YIELD!

It's time to stop pitting yield grade against quality grade, because profit requires both.

BY DAN MOSER, KANSAS STATE UNIVERSITY

We've all heard of progeny test groups that graded 90% Choice or better, perhaps with a 40% or greater *Certified Angus Beef*™ acceptance rate. But do we recall the percentage that made Yield Grade (YG) 2 or better?

Often when we hear about a group with 80% YG 2 or better, we don't hear anything about quality grade.

The two can and should go together.

A recent report from the Certified Angus Beef (CAB) Program listed the average yield grade for *Certified Angus Beef* carcasses as 3.4. That's a less-than-desirable result; after all, carcasses with a yield grade of 4.0 or above are ineligible for *Certified Angus Beef* acceptance, regardless of marbling.

Producers who market cattle on a value-based grid often find yield grade is as important as quality grade. With optimum selection and management, the percentage of a group that both meets *Certified Angus Beef* specifications and yield grades 2 or better can be increased.

Grids vary widely in their premiums and discounts, but example grids (see tables on page 128) illustrate the effect yield grade can have on grid-determined carcass price.

In the yield-grade grid you can see that the additional premium gained by improving yield grade is nearly as great as improving quality grade. In the quality-grade grid, increases in yield grade are not as highly valued.

Both grids severely penalize cattle that fail to make at least YG 3. In these examples, as with most grids, significant premiums are earned when cattle improve both quality and yield grade.

Most experts agree that grid premiums and discounts are conservative and do not fully reflect differences in true retail value. They expect the magnitude of premiums and discounts to increase, providing greater incentive for genetic improvement.

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Components of yield

While packers use the term *yield* to mean "dressing percentage," that is a different sense of the word that is more commonly related to cutability. This yield is the amount of the carcass that is retail product after bone and external, internal and seam fat are removed during fabrication. The most widely used indicator of yield is the U.S. Department of Agriculture (USDA) Yield Grade.

It combines estimates of fat thickness at the 12th rib, ribeye area, carcass weight and internal (kidney, pelvic and heart) fat to predict the percentage of carcass weight that will result in boneless, closely trimmed retail cuts from the chuck, rib, loin and round. Yield grades range from 1 to 5 and are assigned by USDA graders in whole numbers, although yield grades can be calculated to a tenth of a grade.

As the grade increases from 1 to 5, the percentage of carcass weight that is retail cuts decreases. A carcass in the middle of YG 1 will result in 53.5% retail cuts, while an average YG 5 carcass is expected to produce 44.3% of its weight in retail cuts.

Other equations have been developed to predict yield directly rather than to assign grades. An example of this is the equation used in the American Angus Association sire evaluation for carcass traits, which estimates percent retail product from carcass measurements. Those estimates are

YIELD! CONTINUED

"The limited amount of research on relationships between carcass and reproductive traits has not revealed any negative effects of selection for retail yield," says Dan Moser.

used to calculate expected progeny differences (EPDs) for percent retail product.

Fat thickness is the most important factor in determining yield. Genetic relationships between all traits are described using genetic correlations, which can range from -1.0 to 1.0. A correlation of 0.90 indicates that selection for increase in one trait will result in a strong increase in another. A genetic correlation of -0.90 indicates that selection for an increase should result in a considerable decrease in the other, while a correlation between -0.10 and 0.10 means the traits are genetically unrelated.

In the Angus carcass database, the genetic correlation between fat thickness and percent retail product is -0.84. This indicates that as producers decrease fat thickness through genetic selection, percent retail product should rapidly increase, a favorable result.

Ribeye area is also predictive of yield, although less so than fat thickness. Ribeye area is positively correlated with percent retail product (0.59), but it is also positively related to carcass weight (0.48).

Therefore, selection for increased ribeye area should improve percent retail product, but it will also increase carcass weight. However, to improve yield, ribeye area must increase relative to the weight of the carcass. Since data used to calculate carcass EPDs are adjusted to a constant age, sires with a superior EPD for ribeye area could potentially sire cattle that are faster gaining and heavier at processing, but no more muscular relative to their weight.

