Retrospective analysis of growth performance and carcass ultrasound data of yearling bulls enrolled at the Cal Poly Bull Test

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Introduction

The Cal Poly Bull Test (1956-present):

- Multi-breed contemporary group performance test (~100 days; Fig. 1)
- Evaluate yearling bulls on genetic merit and growth performance
- Performance data collected: monthly bull weights, ultrasound measurements and semen quality analysis

Objectives

The aim of this study was to estimate the correlation between growth traits and ultrasound characteristics in Angus yearling bulls participating in the test over a 19-year span. A second objective was to analyze sale price data from each year to determine if relationships existed between the number of animals selling and price.

Material & Methods

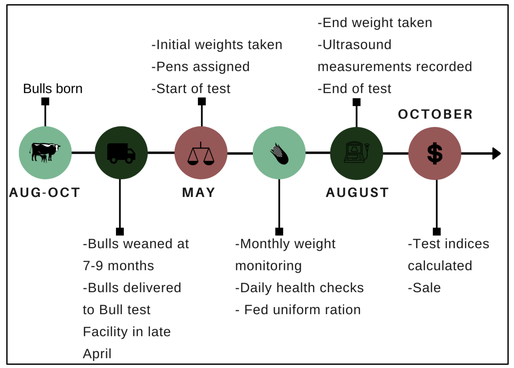

Figure 1: Yearly timeline of Bull Test events

- 2,624 Angus and Hereford records collected from the Cal Poly Bull Test between the years 2001-2019
- Bulls were fed a high-energy ration in accordance to the Beef Improvement Federation over the ~100-day period (Fig. 2)

Item	As Fed basis
Ingredients, %	
Corn, steam flaked	19.71
Almond hulls	18.59
Distillers dried grains w/ solubles	7.44
Mineral premix	5.58
Molasses	14.13
Oat Hay, suncured	26.02
Alfalfa hay, suncured full-bloom 13	8.55

Figure 2: Bull Test Ration for years 2001-2013

- Ration had slight changes throughout 19-year period due to ingredient availability
- The ultrasound measurements Ribeye Area (REA) and Intramuscular Fat Percentage (IMF), were analyzed along with start and end weights
  - Model also included: average daily gain (ADG) Julian Calving date, birth weight (BW), scrotal circumference (SC)
- Sale price data was analyzed to determine the relationship of number of bulls enrolled in the auction and sale price as well as which breed had the highest sale price
- SAS 9.4 utilized for Pearson Correlation
  - PROC CORR, PROC MEAN, AND PROC UNIVARIATE

Results

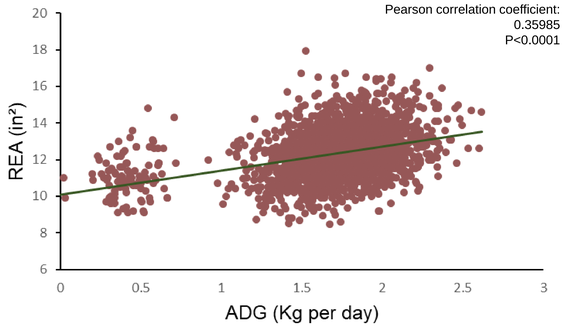

Figure 3: Relationship between Ribeye Area and Average Daily Gain

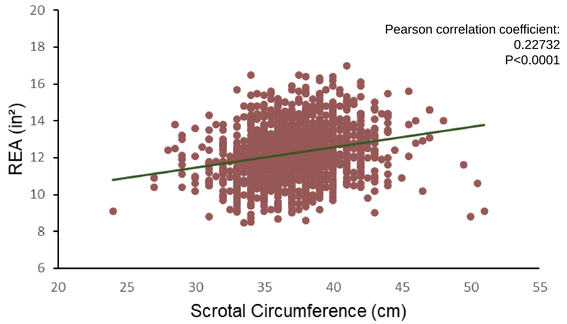

Figure 4: Relationship between Ribeye Area and Average Daily Gain

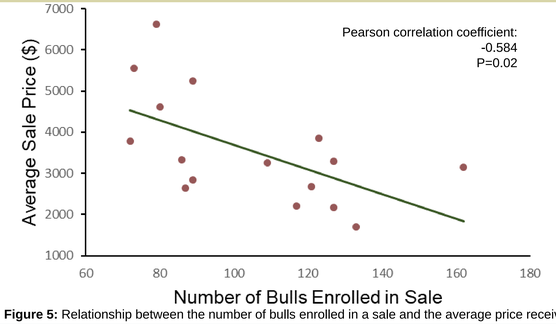

Figure 5: Relationship between the number of bulls enrolled in a sale and the average price received per bull

Discussion

- A significant (P <0.01) year × breed interaction occurred for sale price, BW, start weight, end weight, SC, REA, IMF, and ADG
- The relationship between ADG and REA was moderate and showed a significant positive correlation (Fig. 3)
  - The bulls that gained the most weight per day (in kg) had larger ribeye area at the end of test indicating a more developed musculature
  - This relates to the End weight × REA relationship because the bulls with the larger body weights were also the animals with the greater REA (P <0.0001; r^2 = 0.24)
- SC × REA interaction is moderately and positively correlated suggesting that bull's with greater scrotal circumference are also the animals with greater ribeye area (Fig. 4)
- A weak, positive relationship was established between IMF and both end weight (P<0.0001, r^2= 0.03) and REA (P<0.001, r^2= 0.01)
  - This might indicate that with bulls that gained the most weight daily and those that had the highest weight at the end of the test deposited higher amounts of intramuscular fat
- Overall, Hereford bulls had a lower (P <0.0001) ADG compared to the Angus bulls.
- Consistently, Angus bulls had higher sale prices than Hereford bulls.
- Sale price analysis indicated that there was a moderate, negative relationship (P=0.02; R = -0.584) between number of animals entered in the sale and price the bulls sold for (Fig. 5)
  - This indicates that sales with higher number of bulls were also those with lower prices per bull sold

Implications

- There is a possibility that the focus on the growth potential in bulls may hinder the marbling and carcass characteristics in the animal. Further investigation of the heritability of these ultrasound characteristics and potential negative relationship between ribeye are and intramuscular fat should occur.
- The sale price data suggests that as the number of enrolled bulls in the sale increases that the average price per bull will lower. This might indicate a possible need for a structure change in the sale limiting the number of bulls enrolled by changing entry requirements so producers can receive higher prices per bull.
- There was a general trend of increasing sale prices over an 18-year span of the test. Similarly, ultrasound characteristics and growth performance also seemed to follow a trend of increased performance across these years of the test.

References

Garcia et. al. Evaluation of Performance Trends in the Tucumcari Bull Test 1961 to 2000. NMSU.