Kansas Agricultural Experiment Station Research Reports

Volume 10
Issue 1 *Cattlemen's Day*

Article 6

2024

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## Recommended Citation

Blackwood, Tyler; Spore, Tyler J.; Kleinhenz, Michael D.; Hollenbeck, William R.; Blasi, Dale A.; and Tarpoff, A. J. (2024) "Comparing the Performance of Cattle Castrated Using Different Techniques Upon Arrival at the Feedlot," *Kansas Agricultural Experiment Station Research Reports*: Vol. 10: Iss. 1. https://doi.org/10.4148/2378-5977.8558

# Comparing the Performance of Cattle Castrated Using Different Techniques Upon Arrival at the Feedlot


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K-STATE Research and Extension

CATTLEMEN'S DAY 2024

KANSAS STATE UNIVERSITY CATTLEMEN'S DAY

# Comparing the Performance of Cattle Castrated Using Different Techniques Upon Arrival at the Feedlot

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## Abstract

Ample evidence exists that male cattle intended for the beef production system should be castrated at or near birth. Producers insist on leaving male cattle intact until the feeding period as intact bulls will weigh more than steers; however, studies have shown that these bulls experience increased stress and weight loss at castration compared to cattle castrated at or near birth. The purpose of this study was to evaluate which castration technique would result in the least reduction of growth performance at the feedlot.

## Introduction

The castration of male beef cattle is common practice and is done for a variety of practical reasons, including the reduction of aggression towards other animals and human handlers, improvement in meat quality and reduction of dark-cutting beef, and the elimination of instances of unwanted breeding (Booker et al., 2008; Coetzee, 2013; Coetzee et al., 2010). Many studies have been published pertaining to castration and have generally focused on age and timing, technique, pain, and pain management. The vast majority of studies have involved cattle aged from birth to weaning. These studies have demonstrated that the optimal age to castrate calves is at or near birth (Booker et al., 2008; Bretschneider, 2005; Rust et al., 2007). While the preferred technique remains a source of contention, there is some evidence that banding young cattle results in reduced chronic pain (Bretschneider, 2005).

While this has all been demonstrated many times over, some producers still insist on leaving cattle intact until they enter the feeding system under the pretense that the production of testosterone will result in increased weight gain. While intact bulls might weigh more than their castrated counterparts upon entry to the feedlot, they lose the weight benefit brought on by testosterone-induced secondary sex characteristics and will tend to perform equal to or worse than cattle that were castrated prior to entering the feeding system (Booker et al., 2008; Bretschneider, 2005; Fisher et al., 2001; Rust et al., 2007). Intact bulls continue to be sent to the feedlot despite this evidence, but there is little literature available that evaluates castration at the feedlot and its impact on growth performance. This study was conducted to evaluate this topic and attempt to provide an answer. The castration techniques evaluated included latex band, latex band

with a split distal scrotum, burdizzo clamp, Henderson Tool, and a negative control group of intact bulls.

## Experimental Procedures

Intact bulls were sourced from southeastern U.S. buying stations and received at the Kansas State University (K-State) Beef Stocker Unit (BSU) in the fall of 2020. The bulls were backgrounded at the K-State BSU to allow any health impacts from shipping to not influence the outcome of the study. The cattle were vaccinated upon arrival, received vaccination boosters at day 28, and were pulled for health intervention on an as-need basis and treated per the K-State BSU's established treatment protocol.

In December 2020, 700-lb cattle were weighed individually and stratified by weight into treatment groups which consisted of latex band applied by a Callicarate Bander (No-Bull Enterprises, St. Francis, KS), latex band with the splitting of the distal scrotum via Newberry Knife, burdizzo clamp, Henderson Tool, and intact bulls (negative control). All cattle received their first dose of tetanus vaccination at this point and were affixed with an SCR ear tag (Allflex-Merk & Co., Inc., Rahway, NJ) which was numerically linked to individual ID ear tags and used to monitor rumination and movement every two hours. All cattle were castrated 21 days later according to their assigned treatment, except cattle assigned to the negative control group. All cattle received a booster of tetanus vaccination, and all cattle were administered a weight-appropriate dose of Banamine Transdermal (Merk Animal Health-Merk & Co., Inc., Rahway, NJ) per the K-State BSU protocol. Thermographic images of the scrotum were collected for every animal in the trial which allowed for a base scrotal temperature.

