



Crossbreeding – back to the future....

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Are we ranching WITH money?



Or are we ranching FOR money?

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Statistics and agriculture

- ❖ If you agree with what I am saying a sample size of 1 is sufficient!
- ❖ If you don't agree with what I am saying, than a study with 10,000 head won't change your mind!

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Albert Einstein....

- ❖ Insanity is doing the same thing over and over and expecting different results!



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Genetic Improvement

- ❖ Selection - within breed (use of genetic predictors (EPD's and indices)
- ❖ Crossbreeding - heterosis / breed complementarity

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Breed Complementarity

The degree to which two breeds complement one another....



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⊕ **Heterosis** - the superiority of the crossbred progeny compared to the average of the parental breeds.....

⊕ **Maternal Heterosis** - the increase in calf performance due to the maternal effect of a crossbred cow

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Heterosis – what should we expect?

- ⊕ Primary advantage in the “lowly heritable” traits --- “the non-additive genetic portion”
- ⊕ Small, net positive effects in many traits
- ⊕ Fitness traits---often difficult to measure and difficult to “visualize” success
- ⊕ LARGE NET POSITIVE CUMULATIVE EFFECT

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Direct (individual) vs. maternal heterosis

- Heterosis of the calf = 8.5% (individual)
- Heterosis of the F1 = 14.5% (maternal)

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Heterosis Effects – individual (crossbred calves)

- ⊕ Calving rate 4.4%
- ⊕ Survival to weaning 1.9%
- ⊕ Weaning weight 3.9%
- ⊕ Postweaning ADG 2.6%
- ⊕ Yearling weight 3.8%
- ⊕ Feed conversion 2.2%.

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Heterosis effects – maternal Crossbred cows

- ⊕ Calving rate 3.7%
- ⊕ Survival to weaning 1.5%
- ⊕ Weaning weight 3.9%
- ⊕ LONGEVITY 38%
- ⊕ NUMBER OF CALVES 17.0%
- ⊕ CUMULATIVE WEANING WT. 25.3%.

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The Perception of Crossbreeding

- ⊕ increase variability
- ⊕ lack of consistency
- ⊕ “mongerelize” the nation’s cow herd
- ⊕ “too many breeds”
- ⊕ lack of predictability.

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Lifetime Membership in “The Breed of the Month Club”



The lack of implementation of well planned crossbreeding systems is the result of.....

- ✳ Early failures because of the wrong genetic inputs.....
- ✳ Purebred breeders.....
- ✳ Culture.....
- ✳ We measure the wrong traits!



Planned Crossbreeding Programs

- ✳ Systematic – utilize resource base
- ✳ Retain HETEROSIS
- ✳ Breed complementarity
- ✳ SIMPLE
- ✳ Marketability
- ✳ MATCH COWS TO THEIR ENVIRONMENT
- ✳ MEASURE PROFIT.



Why not planned crossbreeding?

1. A cultural bias that clearly reflects “purebreds are better!”



Why not crossbreeding?

3. We have decided that measuring outputs is more meaningful than measuring inputs--and easier!
 - ✳ Average daily gain
 - ✳ Ribeye area
 - ✳ Quality grade
 - ✳ Weaning weight
 - ✳ Milk
 - ✳and the list goes on.....



Why not crossbreeding?

5. Heterosis is very difficult to visualize and even more difficult to measure.
 - ✳ longevity
 - ✳ morbidity
 - ✳ livability
 - ✳ age at puberty
 - ✳ lifetime productivity



Why not crossbreeding?

- ❖ 10. Our industry and academics have focused on individual animal measurements for over 50 years.



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The impact of crossbreeding on vertically coordinated beef systems



Objective

- ❖ Conduct a controlled crossbreeding field trial under "real world conditions", comparing Angus and Hereford bulls on an Angus based cow herd
- ❖ Measure traits that may have potential to impact overall profitability



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Materials & Methods

- ❖ 600 Angus based cows randomly mated to 15 Angus or 15 Hereford bulls
- ❖ Project conducted for 3 years
- ❖ Records maintained on all calves born into the project through production cycle
- ❖ Sire verification through calf DNA samples



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Preliminary results – Economic impacts of crossbreeding in vertically coordinated beef marketing systems

- ❖ Slight increase in weaning performance
- ❖ Slight increase in average daily gain
- ❖ Increase in feed efficiency
- ❖ Decrease in cost of gain
- ❖ Decrease in quality grade
- ❖ **Increase in net return**

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Preliminary report – crossbreeding (maternal heterosis)

- ✦ 7 percent increase in pregnancy rates of “F1” yearling heifers compared to “straightbred.....”



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We have focused on sexy traits – not profit traits.....

- ✦ Our industry has focused on maximums, rather than on maximum return.
- ✦ When are we going to focus on maximum sustained profit per acre, per hectare or per unit—not maximum dollars per head.

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The basic premise of seedstock production.....

- ✦ All breeds can do all things! Just ask the breeders.....
- ✦ We have not capitalized on maternal and paternal lines...we have spent far too much time trying to blur those lines rather than utilize the differences.

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Genetic improvement

- ✦ When EPD's became a marketing tool rather than a tool for genetic improvement, we lost our direction in genetic improvement

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What about genetic defects?

- ✦ Are we so busy trying to stay ahead of the EPD game that we don't thoroughly test cattle before they are widely used? What happened to linebreeding first?
- ✦ Are we narrowing the genetic diversity of the beef business in the quest for the perfect product? Do we really want to become like Holsteins?

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Gene markers

- ✦ Remarkable science – potential tools... but don't oversell the product at the risk of burning commercial producers....
- ✦ What is the value of a marker for highly heritable traits that only account for a small amount of variability in the trait? We can already improve those traits with standard selection programs.
- ✦ What about markers for disease resistance, longevity, etc....---true profit makers that are lowly heritable?
- ✦ What about genotypic-environmental interactions?

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Cattle breeding

✦ Rather than making the complex simple (the mark of a great teacher), we seem bent on making the simple complex.....

- ✦ *Selection within breeds using EPD's*
- ✦ *Planned crossbreeding to capitalize on heterosis.....*

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Cattle breeding – so what have we done...

- ✦ Increased growth rate and mature size
- ✦ Focused on carcass merit (improved)
- ✦ Increased milk
- ✦ Increased maintenance cost
- ✦ Decreased functionality/adaptability
- ✦ Decreased longevity
- ✦ Made cattle phenotypically "better"
- ✦ Developed "trait leader" lists emphasizing maximums
- ✦ Selected for fertility with a feed truck
- ✦ Decreased emphasis on the ability of the cow to harvest low quality forages

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Cattle Breeding – progress report

✦ We have lots of measurement of "horsepower"...

- ✦ *What about miles per gallon?*
- ✦ *Warranty on the engine or powertrain?*
- ✦ *Years of service?*
- ✦ *Is it "buyer beware"?*

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Final thought.....

- ✦ " At no time in the history of cattle breeding have we had the tools and the potential to more quickly and accurately make mistakes. Rest assured that we have the ability to screw them up quicker than we used to!"

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Final, final thought.....Product development and the beef industry

- ✦ The beef industry is one of the few businesses that seems to develop products and then tell their customers what they need, rather than asking their customers what they need and building a product to do the job....Then they wonder about market penetration and accuse the commercial sector of not being progressive. What a model!

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