

2020

## Factors Affecting the Sale Price of Bred Heifers and Bred Cows Sold Through Superior Livestock Video Auctions

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### Recommended Citation

Smith, M. J.; McCabe, E. D.; King, M. E.; Fike, K. E.; Rogers, G. M.; and Odde, K. G. (2020) "Factors Affecting the Sale Price of Bred Heifers and Bred Cows Sold Through Superior Livestock Video Auctions," *Kansas Agricultural Experiment Station Research Reports*: Vol. 6: Iss. 2. <https://doi.org/10.4148/2378-5977.7888>

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# Factors Affecting the Sale Price of Bred Heifers and Bred Cows Sold Through Superior Livestock Video Auctions

## Abstract

**Objective:** The objective of the study was to evaluate potential factors influencing the sale price of bred heifers and bred cows sold through video auctions while adjusting for all other factors that significantly influenced prices.

**Study Description:** Descriptive characteristics of lots offered for sale were obtained through a livestock video auction service (Superior Livestock Auction, Fort Worth, TX). Data were available on 1,870 lots of bred heifers sold through video auctions from 2010 through 2018 and 1,237 lots of bred cows sold through video auctions from 2011 through 2018. Two separate multiple regression models were developed to determine the factors influencing the sale price for each.

**The Bottom Line:** Understanding the various factors influencing the sale price of bred heifers and bred cows will allow producers to make more informed investment decisions.

## Keywords

bred heifers, bred cows, sale price

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## Cover Page Footnote

We would like to thank the Red Angus Association of America for their support in conducting this research.

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### Abstract

This study utilized data from Superior Livestock Video Auction with the objective of quantifying various management factors, physical descriptors, and lot characteristics that possess the potential to influence the sale price of bred females. Variation among several of these female traits indicates that numerous characteristics affect the sale price. Understanding the forces driving investment decisions may prove valuable to buyers and sellers within the beef industry.

### Introduction

Literature regarding factors that influence the sale price of bred heifers and bred cows is typically limited to analyses within a defined region or breed composition. Descriptive information about bred females is often provided to buyers across numerous marketing venues. From physical descriptors, management factors, and lot characteristics, comprehending how traits have the potential to cause variation in sale price is imperative in allowing producers to make sound and informed purchasing decisions. Continued research and understanding of the value placed on bred female traits may prove advantageous to producers throughout various regions of the United States.

### Experimental Procedures

Information describing factors about lots of bred heifers and bred cows marketed and sold nationwide through a livestock video auction service (Superior Livestock Video Auction, Fort Worth, TX) were obtained from the auction service in an electronic format. These data were collected for all lots of bred heifers offered for sale from 2010 through 2018 and all lots of bred cows offered for sale from 2011 through 2018. Two separate multiple regression models were developed using a backwards selection procedure to investigate various factors influencing sale price of both bred heifers and bred cows. Quantifiable factors within both models included sale year, weight (linear and quadratic), region of the United States where the lot originated, breed description, variation in weight within the lot, origin (home-raised or purchased), frame score, flesh score, and size of the lot (linear and quadratic).

### Results and Discussion

Data were collected from 1,870 lots of bred heifers over a nine-year period (2010–2018) and 1,237 lots of bred cows over an eight-year period (2011–2018). Sale year was a significant factor

<sup>1</sup>Grassy Ridge Consulting, Aledo, TX.

influencing price within both models. Bred heifers sold for the greatest ( $P < 0.05$ ) price in 2014, compared to all other years. In 2014 and 2015, bred cows sold for similar ( $P > 0.05$ ) prices, but at prices greater ( $P < 0.05$ ) than all other years. For both bred heifers and bred cows, those lots categorized as Red Angus sired sold for the greatest ( $P < 0.05$ ) price, compared to all other breeds. Region of the United States affected bred heifer sale price, with the greatest ( $P < 0.05$ ) price paid for bred heifers originating from the North Central region. Additional lot characteristics that significantly influenced price within both models included weight (linear), frame score, and flesh score. Non-significant factors for bred heifers were weight variation within the lot, lot size (linear and quadratic), and weight (quadratic). Non-significant factors for bred cows included lot size (quadratic), origin (home-raised or purchased), and region where the lot originated. A complete list of factors affecting the sale price of bred heifers and bred cows are shown in Table 1 and Table 2, respectively.

## Implications

Continued research and understanding of the characteristics and factors that influence the sale price of breeding cattle across the United States may provide insight to cow-calf producers.

