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Carcass Ultrasound 101

By Patrick Wall, Director of Communications, The CUP Lab®

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Selection: Is It “Genetic Progress” Or Just Genetic Change?

The last issue of *Carcass Ultrasound 101* dealt with selection practices used to increase muscle via ultrasound, mainly through the use of Ribeye Area (REA) Expected Progeny Differences (EPD). This issue turns to the quality side of ultrasound technology via selection for Percent Intramuscular Fat (%IMF) or marbling. The ability of ultrasound to measure carcass quality significantly helped launch the science, since cattle breeders cannot “see” marbling from viewing the live animal. In 2000, May et. al. used highly trained personnel to assess carcass quality and only mustered a correlation of 0.30. Recent validation trials of CUP Lab® software showed ultrasound %IMF correlation to carcass marbling score just under 0.80.

As breeders, it’s all too easy to establish goals that concentrate on specific traits; the tools to make “progress” are readily available. Unfortunately, the beauty and simplicity of EPDs can also cause breeders to make unwanted changes. It’s important to understand the potential for Mother Nature to humble cattle producers when using technology in mating decisions. However, a little patience and proper use of all the genetic tools available gives breeders an unequalled opportunity. A more in depth look at carcass quality selection via ultrasound can help breeders avoid some of the unexpected pitfalls.

The technology harnessed to measure marbling on the live animal via ultrasound has picked up steam in the last five years. Still, skeptics of the science want hard evidence that more cattle are grading Choice or better as a result of selection for carcass marbling. The USDA reported that from 1996 to 2006 the percentage of carcasses grading Choice or better actually declined while the percentage of Yield Grade 4’s went up. On the surface, it’s logical to say that cattle have less marbling and more fat than cattle from the mid 1990’s. However, if you study the genetic trends for Weaning and Yearling Weight EPDs of virtually every beef breed in the United States, most would agree that purebred cattle gain faster than they did ten years ago. Likewise, more moderate framed, earlier maturing (fatter) cows have replaced the taller, less economical styles of the 80’s and early 90’s.

Recent research across all biological types of cattle has proven that marbling is much more dependent on age than weight, fat cover, or feeding scheme. If one believes that cattle selection for growth via EPDs is working and cattle are reaching market weight faster than they did a decade ago, then one must also agree that cattle are being marketed younger. This raises an entirely new argument about who is to blame for the decrease in % Choice from ’96 to ’06. More current statistics of the percentage of cattle grading Choice or better are much more encouraging. The summer of 2008 brought record high feed and input prices to the cattle feeding industry, yet USDA Choice Grade out was roughly 3% higher than the average of the previous five years (2003-2007) over the same time period. Ask yourself, do you believe selection for carcass marbling at the seedstock level is beginning to have an impact on beef hitting the shelves?



There are essentially two ways to increase marbling: increase the number of days on feed (age) or select for improved marbling genetics. The genetic trend of marbling via ultrasound data selection is impressive among some breeds, stagnant among others. As a result, breed complementarity and heterosis have never been more important to the commercial bull & female buyer. The potential antagonisms between marbling and other traits, particularly reproductive traits, have been explored. A study by Iowa State University in 2001 showed that intensive selection for %IMF or REA was not detrimental to scrotal circumference in Angus bulls (A.S. Leaflet R1737). The general carcass assumption has long been that fat cattle have more marbling or high marbling cattle are generally fatter. While the general association between intramuscular and subcutaneous fat is positive, the two fat depots appear to be controlled by some different genes. The genetic correlation between Marbling and Fat is quite low (0.2-0.4). Still, if one ignores Fat EPD while selecting for Marbling, unwanted changes can occur. As always, mature size needs to be monitored to avoid selecting for cattle that mature or fatten too early. Potential yield grade discounts for progeny may soon follow.

The genetic antagonism between muscle and marbling has been disproved many times in the last decade. However, the assumption still looms over the industry. Comparing breed to breed, there are noticeable differences among them. But the fact remains, breeders can make “progress” in marbling and muscle at the same time by using ultrasound technology and genetic selection hand-in-hand. On the down side, finding a herd sire or donor female that excels in both marbling and muscle is a bit more difficult. Rest assured, when you find one, you won’t be the only person raising your hand when it comes into the sale ring.

Internal research conducted by The CUP Lab[®] has discovered animals that actually scan into the Choice grade when they come off the cow. This lends to the belief that marbling is a lifetime event in beef cattle, not a nutritional event inserted in the last 150 days on feed. As a result, one can make a general assumption that selecting for marbling genetics may be finding cattle that marble at a younger age than their contemporaries. Ultimately, if cattle are marbling younger yet also growing faster, one would hope the percentage of cattle grading Choice should at least hold steady if genetic selection tools are being used effectively. Other factors like implant strategy, diet, and management can also play a role in marbling deposition.

At the seedstock level, ultrasound is not only being used to find elite progeny that excel in marbling genetics, but also to pinpoint the carcass genetics that aren’t getting the job done. In the commercial sector, producers are setting threshold levels of %IMF that it takes to meet the goals of their operation. Those potential replacements that do not meet the minimum standard find a new home outside the breeding herd. In either case, basic reproductive soundness and performance traits should be considered in conjunction with carcass evaluation via ultrasound. To put it simply, a heifer that scans USDA Prime that will not conceive, milk, and rebreed has more value on the grid at 15 months of age than she will ever be worth as an open 3 year-old cow.