Why Haven't We Seen an Improvement in Quality Grade?

A Genetic Improvement Perspective

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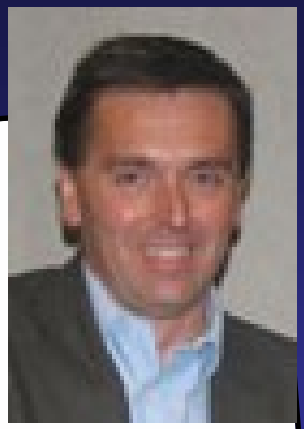
The Seedstock Digest

A Cattleman's Guide to the Future of the Beef Industry

Genetics/Marketing/Management:
Discussion -- Why we aren't seeing a shift in the % IMF in the cattle population, despite tremendous selection pressure in the seedstock industry for marbling? Before beginning this discussion, I would like to thank everyone for the overwhelming response to this question. I have been able to have great discussions with representatives from breed associations, academia, breeders, and feeders on this topic. While the following summary of these thoughts may not provide any definitive answers they are thought provoking.

The dilemna: The industry certainly has ratcheted up its selection pressure on carcass traits, but a look at industry averages would bring into question whether the industry is making any progress at all. Looking at the data we have lost muscle relative to carcass weight, increased fat, while the percentage of cattle grading Choice, Upper 2/3 of choice and Prime has remained essentially flat.

Possible explanations: Probably the most common theory was that genetic improvement and genetic trend have been masked by **market conditions**. Excellent profitability and a high degree



Proceedings, Annual Meeting of Beef Improvement Federation
May 15-17, 1996, Birmingham, Alabama

Carcass EPDs: Put Up or Shut Up!!

Ronnie D. Green
Department of Animal Sciences
Colorado State University, Fort Collins

Is Measurement of Carcass Performance Justified?

The past ten year history of the "carcass merit/value-based marketing" issue in the beef industry has burned up a tremendous amount of energy. Most of this energy has been consumed by making the repeated argument from both industry **and** academia that: "We do not get paid on the basis of performance in the carcass, and until we do, there is little justification for collecting carcass data. Furthermore, "value-based marketing" is a buzz term made up by the packing industry, for the benefit of the packing industry, that seems to keep getting delayed in its implementation." While this argument may appear to be historically true, it also is somewhat short-sighted. The fact of the matter is that the business of selling beef and beef products has become more challenging due to competition of products from the poultry and pork industries.

