Regrouping and subsequent behaviour patterns in young bulls and steers

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Introduction

Although beef producers in Canada accept that bulls grow faster and more efficiently than steers, they are often reluctant to raise bulls for beef. This reluctance is partly a result of bulls' alleged lack of docility. They are thought to be more difficult to handle, more destructive to property and more aggresive than steers. This is particularly so if they are regrouped with strange bulls which leads to another objection to bulls for beef: during trucking and pre-slaughter lairage they are likely to encounter strange animals which can cause sufficient stress, particularly if the strange animals are bulls, to cause dark-cutting beef (Price and Tennessen 1981).

The following study was undertaken to quantify and compare the reactions of bulls and steers of various ages to being regrouped with strange animals of their own gender.

Materials and Methods

Sixty-four male calves born at The University of Alberta Ranch, Kinsella, Alberta during April and May 1981, were divided into two groups balanced with respect to breed of sire and dam. Calves in one group were castrated at about two months of age. After weaning in October, bull and steer calves were assigned within gender to eight 6.15m x 9.1m pens of eight animals each. Throughout the post-weaning period, the animals were fed ad libitum a high energy, low roughage diet consisting primarily of barley and oats.

In January, April and July, when the cattle were about nine, twelve and fifteen months old, they were regrouped into new combinations. The regrouping was done in such a way that each animal was penned with one of his previous pen-mates and six strangers. For ten consecutive days after regrouping, each of the eight pens was observed from a parked truck for 22.5 minutes three times per day; morning, afternoon and evening, for a total of nine hours per day. The following behaviour traits were recorded:

Sexual Behaviours	
Mounting	One animal mounting another, from any angle.
Chinresting	One animal placing its chin on the hips of another, often accompanied by sideways licking motion.
Flehmen	Lip-curl response, preceded by licking or smelling the urine of another animal.
Aggressive Behaviours	
Headbunting	Two animals bunting their heads together and pushing.
Bunting	One animal bunting another, usually to shoulder or flank.
Threatening	A Bunt or Headbunt was begun, but no contact was made.
Other	
Grooming	One animal licking another around the face and neck. Assumed to be amicable.
Cribbing	Chewing fencing or other property.

Each time the behaviour occurred it was recorded as a single event. In addition the total amount of time spent engaging in headbunts was recorded as "fighting". Ambient temperature was recorded at the beginning of each observation period. Data were analyzed by least-squares analysis of variance.

Results

Both bulls and steers fought when introduced to animals with which they were unfamiliar (Table 1) but at all ages, bulls were more aggressive than steers.

Table 1. Means (SE), of liveweight and aggressive behaviour/pen/hour observed during a 10 day period after regrouping.

	Age=9 mo		Age=12 mo		Age=15 mo		Effect of:		
	Bulls	Steers	Bulls	Steers	Bulls	Steers	Gender	Age	Gen x Age
Liveweight (kg)	299 (6.4)	290 (6.41)	407 (8.0)	386 (7.2)	526 (9.9)	491 (8.7)	**	***	***
Fighting (min:sec)	7:45 (1:08)	1:59 (0:23)	3:43 (0:30)	1:25 (0:13)	0:58 (0:10)	0:08 (0:02)	***	***	***
Bunting	6.5 (0.9)	4.7 (0.6)	9.7 (1.0)	5.3 (0.7)	6.1 (0.9)	2.1 (0.3)	***	**	NS
Head Bunting	11.2 (1.4)	6.8 (1.0)	13.4 (1.5)	5.2 (0.6)	6.1 (0.9)	1.1 (0.2)	***	***	**
Threatening	5.0 (0.5)	2.2 (0.3)	5.2 (0.5)	5.3 (0.6)	4.5 (0.7)	2.3 (0.4)	**	**	NS

** P<0.05; *** P<0.01

For both genders, the average time spent fighting during observation periods decreased from a high at age nine months, but the number of "fights" (Bunting + Headbunting + Threatening) peaked at 12 months. The average duration of each contest was therefore considerably less at 12 months than at nine. High ambient temperatures may account for the decreased fighting in July. There was a negative correlation between amount of time spent fighting and ambient temperature for both bulls and steers (r=-0.332 and r=-0.296 respectively, p<0.01).

