Innovative mating practice to breed highly fertile replacement heifers in a terminal crossbreeding system

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Abstract

The utilization of heterosis, such as terminal crossbreeding improves the efficiency and output of beef cattle farming. Terminal crossbreeding is also less complicated than rotational crossbreeding. The only prerequisite is that the fertility of the dam line should be high enough to allow for the production of enough straight-bred heifers to maintain the system, and many systems fail because this can not be met. In this article the principle that all cows are straight bred to dam-breed bulls during the first part of the mating season, and thereafter to terminal-breed bulls is discussed. It is demonstrated that fertility can be drastically increased by using this method, resulting in a successful system of terminal crossbreeding.

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According to MacNeil & Newman (1991) and MacNeil (2005) commercial beef production is economically most efficient when heterosis can be captured. This higher efficiency arises from a potential increase of ca. 26% in weaning weight per cow exposed, while feed energy requirement only increases by 1%. In addition, and of particular importance to the developing world, is the opportunity to use locally adapted (low input) maternal breeds and to improve the production potential of the progeny by using terminal sire breeds (Scholtz, 1988; Scholtz et al., 1990).

Under commercial farming practices in South Africa, even where conditions are harsh with relatively low levels of nutrition, such terminal crossbreeding with small cows can still succeed in improving the efficiency and output of beef cattle farming. This can be attributed to the increase in efficiency of production arising from the lower intake and maintenance requirements of the smaller cow.

This system of terminal crossbreeding may even be valuable for the commercialization of identified individuals within the emerging beef cattle sector. In this case the system will rely heavily on adapted indigenous breeds (such as the Nguni) as dam line. A breed such as the Angus can play an important role as the sire line. The biggest advantage of the Angus is that it starts with the market (quality product and branded beef), and crossbred animals can now be specifically bred for this market (Matjuda, 2005).

Where rotational crossbreeding can be very complicated, terminal crossbreeding, in contrast to rotational crossbreeding, does not put any additional burden on managerial skills. All it implies is that bulls from the sire and dam lines are mated in the desired ratio to the cows. The bulls from the sire and dam line can even be reared together during the breeding season. All crossbred progeny as well as the straight bred males should be marketed.

Traits desired for dam lines are primarily those related to reproduction and cow maintenance. The females should be adapted and hardy, have low maintenance (small size), early puberty, high fertility, easy calving, moderate milk production and productive longevity.

The only prerequisite is that the fertility of the dam line should be high enough to allow for the production of enough straight-bred heifers to maintain the system. In many cases a system of terminal crossbreeding fails because this condition cannot be met, and farmers start to use some of the crossbred females as replacement heifers. In such a case the advantages of terminal crossbreeding associated with hererossis, adaptability, hardiness, low maintenance and calving ease are lost.

Heritabilities of most female fertility traits are low and range from 0.04 - 0.17, while heritability estimates for age at first calving ranges from 0.24 - 0.61. It is therefore clear that environmental effects have
the largest impact on the expression of fertility. Improvement of female fertility should thus focus on the selection of heifers with higher genetic potential to breed early in their first season, and then continue to rebreed and calve early every year as mature cows (Doyle et al., 2000).

Potgieter (of the farm Kraaldooorn in Calitzdorp) has come up with an innovative mating practice for his Afrikaner herd to breed replacement heifers for terminal crossbreeding (Landbouweekblad, 8 April 2005). It is well known that the most fertile cows tend to come on heat early in the mating season. He therefore follows the principle that all cows are straight bred to Afrikaner bulls during the first part of the mating season. Thereafter the Afrikaner bulls are all replaced by Angus bulls.

The first calves to be born are thus purebred Afrikaner calves from the most fertile cows, and replacement heifers are selected from these calves. By following this practice the calving percentage of the herd has increased to 85%, in spite of the relatively poor conditions under which the herd is kept. The relative low fertility in the female population of the Afrikaner breed in South Africa is well documented (Scholtz, 1988; Matjuda, 1997).

The results obtained by Potgieter is thus of particular importance if viewed in context of the study by Matjuda et al. (1998), that indicated the involvement of major genes in the determination of age at first calving in the Afrikaner breed. Traits that are under influence of major genes are normally highly heritable and this may explain why Potgieter succeeded in increasing the calving percentage of his herd to 85%, despite the poor conditions under which it is kept.

This method seems to represent an innovative mating practice that can be widely used to breed highly fertile replacement heifers in a terminal crossbreeding system. However, its application is not only limited to terminal crossbreeding. It can also be a valuable method to increase fertility in pure breeds. In such a case breeding bulls should only be selected from cows that calved early in the season and that re-calve every year.

References


