

Is there Middle Ground?

Easy keeping vs. lean beef

By Jim Cotton
Editor

That Angus cow is a remarkable creature. She can span a broad spectrum of beef production. Envied and respected for both its carcass merit and maternal qualities, the Angus cow continues its ascendancy. Most crossbreeders agree: "Y" need some Angus in there -- maybe 50 percent in most cases."

The expectations levied by such a reputation become a bit burdensome in this age of specification beef. Can the breed retain the values cowmen across the country appreciate while satisfying the packer-retailer-consumer segment of the chain? The polarity between easy keeping and lean, muscular carcasses is defining the field. Some say no breed can reconcile these two ends of the process successfully. At least, consistently. Others say, yes, the possibility of a breed supplying both easy "fleshing" characteristics and lean beef attractive to shoppers is within the grasp of technology and genetics. Selection, environment, and heritability are the forces that bring into harmony.

In his presentation before the 1988 National Beef Cattle Conference at Oklahoma State University last May Dr. Larry Cundiff of the Meat Animal Research Center, Clay Center, Neb., addressed muscling as a goal of selection. He concluded genetic variation between breeds compares to that found *within* breeds for most growth and carcass traits. He stated -- because of the moderate to high heritability of carcass traits -- significant genetic change can result from selection both between and within breeds.

Then, if carcass traits respond well to selection, what of the criticism that lean, muscular cattle lack the constitution to survive economically on the range?

Practical experience here is well known. Every breed has its strain most dyed-in-the-wool cowmen scornfully dismiss as "hard doers". Dr. Daryl Strohbehn of Iowa State University and Dr. Harlan Ritchie at Michigan State acknowledged these observations in their report to the Cornbelt Cow-Calf Conference at Ottumwa, Iowa:

"At the production level, the cowman needs females that reach puberty early, "flesh" easily, winter well, calve easily, and breed back on schedule. However, research has shown that these traits are not altogether compatible with the

demand for a reduction in fat in the final product. These antagonisms could be solved by utilizing a terminal sire program in which a lean breed of sire is mated to fleshier, easier-keeping females."

For the crossbreeder, this is fairly simple. Poring over the sire summaries of Breed A and matching them with the characteristics of Breed B charts his or her course. For the purebred and registered seedstock producer, the search may become complicated. For the Angus breeder, the investigation must be even more thorough as another factor enters the equation.

The breeds' traditional marbling ability is not compatible with selection for leanness. This is well-established by both research and literature. Drs. Ritchie and Strohbehn describe the degree of finish as a "two-edged" sword. They point out the correlation between marbling and trimmed retail yield is antagonistic and negative, ranging from -0.5 to -0.7. "At the product level, a minimum amount of external fat (0.2 in.) along with Choice marbling would be ideal. . . . These are antagonistic traits. (T)he genetic correlation is not perfect, which leaves some room for hope."

Over its years on the North American continent, the Angus industry has established its ability to move from large and highly finished products in the early 1900s to short and heavily finished in the 1950s, then to large and lean in the 1980s. Dr. Gary Smith of Texas A&M University cited this ability to point out the effectiveness of within-breed selection pressure. The Angus breed has been able to change its frame size up or down all the while retaining its unique predisposition to marble easily. An advantage to be sure in the changing marketplace and its expectations.

At this year's Beef Improvement Federation Annual Meeting and Research Symposium, Albuquerque, N.M., Dr. Smith considered marbling and the response to it by different breeds.

He introduced the little-known segregation of breeds by muscle fiber in the rib-eye area. Angus belongs to the red fiber group, he notes, in company with such breeds as the Jersey, Longhorn, and Short horn. These breeds, through their pre-

dominant red fibers, use fatty acids as a primary source of muscle energy for contraction and relaxation.

Breeds such as the Charolais, Maine-Anjou, Limousin, and Gelbvieh are white fiber cattle deriving their muscle energy largely from blood and muscle sugars such as glucose and glycogen.

Red-fibered breeds store fatty acids in intramuscular depots -- as marbling -- the flecks we see distributed among the muscle portions of the carcass. White-fibered cattle have much less need for a nearby source of fatty acids for energy, and therefore there's less marbling in their ribeyes.

Also, Dr. Smith points out, because white muscle fibers are substantially larger in diameter -- on the average -- than red muscle fibers, those breeds have larger ribeyes than their red-fibered cousins. This red fiber - white fiber situation provokes the well-known apparent genetic antagonism between muscling and marbling.