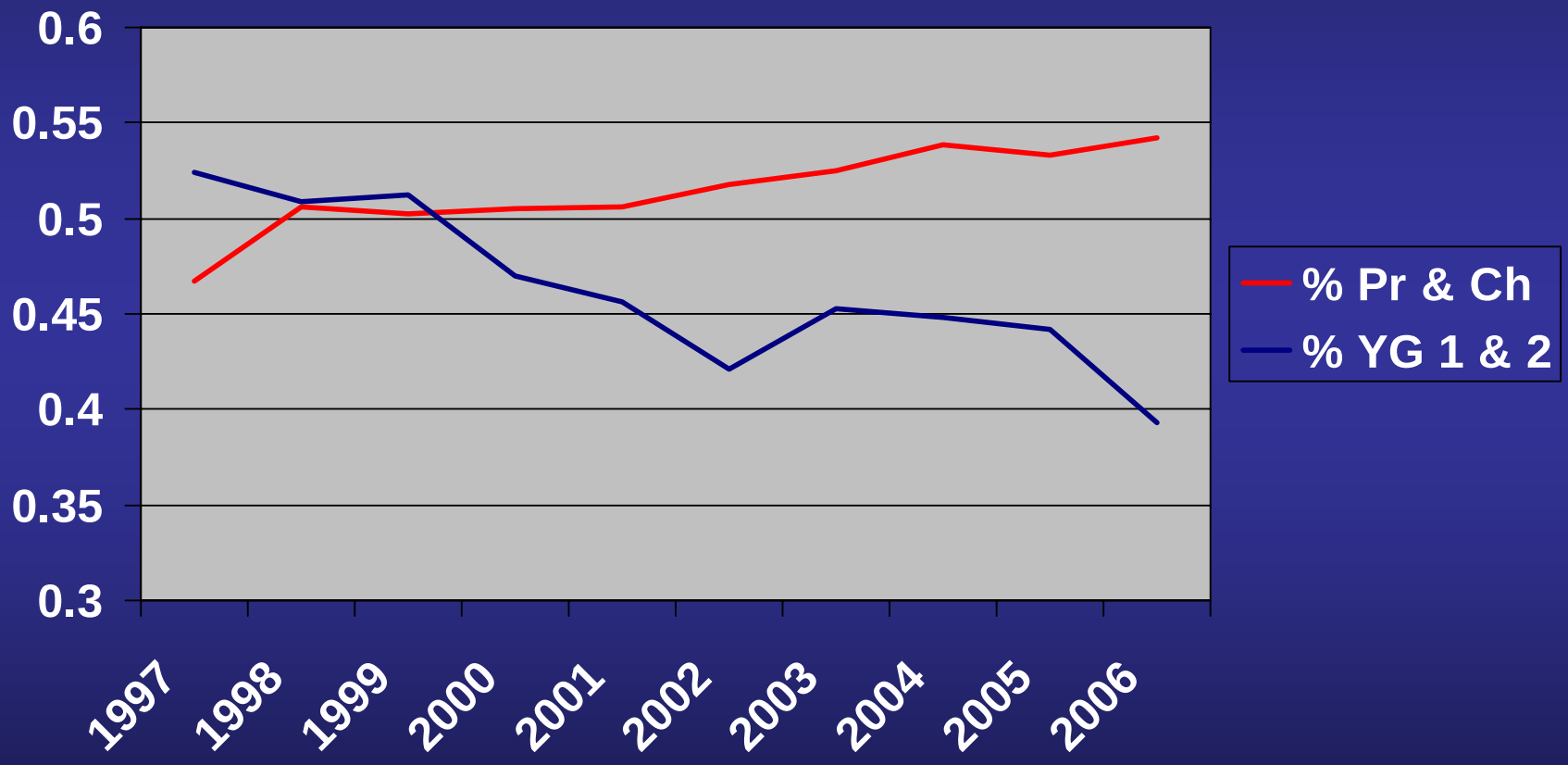
The response of the beef packing and retail industries is beginning to be seen through the development of new closely-trimmed boxed beef and through the development of alliance and branded beef programs. In the past two years, Excel, IBP and Monfort-ConAgra have all

Audience Response

In response to Dr. Green's challenge, the beef industry decided to:

1. Put up
2. Shut up
3. Give up
4. Do something else


Simmental
Very
We've Been Busy!
Calving Ease Program
4,000 British Heifers Mated
Average Birth Weight 77.6 lbs.
Carcass Program
Over 25,000 Cows Mated
Average 75% Choice, Yield Grade 2.7
Multi-Breed Focus
1st Multi-Breed Genetic Evaluation
SimAngus Solutions
Simbrah Maternal Power
"We're committed to producing cattle that calve easily, grow fast and efficiently and have distinct end product value."
AMERICAN Simmental ASSOCIATION
406-587-4531
"I have learne
Just being bla
CERTIFIED ANGUS BEEF
INTERNATIONAL BREEDERS
Beef u
LIM


0.6
0.55
0.5
0.45
0.4
0.35
0.3
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
% Pr & Ch
% YG 1 & 2

	97	98	99	00	01	02	03	04	05	06
Pr + Ch	46.7	50.6	50.2	50.5	50.6	51.8	52.5	53.9	53.3	54.2
YG 1&2										
YG 4										

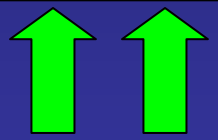
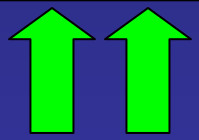
	97	98	99	00	01	02	03	04	05	06
Pr + Ch	46.7	50.6	50.2	50.5	50.6	51.8	52.5	53.9	53.3	54.2
YG 1&2	52.4	50.9	51.2	47.0	45.6	42.1	45.3	44.8	44.2	39.3
YG 4										

	97	98	99	00	01	02	03	04	05	06
Pr + Ch	46.7	50.6	50.2	50.5	50.6	51.8	52.5	53.9	53.3	54.2
YG 1&2	52.4	50.9	51.2	47.0	45.6	42.1	45.3	44.8	44.2	39.3
YG 4	1.0	1.3	1.5	1.8	2.4	3.2	4.5	6.3	7.3	9.1

Conventional Wisdom says,

- We've made great genetic progress in beef quality, but environmental factors have limited expression.

