

## Preliminary results on the beef production of Belgian-Blue x Jersey-, Limousin x Jersey- and Jersey cattle in a pasture based system

C.J.C. Muller<sup>1#</sup>, R. Meeske<sup>2</sup>, G.D. van der Merwe<sup>2</sup> and J.A. Botha<sup>1</sup>

<sup>1</sup>Animal Production, Private Bag X1, Elsenburg 7607, South Africa

<sup>2</sup>Outeniqua Experimental Farm, PO Box 249, George 6530, South Africa

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### Abstract

The beef production of Belgian Blue and Limousin (x Jersey) crossbred heifers and steers was compared to that of Jersey steers. Fifty, second parity and older Jersey cows weighing at least 350 kg were inseminated with Belgian Blue or Limousin semen. Calving ease was scored for every cow giving birth to a crossbred calf. Crossbred heifers and steers were reared according to standard procedures for a pasture-based system. Crossbred animals and Jersey steers were slaughtered at 24 months of age. Belgian Blue x Jersey-, and Limousin x Jersey calves were heavier ( $P < 0.01$ ) at birth than Jersey calves, i.e. 32 and 31 vs. 24 kg respectively. Most (75%) Jersey cows gave birth to crossbred calves without any assistance. The remaining number of cows also received very little assistance. The average daily gain of Jerseys was lower ( $P < 0.05$ ) than that of crossbred heifers and steers resulting in lower pre-slaughter live-weights at 24 months of age. Belgian Blue x Jersey and Limousin x Jersey heifers and steers weighed 355 and 328 kg respectively in comparison to 287 kg for Jersey steers. The dressing percentage of Jerseys was also lower ( $P < 0.001$ ) than that of crossbreds. Results from this study confirmed the superiority of specialized beef breeds in comparison to Jersey steers. The crossbred heifers and steers should, however, be raised on a higher quality diet to capitalize on their growth potential.

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**Keywords:** Belgian Blue, Limousin, Jersey, steers, heifers, growth rate, pasture system

#Corresponding author. E-mail: [carelm@elsenburg.com](mailto:carelm@elsenburg.com)

### Introduction

The growth rate of Jersey cows and steers in comparison to other dairy or beef breeds is low resulting in a smaller carcass and poor carcass grading with typical yellow body fat (Burke *et al.*, 1998). It is possible to improve the beef production potential in Jersey herds through crossbreeding. No studies have been done recently in South Africa to exploit this aspect of dairy farming. More than 20 years ago on the Tygerhoek Experimental Farm, it was found that Simmentaler x Jersey calves had the same growth rate as Simmentaler calves, i.e. 0.699 vs. 0.709 kg per day (Muller *et al.*, 1999). Naude & Bocard (1973) found that Jersey crossbred progeny compares favourably with crossbreds from beef breeds such as the Afrikaner. Naude & Armstrong (1967) found that the live weights at birth and at slaughter at 15 months of age were higher for Brown Swiss x Jersey and Simmentaler x Jersey male calves (castrated and intact) to similar Jersey calves. As early as the 1960's, the potential of the Belgian Blue beef breed has been considered for crossbreeding to improve the beef potential of dairy cattle (Butterfield, 1966). This breed has the genes for double muscling or muscular hypertrophy (Arthur, 1995). Crossbreeding with the Belgian Blue should improve meat yield, meat tenderness and feed efficiency (Arthur, 1995). Arpacik *et al.* (1993) showed that Belgian Blue x Jersey bulls had higher growth rates than purebred Jersey bulls. The aim of this study was to provide production guidelines on the beef production of terminal crossings of Belgian Blue and Limousin bulls on Jersey cows in comparison to Jersey steers in a pasture based system.