So, if that's the science behind some of the Angus marbling factor, what's the meaning when trying to balance easy keeping with muscularity and/or leanness?

The inherent ability of Angus to marble is its trump card in the quest for lean beef produced economically out on the range or farm. Consumers, says Smith, are objecting to the "waste" fat -- that along the borders and in the seams between muscles -- but not the "taste" fat, or that inside the muscle. In short, breed off the waste, retain the taste.

Well, how?

Dr. Smith sums it up in this couplet: match the cow to the environment, the bull to the endpoint, to breed offspring that will dominate in the marketplace.

Again for the crossbreeder with a plan, he can achieve the best of both worlds -- broody, low maintenance cows mated to a meatwagon of a bull.

For the purebred and seedstock producer, the procedure is the same except his or her investigation must be more thorough. Selective breeding and complementarity are the keys, Smith suggests.

Complementarity as defined by Dr. Smith involves these essentials:

1. Identify the genotype of the female needed to operate in the environment. Consider the temperature, humidity, feed supply, wintering situation.

2. Appraise the cow's most probable beef end-product if she were to reproduce herself without some sires influence (try to predict quality and yield from the female's genotype).

3. Select your market and shoot toward its quality and yield specs.

4. Select a bull of a genotype that's targeted toward producing the offspring (feeder cattle) desired in Number Three.

In other words, make sure the genotype of the purebred sire complements the genotype of the purebred cowherd. Another question needs to be raised. What if we're not happy with our genotypes? Are there shortcuts we can take toward changing something less than desirable?

Or, perhaps we're quite satisfied with the genetics we have. Why jeopardize and risk a loss while trying to incorporate some new element such as more muscling?

Dr. Dave Buchanan of Oklahoma State University presented discussions of this dilemma at both the National Beef Cattle Conference and the American Angus Breeders' Futurity Conference -- "The Next Decade" -- held in Louisville, Ky., July 31, 1988.

Cycles, said Dr. Buchanan, in the cattle business usually stem from trying to correct a substantial shortcoming in the cattle of the day. Frame size will be recorded as one of the most historic.

Buchanan states those who would pursue genetic alteration need a wide-angle perspective. "It appears genetically altering one aspect of development without adequate attention to the overall well-being of the animal will ultimately lead to a revolt by Mother Nature.... Selection pressure is a precious commodity, especially in cattle, and should not be squandered on traits that do not contribute to efficient production."

Buchanan believes the well will only deliver so much. Asking for progress in traits that may be important economically but which are slow to respond to selection or hard to measure may be self-defeating. What, then, will selection for increased muscling do to growth, reproduction, and maternal ability?

There's not much literature describing the relationship between carcass characteristics and reproduction or maternal ability, says Buchanan. What is available is not all that encouraging. Results from one half-sib germ plasm evaluation done in 1984 by MacNeil et al. with seven breeds indicates a definite negative correlation between fat thickness and reproductive

Results from this and similar studies suggest selection for reduced fat trim can likely produce delayed puberty, decreased fertility, increased birth weight and calving difficulty, and increased preweaning growth of progeny. Buchanan characterizes these relationships as not very strong, saying "but they have sufficient strength to indicate that singleminded selection for increased muscling in breeds... would diminish productivity...."

He advises against single selection based on muscling. The cattle industry

when evaluating bulls that have been sonorayed for fat thickness. In absolute terms, the difference between steers and bulls ranges from 0.1 to 0.2 inches. If one's goal is to produce market cattle with carcasses having less than 0.5 inches external finish, some guidelines might be proposed (TABLE 1).

State Strohbehn and Ritchie: "The values in TABLE 1 suggest in order for bulls to sire progeny with no more than 0.5 inches of external fat, they need to sonoray somewhere in the range of 0.10 to 0.45 inches, depending upon the breeding value of the cowherd they are used in. Yearling bulls with more than about 0.45 inches are simply too fat for today's beef industry.

Pressure from such industry giants such as Excel has pushed muscling to center stage. Whether other segments approve is of secondary importance; it appears they must cope in the future through a system of premiums or discounts. What's known, Ritchie and Strohbehn point out, is the emphasis on muscle-to-bone ratio. The percentage of retail beef being merchandised in boneless form is rapidly becoming an industry norm.

Do British breeds possess enough muscling? Ritchie and Strohbehn cite a MARC (Meat Animal Research Center) five-year study that ribeye averages of Angus and Hereford progeny have not changed much over a 15-year period. The data gathered show the breeds have been picked up in growth rate without an accompanying increase in muscling. "Therefore," they conclude, "it appears that breeders of British cattle need to place more selection pressure on muscling in order to better position themselves in the beef industry of the future."