To monitor and compare the performance of each treatment group, individual weights were collected on days 7, 14, 21, 35, 49, and 56. The last few observations were moved to a bi-weekly schedule to reduce handling stress on the cattle in the study. Individual weights were averaged for each treatment group, for each weigh day. Thermographic images were collected at every weigh day so that the inflammation process of each treatment group could be monitored.

## Results and Discussion

The average weights of the treatment groups did not differ when cattle were sorted before the study based on stratified weights ($P = 0.9998$). While the weights did spread due to differing metabolic demands of individuals, the treatment groups did not differ on average weight by day 0 ($P = 0.6383$). The average weights between treatment groups continued to be similar to each other on days 7, 14, and 21 ($P = 0.9961$, $P = 0.9119$, $P = 0.8851$, respectively). On day 35, the Henderson Tool group weighed less ($P = 0.0008$) than the other groups, while the other treatment groups remained similar in weight to each other. All treatment groups had similar weights on days 49 and 56 ($P = 0.7236$, $P = 0.7889$, respectively).

Average daily gain (ADG) was observed weekly, as well as on a day 0 to day 56 basis. Weekly ADG varied greatly throughout the study, most likely due to the inflammation and healing process of the different castration techniques. For ADG of the entire study period, no group was different from another; however, there was a trend ($P = 0.0643$) of the Henderson Tool group to have a lower ADG compared to all other groups.

The thermographic images obtained on day 0 demonstrated that all cattle were equal in scrotal temperature ($P = 0.4142$). Scrotal temperatures varied throughout the study. On a week-to-week basis, there were significant differences between treatment groups. The burdizzo group trended similarly to the control group throughout the study, while the band and band-cut groups had lower temperatures for the first portion of the study and then trended similarly to the control group near the end of the study. The Henderson Tool group was significantly warmer in scrotal temperature than the control group for most of the study.

Data on rumination and movement were analyzed as a daily average per animal, and on a two-hour average across the entire study per animal. The individual animal averages were again averaged for each treatment group. This allowed for four data sets per treatment group: daily activity, daily rumination, hourly activity, and hourly rumination. Daily activity remained similar for all treatment groups, although cattle castrated using the Henderson Tool trended lower and the control group trended higher compared to the other groups (Figure 1). The control group trended higher for hourly activity, but all groups had a similar activity pattern. The Henderson Tool group trended lower in daily rumination and the control group trended higher than other groups (Figure 2). For hourly rumination, the Henderson Tool group trended higher than all other groups for much of the study period.

There was a major cold front during the study which may have contributed to the patterns of decreased weight gain during the middle of the study period. Aside from this cold period, the trend was that cattle treated with castration techniques which involved severing of the skin (Henderson Tool and band-cut), trended lower for weight gain compared to other treatment groups ($P = 0.0643$). While ADG was similar for all treatments, there was a trend with the control group of ADG = 3.35 lb/day, burdizzo = 3.05 lb/day, band = 2.98 lb/day, band-cut = 2.63 lb/day, and Henderson Tool = 2.53 lb/day. The trend in ADG is possibly explained by increased thermographic values of the Henderson Tool group compared to the control for days 7 to day 35. On day 21, the thermographic values of the Henderson Tool group were similar to the control. The increased thermographic values demonstrated persistent inflammation, yielding a decrease in weight gain compared to other groups.

By day 56, the burdizzo group had a similar ADG for the entire study period compared to the control. Therefore, this would appear to be an option for castrating cattle of this weight class; however, the use of the burdizzo is physically taxing on the operator and requires two people to operate the clamp arms for a successful crush of the spermaticord. This method was deemed to be a wholly impractical method of castrating cattle of this weight class. Based on ADG, using a band appears to be a better option compared to band-cut and the Henderson Tool, which trended lower in ADG compared to banding. The thermographic data show the band group and band-cut group to have lower scrotal temperatures compared to the control for much of the study. This could be explained by reduced blood flow to the scrotum resulting in a lower tissue temperature. As the scrotum sloughed off the body, the minimum temperature observed was a result of frostbite to tissue that had no blood flow and resulted in a lower average temperature than the control. The inflammatory period appears to not have had a major impact on ADG compared to the control, while the inflammatory period for the Henderson Tool group appears to have been detrimental to ADG.

