CPEC/FARMVET TECHNOLOGIES

The Sortin' Stick

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PREDICTING CARCASS MARBLING SCORE

One of our licensed technicians from Illinois recently asked John Brethour a few questions in reference to carcass marbling. Jamie's specific questions were: 1) At what rate do different cattle marble?; 2) If marbling EPD is accurate, then isn't the rate of marbling being measured?; 3) If not, what is marbling EPD measuring?; 4) Genetic propensity to marble?; 5) We must know the difference in rate of marbling to accurately predict endpoint marbling; 6) Do we have any idea at all what the range in rate of marbling is or what affects it?; 7) Obviously we have proven that early introduction to starch in the diet affects final marbling (I think) but what other factors come into play? Following is the response John gave to Jamie's questions.

Considering how important marbling is, there is really not that much research out there. Also, much of it has been interpreted incorrectly. About ten years ago, I included in a Journal of Animal Science paper the observation that marbling scores do not fall into a Gaussian (bell shaped) distribution and therefore conventional statistics are not appropriate in analyzing those data. A different set of procedures called non-parametric statistics is required. So, most scientists make the mistake of concluding that there are no treatment differences when differences may actually exist.

It would be nice to know if breed affects rate of marbling deposition, but there are not any experiments that address that issue. In our program we use a power function equation. The following is taken from a journal article and explains this.

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Predicting Carcass Marbling continued

Predicting Carcass Marbling Score (Quality Grade)

For the Group 1 cattle, little difference occurred among linear, exponential, and power functions (r sq. = .763, .765, and .776, respectively) when they were compared for fitting the serial ultrasound marbling scores, although the power function had a higher r sq. value. Differences among models were more evident in Group 2, where r sq. values were .802, .823, and .852 for the linear, exponential, and power function models, respectively. In both Groups, the power function provided a significantly better fit because of the large number of observations in each data set.

Intuitively, the power function (Figure 5), which is more concave than the exponential function, seems to describe the change in marbling score best, because it coincides with observations that cattle that have low initial marbling do not reach Choice, even when fed for as long as 200 days. It also explains why other cattle can quickly surpass average Choice and even grade Prime. The progression is slow early in the feeding period (about .01 marbling score unit per day or 100 days to move from Low Select to Low Choice) and then starts to increase faster after cattle reach Low Choice. But animals that start with low traces of marbling (Standard 0) usually fail to become Choice within conventional feeding periods (>200 days).

The solution of the power function equation that models marbling enables the prediction of future marbling as a function of time from an estimate of present marbling. Some machines may not have the exact equation in them but their programs do approximate the power function equation model.

What this says is that cattle with low initial marbling will increase slowly and those with a higher initial marbling will increase faster. (It took 114 days to go from Low Select to Low Choice, 70 days from Low Choice to Average Choice, and 96 days from Average Choice to Prime-two marbling steps). So there are differences in marbling rate that depend on differences in initial marbling readings, which in turn are related to breed.

The neat thing about this model is that it fits cattle that have a low initial value of about 3.5 and never get to Choice even after 200 days while cattle with an initial value of 5.0 can be CAB after only 80 days in the feedlot.

Predicting Carcass Marbling continued

Considering the experimental error in studying marbling, the immense cost of serial slaughter, and the error associated with getting objective carcass marbling readings on different slaughter dates in the packing plant, I doubt if anyone is going to improve on this model.

One item that I want to mention, however, is the question of whether the high marbling values that are obtained on calves or on feeder cattle when they enter the feedlot really represent the amount of marbling that would appear in the carcass if the animal were harvested on that date. Or, are these signals that register as marbling on the image really precursor fat cells that will fill later? I do not know why implanting reduces marbling.

I really doubt if feed affects marbling unless the animal is deprived. I know that I can get as much marbling from our Western Kansas milo as you can from your filthy corn! I think that stress reduces marbling because it is located where it can be quickly metabolized when the animal needs to overcome an energy shortfall.

