

Maternal Myths

New research says cows can ‘do it all.’

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It may be easier to explain why you don't have it than it is to get it. Marbling, that is. Some in the beef industry say that's the origin of the popular “urban legend” in the Angus breed that marbling potential and maternal function can't exist in the same herd.

“There are no facts to back that up,” says Dick Beck, Three Trees Ranch, Sharpsburg, Ga. “I do not advocate for single-trait selection for A or B carcass trait, but it just isn't that difficult to make carcass a part of your selection criteria.”

Yet the long-held suspicion that cows can't do it all is spread by registered producers as often as it is heard among commercial cattlemen.

“People have created this theory mainly because they haven't ever selected for carcass traits, so they try to characterize their herd as ‘maternal,’ ” says Bill Bowman, longtime operations and genetics executive at the American Angus Association.

A new research paper, “Selection for Marbling and the Impact on Maternal Traits,” explores the topic, citing nearly 70 sources on everything from heifer pregnancy and calving ease to milk production and maternal size. It is available at www.cabpartners.com/news/research.php.

Marbling selection

Virginia Tech Extension animal scientist Scott Greiner and graduate student Jason Smith combed through academic literature and the Association's *Fall 2013 Sire Summary* “to help answer the question: Has marbling selection affected cow herd productivity? In a nutshell, what we've found is that, no, it has not.”

“Marbling has a very small, if not insignificant, relationship with most of the traits that we associate with cow herd productivity,” Greiner says (see Table 1, page 82). “You can have terminal traits and maternal traits, and they can coexist.”

The first step to building a productive cow is to get her bred and bred early. Scrotal circumference is considered an indicator of fertility, both in bulls and their daughters.

“Early on, there were a couple of fairly high-marbling bulls that also happened to be low-scrotal-circumference bulls, and automatically there was this association that marbling and scrotal circumference had this

big negative relationship,” Bowman says, “but that is not the case.”

Both small-scale studies and actual analysis of the expected progeny differences (EPDs) for marbling and scrotal circumference found no association between the two traits.

“In the Angus breed, we don't have a ‘females reaching puberty’ problem at all,” Bowman says, but the paper also confirms that a marbling focus will not affect age of puberty.

“Profitability of a female to a producer can be limited by her ability to conceive during a normal breeding season,” the paper says, noting that “age at first calving” is often the chosen measurement of this trait.

Studies show differing results, one indicating no relationship and another pointing to an increase in a full unit of marbling would extend age at first calving by 10 days. The practical application of the latter leaves little need for concern.

“A breeder that makes a 0.25 unit improvement in marbling EPD would be expected to increase age at first calving by less than three days,” the authors state.

Ultrasound evaluation of heifers that settled in a single-service artificial insemination (AI) program had higher intramuscular fat compared to those that did not get bred in the first cycle. There is no correlation between marbling and heifer pregnancy in the Angus database.

High-marbling females reach fertility and similar breeding rates to their lower-achieving counterparts, but that's only half the equation.

Angus sires are highly sought after amongst commercial producers due to their ability to excel at calving ease while they



maintain or improve carcass traits when compared to a number of other breeds and their composites,” the paper says.

Is that urban legend, too, or based on fact?

Angus sires

The research is limited, but what exists doesn't expose any negative associations between marbling and calving. Instead, several findings highlight possible positive impacts, such as increasing marbling in tandem with calf survival, lower birth weight and better calving ease.

Once the calf is on the ground, higher-marbling mothers will likely have enough milk to nourish calves, but depending on ranch location, it could be too much.

“This is always important, whether you're selecting for marbling or not: keeping milk production at a level that's appropriate for your environment and your management,” Greiner says. “That optimum level is different depending on where you live and what your resources are.”

Some genes that influence milk production seem to be in the same chromosomal region as those responsible for marbling development, so DNA technology may increase understanding of that relationship in the future. For now, the Association's data provides the best picture, showing that there is a positive correlation of 0.22 between marbling and maternal milk EPDs.

“Single-trait selection for marbling may lead to elevations in maternal milk yield,” the authors note, but “opportunity currently exists within the Angus sire population to

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select for marbling while divergently selecting for maternal milk."

The scientists found no evidence of increased calving interval or reduced stayability among high-marbling populations.

Seedstock producer Lee Leachman, Wellington, Colo., participated in a roundtable with Beck, Bowman, Greiner and others last year and says, "We calculate a calving-interval EPD and it is not correlated to marbling in our database."

He also wondered about the impact of popularity in AI sire selection, since that is bound to be "influenced by the trends and fads of the day. The use of outlier, high-\$B bulls has become less popular because of the perception that those cattle might be less functional."

