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THE BEEF PRODUCTION OF A JERSEY HERD AS AFFECTED BY CROSSBREEDING USING FLECKVIEH SIRES

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SUMMARY

Beef production is a natural possibility in a dairy herd through cull cows and bull calves. This is not always exploited fully probably because of its relatively small contribution to farm income. While producing high quality beef, the growth rate of Jersey (J) bull calves for veal and beef is low in comparison to other dairy breeds. This could be improved by crossbreeding with beef breeds. In this paper the beef production of purebred J and Fleckvieh x Jersey (FxJ) bull calves was compared. Bull calves were reared similarly for veal, i.e. a carcass weight not exceeding 100 kg, or as steers for beef to 21 months of age. In the veal production system, for J and FxJ bull calves, respectively, the mean±se birth weight of 27.5±1.2 and 31.9±0.8 kg, live weight at 6 months of age of 166.2±10.4 and 190.0±20.1 kg, average daily gain (ADG) of 0.754±0.013 and 0.865±0.017 kg and marketing age at 7.3±0.1 and 6.2±1.2 months differed ($P<0.01$). In the beef production system, for J and FxJ bull calves, respectively, the mean±se birth weight of 26.5±1.0 and 33.4±1.1kg, end live weight at 21 months of age of 324.4±10.2 and 433.0±13.3 kg, ADG of 0.465±0.016 and 0.624±0.021 kg differed ($P<0.01$). Results indicate a potentially higher beef income for crossbred veal calves and steers. Further studies are required to determine an optimal feeding programme and marketing age as well as its effect on beef quality characteristics.

INTRODUCTION

In South Africa, the beef potential of dairy herds is not always exploited fully. As most dairy farmers are not bull breeders, bull calves could be reared for veal or beef. However, J bull calves are regarded as unwanted animals and are sold at low prices. Even though the beef quality of J steers is high in terms of tenderness (Koch *et al*. 1976) and meat:bone ratio (Purchas *et al*. 2003), their growth potential is low in comparison to other dairy breeds (Morgan *et al*. 1969, McIvor, 2004). Specialization of farming systems have resulted in most dairy herds becoming a purely milk production system in contrast to past systems. In the 1980's, a major portion of the beef animals in the United Kingdom were born in dairy herds and were reared for beef production. Breeding and selection programmes towards increased milk yields have resulted in cows showing more dairy character or "sharpness" (Hansen, 2003) with cows having a lower beef potential in comparison to the earlier British Friesian type dairy cows. Kempster *et al*. (1988) found that Canadian Holsteins slaughtered either at 16 and 24 months of age, had a lower ($P<0.05$) carcass weight and conformation score in comparison to British Friesian steers. The growth in the Jersey breed replacing Friesian or Holstein herds has further reduced the beef potential of the dairy industry. Culling of cows not becoming pregnant to maintain a strict seasonal calving system have in some countries like Ireland resulted in fertile cows requiring low replacement rates (<20%) to maintain herd sizes (Downing 2013). This provides the opportunity to inseminate a considerable portion of the herd with beef semen to increase the beef potential of dairy herds. In South Africa this practice is not always possible as the internal herd growth of most dairy herds is questionable because of high culling rates of cows and poor success rate of heifer rearing.

Crossbreeding has become a system to overcome some breeding problems like fertility and longevity in some dairy breeds (Funk 2006). Little attention has been given towards using dual-

purpose breeds in crossbreeding programmes which provides the opportunity to maintain the milk yield of cows while increasing the beef production of crossbred animals. One such a breed to consider is the Fleckvieh (F), a Simmental-derived breed from Germany. This is a dual-purpose breed with medium to high (in comparison to Holstein cows) milk yield levels and milk components while also having a high beef production potential. The aim of the paper is to compare the beef production of J and FxJ bull calves reared intensively for veal and for beef in a partly pasture-based feeding system.