## Acknowledgments

We would like to thank the Red Angus Association of America for their support in conducting this research.

**Table 1. Factors affecting the sale price of bred heifers sold through Superior Livestock video auctions from 2010 through 2018**

| Factor                 | Number of lots | Least squares mean of sale price (\$/head) | Price difference (\$/head) | P-value |
|------------------------|----------------|--|----------------------------|---------|
| Auction year           |                |  |                            | <.0001  |
| 2010                   | 44             | 1,086 <sup>a</sup>                         | -340                       |         |
| 2011                   | 146            | 1,294 <sup>b</sup>                         | -132                       |         |
| 2012                   | 228            | 1,394 <sup>c</sup>                         | -32                        |         |
| 2013                   | 260            | 1,688 <sup>d</sup>                         | 262                        |         |
| 2014                   | 405            | 2,455 <sup>e</sup>                         | 1,029                      |         |
| 2015                   | 372            | 2,201 <sup>f</sup>                         | 775                        |         |
| 2016                   | 178            | 1,449 <sup>c</sup>                         | 23                         |         |
| 2017                   | 146            | 1,463 <sup>c</sup>                         | 37                         |         |
| 2018                   | 91             | 1,426 <sup>c</sup>                         | 0                          |         |
| Base weight of the lot | 1,870          |  | .90                        | <.0001  |

*continued*

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| Factor  | Number of lots | Least squares mean of sale price (\$/head) | Price difference (\$/head) | P-value |
|---|----------------|--|----------------------------|---------|
| Region of the United States where the lot originated <sup>g</sup> |                |  |                            | <.0001  |
| West Coast  | 233            | 1,563 <sup>a</sup>                         | 4                          |         |
| Rocky Mountain/North Central                                      | 988            | 1,681 <sup>b</sup>                         | 122                        |         |
| South Central   | 591            | 1,622 <sup>c</sup>                         | 63                         |         |
| South East  | 58             | 1,559 <sup>ac</sup>                        | 0                          |         |
| Breed description of the lot                                      |                |  |                            | <.0001  |
| English, English crosses  | 438            | 1,584 <sup>a</sup>                         | 62                         |         |
| English-Continental crosses                                       | 149            | 1,622 <sup>a</sup>                         | 100                        |         |
| Black Angus sired <sup>h</sup>                                    | 768            | 1,582 <sup>a</sup>                         | 60                         |         |
| Red Angus sired <sup>i</sup>                                      | 391            | 1,721 <sup>b</sup>                         | 199                        |         |
| Brahman influenced  | 124            | 1,522 <sup>a</sup>                         | 0                          |         |
| Origin  |                |  |                            | .0008   |
| Home-raised   | 390            | 1,628 <sup>a</sup>                         | 44                         |         |
| Purchased   | 1,480          | 1,584 <sup>b</sup>                         | 0                          |         |
| Frame score of the lot  |                |  |                            | .0016   |
| Medium  | 582            | 1,579 <sup>a</sup>                         | -42                        |         |
| Medium-medium large   | 875            | 1,618 <sup>b</sup>                         | -3                         |         |
| Medium large  | 413            | 1,621 <sup>b</sup>                         | 0                          |         |
| Flesh score of the lot  |                |  |                            | .0249   |
| Light medium-medium   | 123            | 1,565 <sup>a</sup>                         | -74                        |         |
| Medium  | 1,622          | 1,615 <sup>b</sup>                         | -24                        |         |
| Medium-medium heavy   | 125            | 1,639 <sup>b</sup>                         | 0                          |         |

<sup>a,b,c,d,e,f</sup>Values within a factor without a common superscript differ ( $P < 0.05$ ).

<sup>g</sup>States in the region of origin were: West Coast—California, Idaho, Nevada, Oregon, Utah, and Washington; Rocky Mountain/North Central—Colorado, Iowa, Illinois, Indiana, Michigan, Minnesota, Montana, North Dakota, Nebraska, South Dakota, Wisconsin, and Wyoming; South Central—Arizona, Kansas, Missouri, New Mexico, Oklahoma, and Texas; South East—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia.

<sup>h</sup>Lots in this group were sired by Black Angus bulls and out of dams with no Brahman influence.

<sup>i</sup>Lots in this group were sired by Red Angus bulls and out of dams with no Brahman influence.

Non-significant factors include variation in weight within the lot ( $P = 0.75$ ), number of heifers in the lot ( $P = 0.35$ ), number of heifers in the lot (quadratic)<sup>j</sup> ( $P = 0.63$ ), and base weight of the lot (quadratic)<sup>k</sup> ( $P = 0.07$ ).