The trend of cattle treated with the Henderson Tool performing worse than other treatment groups is further supported by the decreased activity time compared to other treatment groups (Figure 1), and the increased rumination time (Figure 2). The increase in observed rumination time is likely teeth grinding as a pain response, more so than actual rumination. Cattle castrated using the Henderson Tool appeared uncomfortable for most of the study.

The idea that banded cattle performed better than surgically castrated cattle is not uncommon (Rust et al., 2007). Splitting of the distal scrotum resulted in decreased performance compared to an intact scrotum, which conflicts with the only other study comparing these methods known to the authors at the time of this study (Theurer et al., 2019). This study would agree with previous research conducted on younger calves that banding is a superior castration method compared to surgical methods in terms of long term ADG (Bretschneider, 2005; Meléndez et al., 2017; Rust et al., 2007). Banding appears to be the technique that results in the least detrimental effects on ADG for intact cattle entering the feedlot. That said, this study was limited in scope in terms of the number of cattle per treatment group (roughly 10 head) and the time of year (the study was done once in the year and during an abnormally cold period). Because of these results, further research on castration's impact on feedlot performance is warranted. Cattle treated with surgical techniques seem to do worse, so increasing the head count of treatment groups and reducing the number of treatment groups would be a valid future study.

## Implications

Given the scope of this study, the results indicate that the best way to castrate cattle entering the feedlot would be banding, as surgical techniques decrease performance and the burdizzo is not practical for cattle of this size.

## References

Booker, C. W., Abutarbush, S. M., Schunicht, O. C., Pollock, C. M., Perrett, T., Wildman, B. K., Hannon, S. J., Pittman, T. J., Jones, C. W., Jim, G. K., and Morley, P. S. 2008. Effect of castration timing, technique, and pain management on health and performance of young feedlot bulls in Alberta. The Bovine Practitioner. *https://doi.org/10.21423/bovine-vol43no1p1-11*

Bretschneider, G. 2005. Effects of age and method of castration on performance and stress response of beef male cattle: A review. In Livestock Production Science 97 (2–3). *https://doi.org/10.1016/j.livprodsci.2005.04.006*

Coetzee, J. F. 2013. Assessment and Management of Pain Associated with Castration in Cattle. In Veterinary Clinics of North America - Food Animal Practice 29 (1). *https://doi.org/10.1016/j.cvfa.2012.11.002*

Coetzee, J. F., Nutsch, A. L., Barbur, L. A., and Bradburn, R. M. 2010. A survey of castration methods and associated livestock management practices performed by bovine veterinarians in the United States. BMC Veterinary Research 6. *https://doi.org/10.1186/1746-6148-6-12*

Fisher, A. D., Knight, T. W., Cosgrove, G. P., Death, A. F., Anderson, C. B., Duganzich, D. M., and Matthews, L. R. 2001. Effects of surgical or banding castration on

stress responses and behaviour of bulls. Australian Veterinary Journal 79(4). https://doi.org/10.1111/j.1751-0813.2001.tb11981.x

Meléndez, D. M., Marti, S., Pajor, E. A., Moya, D., Heuston, C. E. M., Gellatly, D., Janzen, E. D., and Schwartzkopf-Genswein, K. S. 2017. Effect of band and knife castration of beef calves on welfare indicators of pain at three relevant industry ages: I. Acute pain. Journal of Animal Science, 95 (10). https://doi.org/10.2527/jas2017.1762

Rust, R. L., Thomson, D. U., Loneragan, G. H., Apley, M. D., and Swanson, J. C. 2007. Effect of different castration methods on growth performance and behavior responses of postpubertal beef bulls. The Bovine Practitioner. https://doi.org/10.21423/bovine-vol41no2p111-119

Theurer, M. E., Fox, J. T., McCarty, T. M., McCollum, R. M., and Cranwell, C. D. 2019. Effect of distal splitting the scrotum when banding feedlot bulls on performance outcomes and healing time. The Bovine Practitioner. https://doi.org/10.21423/bovine-vol53no2p160-165