Carcass Genetic Trends

	Marbling	Ribeye	Fat
Angus			
Red Angus			
Hereford			
Simmental			
Limousin			
Gelbvieh			?

Genetic Change for Marbling

- Marbling EPD is increasing
  - About 0.015 per year in Angus
  - About 0.0075 per year in several other breeds

Conventional Wisdom says,

- We’ve made great genetic progress in beef quality, but environmental factors have limited expression.

Upon further review,

- In many cases the genetic improvement of marbling has been overstated

What Drives Genetic Change?

$$\Delta_{BV} / t = \frac{r_{BV,EBV}\, i \sigma_{BV}}{L}$$

What Drives Genetic Change?

- Accuracy of Selection
- Generation Interval
- Genetic Variation
- Intensity of Selection

Genetic Variation

"Variation – differences between individuals – is the raw material on which the breeder works,"

Lush, 1945

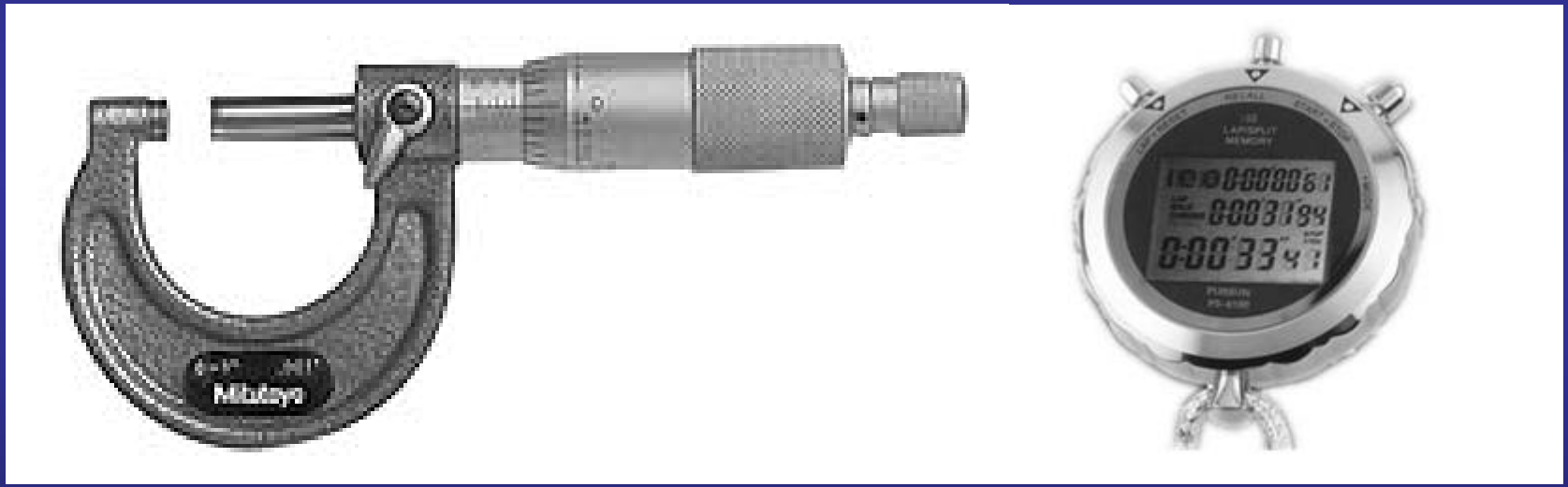
Can we increase genetic variation?

