A comparison of selected traits in polled and horned beef bulls

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SUMMARY

Data from two test stations were used to compare selected traits between polled and horned bulls. The traits evaluated were birth weight (BIR), on test average daily gain (ADG), adjusted yearling weight (ADJYRL), weight per day of age (WPDA), scrotal circumference (SC), adjusted scrotal circumference (ADJSC) and back fat thickness (BFAT). The results show no disadvantage for polled bulls compared to horned for ADG, ADJYRL, WPDA, SC and ADJSC.

INTRODUCTION

The evolutionary function of horns in the family Bovidae (hollow horned ruminants) varies between the sexes. It is theorised that horns are used by males, as weapons to gain access to females and by females as a form of sexual mimicry to reduce male aggression directed towards immature male offspring (Estes 1991). Commercial progeny of horned bulls are typically dehorned at some point prior to slaughter. Horned cattle dehorned in the feedlot suffer a setback in average daily gain detected up to 106 days post dehorning (Hand and Goonewardene 1991). In addition, the process of dehorning is perceived as a painful procedure and is therefore a welfare concern. The polled condition in cattle is inherited as an autosomal dominant and when a homozygous polled bull is bred with a homozygous horned cow the offspring are heterozygous and polled (Lasley 1978). The use of genetically polled sires would eliminate the need for dehorning and circumvent the negative aspects of dehorning. Our objective was to determine if differences exist between polled and horned test station bulls, for selected traits within breed.

MATERIALS AND METHODS

Data from two separate Record of Performance (ROP) test stations, which contained horned and polled bulls were used. The University of Saskatchewan ROP Test Station in Saskatoon, Saskatchewan contributed 658 Charolais and 397 Hereford bulls from 1985-1992. The Alberta Hereford ROP Test Station in Innisfail, provided records on 1,485 Hereford bulls over a 9 year period from 1985-1993.

Saskatchewan ROP Test Station data: All Charolais and Hereford bulls admitted to the ROP test were either purebred or grade. Bulls were physically examined and classified as horned, scurred or polled. For the analysis, scurred bulls were classified as being horned. Herefords were penned separately according to horn status. A 28 day pretest adjustment period was provided for bulls each year. Bulls were fed a diet formulated to provide 16% crude protein and 67% total digestible nutrients on a dry matter basis. Birth weight (BIR) was provided by individual producers on each bull for years beginning in 1985. The on test average daily gain

(ADG) was calculated as a difference in final weight and start weight divided by the number of days on test. Scrotal circumference (SC) measurements were taken at the end of the test. The bulls were on test for 140 days during the years 1985-1987 and 112 days in years 1988-1992. Adjusted yearling weight (ADJYRL) was calculated as: [{(final weight-BIR)/(age at start of test + number of days on test)} x 365] + BIR. Adjusted yearling SC (ADJSC) was calculated as: [{365-(age at start of test + number of days on test)} x 0.032] + SC. The adjustment factor of 0.032 cm d^{-1} was used for both breeds (Lunstra et al. 1988). The data was incomplete in 1985. Backfat thickness (BFAT) was determined using an ultrasonics at the end of test.

Alberta Hereford ROP Test Station data: Hereford bulls tested were either purebred or grade. They were classified on arrival as horned or polled and penned according to horn status. A 28 day pretest adjustment period was provided for bulls each year. Bulls were fed a daily ration of rolled barely and oats, cut hay, silage and minerals formulated to allow a growth rate between 1.1 and 1.4 kg d^{-1}. On test ADG was calculated as the difference in weight divided by days on test and adjusted for age. Scrotal circumference measured at end of test, and adjusted for age in 552 bulls that were sold. No SC data were available on bulls in 1985 and 1989. Weight per day of age (WPDA) was calculated by dividing the final weight by age. The bulls were on test for 140 days during the years 1985-1989, 135 days in 1991 and 112 days in years 1990, 1992 and 1993. The General Linear Models procedure (SAS 1990) was used to derive least square means and standard errors for the dependent variables ADG, SC and WPDA in the Alberta data and ADG, ADJYRL, ADJSC and BFAT in the Saskatchewan Hereford data using a nested design. The main effects included were, horn status (H), year (Y), Y x H and pen (Y x H). In the Saskatchewan data the statistical model used for BIR included, Y, H and Y x H for both breeds. For the Charolais data, the dependent variables were analyzed as a split-plot design, which included Y, pen (Y), H and H x Y as the main effects. Appropriate error terms were used for testing.

RESULTS AND DISCUSSION

The differences between years was significant ($P<0.01$) for ADG and BFAT for the Hereford and Charolais data form Saskatchewan and ADG and WPDA in the Alberta data. Polled Hereford bulls from the Saskatchewan ROP test had significantly higher ($P=0.01$) on test ADG compared with horned bulls (Table 1) while, birth weights were significantly lower ($P=0.01$). No differences between polled and horned were observed for ADJYRL, ADJSC and BFAT in the Saskatchewan Herefords. Polled Charolais bulls had similar ADG, ADJYRL and ADJSC to horned bulls whereas, BFAT was significantly higher ($P=0.03$). No differences were observed between polled and horned bulls for traits measured in the Alberta Herefords (Table 2).

These data show no disadvantage for polled Charolais or Hereford bulls compared to horned. However, these results apply only to selected growth traits, SC and BFAT of test station bulls. The final decision on the use of polled bulls as an alternative to dehorning would in addition depend on, comparable reproductive performance in males, females and carcass quality attributes of heifers, steers and bulls.

Table 1. Least square means for traits in horned and polled bulls by breed - Saskatchewan data.

Breed	Class	Birth Wt. (kg)	ADG[x] (kg d $^{-1}$)	Adjusted Yearling Wt. (kg)	Adjusted Scrotal Cir. (cm)	Backfat Thickness (mm)
Hereford	Horned	44.2±0.6	1.35±0.02	478.4±5.1	31.3±0.33	4.9±0.23
	Polled	42.4±0.3	1.41±0.01	472.1±2.6	31.7±0.15	4.9±0.11
	P	0.01	0.01	0.39	0.29	0.78
Charolais	Horned	44.4±0.3	1.60±0.01	536.6±2.7	32.3±0.15	2.4±0.05
	Polled	43.5±0.3	1.59±0.01	531.6±3.0	32.1±0.18	2.7±0.07
	P	0.03	0.32	0.17	0.49	0.001

[x]ADG=average daily gain

Table 2. Least square means for traits in horned and polled Hereford bulls - Alberta data.

Class	ADG[x] (kg d $^{-1}$)	WPDA[y] (kg d $^{-1}$)	Scrotal Cir. (cm)
Horned	1.28±0.01	1.31±0.004	34.1±0.01
Polled	1.30±0.01	1.30±0.006	34.1±0.01
P	0.09	0.43	0.72

[x]ADG=average daily gain
[y]WPDA=weight per day of age

ACKNOWLEDGEMENTS

The authors wish to thank the University of Saskatchewan and the Alberta Hereford Association for providing the bull test data.

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