MATERIAL AND METHODS

Location and Animals. This paper was based on an on-going breed-comparison study being conducted at the Elsenburg Research Farm of the Western Cape Department of Agriculture (Muller *et al*. 2009). Elsenburg is situated approximately 50 km east of Cape Town in the winter rainfall region of South Africa. The area has a typical Mediterranean climate with short, cold, wet winters and long, dry summers. To create two comparative pure- and crossbred dairy herds, all available J cows were divided into two groups according to estimated breeding value for milk yield. Groups were randomly allocated to be inseminated by J or F bulls. The following lactation cows were inseminated with the alternative sire breed. The progeny born from J and F sires were subsequently inseminated with the same breed. Pure- and all crossbred (comprising 50 and 75% F) bull calves born were used in the beef or veal production system. Bull calves born within 7 days from each other were allocated to the beef production system while all other bull calves were used in the veal production system. For the veal production system calves were fed intensively using a commercial calf starter meal to 2 months of age and a calf growth meal to marketing, viz. a carcass weight not exceeding 100 kg. For the beef production system, J and FxJ bull calves were castrated at about 2 months of age and reared similarly as the veal production system to 3 months of age after which they were put on kikuyu pasture supplemented with about 2 kg of a calf growth meal to 6 months of age. After this stage, they were kept on natural pasture, i.e. pasture was rain-fed and no fertilizers were used. During summer droughts, pasture was supplemented with oats hay. Fresh drinking water was freely available at all times.

Data recording. Birth weights were recorded when bull calves were removed from their dams to be put into individual crates at two days of age. Thereafter calves were weighed once a month. On reaching a live weight of about 180 kg, calves reared for veal, were weighed once a week on a Thursday. When a live weight of approximately 195 kg was reached, bull calves were marketed the following Tuesday. Calves were weighed before leaving to the abattoir (end live weight) and hot and cold carcass weights were recorded after slaughter. Bull calves reared for beef were grouped according to calving date which had to be within 7 days of each other for both breeds. This was to ensure that animals from both breeds were exposed to similar environmental conditions over the 21-month growing-out period. Similarly, bull calves were weighed at birth and thereafter once a month until marketing at 21 months of age when they were transported to the abattoir.

Statistical analyses. Growth traits were compared between breeds within production system by analysis of variance using cows within breed as replicates. Data on all crossbred combinations (50 and 75% F) were grouped together. Breed means and probabilities of differences are provided.

RESULTS AND DISCUSSION

The birth weight of J and FxJ bull calves reared for veal differed ($P<0.01$) being 27.5±1.2 and 31.9±0.8 kg respectively (Table 1). Crossbred bull calves had a higher ($P<0.01$) average daily

gain (ADG) thus reaching the required live weight for marketing as veal earlier (P<0.01) than purebred J, i.e. 6.2±0.1 and 7.3±0.1 months of age respectively. The ADG of FxJ and J veal calves differed (P<0.01) being 0.865±0.017 and 0.754±0.013 kg. The birth weight of J and FxJ bull calves reared for beef differed (P<0.01) being 26.4±1.0 and 33.4±1.1 kg respectively. Crossbred bull calves had a 34% higher (P<0.01) end live weight at marketing at 21 months of age of 433.0±13.3 kg in comparison to 324.4±10.2 kg for J steers. The ADG for FxJ was higher (P<0.01) than for J steers being 0.624±0.021 and 0.465±0.016 kg respectively.

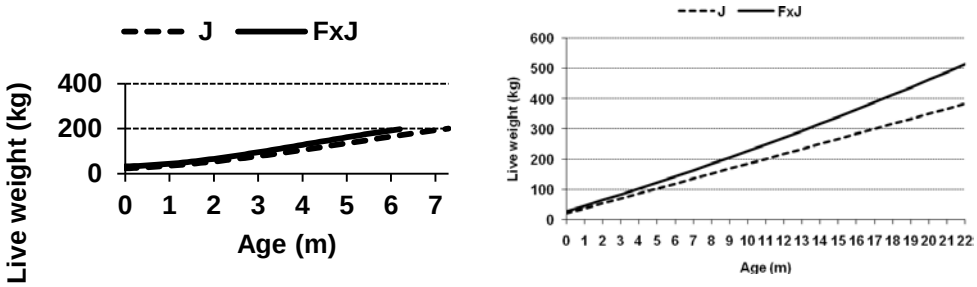
Table 1. The mean±se growth performances of Jersey (J) and Fleckvieh x Jersey (FxJ) bull calves reared intensively for veal or in a partially pasture-based feeding system for beef production ([1]50% F: n=22, 75% F: n=17; [2]50% F: n=17, 75% F: n=8)

