = +0.15$$

(Adjustment is positive because actual is smaller than needed.)

$$11.0 - 12.0 = -1.0 \times 0.3 = -0.3$$

(Adjustment is negative because actual is larger than needed.)

Step 5. Determining the Percentage of Kidney, Pelvic, and Heart Fat (KPH)

Animals deposit fat internally in the kidney, pelvic, and heart regions. These deposits protect vital internal organs and store excess energy. KPH is expressed as a percentage of hot carcass weight. For example, if you determined that a 700-pound carcass had 14 pounds of KPH, the KPH percentage would be 2.0. Table 8-7 shows the adjustments to PYG for variations in KPH percentage.

Table 8-7. KPH percentage and PYG adjustment.

KPH, %	PYG	
	KPH, %	Adjustment
2.0		-0.3
2.5		-0.2
3.0		-0.1
3.5		None
4.0		+0.1
4.5		+0.2
5.0		+0.3

Step 2. Determining the Marbling

Once you have determined the maturity group, you must next determine the marbling score (Figure 8-2). Both maturity and marbling are used together to come up with a final quality grade. Marbling can be defined as the amount of intramuscular flakes of fat within the muscle. Marbling is broken down into nine different degrees:

- Ab.....Abundant
- Md Ab.....Moderately Abundant
- Sl Ab.....Slightly Abundant
- Md.....Moderate
- Mt.....Modest
- Sm.....Small
- Sl.....Slight
- Tr.....Traces
- PD.....Practically Devoid

Determining the Quality Grade of a Beef Carcass

Beef quality grading is a very important aspect of beef carcass evaluation. Quality grades are based on maturity and marbling.

Step 1. Determining the Maturity Group

As an animal matures, cartilage begins to turn to bone via the ossification process. This is a relatively constant process, and the chronological age of an animal at slaughter can be accurately estimated based on the physiological age as determined by the bone and cartilage relationships. Younger animals will have more cartilage and less ossification, while older animals will have less cartilage and more ossification.

Beef carcasses are divided into five different maturity groups (A, B, C, D, and E), with A being the youngest and E being the oldest. In order to give you an idea of the relative age of the different maturity groups, they can be broken down into months.

- A maturityA young carcass about nine to 30 months of age at slaughter.
- B maturity.....A fairly young carcass about 30 to 42 months of age at slaughter.
- C maturityThe youngest carcasses to be considered "old." These carcasses will be about 42 to 72 months of age at slaughter.
- D maturityA fairly old carcass about 72 to 96 months at slaughter.
- E maturity.....The oldest age classification. Carcasses are older than 96 months at slaughter.

To determine which age group an animal falls into, you look at three basic locations for bone (sacral, lumbar, and thoracic vertebrae) and also look at the ribs for flatness (the older the animal, the flatter the ribs) and the chine bones for ossification.

Step 3. Determining the Final Quality Grade

Once the maturity and marbling scores have been determined, you can now calculate the final quality grade (Figure 8-3). Quality grade is broken down into six different categories:

- PrPrime
- ChChoice
- Se.....Select
- St.....Standard
- Cm.....Commercial
- Ut.....Utility

"A" maturity carcasses qualify for Prime, Choice, Select, and Standard grades. "B" maturity carcasses qualify for Prime, Choice, Standard, and Utility. "C," "D," and "E" maturities only qualify for commercial and utility. The B/C borderline is the line that distinguishes between old animals and young animals. Younger animals tend to have meat that is more tender and palatable. This is why only the A and B maturities qualify for the higher-quality grades.

Figure 8-3. Relationship of maturity and marbling score in determining USDA Quality Grades.

Degrees of Marbling	Maturity			
	A	B	C	D/E
Abundant	Prime			
Moderately Abundant			Commercial	
Slightly Abundant				
Moderate				
Modest	Choice			
Small			Utility	
Slight	Select			
Traces		Standard		
Practically Devoid			Cutter	

Direct Marketing of Beef Products

Keys to Success

- Know your product(s)
- Know your consumer clientele(s)
- Know local and federal regulations
- Develop the necessary infrastructure
 - processing capabilities
 - distribution avenues
 - market segments
 - cooperative arrangements
 - cash flow requirements

If you want to market beef products from the animals you produce directly to consumers, you must consider what you are getting into. The information contained in this section will provide guidelines for producers and entrepreneurs who are attempting to direct market their products for the first time. In most cases, this is a completely new experience for a producer. It can be overwhelming if you do not take it one step at a time.

Step 1. Gather Information

To be successful in marketing your product directly to consumers, it is important that you understand a few issues up front before making a large monetary investment. In many cases, as you gather information on how to direct market your product, you may find that this endeavor requires more responsibility and/or effort than you had originally planned to commit. If that is the case, do not feel defeated. At least you explored the idea and put forth an effort.

Many individuals have found after attempting to start a direct marketing business that this is not what they really want to do. You must approach direct marketing differently than you would many aspects of animal production. The following checklist contains some questions to ask yourself to determine if you are truly committed to marketing products directly to consumers.

