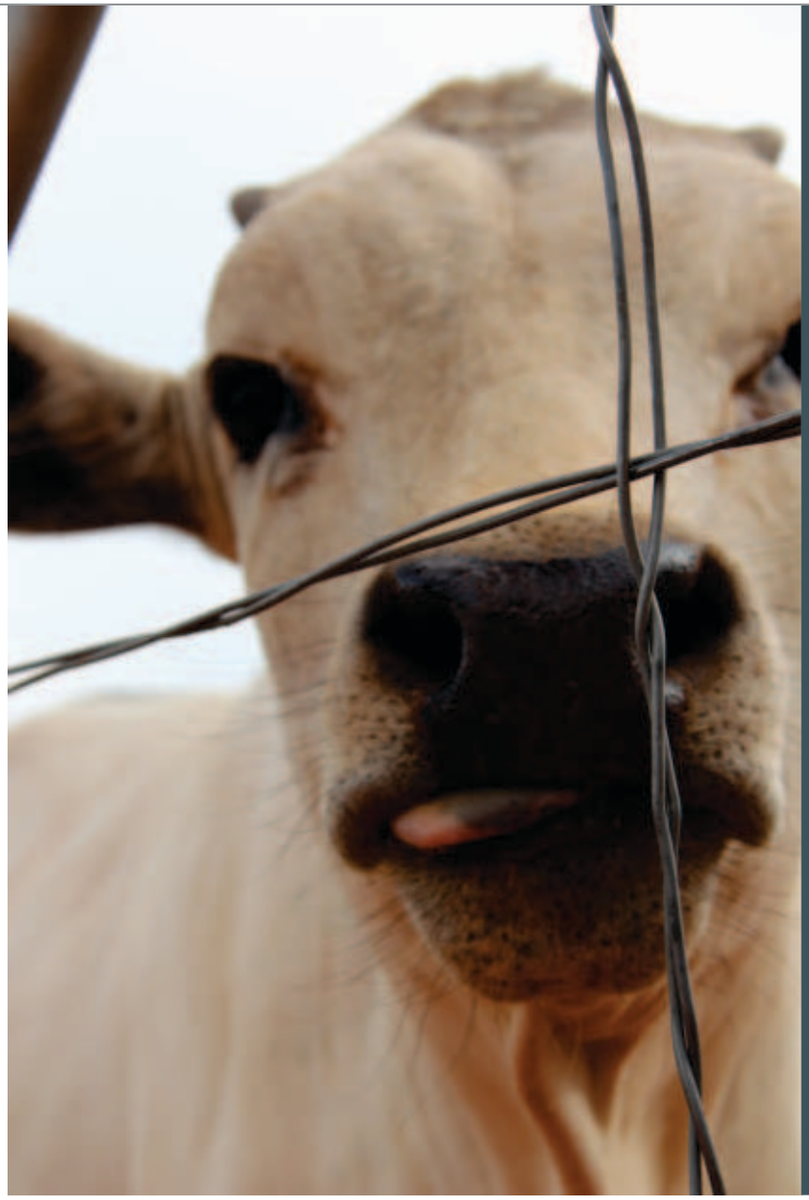

BREEDING STRATEGIES FOR NGUNI CATTLE TO SUPPORT CLIMATE SMART BEEF PRODUCTION

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PERSPECTIVE

Livestock and rice are unique in the sense that climate change represents a feedback-loop within which livestock and rice production both contribute to the problem and suffer from the consequences. The impact of global warming and continued uncontrolled release of greenhouse gas (GHG) has twofold implications for livestock production and climate smart agriculture. Livestock is responsible for 21% of anthropogenic methane and extensive beef cattle farming is a major contributor.

IMPROVED PRODUCTION EFFICIENCY

An effective way to reduce the carbon footprint from beef production and to support climate smart production, is to reduce cattle numbers and increase the production per animal. Increased productivity generates less greenhouse gas emission per unit of product. There is sufficient genetic variation in Southern Africa's beef cattle genetic resources to facilitate breeding for improved production efficiency.