Figure 1. The average number of aggressive acts per hour by bulls and steers aged 9–15 months during a ten day period after mixing

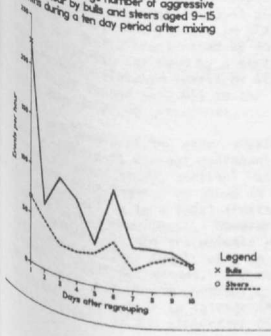
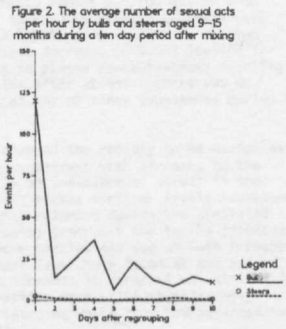


Figure 2. The average number of sexual acts per hour by bulls and steers aged 9–15 months during a ten day period after mixing



A decay in aggressive behaviour was evident during the ten day period after regrouping when the data for January, April and July were pooled (Figure 1). The initial level of aggressive behaviour among bulls was more than twice that of the steers. But during the succeeding days there was a decrease in aggressive behaviour in both groups, and by the ninth and tenth days there was no statistically significant difference between bulls and steers in the occurrence of aggressive behaviour.

Figure 2 and Table 2 make it clear that although the rate of sexual behaviour decreased with time after regrouping, the bulls maintained a much higher level of mounting than did the steers. Whereas regrouping seemed to be a stimulus for sexual investigation among bulls, it had no such effect on steers. Among bulls and steers, mounting occurred more frequently in April (aged about twelve months) than in January or July (Table 2). Mounting, as opposed to aggressive behaviour, was not significantly correlated with ambient temperature (r=0.038, p>.5).

Another category of activity recorded was 'cribbing' (Table 2). This behaviour occurred sporadically in both genders, with neither predominating: at age twelve months steers cribbed more than bulls, and at fifteen months the positions were reversed. There was no gender-effect on the frequency of grooming.

Table 2. Means (SE), of sexual and other behaviours/pen/hour observed during a 10 day period after regrouping.

	Age=9 mo		Age=12 mo		Age=15 mo		Effect of:		
	Bulls	Steers	Bulls	Steers	Bulls	Steers	Gender	Age	Gen x Age
Mounting	6.9 (1.2)	0.3 (0.1)	12.3 (1.5)	0.6 (0.1)	3.9 (0.8)	0.1 (0.08)	***	**	*
Chin Resting	4.8 (0.7)	0.8 (0.2)	7.9 (0.7)	1.2 (0.2)	5.4 (0.9)	0.1 (0.06)	***	*	NS
Flehmen	3.3 (0.4)	0.4 (0.1)	4.9 (0.5)	0.4 (0.1)	2.8 (0.4)	0.1 (0.05)	***	**	*
Cribbing	0.4 (0.14)	0.3 (0.09)	0.4 (0.11)	1.2 (0.17)	1.5 (0.30)	0.7 (0.18)	NS	***	***
Grooming	0.7 (0.17)	0.6 (0.13)	7.6 (0.13)	1.7 (0.20)	1.2 (0.25)	1.1 (0.22)	NS	NS	NS

* P<0.1; ** P<0.05; *** P<0.01

Discussion

It has been reported that in bulls (Venediktova et al., 1977) and in steers (McPhee et al., 1964), regrouping leads to an increase in aggressive and sex-related social interactions. From Figure 1 it can be seen that regrouping led to more aggressive behaviour among bulls. These data suggest that the magnitude of this gender difference changes with age. With the present design, the effects of age were confounded with those of ambient temperature, photoperiod, body weight and body fatness. Nevertheless, the data show that steers were 63% as aggressive as bulls in January at age nine months, and that the difference between the genders increased with age: 57% at 12 months; 32% at 15 months. Baseline androgen levels and levels of aggressive behaviour are known to be correlated (Leshner 1975), though in rats at least, castrates are not more submissive than entire males (Leshner and Meyer, 1975).