How will you know that direct marketing is for you? First and foremost, do you think you have a product for which consumers are willing to pay a premium? To be successful, direct marketing must be approached as a business, not a hobby. Therefore, the product must be capable of demanding a price above your normal market value to compensate you for your added efforts. Have you determined that your product is capable of demanding a premium? Oftentimes, it is difficult to determine on a small scale how much of a premium your product is worth. Although consumers may really like the product, the real question remains, “How much are they willing to pay, especially as a repeat customer?”

Too often, producers do not consider the extra effort put into direct marketing until it is too late, and they then decide that it is too much trouble. Always remember that “time is money”! Your product must pay for your time.

Pitfalls of Direct Marketing

- Possible upfront financial outlay
- Cost/profit ratio of products
- Lack of marketing skills
- Lack of processing infrastructure
- Liability insurance
- Regulatory requirements

Step 2. Evaluate Your Business Approach

Do you as an individual have the personality to deal with people on a business level? Are you a salesperson? Can you make the appropriate sales pitch to a wide variety of clients? Can you handle rejection? Can you deal with negative comments about your product? Can you manage employees (chances are, to be successful, you may have to expand your workforce)? Are you capable of listening and responding to regulatory officials on a daily basis? How would you respond to consumer complaints about your products? These are all issues requiring someone who has the ability to deal with a wide variety of people on different levels from production through marketing and sales.

As you grow the business, it becomes easier to add this expertise with new employees. However, one of the most frustrating issues facing new direct marketers is the necessity of being able to handle the various situations listed above. These issues, added to the fact that many small producers work alone and enjoy this aspect of their job, can lead to a difficult transition early on in the process. A key point to remember during your initial startup is that “the consumer is always right” and that everyone is your consumer.

If you have the premium product and the personality to succeed in dealing with people, you are a prime candidate for direct marketing. However, this is where the small details began to demand attention to ensure success. Advanced planning and discussions with regulatory agencies is a must prior to startup. By involving all necessary federal and state governmental agencies (i.e., USDA, FDA, EPA, public health, Department of Agriculture, etc.) you not only avoid potential costly mistakes but also exhibit your desire to properly follow regulations and produce a safe and wholesome food product.

Step 3. Develop a Marketing Plan

Issues such as consistent animal supply, processing capacity, labeling, product transportation, marketing, cash flow, etc., are extremely important aspects of the infrastructure necessary for a successful direct marketing venture. It is important that interested parties develop a business and marketing plan prior to starting an operation. In many cases, this will be required for financial institutions if outside capital is required for startup. Not only will these plans assist you in developing your approach to direct marketing, but they may also prompt you to evaluate the way you do business in your other operations as well. Many small livestock producers have started to look at their production operation differently after exploring direct marketing.

Furthermore, you have to decide what it is you want to achieve through direct marketing your product. Will this become your primary source of income? Many niche markets have grown to become major enterprises much past the expectations of those involved. Or are you looking to stabilize cash flow throughout the year to offset live animal price fluctuations? This is an important decision you have to make, as it will drive the efforts and input into your direct marketing program.

Step 4. Join with Other Direct Marketers

Finally, seek out others who are also interested or involved in direct product marketing. There is strength in numbers. By associating with others involved in this area, you expand your knowledge base in many areas necessary for success. It may even be possible that you can work toward a common goal in overcoming shortfalls in reaching customers, processing roadblocks, marketing efforts, transportation deficiencies, etc.

Sources of Information

- Networking with other producers
- Direct marketing/Value-added conferences and workshops
- Department of Agriculture
- University of Kentucky
- Local Cooperative Extension office
- Trade publications/associations
- United States Department of Agriculture-Agricultural Marketing Service

Summary

Plan! Plan! Plan! Prior thought and planning will be the keys to success. In addition, never give up. More than likely, someone before you has encountered a similar problem and developed a solution. The key to direct marketing is having a great consumer-demanded product and the perseverance to turn obstacles into opportunities. So go out and add value to your products through direct marketing.

Literature Cited

- Direct Marketing Today: Challenges and Opportunities. 2000. USDA-AMS
- University of Kentucky Direct and Local Beef Marketing Web Site: <http://www.uky.edu/Ag/KyBeef/>. 2002.
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Checklist for Success

Answer the following questions before you move ahead in direct marketing your products. If you answer "yes" to the majority of these questions, then you are going in the right direction.

- | yes | no | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Do you like working with various types of people? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are you able to manage employees? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are you willing to learn new ways of doing business? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you have the proper sales skills to meet the needs of the consumer? |
| <input type="checkbox"/> | <input type="checkbox"/> | Have you developed short- and long-term business goals? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you have financing resources for both short- and long-term available? |
| <input type="checkbox"/> | <input type="checkbox"/> | Have you considered your cash flow throughout the year? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you know who will do your accounting/business management? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are you willing to accept the liability related to producing a safe product? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you have a marketing plan for your product? |
| <input type="checkbox"/> | <input type="checkbox"/> | Have you considered animal availability and supply? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you know if this is a continual or seasonal product? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are you willing to meet USDA and Public Health regulations? |
| <input type="checkbox"/> | <input type="checkbox"/> | Where/how will the processing of your product take place? |
| <input type="checkbox"/> | <input type="checkbox"/> | Can you merchandise the entire carcass? |
| <input type="checkbox"/> | <input type="checkbox"/> | How will the products be distributed/transported? |