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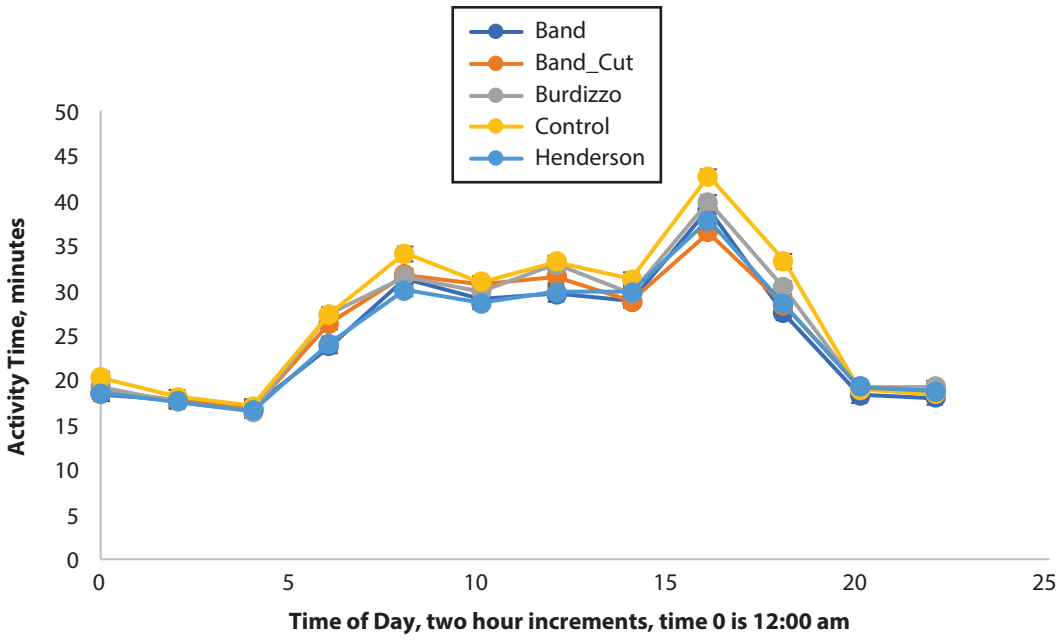


**Figure 1. Activity time (minutes) in two-hour increments averaged over every other day for 56 days for all treatment groups.**

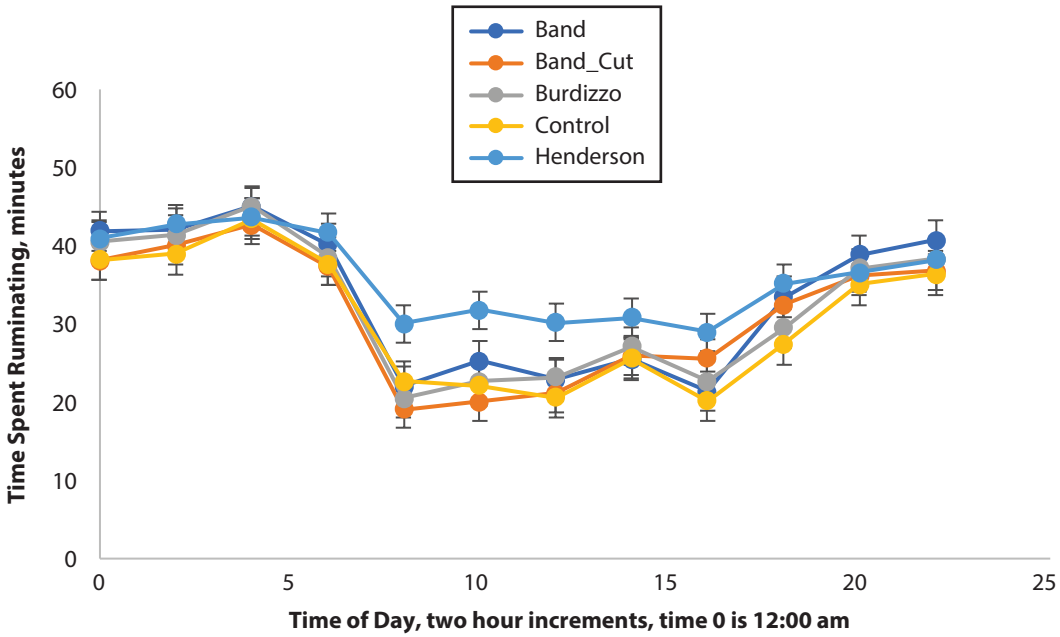


**Figure 2. Time spent ruminating (minutes) in two-hour increments averaged over every other day for 56 days for all treatment groups.**