<sup>j</sup>In order to prevent multicollinearity between the linear and quadratic lot size terms, the number of heifers in each lot was centered at zero by subtracting the mean lot size of all the lots (47.5 head) from the lot size of each lot.

<sup>k</sup>In order to prevent multicollinearity between the linear and quadratic base weight terms, the base weight of each lot was centered at zero by subtracting the mean base weight of all the lots (1,000.7 lb) from the base weight of each lot.

**Table 2. Factors affecting the sale price of bred cows sold through Superior Livestock video auctions from 2011 through 2018**

| Factor  | Number of lots | Least squares mean of sale price (\$/head) | Price difference (\$/head) | P-value |
|---|----------------|--|----------------------------|---------|
| Auction year                                    |                |  |                            | <.0001  |
| 2011  | 232            | 1,295 <sup>a</sup>                         | -5                         |         |
| 2012  | 140            | 1,381 <sup>ad</sup>                        | 81                         |         |
| 2013  | 132            | 1,590 <sup>b</sup>                         | 290                        |         |
| 2014  | 159            | 2,392 <sup>c</sup>                         | 1,092                      |         |
| 2015  | 197            | 2,402 <sup>c</sup>                         | 1,102                      |         |
| 2016  | 184            | 1,604 <sup>b</sup>                         | 304                        |         |
| 2017  | 120            | 1,420 <sup>d</sup>                         | 120                        |         |
| 2018  | 73             | 1,300 <sup>ad</sup>                        | 0                          |         |
| Base weight of the lot                          | 1,237          |  | -.65                       | <.0001  |
| Base weight of the lot (quadratic) <sup>e</sup> | 1,237          |  | -.0025                     | <.0001  |
| Number of cows in the lot                       | 1,237          |  | -.82                       | .0312   |
| Breed description of the lot                    |                |  |                            | <.0001  |
| English, English crosses                        | 515            | 1,637 <sup>a</sup>                         | 202                        |         |
| English-Continental crosses                     | 121            | 1,638 <sup>ab</sup>                        | 203                        |         |
| Black Angus sired <sup>f</sup>                  | 362            | 1,719 <sup>b</sup>                         | 284                        |         |
| Red Angus sired <sup>g</sup>                    | 168            | 1,935 <sup>c</sup>                         | 500                        |         |
| Brahman influenced                              | 71             | 1,435 <sup>d</sup>                         | 0                          |         |
| Variation in weight within the lot              |                |  |                            | <.0001  |
| Fairly even                                     | 109            | 1,747 <sup>a</sup>                         | 149                        |         |
| Uneven  | 1128           | 1,598 <sup>b</sup>                         | 0                          |         |
| Frame score of the lot                          |                |  |                            | .0418   |
| Medium  | 354            | 1,637 <sup>a</sup>                         | -55                        |         |
| Medium-medium large                             | 482            | 1,690 <sup>a</sup>                         | -2                         |         |
| Medium large                                    | 401            | 1,692 <sup>a</sup>                         | 0                          |         |

*continued*

|                        |     |                    |      |        |
|------------------------|-----|--------------------|------|--------|
| Flesh score of the lot |     |                    |      | <.0001 |
| Light medium-medium    | 221 | 1,517 <sup>a</sup> | -279 |        |
| Medium                 | 926 | 1,705 <sup>b</sup> | -91  |        |
| Medium-medium heavy    | 90  | 1,796 <sup>c</sup> | 0    |        |

<sup>a,b,c,d</sup>Values within a factor without a common superscript differ ( $P < 0.05$ ).

<sup>e</sup>In order to prevent multicollinearity between the linear and quadratic base weight terms, the base weight of each lot was centered at zero by subtracting the mean base weight of all the lots (1,182.8 lb) from the base weight of each lot.

<sup>f</sup>Lots in this group were sired by Black Angus bulls and out of dams with no Brahman influence.

<sup>g</sup>Lots in this group were sired by Red Angus bulls and out of dams with no Brahman influence.

Non-significant factors include number of cows in the lot (quadratic)<sup>h</sup> ( $P = 0.71$ ), origin ( $P = 0.48$ ), and region of the United States where the lot originated ( $P = 0.08$ ).

<sup>h</sup>In order to prevent multicollinearity between the linear and quadratic lot size terms, the number of cows in each lot was centered at zero by subtracting the mean lot size of all the lots (43.6 head) from the lot size of each lot.