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Relationships Among Maternal Traits and Sale Prices of Red Angus Bulls Sold at Auction From 2017 Through 2019

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Abstract

Objective: The objective of this study was to evaluate the influence of maternal traits in the form of selection indices and expected progeny differences on the sale price of Red Angus Bulls sold at auction from 2017 through 2019 across the United States.

Study Description: Information describing factors about Red Angus bulls marketed through auctions were obtained from the Red Angus Association of America (Commerce City, CO) in an electronic format. Data were collected for 21,362 Red Angus bulls offered for sale in auctions from 2017 through 2019. Multiple regression models were developed using backward selection procedures to examine the effect of maternally-related genetic factors in the form of selection indices and expected progeny differences on bull sale price.

Results: Various maternal factors in the form of selection indices and expected progeny differences were significant factors influencing Red Angus bull sale price. Sale price was found to be positively associated with HerdBuilder Index. Results indicated significant relationships between sale price and various expected progeny differences including calving ease direct expected progeny difference, maintenance energy expected progeny difference, heifer pregnancy expected progeny difference, calving ease maternal expected progeny difference, and stayability expected progeny difference. However, relatively low R^2 values across both models indicate that only a small amount of the price variation was accounted for, suggesting that buyers are utilizing additional information when making purchasing decisions that we are not able to fully characterize.

The Bottom Line: In addition to genetic factors, buyers may be considering other characteristics not captured within this data such as physical attributes, marketing tactics, and breeder reputation. Continued research and understanding of the various maternal factors affecting beef bull sale price may prove valuable to this sector of the beef industry.

Keywords

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Relationships Among Maternal Traits and Sale Prices of Red Angus Bulls Sold at Auction From 2017 Through 2019

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Abstract

The objective of this study was to evaluate the influence of maternal traits in the form of selection indices and expected progeny differences on the sale price of Red Angus bulls sold at auction from 2017 through 2019 across the United States. Various factors were discovered to be of significance through statistical models. Through the construction of descriptive figures, sale price was found to be positively associated with several maternal traits. However, relatively low R^2 values indicate that only a small amount of the price variation was accounted for, suggesting buyers are using additional information that we are not able to fully characterize.

Introduction

The selection of a beef bull is an important choice, as a herd sire provides more than 80% of genetic merit and change to a herd (Ishmael, 2017). In an industry with rapid change in producer priorities and preferences, the utilization of various management strategies and selection tools has been crucial in ensuring a continued level of economic productivity (Hersom et al., 2011). Numerous categories of information are provided to potential buyers through various auction channels. Information ranges from values concerning expected progeny differences, selection indices, and phenotypic data and characteristics. Different information provided to buyers during the time of sale may have the potential to alter the price a buyer may be willing to offer for the bull, depending on the goals and priorities of the specific producer (Dhuyvetter et al., 1996).

Experimental Procedures

Information describing various factors about Red Angus bulls marketed and sold nationwide through auctions were obtained from the Red Angus Association of America (Commerce City, CO) in an electronic format. These data were available for all Red Angus bulls offered for sale in auctions during the spring and fall of 2017 and 2018, and the spring of 2019 sale seasons. Quantifiable factors came in the form of two selection indices and fourteen expected progeny differences, encompassing a variety of maternal and terminal traits.

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[1] Grassy Ridge Consulting, Aledo, TX.

Two separate multiple regression models were developed using backward selection procedures to examine the effect of genetic factors in the form of selection indices and expected progeny differences on the sale price of Red Angus bulls. Maternal traits included with the selection index model came in the form of the HerdBuilder Index. Maternal expected progeny difference traits included calving ease direct expected progeny difference, milk expected progeny difference, maintenance energy expected progeny difference, heifer pregnancy expected progeny difference, calving ease maternal expected progeny difference, and stayability expected progeny difference. Relationships between sale price and these maternal genetic parameters were further examined by evaluating trends in selection indices and expected progeny differences across sale price categories. Red Angus bulls were categorized into eight groups by respective sale price. The unadjusted, average values of these selection indices and expected progeny differences were calculated across price categories to investigate the trend of these various genetic factors relative to sale price.