Table 1: Three alternative grids

	Commodity	Yield Grade	Quality Grade
Prime	$6.00	$3.00	$10.00
Upper two-thirds Choice	$1.50	$0.00	$3.50
Choice	$0.00	$0.00	$0.00
Select	USDA Spread	USDA spread x 0.85	USDA spread x 1.15
Standard	Select-$10.00	Select-$3.00	Select-$15.00
YG 1	$2.00	$3.00	$1.00
YG 2	$1.00	$2.00	$1.00
YG 3	$0.00	-$1.00	$0.00
YG 4	-$15.00	-$20.00	-$12.00
YG 5	-$20.00	-$25.00	-$17.00
Light & heavy carcass	-$15.00	-$15.00	-$15.00

Source: Dillon Feuz, agricultural economist, University of Nebraska, Panhandle Research & Extension Center.

Table 2: Representative variation among commodity, yield-grade and quality-grade grid prices, $, based on the following assumptions:

USDA Choice-Select spread:	$7.00
Average dressed price:	$100.00
% cattle grading Choice:	60
Base grid price:	$103.80

Commodity Grid:

	Yield Grade				
Quality grade	1	2	3	4	5
Prime	111.80	110.80	109.80	94.80	89.80
Upper two-thirds Choice	107.30	106.30	105.30	88.80	83.80
Choice	105.80	104.80	103.80	88.80	83.80
Select	98.80	97.80	96.80	81.80	76.80
Standard	88.80	87.80	86.80	71.80	66.80
Out cattle	-15.00				

Yield-Grade Grid:

	Yield Grade				
Quality grade	1	2	3	4	5
Prime	109.80	108.80	105.80	86.80	81.80
Upper two-thirds Choice	106.80	105.80	102.80	83.80	78.80
Choice	106.80	105.80	102.80	83.80	78.80
Select	100.85	99.85	96.85	77.85	72.85
Standard	97.85	96.85	93.85	74.85	69.85
Out cattle	-15.00				

Quality-Grade Grid:

	Yield Grade				
Quality grade	1	2	3	4	5
Prime	114.80	114.80	113.80	101.80	96.80
Upper two-thirds Choice	108.30	108.30	107.30	91.80	86.80
Choice	104.80	104.80	103.80	91.80	86.80
Select	95.75	95.75	95.75	83.75	78.75
Standard	80.75	80.75	80.75	68.75	63.75
Out cattle	-15.00				

Source: Dillon Feuz, agricultural economist, University of Nebraska, Panhandle Research & Extension Center.

The simplest and most effective way to genetically improve yield is to select sires with a higher EPD for percent retail product. This EPD identifies sires that provide a superior combination of genetics for fat thickness, ribeye area and carcass weight.

Selection for yield

There is considerable genetic variation within the Angus breed, which allows for improvement through genetic selection. Heritability of percent retail product in the Angus database is a moderate 0.24, but the average heritability of this trait in research studies is much higher at 0.47. A recent

study at the U.S. Meat Animal Research Center (MARC) in Clay Center, Neb., estimated the heritability of retail product percentage to be an even higher 0.66.

These estimates of heritability indicate increased retail yield can easily be achieved through selection using the EPD for percent retail product. In fact, retail product percentage and other carcass traits are some of the most heritable and, thus, show the most rapid response to selection.

The relationship of retail yield to other production traits has been studied only to a limited extent. Several studies have noted that increased retail yield seems to have a favorable relationship with measures of growth.

Genetic correlations between retail yield and weaning and yearling weight were 0.57 and 0.87, respectively, indicating that increased yield is associated with increased growth rate. Yet yield seems to have little genetic relationship with either birth weight or mature cow size (0.05 and 0.25, respectively), so an increase in yield should have a limited effect on those traits.