	Veal production system		Beef production system	
Variables	J	FxJ	J	FxJ
Number of records	22	39[1]	22	25[2]
Birth weight (kg)	27.5[a]±1.2	31.9[b]±0.8	26.4[a]±1.0	33.4[b]±1.1
End live weight (kg)	193.6±2.0	194.4±2.5	324.4[a]±10.2	433.0[b]±13.3
Marketing age (m)	7.27[a]±0.12	6.21[b]±0.08	21.06±0.08	21.05±0.08
Average daily gain (kg)	0.754[a]±0.013	0.865[b]±0.017	0.465[a]±0.016	0.624[b]±0.021
Hot carcass weight (kg)	93.2±1.8	97.9±1.3	161.1[a]±7.9	204.4[b]±8.1
Dressing-out (%)	0.48[a]±0.01	0.50[b]±0.01	0.49±0.017	0.47±0.011

[a,b]Values with different superscripts within production system differ at P<0.01

Early work by Naude and Armstrong (1967) in South Africa also found low growth rates and efficiency of gain for purebred Jersey steers in comparison to beef-Jersey crossbred steers. In that study the weight gain of J bulls was improved by 39% by crossbreeding with Simmental bulls. Morgan *et al.* (1969) and Barton *et al.* (1994) also found that the disadvantages of pure J cattle are greatly reduced by crossbreeding with beef breeds.

The live weight of bull calves reared as veal or steers reared as beef is presented in Figure 1 demonstrating the earlier age of marketing for veal FxJ calves as well as the higher live weight of FxJ steers at the same marketing age in comparison to J calves and steers respectively.



(a) (b)

Figure 1. The live weight of Jersey (J) and Fleckvieh x Jersey (FxJ) bull calves reared as (a) veal to 100 kg carcass weight and (b) as steers for beef to 21 months of age

The Jersey breed is becoming increasingly popular, especially for pasture-based dairy farming systems. Some research should be conducted to determine the effect of different beef breeds on the beef potential of bull calves which are usually culled soon after birth. To include a substantial beef production option in a dairy herd is, however, only possible when the culling rate of cows in the herd is low requiring a low replacement rate. This causes a strong internal herd growth rate

resulting in surplus dairy heifers which could be sold as breeding animals especially when herd expansion is limited. Alternatively, when the market for such heifers is poor, a significant portion of the cows in the herd could be inseminated with beef semen to create a beef option for the dairy herd. This requires further research to determine the best beef breeds suitable to be used in such a production system. Earlier work by Morris *et al*. (1995) showed that in New Zealand beef production could be increased through higher dressing-out percentages and meat yield by using suitable beef breeds, i.e. Piedmontese and Belgian Blue sires on Friesian cows. Arpacik *et al*. (1993) showed the potential of Jersey cows in crossbreeding programmes delivering progeny from Belgian Blue and Chianina sires. Birth weights of calves from these sires were on average 34.7 and 35.0 kg respectively with no dystocia in either group of cows. The growth rate of crossbred steers was higher ($P<0.05$) than that of purebred Jerseys bulls.

CONCLUSION

In this study a breed comparison was conducted using production systems generally used by dairy farmers. Higher growth rates for FxJ in comparison to purebred J bull calves reared for either veal or beef under similar feeding conditions were observed. Crossbred bull calves reached the required live weight for veal, on average 32 days earlier than J bull calves. The end live weight of FxJ steers reared as beef in a partially pasture-based system was 34% higher than J steers. Although a higher beef production is realized from crossbreeding using a dual-purpose breed, the improvement in milk yield, milk composition and fitness traits would determine the economic value of crossbreeding. Further studies should be conducted to determine the effect of including better quality pasture into the diet of steers reared for beef as only poor quality pasture was available in the present study. This should include the effect of the inclusion of supplementary feeds to increase the performance of crossbred steers as steers being finished on grass could result in too lean carcasses.

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