Results and Discussion

Data were collected for 21,362 Red Angus bulls offered for sale in auctions from 2017 through 2019. Within the selection index model, the HerdBuilder Index ($P < 0.05$) was found to be a significant factor positively influencing bull sale price. Regression coefficients from the model indicate that a single unit increase in HerdBuilder Index increased auction price by $5.08 (Table 1).

Within the expected progeny difference model, various maternal traits significantly influenced bull sale price. Those factors were: calving ease direct expected progeny difference (P < 0.05), maintenance energy expected progeny difference ($P < 0.05$), heifer pregnancy expected progeny difference ($P < 0.05$), calving ease maternal expected progeny difference ($P < 0.05$), and stayability expected progeny difference ($P < 0.05$) (Table 2). Milk expected progeny difference ($P > 0.05$) did not affect the sale price of Red Angus bulls and was excluded from the final model. Positive relationships with sale price were discovered for the variables of calving ease direct expected progeny difference, heifer pregnancy expected progeny difference, and stayability expected progeny difference, while maintenance energy expected progeny difference and calving ease maternal expected progeny difference were found to be inversely associated with bull sale price. While selection indices and expected progeny differences were found to be significant through statistical models, relatively low R^2 values were found across both models (Table 1 and Table 2), indicating a small amount of variation in auction price was explained by the associated genetic parameters. This suggests that producers are using other factors not captured within the data, such as physical attributes, management and marketing factors, and breeder reputation when making selection decisions.

When summarizing descriptive data for maternal traits across bull sale price groups, positive trends were discovered for the HerdBuilder Index (Figure 1), calving ease direct expected progeny difference (Figure 2), heifer pregnancy expected progeny difference (Figure 3), and stayability expected progeny difference (Figure 4). Relatively flat trends were observed for milk expected progeny difference (Figure 5), maintenance energy

expected progeny difference (Figure 6), and calving ease maternal expected progeny difference (Figure 7).

Implications

Relatively low R^2 values suggest that bull buyers are utilizing other informational components not captured within the data when making investment decisions. Knowledge of physical attributes, marketing strategies, and breeder reputation are likely influencing buyers, and may explain additional variation in the sale price of Red Angus bulls. Continued research on maternal traits influencing the sale price of beef bulls across the United States may prove advantageous to producers.

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Table 1. Maternal traits in the form of selection indices affecting the sale price of Red Angus bulls sold at auction from 2017 through 2019

Factor	Estimate	Standard error	T-value of factor	*P*-value of factor
Intercept	-12,800.00	521.30	-24.55	<0.0001
HerdBuilder Index	5.08	0.60	8.61	<0.0001
Number of observations	21,362			
R^2	0.05			
Adjusted R^2	0.05			

Table 2. Maternal traits in the form of expected progeny differences affecting the sale price of Red Angus bulls sold at auction from 2017 through 2019