For some other traits, the relationships are less favorable. For example, several researchers have noted an unfavorable, although weak, relationship between retail yield and feed intake. This may be a concern if selection for retail yield results in cows with less appetite that fail to maintain themselves under range and pasture conditions.

Since postweaning growth is also partially a function of appetite, including yearling weight EPD in a selection scheme should offset any potential loss due to selection for retail yield. In the feedlot, selection for a combination of growth and retail yield resulted not only in an improvement in those traits, but also in feed efficiency, in a classic 1990 British study. In fact, cattle selected for lean growth in that study improved in feed efficiency as rapidly as those selected directly for feed efficiency.

The most often expressed concern relative to selection for retail yield is the potential negative effect on reproductive traits. This concern is not unwarranted since breeds with the highest retail yield also tend to be the least fertile and because body condition score (BCS), a measure of fatness, is also related to reproductive efficiency.

However, the limited amount of research on relationships between carcass and reproductive traits has not revealed any negative effects of such selection. The British paper previously mentioned found only a small increase in age at first calving from selection for lean growth, and that increase was not statistically different from zero.

Likewise, no increase in birth weight or calving difficulty was noted in the selected cattle. In contrast, the recent Clay Center study found unfavorable, although weak, relationships between retail product percentage and both calving rate and calving difficulty.

Assessing each situation

Before embarking on an effort to select for increased retail product percentage, producers should assess whether such an increase will benefit their commercial bull customers.

First, seedstock suppliers should evaluate how their customers market their calves now and what changes may be made in the future. Selection for increased retail yield benefits only those commercial producers who receive a premium for improved yield through a grid-pricing mechanism.

Next, the type of crossbreeding system used by the commercial producer has a major effect on retail yield and whether selection emphasis is needed. Continental breeds such as Charolais, Limousin, Simmental and Gelbvieh are typically superior to Angus in retail product percentage.

A producer using one or more of these breeds with Angus in a crossbreeding system may not need to increase yield and may have a greater need for Angus bulls that emphasize marbling, maternal traits and moderate mature size, assuming daughters are kept for replacements.

In contrast, a commercial producer who maintains a purebred Angus herd or rotates Angus bulls with Hereford can benefit from using bulls that offer superior retail product percentage, provided retained ownership and grid marketing are also utilized. AJ

Beyond genetics

Without a doubt, expected progeny differences (EPDs) represent the single best source of information for changing carcass characteristics over time through genetic selection. You can apply genetic selection directly through sire selection and indirectly through selecting daughters by sires that are at least breed average for carcass merit.

However, don't forget the role that management plays in determining carcass merit. It's true that external fat cover affects yield grade more than ribeye area affects it. It's true that external fat thickness and rate of fat deposition are influenced by genetics. But external fat thickness is more practically determined by days on feed, or when we decide to pull the trigger.

Numerous factors determine days on feed, including cost of gain (corn price) relative to cash cattle price, replacement cattle price, near-term cash cattle price and method of sale (cash, in-the-beef, grade/yield, formula, grid or other), to name a few. In addition, fatter cattle tend to dress higher, increasing the odds of capturing potential grid premiums on those grids wherein cattle must compete against plant-average dressing percentages.

Indeed, in some cases, premiums gained on superior carcass characteristics can be lost on inferior dressing percentage. Perhaps the answer to the antagonistic nature of quality grade vs. yield grade vs. maternal function lies in identification and propagation of those lines of Angus cattle that can routinely:

1. Marble sufficiently for an acceptable percentage of the cattle to meet *Certified Angus Beef* ™ carcass specifications (average-Choice or above) at minimal fat cover (0.4 in. external fat) to improve yield grade;
2. Produce above-breed-average muscling per unit of carcass weight (again improving yield grade); and
3. Produce easy-fleshing, functionally adapted daughters for a given environment.

Continual success in the eternal search for these lines of cattle remains as the seedstock and commercial Angus producers' competitive advantage for years to come.

— by Ron Bolze