- Purebreds ⟶ Hybrids
- International evaluations and importation of germ plasm
- Need more high quality lines in more breeds

Intensity of Selection

- Superiority of selected parents over the population average
- Limited by the number of traits selected for and the genetic antagonisms that exist
- A function of breeder decisions
  - Resulting from imperfect market signals
- Population size also plays a role

Accuracy and Generation Interval



Loss of Accuracy

- Selection on
  - Actual scan data
  - Scan data ratios
- Limits of IMF prediction
  - We want the outliers
  - Has model development ended?

Loss of Time

- Is running BLUP twice a year the only possibility?
  - How about between scanning and breeding?
  - Would provide parent EPD at age 3 rather than age 4

Loss of Accuracy

- Optimum accuracy of selection occurs when EPD for the ERT (marbling) are calculated and published
  - using the indicator trait (IMF) as a correlated but unpublished trait
- Alternate methods also discourage actual carcass data collection

Conventional Wisdom says,

- Ultrasound measurement of carcass traits in live breeding animals has made collection of carcass data irrelevant / unimportant / obsolete

Audience Response

Assuming r_g of IMF and marbling is 0.70, using a bull with an ultrasound IMF EPD accuracy of 0.90 gives similar accuracy of selection for marbling as using a bull with a marbling EPD accuracy of:

1. 0.90
2. 0.70
3. 0.63
4. 0.28

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Huh?

(BIF) Accuracy of IMF EPD	0.90	0.90
True Accuracy of Selection for IMF	0.995	0.995
Genetic correlation between IMF and MARB	0.70	0.80
True Accuracy of Selection for Marbling	0.696	0.796
(BIF) Accuracy of Selection for Marbling	0.282	0.395

Bottom Line

- In a correlated trait approach, adding a few carcass progeny records to a bull with lots of scan data can
  - Significantly increase accuracy
  - Significantly change the marbling EPD
- An ultrasound-only IMF EPD severely overstates accuracy of selection for marbling

Where Does Ultrasound Fit?

- Ultrasound is a POWERFUL tool for identifying young bulls with superior genetic potential for marbling
- Ultrasound EPD are POWERFUL tools for commercial cow/calf producers to select bulls for natural service
- For selecting AI sires, we can do better
  - We should still carcass test young AI sires

Conventional Wisdom says,

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Upon further review,

- We shouldn't give up on carcass data

- Conventional Wisdom says,
  - Fed cattle are marketed at weight and/or fat thickness endpoints, so our carcass data should be adjusted to a constant weight or a constant fat thickness

Endpoint Issues?

- Endpoint determination and adjustment of data are separate issues
- Adjustments insure fair comparisons among sires in the contemporary group
- Equations, indices and decision support can provide whatever selection criteria are appropriate/desired
- Rumph et al (2007) says age is appropriate

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- Fed cattle are marketed at weight and/or fat thickness endpoints, so our carcass data should be adjusted to a constant weight or a constant fat thickness

Upon further review,

- Adjusting carcass data to a constant age still makes sense

- Conventional wisdom says,
  - Genomic tools are either the answer to all beef quality issues, or an even bigger problem.

Do We Know What We're Doing?

- Some breeders still see EPD and genomic tools as an either/or proposition
- The real power of these tools lies in earlier, more precise evaluation of young animals, especially for unmeasured traits
- So why is there so much interest in marbling marker results for older AI sires?

We're Making Progress

- The number of tools available and the power of those tools is increasing, as expected
- The format in which results are reported is becoming more user friendly and more meaningful
- We seem to be moving toward some incorporation of test results into EPD

Conventional wisdom says,

- Genomic tools are either the answer to all beef quality issues, or an even bigger problem.

Upon further review,

- I'll leave this meeting feeling better about this area than I ever have.

- Conventional Wisdom says,
  - It takes about five years for a generation of selection at the seedstock level, and another five years for a generation at the commercial level before we should expect to see much change

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- It takes about five years for a generation of selection at the seedstock level, and another five years for a generation at the commercial level before we should expect to see much change.

Upon further review,

- Conventional wisdom is right.