South Africa has indigenous beef cattle breeds such as the Nguni that are widely recognized for attributes such as fertility, low maintenance inputs, ease of calving, adaptability, resistance to internal and external parasites, resistance to tick-borne diseases, good temperament, longevity, browsing and good walking abilities. Historians estimate that these indigenous breeds developed over a period of more than 1200 years in Southern Africa, which led to the development of breeds that are well adapted to the environmental extremes of Southern Africa. A breed such as the Nguni can play a major role as a dam line in crossbreeding systems to increase the production per animal.

A crossbreeding experiment was done at the Vaalharts Research Station of the Northern Cape Department of Agriculture, Land Reform and Rural Development near Jan Kempdorp, between the Nguni as dam line and Angus as sire line. The average 205-day adjusted weaning weight of the Angus x Nguni calves were 181 kg and that of the pure Nguni calves 146 kg. If cow efficiency is expressed as kilogramme calf weaned per Large Stock Unit, the cow efficiency of cows with Angus x Nguni calves improved by 25%. This increase in cow efficiency will have a significant effect on the carbon footprint.

An issue of concern however is the large variation in the weaning weights of calves from Nguni cows. The difference in the weaning weight of the heaviest and lightest Nguni calf was 174 kg and that for crossbred calves 198 kg. This variation in the weaning weights of calves will have to be addressed if the Nguni is to be established in the commercial beef sector. The only way to address this variation is to increase the participation in performance recording and to use it in the selection of breeding animals.

Unfortunately, many beef cattle breeding programmes lack basic definition of breeding objectives, and measurements to improve production are based on single production traits (weaning weight, calving interval, growth rate, etc.). Selection for these traits will increase production, but not necessarily productivity or efficiency of production. Selection for productivity or efficiency of production will have a permanent mitigating effect on the production of greenhouse gasses. A higher productivity will lead to higher gross efficiency as a result of diluting the maintenance cost of animals. This does not imply a change in cow size.

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Measures of cow efficiency such as calf/cow weight ratio and calf/metabolic cow weight both favour smaller cows. The challenge is thus to develop a breeding objective that will improve cow efficiency without changing cow weight.

FERTILITY

One of the major challenges in the South African beef cattle industry is the comparatively low fertility in the beef cattle herds. Fortunately, the Nguni breed is one of the more fertile beef breeds and this can play an important role in supporting climate smart beef production.

POST WEANING EFFICIENCY

With respect to post weaning traits the focus is on growth with little emphasis on efficiency of growth. Selection for the traditional post weaning traits will increase production, but not necessarily productivity or efficiency of production. If individual feed intake is measured, it is possible to select for a number of efficiency traits. Traditionally feed efficiency traits such as feed conversion ratio (feed intake/growth) were used as measures of post weaning efficiency. Alternative efficiency traits have now been developed, viz. residual feed intake (RFI), sometimes referred to as net feed intake; and residual daily gain (RDG).

Whereas feed conversion ratio can be improved by either better growth or lower levels of intake or both, RFI is improved by reducing feed intake without changing growth. Selection for (lower) RFI therefore differs from other feed efficiency traits such as feed conversion ratio and feed efficiency, since it is independent of growth and body weight, thus not leading to increased maintenance requirements in mature animals.

There is also a positive correlation between RFI and methane production, meaning that low RFI animals produce less methane, thus reducing the carbon footprint of beef. Likewise, selection for RDG will improve growth without affecting feed intake.

Selection for both these traits will support climate smart beef production. There are also indications that selection for RFI may improve the efficiency of grass utilization in the cow herd.

CONCLUSION

It will become more important to define breeding objectives and to develop appropriate selection criteria for the Nguni breed to ensure that breeding is effective and aimed at sustainable production (climate smart production) in changing environments. However, it is important that any breeding objective must ensure that the Nguni is not losing its adaptive traits. Maximum production may not be the most feasible or appropriate production strategy for the Southern African situation, which is in contrast to production systems in northern hemisphere temperate zone countries.

Optimal production systems that are in harmony with the environment and which utilize appropriate adapted genotypes (such as the Nguni) should thus be developed or implemented. This should include the definition of breeding objectives which accommodate both tangible and intangible factors of adaptation and climate smart production systems in changing environments. ■

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