Any discussion of aggressive or other social behaviour in livestock must consider two important variables: group size and stocking density. This study dealt with small pens, 55.8 m², holding eight animals: circa 7 m²/animal. By contrast, McPhee et al. (1964) studied six steers at a stocking density of 12.4 m²/animal, and Hinch et al. (1983) observed grazing steers and bulls in herds of 24 at a density of over 5800 m²/animal. That may account for the much lower rate of aggressive behaviour among the bulls and steers described for those cattle.

Hinch et al. (1983) report that differences in the patterns and frequencies of social interactions among bulls and steers on pasture were not significant until 14 or 15 months of age. That conclusion may apply to bulls and steers kept at very low stocking densities where, as Fraser (1982) indicated, avoidance serves to reduce agonistic contests among animals. In the present study, gender differences in behaviour were significant even at nine months. This is presumably a result of the high feedlot stocking density serving to defeat avoidance behaviour.

The second variable that must be taken into account, group size, has implications independent of stocking density. Aggressive behaviour is in part related to the establishment of a dominance hierarchy. In cattle, the final order is largely the result of the interactions of each pair of animals. Because the number of combinations of pairs increases with the number of animals, activity in a large, newly formed group can be expected to normalize much more slowly than in a small group. Group size is also important due to the effect of social facilitation. Behaviours such as grazing or feeding are 'contagious' and will spread to other animals if begun by a few. This may also apply to homosexual mounting among cattle (Reinhardt et al., 1978).

The differences that exist between bulls and steers are hormonal in origin. That has, for example, led to a different pattern of muscular development in steers and bulls. Steers never develop the complete muscle distribution pattern of the mature male. In this regard, steers are 'immature' bulls (Berg and Butterfield, 1976). Differences in behavioural development between steers and bulls may be analogous to differences in muscular development. The sexual behaviour and to a lesser extent the aggressive behaviour of the adult male is never developed by the castrate. Some of the differences may be explained by the steer being a behaviourally less 'mature' animal. That is the conclusion reached by workers in Australia who cite their observations that bulls show reduction in play behaviour (running, gambolling) and increase in social grooming at an earlier age than steers (Hinch et al., 1983).

Finally, mounting is perhaps the most difficult behaviour to interpret. Mounting of an estrous cow by a bull is regarded as typical heterosexual behaviour. The motivating drive is explained in terms of libido. But is the mounting observed in this study also a function of libido? Reinhardt et al. (1978) observing five to ten month old male and female Boran cattle (*Bos indicus*), came to the conclusion that mounting was play behaviour, because it lacked "serious motivation" and because the roles were reversible. Hinch et al. (1983) regarded homosexual mounting done by ten month old Hereford bulls and steers as sexual behaviour.

But mounting may also be a manifestation of agonistic behaviour. The bulls in this study had a mean mounting frequency of 15.5 mounts/pen/hour during the first five days after regrouping and a lower rate of only 4.4 mounts/pen/hour for the second five days. This suggests that mounting among bulls may have an agonistic, dominance asserting function as well as a sexual role. For both bulls and steers, there was a significant correlation between mounting and aggressive behaviour (r=.730 and r=.437 respectively, p<.001).

On the other hand, if steers are considered behaviourally less mature than bulls, mounting may have components of sexual, aggressive and play behaviour. From the current work it can be calculated that at ages 9 and 12 months, the sexual behaviour of steers as a percentage of the rate of that behaviour among bulls was 10% and 9% respectively. At age 15 months, it had dropped to 3%. Perhaps what was originally play behaviour among steers, declined as the castrates belatedly matured, but was not replaced by any adult male motivating drive.

Acknowledgements

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