### Materials and Methods

This study was conducted at the Outeniqua Experimental Farm near George (altitude 201 m, 33° 58' 38" S and 22° 15' 16" E) in the Southern Cape region of South Africa. This area has an all year rainfall pattern averaging 725 mm per annum. Dairies produce milk from cultivated pastures such as kikuyu (*Pennisetum clandestinum*) and ryegrass (*Lolium multiflora* and *L. perenne*) under permanent irrigation systems. Fifty, second parity and older Jersey cows, with live weights of at least 350 kg each, were inseminated in random order with Belgian Blue or Limousin semen. Crossbred heifers and steers born from these inseminations were compared to Jerseys born during the same period. Calving ease, ranging from one (cow calving without any assistance) to five (birth by caesarean procedure), was scored for each cow giving birth to a crossbred

calf. Calves were weighed within 24 hours after birth. Each calf received its own dam's colostrum for at least four days after which calves received full milk at 10% of body weight until weaning at six weeks of age. A commercial pelleted calf starter (19% crude protein content) was provided from seven days of age. Bull calves were castrated with a Burdizzo at two months of age. At two months of age, calves were put on cultivated kikuyu-ryegrass pasture while still receiving 2 kg per day of a pelleted calf growth meal. From six months of age Jersey steers and crossbred heifers and steers were kept on surplus kikuyu and ryegrass pastures. A growth concentrate with a 16% CP content was provided at a rate of 1.5 kg/animal/day from six months until slaughter at 24 months of age. Live weight, carcass weight, dressing percentage and carcass grades were recorded at slaughter.

Birth weights, growth parameters and slaughter traits were assessed according to a 3 X 2 factorial design, involving sire breed (Jersey, Belgian Blue and Limousin) and gender as main effects. Jersey heifers were not slaughtered because of their replacement value, thus complicating the analysis. Data were analysed by least square procedures to account for uneven subclasses, using LSMLMW (Harvey, 1990).

## Results and Discussions

A major problem in a trial of this kind is to ensure sufficient experimental animals of both sexes. Eighteen Limousin and 26 Belgian Blue crossbred heifers and steers were born from 20/01/01 to 24/01/02. However, only 75% of all heifers and steers survived until slaughter at about 24 months of age, mainly due to redwater disease. The interactions between sire breed and sex did not reach significance and only main effect means were thus tabulated (Table 1). Sire breeds affected all growth traits of heifers and steers. Purebred Jerseys were smaller ( $P < 0.001$ ) than crossbreds at birth with a slower ( $P < 0.05$ ) growth rate resulting in a lower liveweight at slaughter. Birth weights ranged from about 24 kg for Jerseys to 32 kg for Belgian Blue x Jersey calves. The carcass weight and dressing percentage of Jerseys were lower ( $P < 0.01$ ) than that of crossbreds. Sire breeds had no effect on calving difficulties and most (75%) cows calved without any assistance.

**Table 1 Main effect means (SE) for birth weight and slaughter traits as affected by sire breed and gender of steers and heifers in a pasture based system**

Parameters	Sire breeds			P	Gender		P
	Jersey	Limousin	Belgian Blue		Heifers	Steers	
Number slaughtered	4	11	18		21	12	
Birth weight (kg)	23.7(0.9)	30.5(0.8)	32.2(6)	0.001	28.9(0.6)	28.9(0.7)	0.85
Calving-ease (score 1-5)	1.1(0.1)	1.3(0.1)	1.2(0.1)	0.35	1.1(0.1)	1.2(0.1)	0.29
Pre-slaughter live weight (kg)	287(22)	328(16)	355(10)	0.02	310(12)	337(13)	0.16
Live weight at 24 months of age (kg)	272(23)	323(16)	347(10)	0.02	299(13)	329(13)	0.14
ADG (g)	338(31)	401(22)	431(14)	0.03	370(17)	410(18)	0.13
Carcass weight (kg)	137(12)	164(9)	187(6)	0.001	158(7)	167(7)	0.41
Dressing percentage (%)	46.4(1.5)	49.7(1.1)	51.8(0.7)	0.01	49.9(0.9)	48.8(0.9)	0.41

ADG: Average daily gain

(s.e.): standard error

Arpacik *et al.* (1993) found that Belgian-Blue x Jersey steers weighed 35 kg at birth with very few calving problems among cows. The average daily gain of crossbred steers was 0.844 kg per day and they reached a live weight of 305 kg at 320 days of age. Belgian Blue and Limousin crossbred steers and heifers in the present study had much lower daily live weight gains (Table 1).