Generalities apply. There are, of course, individual sires and lines in the Angus breed excelling in muscling and muscle-to-bone ratio. A number have been identified. Gravitating toward these bloodlines must be tempered with an understanding of the tradeoffs and antagonisms. Ritchie and Strohbehn raise these flags concerning extreme muscling:

1. Ribeyes too large for acceptable portion size.
2. Reduced quality grade (lower marbling).
3. More calving difficulty.
4. Bigger cows and higher maintenance costs.

Dr. Buchanan points out extremes in leanness and muscling will be especially dangerous if they surface in breeds "that

TABLE 1: Proposed mating plans for producing market cattle with .5 inches external fat or less.

Breeding value of cowherd for external fat (steer basis),	Suggested range in fat thickness of bulls used
0.8	0.10 - 0.13
0.7	0.10 - 0.20
0.6	0.10 - 0.27
0.5	0.10 - 0.33
0.4	0.10 - 0.40
0.3	0.10 - 0.47

has never been very skilled in knowing when to stop in its quest for change. Also, it is a fragmented industry. One segment's meat may be another's poison. The economic objectives of the different components of the industry are not always compatible. And, muscling appears to be the orphan of the industry. Packers want it and lack the means to produce it. Producers can produce it, to a degree of course, but are not sure they want it at the expense of cow herd efficiency.

Are there some guidelines for monitoring muscling/lean while retaining the breed-ability of the cowherd? Ritchie and Strohbehn lay out some pegs. Fitting them in the right holes requires a recognition of the antagonisms. They suggest maternal and general purpose bulls would be expected to carry more finish than terminal sire breeds. "A suggested standard to follow would be 0.20 to 0.45 inches on maternal and general purpose bulls and 0.10 to 0.30 inches on terminal bulls."

The writers acknowledge getting a handle on the fat thickness of one's bull battery is difficult unless there's been some sophisticated effort to collect carcass data or employ ultrasound. A rough guide suggested is to consider British Choice steers as possessing an average fat thickness of 0.60 inches; British X Continental steers as 0.45 inches; and Continental steers, 0.30.

Strohbehn and Ritchie emphasize it is important to remember steer progeny will carry about 50 percent more external finish than their sires if they are of the same breed. "This should be taken into account

are major contributors to the commercial cowherd . . . Selection theory tells us that the most efficient route to improvement is to establish our selection objective, then derive the index of performance traits that has the largest correlation with that objective . . . Current economics may justify more emphasis on muscling and leanness than previously. . . ."

Buchanan suggests growth rate and carcass merit can be provided to the calf through the sire without having much effect on the maintenance requirements or reproductive ability of the cowherd. Fairly easy for the commercial cowman to achieve, clearly easy through intelligent crossbreeding.

And, not impossible for the registered seedstock producer who studies the genetics available within his or her breed. The trick as Buchanan points out is to emphasize a balance of traits while ensuring that nothing is done to damage the breed's primary utility.

"Historically," he continues, "those breeds of livestock that cannot serve broad segments of the commercial industry, have become novelties."

Angus breeders are blessed. Over the decades past, their cattle have possessed qualities to satisfy the mainstream while serving the tributaries flowing from many diverse channels. They've contributed marbling and carcass merit to the conti-

mental ox plus a solid dose of maternal ability to its mother. They've beefed up and lent hardiness to dairy crosses. They've provided heterosis and other valuable traits of soundness, polledness, and pigmentation across a wide variety of English-bred crosses. They've established enough variation within the breed for selection and outcrossing opportunity.

If the breed is called upon to excel as both a builder of lean, muscular steers and reproductive, economical heifers, then its mettle will be tested. Perhaps as no breed's been tested before.

Yet as Harlan Ritchie and Daryl Strohbehn pointed out in Iowa, the Angus Sire Evaluation Report revealed there are bulls that can do both - hang an exemplary carcass plus produce sound, easy-keeping females. Their analysis shows out of 420 Angus sires, 120 are breed average or higher for three important carcass traits - marbling score, fat thickness, and ribeye area. Of the 120, eight they describe as well*-balanced for other traits: less than plus five pounds for birthweight; more than plus 35 pounds for yearling weight; and at least breed average for milk.

"This simply shows there are bulls available," they write, "that can improve carcass as well as other production traits."

Spanning the demands and standing the test of time. . . Aren't those traditional Angus values as well?

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Next

Walking your clients through the EPD process.

41