Factor expected progeny difference	Estimate	Standard error	T-value of factor	*P*-value of factor
Intercept	627.10	164.24	3.82	<0.01
Calving ease direct	57.09	9.91	5.76	<0.0001
Maintenance energy	-62.53	7.19	-8.70	<0.0001
Heifer pregnancy	51.62	9.82	5.26	<0.0001
Calving ease maternal	-22.79	11.58	-1.97	<0.05
Stayability	20.66	8.75	2.36	0.02
Number of observations	21,362			
R^2	0.07			
Adjusted R^2	0.07			
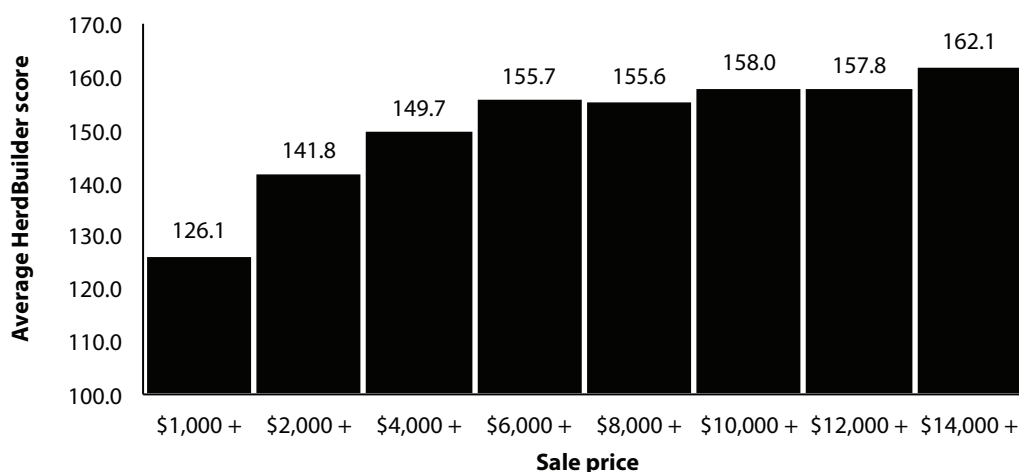
Figure 1. HerdBuilder score by sale price category.
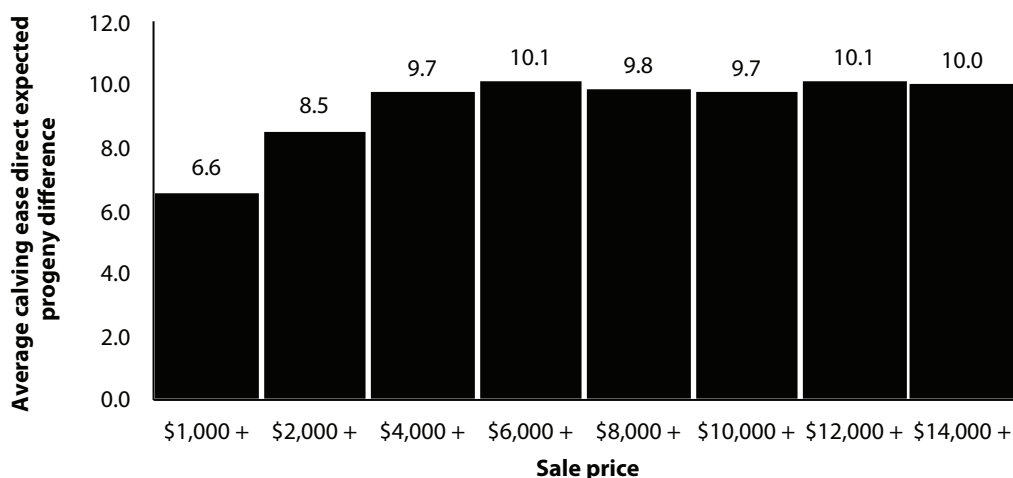
Figure 2. Calving ease direct expected progeny difference by sale price category.
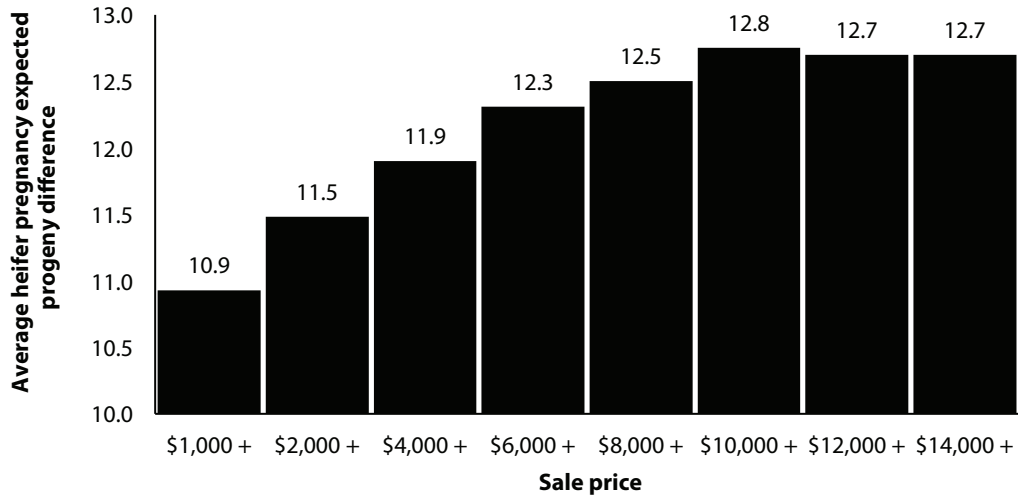
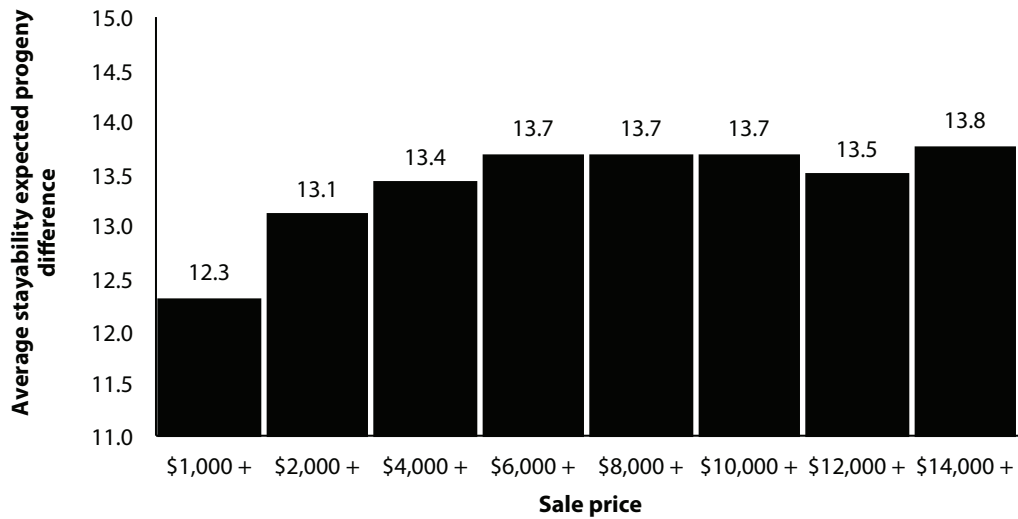**Figure 3. Heifer pregnancy expected progeny difference by sale price category.**