The poor growth rates obtained in the present study could probably be ascribed to limited pasture availability. On most pasture-based dairies, dairy steers being reared for beef production are kept on surplus and often rank pasture or to clean-up excess pasture post-grazing by dairy cows or heifers (Burger W.J., 2003, Outeniqua Experimental Farm, personal communication). There is usually very little emphasis on achieving maximum growth rates, as that would entail an increased input costs in terms of more or better pastures as well as providing some additional concentrates. In the present study, a similar approach was used as on commercial farms in this area. Keane & Allen (2002) also noted that beef breed comparisons should

be undertaken within the production system to which the results are intended to apply. Although achieving lower growth rates than results from other studies, the performance of Limousin and Belgian Blue crossbred steers was 30% higher than that of purebred Jersey steers. This would result in a higher income for the crossbred steers. Providing a higher quality pasture and supplementary concentrate would increase growth rates although also increasing feed costs.

Notwithstanding the poor growth rates of crossbred steers and heifers in the present study, there is a large beef production potential in using double muscled sires on old or low breeding value cows in the dairy herd. The milk yield of these cows is not affected, while the meat yield of the progeny is greatly improved. The number of cows used for this should probably not be more than 20% of the herd to compromise the genetic improvement of the herd by reducing the number of replacement heifers from Jersey sires. All crossbred animals should be marketed as beef. Crossbred animals from double muscled beef breeds should perform better in a feedlot as opposed to a pasture-based system. Double muscled animals have smaller digestive tracts and therefore need a more concentrated diet to perform optimally (Arthur, 1995). Further studies are envisaged to include aspects such as feedlotting animals, marketing at an earlier age as well as carcass and meat quality studies. Double muscled cattle are for instance more resistant to intra-muscular fat deposition (Hornick *et al.*, 1999). No information is presently available on the susceptibility of crossbred double muscled animals to heat stress.

## Conclusions

This study showed the superiority of Belgian Blue x Jersey and Limousin x Jersey heifers and steers in comparison to Jersey steers. Jersey cows experienced no calving difficulties although the birth weights of crossbred calves were higher than those of Jersey calves. The Belgian Blue x Jersey and Limousin x Jersey progeny achieved a higher dressing percentage, resulting in a larger carcass at slaughter as well as higher grades. This should result in a higher income for crossbred heifers and steers.

## References

- Arpacik, R., Alpin, O., Bayraktar, M. & Cekgul, E., 1993. Commercial crossing of Jersey cows with Belgian Blue and Chianina bulls for beef production. *Lalahan-Hayvancilik-Arastirma-Enstitusu-Dergisi*. 33 (3/4): 1-15. Ankara University, Ankara. Turkey.
- Arthur, P.F., 1995. Double muscling in cattle : a review. *Aust. J. Agric. Res.* 46, 1493–1515.
- Boccard, R., 1982. Relationship between muscle hypertrophy and the composition of skeletal muscles. In : *Muscle hypertrophy of genetic origin and its use to improve beef production*. Eds. King, J.W.B. and Ménissier, F., Martinus Nijhoff Publishers. The Hague. Netherlands. pp. 148–162.
- Burke, J.I., Purchas, R.W. & Morris, S.T., 1998. A comparison of growth, carcass, and meat characteristics of Jersey- and Friesian-cross heifers in a once-bred heifer system of beef production. *New Zealand J. Agric. Res.* 41, 91-99.
- Butterfield R.M., 1966. Muscular hypertrophy of cattle. *Austr. Vet. J.* 42, 37-39.
- Harvey, W.R., 1990. User's guide for LSMLMW and MIXMDL. PC-2 version, Mimeograph.
- Hornick, J.L., Van Eanaeme, C., Clinquart, A., Gerard, O. & Istasse, L., 1999. Different modes of food restriction and compensatory growth in double muscled Belgian Blue bulls: animal performance, carcass and meat characteristics. *Anim. Sci.* 69, 563–572.
- Muller, C.J.C., Brand, C.J.J. & Metcalf, L., 1999. Grootmaak van Friesbulkalwers saam met kalwers van vleis- en kruisraskoeie in die Suid-Kaap. *Outeniqua Nuus*, Vol 1. 16–18.
- Naude, R.T. & Armstrong, C.W.B., 1967. Beef production from Jersey and crossbred steers and bulls. *Proc. S. Afr. Soc. Anim. Prod.* pp. 156–161.
- Naude, R.T. & Boccard, R., 1973. Carcass and meat quality of Africander and Jersey crossbred steers. *S. Afr. J. Anim. Sci.* 3, 95-100.
- Swatland, H.J. and Kiefer, N.M., 1974. Fetal development of the double muscled condition in cattle. *J. Anim. Sci.* 38, 752–757.