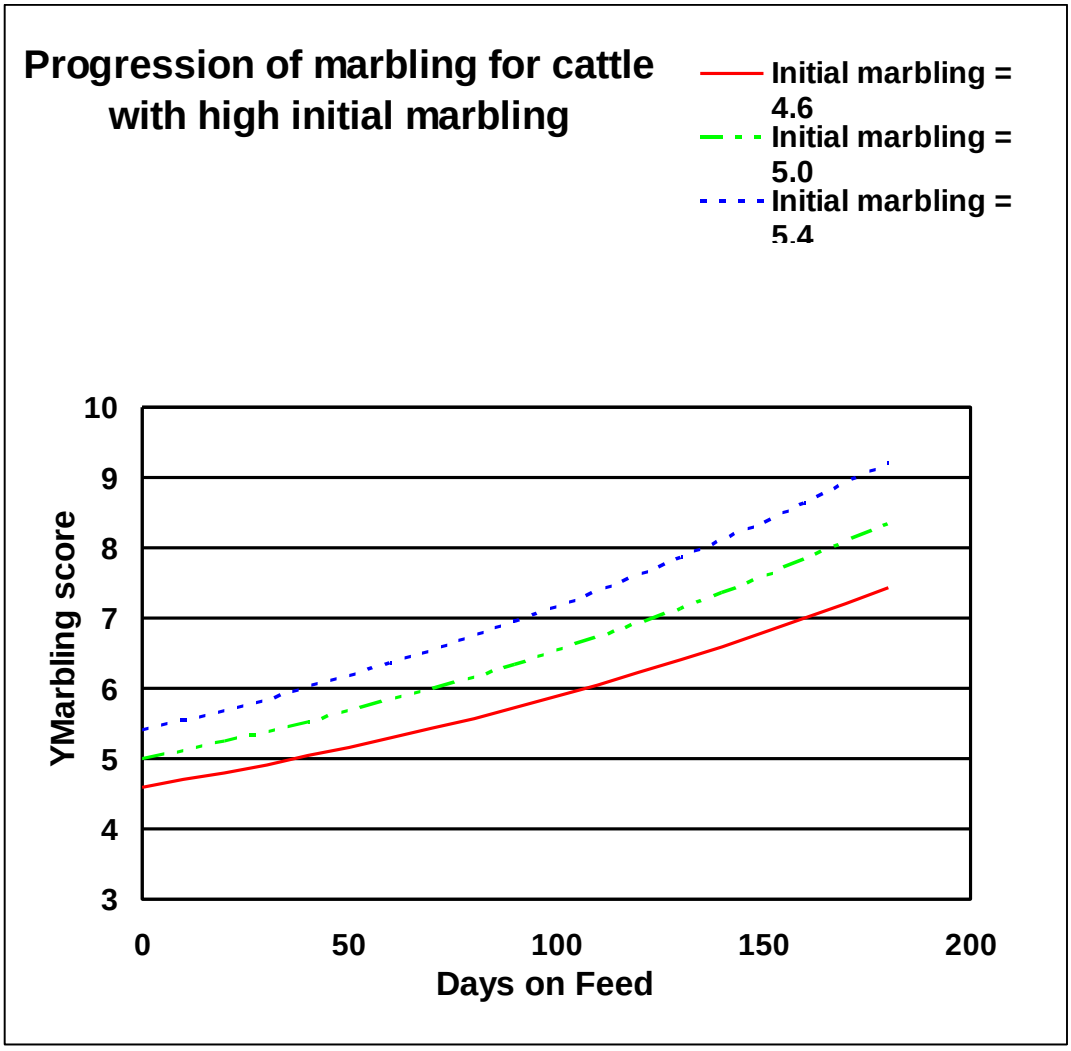
25 years ago I played around with trying to increase marbling with shots of dexamethosone (Azium) and thought that I had some benefit although it was inconsistent. I tried feeding MGA to steers with the idea that progestins should increase marbling but there was no response. Last summer we observed that pregnant heifers graded better than open heifers. But, were the heifers that marbled better, those that were more likely to get pregnant?

I wish that we knew whether some breeds stall in marbling when they are about a year old while others may continue to marble forever (Wagyu).

Our results do not agree with the contention that heifers have all the marbling that they are going to have at about 110 days. The ones with the genetic propensity to marbling continue to increase while the colored heifers increase so slowly that one does not get much change in percent Choice with another 50 days on feed. This is about all that I don't know about marbling!

The power function equations for the change in marbling score in Groups 1 and 2, respectively, were Y = 3.10 + .00214 * T (to the 1.55 power) and Y = 3.39 + .00000000123632 * T (to the 3.42 power), where Y = marbling score, and T = days.

Predicting Carcass Marbling
continued



Differences in Grading

Recently, 117 steers were delivered to a major packing plant and harvested in two groups. The owner had the plant pull 59 head from the pen and they were graded by a USDA grader. 45 minutes later the other 58 head were harvested and graded by a different USDA grader. Here are the results from the grading of the cattle:

	Grader 1		**Grader 2**	
Average Marbling Score	5.06		5.91	
Prime	0	0.00%	4	6.90%
CAB	5	8.47%	8	13.79%
Choice & Higher	28	47.46%	42	72.41%
Select	28	47.46%	15	25.86%
No Roll	3	5.08%	1	1.72%
Total Head	59		58	
YG #1	9	15.25%	24	41.38%
YG #2	25	42.37%	27	46.55%
YG #3	21	35.59%	7	12.07%
YG #4	4	6.78%	0	0.00%
Total Head	59		58	

Actually Grader #1 evaluated the first half, which one would expect to be the better cattle. Notice the discrepancy in Yield Grade is about as great as Quality Grade. And our customers complain that the packing plant grades do not exactly match the ultrasound predictions!!!

Our annual CPEC/FarmVet Technologies meeting has been scheduled for September 23rd and 24th in Hays, Kansas at the KSU Ag Research Center. Please mark your calendar and plan to attend as we have an excellent lineup of speakers and information. Please RSVP.

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