Figure 4. Stayability expected progeny difference by sale price category.
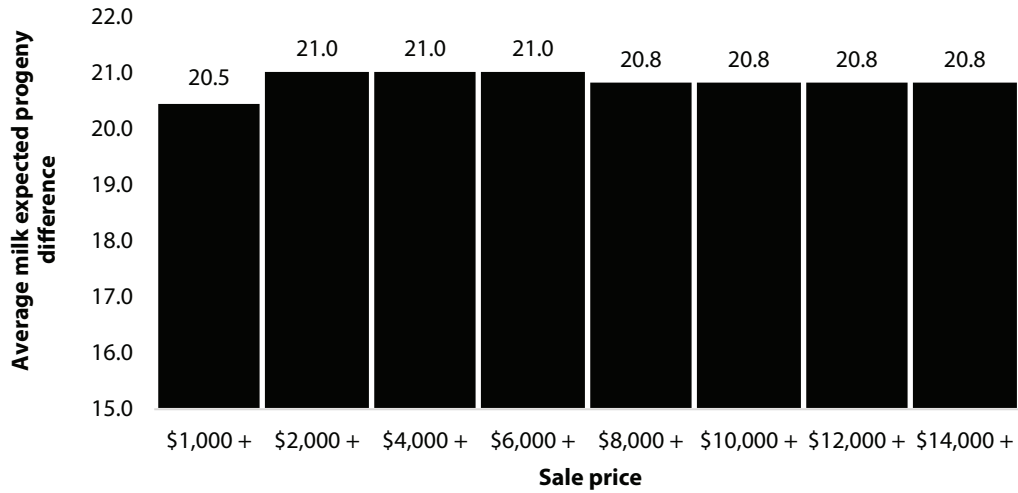
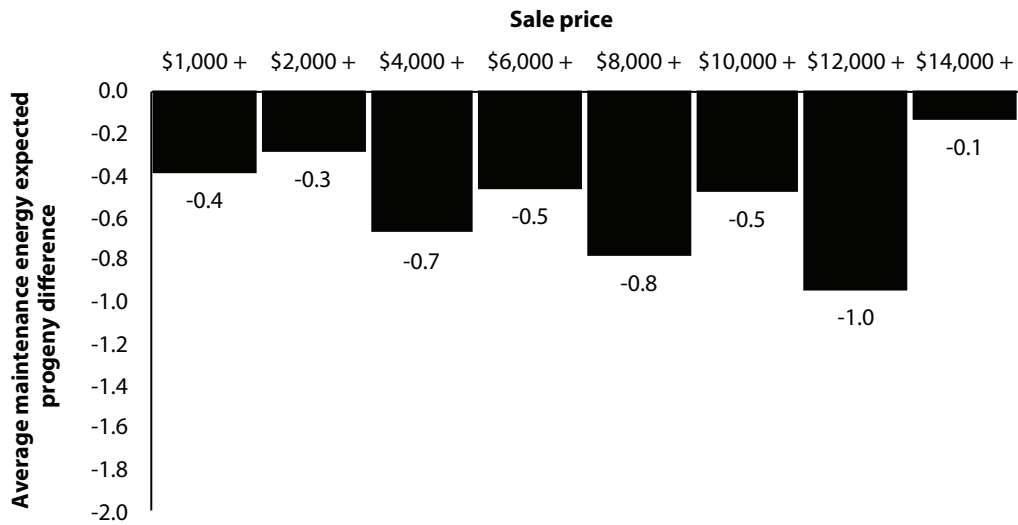**Figure 5.** Milk expected progeny difference by sale price category.