Indeed, Bowman says the average marbling EPD of the 25 top-use AI sires had dropped. However, the recent white paper showed although the numbers shifted somewhat, all of the trait correlations maintained the same trends when high-use and high-accuracy bulls were compared to the Table 1 data for all Angus sires.

Leachman says it's important to figure out whether that cow-function/marbling relationship exists. "Is it real or is it perceived? If it is just a perception, then we should put our foot back on the pedal to increase carcass quality," he says.

The white paper suggests the perceptions have little to no basis in fact.

Beck says it is a seedstock producer's responsibility to stay focused on marbling. "Five to 10 years from now, the surviving feedyards will know where the cattle are

coming from," he says. "If we've taken our foot off the pedal, we're setting our customers up for failure."

Selection includes culling, of course, but if high-quality females leave the herd, it's not likely due to increased aggression because the paper finds no significant link between marbling and docility EPDs.

Research in the areas of mature cow size and cow efficiency is difficult to discern. On one hand, high-marbling cows may tend to be larger and slightly less efficient. The cow energy value index (\$EN) has a minor negative correlation with marbling at -0.23. On the other hand, the marbling EPD is positively correlated with the residual average daily gain (RADG) measure and the Angus weaned calf dollar value index (\$W), "suggesting a favorable relationship between marbling potential and both preweaning value and postweaning gain efficiency," it says.

Using EPDs and indexes to match cattle to environment is key.

"The tools are there; you just have to use them," Bowman says. "The mature size-type components are totally underused."

This paper explains associations or the lack thereof between traits, but Greiner says what a cattleman sees at the ranch is more than just genetics at work.

Breeding for maternal traits takes much longer to see marked improvements since they're lowly heritable measures, he says.

"Take a trait like fertility. We do know there is a genetic component, unquestionably," Greiner says. "It's just that the environmental factors override it so much that genetic selection becomes more difficult for the simple fact that identifying differences becomes more difficult."

Beck says that's why it is so rewarding to focus on both sides at the same time.

Benefit of both

"Of course we should keep working on the cow herd, but why would you walk away from making progress on a trait that's easily improved?" he asks.

Consumer demand trends underscore that it's not just a rhetorical question. Colorado State University meat scientist Dale Woerner says, "Flavor has replaced tenderness as the key driver of beef consumption today. Never lose sight of the fact that marbling is the key driver of flavor; don't weaken on your marbling focus."

Plus, as Beck says, it's not tiring to include that focus.

"To say I'm going to improve 90-day conception rate by 5%, that is a tough, tough goal," Beck says. "Saying I'm going to improve the quality grade of my next calves by 5%, I can do that in my sleep with the right genetics, and it doesn't take away from my efforts to improve on those tough goals."

Maternal traits are still hard to pin down. However, in the last few decades the Association has utilized EPDs to accomplish this, adding heifer pregnancy, and now incorporates DNA information into those tools.

"Through the use of genomics and science, moving forward we're going to be able to understand these relationships much better," Greiner says.

Of course, getting a good grasp on reproduction, fertility and longevity at the ranch level starts in much the same way: "There's no substitute for good herd records where they can keep track of things like the number of cows exposed, pregnancy rate, how many calves born in the first cycle of the breeding season, weaning weight of calves and those kinds of things that are all tied together," he says.

Bowman notes that the Angus breed has been known for both its maternal and carcass merits since the cattle arrived in the United States 135 years ago.

"That said, I don't like to live relying on tradition or history, so we now have a very complex, expansive database that will allow genetic progress to be made for these traits with great reliability," he adds. "Proof is in the genetic trend that we've seen in the Angus seedstock that have improved growth, improved maternal capabilities, while at the same time improving all aspects of carcass genetics."

That's the stuff of legends ... backed by facts, of course.



Table 1: Pairwise correlations between marbling and maternal EPDs or dollar value indexes for all sires included in the Fall 2013 Angus Sire Evaluation Report

Statistics	r	P value
Birth weight (BW)	-0.08	0.0001
Calving ease direct (CED)	0.17	< 0.0001
Calving ease maternal (CEM)	0.28	< 0.0001
Weaning weight (WW)	0.15	< 0.0001
Yearling weight (YW)	0.19	< 0.0001
Residual avg. daily gain (RADG)	0.07	0.0027
Scrotal circumference (SC)	0.06	0.0039
Heifer pregnancy (HP)	0.06	0.0408
Docility (DOC)	0.05	0.0258
Maternal milk (Milk)	0.22	< 0.0001
Mature weight (MW)	0.13	< 0.0001
Mature height (MH)	0.18	< 0.0001
Cow energy value (\$EN)	-0.23	< 0.0001
Weaned calf value (\$W)	0.15	< 0.0001