Carcass Ultrasound 101

By Patrick Wall, Director of Communications, The CUP Lab®
Volume 1

"%IMF or Marbling Score...Which is it? How can I tell?"

With all of the incentives to raise Choice and Prime cattle, it's easy to see why so much selection pressure has been placed on marbling. However, the industry has done a poor job of explaining how producers can use ultrasound to select for quality grade, how ultrasound "measures" marbling, and why it's done in such a confusing fashion. Percent Intramuscular Fat, or %IMF, is the common ultrasound term for marbling, but it needs further explanation to fully understand the concept. In short, %IMF is simply an indicator trait for marbling, much like Birth Weight EPD is an indicator of calving ease. With high marbling EPDs and carcass quality genetics demanding top dollar in the sale ring, it is extremely important producers understand what they are buying.

The major difference between %IMF and marbling is that %IMF is a numeric objective measure, whereas marbling is subjective to the eye of the grader. The correlation is usually around +.70 to +.80 between the two measures. In order to accurately predict USDA marbling score using ultrasound, the same grader would need to be used for every research trial. As a result, a chemical extraction procedure was adopted, using the percentage of intramuscular fat in the ribeye muscle. The collection of %IMF comes from taking a thin slice of the ribeye in the cooler. External and seam fat are removed from the sample. The steak is then frozen, ground up, and ether extract analysis determines the fat percentage from a sub-sample of the ribeye. Thus, a live animal with an ultrasound estimate of 4.0%IMF should also produce a carcass with a ribeye steak that has 4.0% fat within it.

This method captures saturated and unsaturated fat cells, both of which contribute to the eating experience of the consumer. USDA Graders can only measure fat or marbling they can see when assessing quality grade. Typical chain speed in a harvest facility often does not give ample time for some fats to "bloom" or whiten before the carcass is stamped for quality. As a result, some animals are sent to a "re-grade" rail in the cooler to allow more time for fat cells to appear to the human eye. Some High Select carcasses will actually reach Low Choice if given this opportunity.

Ultrasound machines show intramuscular fat by "hearing" a density change and portraying it on a screen as a grayscale (black& white) color change. Muscle tissue has a different density than fat, thus allowing us to estimate the amount of fat vs. muscle on a percentage basis. As a result, the prediction equations developed to estimate %IMF in seedstock do just that; they do not attempt to mirror any USDA grader. To classify and compare the actual IMF value is extremely difficult. A bull with a Birth Weight EPD of -1.5 is often termed a "Calving Ease Sire" with little to no argument. However, a bull with a high Marbling or %IMF EPD cannot necessarily be called a "Prime or High Choice Sire," but merely a bull with good carcass quality genetics.

The most confusing element of understanding ultrasound data is deciphering which unit of measure is actually under your nose, especially in the case of numeric marbling score vs.

marbling score degrees vs. %IMF. As one can see in the table, the number scale for Percent Intramuscular Fat and Numeric Carcass Marbling Score is not one in the same. There is no written law or breed association rule that defines how %IMF or marbling is published in either sale catalogs or advertisements. When data is sent out from The CUP Lab to a breed association or breeder, it is in %IMF form, simply an average value taken from 4-5 images per animal. Complex computer models estimate the percent of intramuscular fat within a box placed by the interpreting technician in a consistent spot between the 12th and 13th ribs in the image, reported to the nearest hundredth. Some breeds express the EPD in %IMF fashion, but others convert the measure to Numeric Marbling Score units in order to prevent confusion.

% IMF	Quality Grade	Marbling Degree	Marbling Score
2.0-3.0	Select -	Slight 00-40	4.0-4.4
3.1-3.9	Select +	Slight 50-90	4.5-4.9
4.0-5.5	Choice -	Small 00-90	5.0-5.9
5.6-6.9	Choice o	Modest 00-90	6.0-6.9
7.0-8.5	Choice +	Moderate 00-90	7.0-7.9
8.6-9.9	Prime -	Slightly Ab 00-90	8.0-8.9
10.0+	Prime o	Mod Ab 00-90	9.0+

When purchasing bulls or heifers, keep in mind that sale catalogs may express marbling or %IMF in any of the columns presented in the table, not to mention additional data for EPDs and Ratios.

Along with this, some breeders adjust bull ultrasound data to a "steer equivalent." This attempts to give bull buyers information on how they can expect feedlot calves from a particular bull to grade, offsetting the testosterone effect known to be detrimental to a bull's marbling. If all breeders used the same adjustment, data would be easier to compare. Unfortunately, a variety of unpublished math problems get used. Some use a base adjustment, for instance +2.0% IMF, which may overestimate the genetic ability of the poorest bulls to grade and undersell the top-end genetics. Others may multiply the actual %IMF or the age-adjusted values. If you are unclear if the data in front of you has been adjusted and to what extent, consult the breeder for clarification. Remember, the bull sale you attend first may differ from the one just down the road or the one you catch via satellite or video auction.

The easiest way to ensure you make the right buying decision is to use EPDs first and foremost. Regardless of how they get published in the catalog, %IMF or Marbling EPDs are your best source of ranking animals based on their genetics for quality grade. Using actual or adjusted %IMF values is risky; here's an example: You find a bull in a consignment sale catalog with a published %IMF of 6.25…pretty impressive. However, what was unpublished may scare you. The bull also scanned with 0.75in. backfat (unpublished) and came from a contemporary group that was fed hard and averaged 4.50%IMF. The bull was leaned up for the sale and looked really good that day. The chosen bull still looks pretty good for marbling until you figure in the +2.0%IMF adjustment put on every bull in the catalog. Using EPDs and Ratios would have told you the bull was below average in his contemporary group for marbling and should not be selected to help you increase quality grade in your calf crop.

The amount of information that accompanies a registered animal has and will continue to increase. With feed costs and high quality beef demand on the rise, marbling will remain one of the most important selection criteria. Be sure you don't let the numbers and stars get in the way of selecting the right animals for your program.