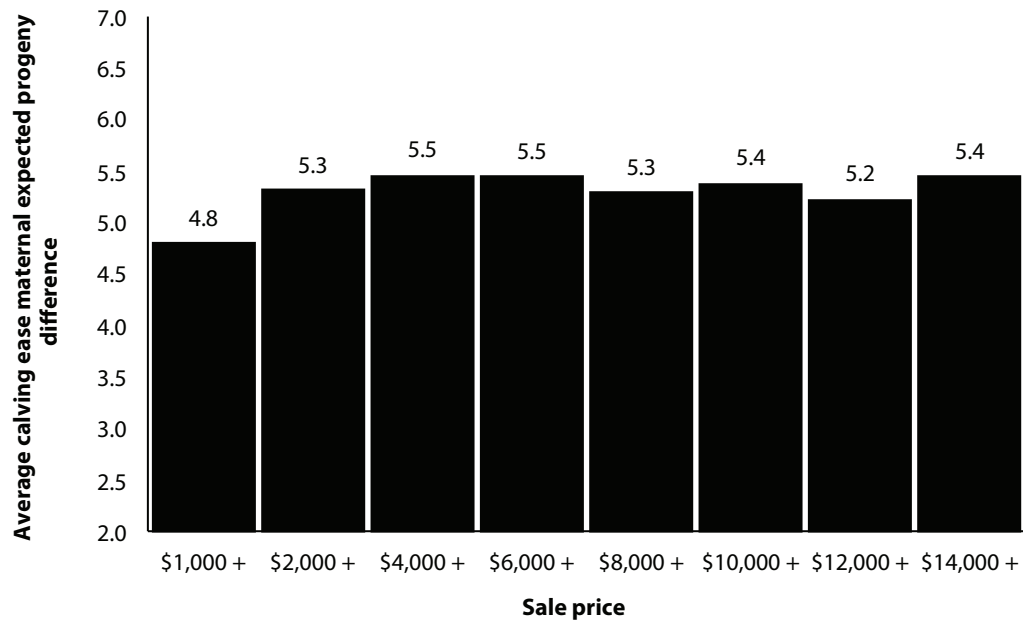**Figure 6.** Maintenance energy expected progeny difference by sale price category.

Figure 7. Calving ease maternal expected progeny difference by sale price category.