The role of indigenous and cross-bred cattle for smallholder dairy production in Zimbabwe

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Introduction Historically the cattle industry in Zimbabwe has consisted of two sectors, the commercial single purpose herds producing either beef or milk, and the multi-functional smallholder owned herds, based on the indigenous breeds. Commercial dairy herds have consisted entirely of exotic breeds of cattle, dominated by Holstein-Friesian, but with most of the major European breeds being represented, whereas the smallholder herds are made up of indigenous breeds and cross-breeds. When compared on the basis of milk output the commercial sector cattle appear more productive, but such comparisons are not valid for the following reasons:

1) Smallholder farmers rarely have the resources to purchase veterinary and feed inputs, essential to sustain the animal and ameliorate the constraints imposed by the environment

2) In the smallholder sector cattle draught animal power and manure are often valued as highly as milk (meat is seen as a terminal function), with socio-economic and cultural functions also being important.

However, there is a growing incentive for smallholder livestock keepers to generate income from animal products because services, such as education, health and veterinary services, are being withdrawn because of pressure on the economy. Milk production, previously for use within the household, is increasingly seen as the solution to generating a cash income from cattle, without resorting to slaughtering them. For many, increasing the number of cattle and cross-breeding with exotics is seen as the panacea to meeting changing targets. However, before recommending widespread out-crossing of indigenous stock, their potential needs assessing, as should the promotion of production targets, which are usually based on intensive Western systems where the levels of expensive inputs are high and single-purpose herds are the norm. In this paper the current situation regarding cattle for smallholder dairy production will be summarised.

Indigenous cattle Advantages, or adaptation characteristics, of indigenous cattle are credited as:

- Maintenance requirements are not known but they may be lower than European breeds
- They are more adept at grazing and digesting poor quality forages
- They are better able to cope with heat stress and require less drinking water
- Their adult size is less than many of the European breeds, thus reducing feed requirements and increasing the numbers sustainable on a given area of land, giving scope for risk aversion strategies
- They have increased resistance to endemic disease.

There are three indigenous breeds in Zimbabwe: the Mashona popular in the Midlands and North of the country; the Tuli, widespread in the South and in Botswana (Tswana cattle) and South Africa; and the Nkone, also in the South and an offshoot of the Mguni breed of South Africa. All three breeds are described as *Sanga* and regarded as indigenous or 'adapted', a term with no formal definition. However, the three breeds have demonstrated tolerance of the harsh conditions of the semi-arid tropics, where a long dry season, characterized by feed shortages, is normal and drought is not uncommon. Of the three, the Mashona is the smallest, adult cows weighing 350-400 kg, but all, if the conditions are suitable are prolific and exhibit good maternal characteristics. There have been few attempts to assess milk production in indigenous breeds in Zimbabwe, and no selection for this trait has been undertaken. Starting from scratch this is a slow process, but within Zimbabwe there are large numbers of indigenous cattle whose parentage and growth rates are traceable. Bulls from selected dam lines could then either be used for AI (at present not widely available) or distributed to communities. Such an approach would require control of the large numbers of local bulls running with the communal areas grazing herd. The constraints to using indigenous cattle for milk production include:

- Low inherent yields
- The need to have the calf present at milking to encourage milk let-down
- Low rates of conception.

The effect of work on an underfed cow is to greatly reduce the chances of conception (Prasad and Mandebvu, 1990). These effects, especially when coupled with restricted supplies of feed are likely to be greater with cross-bred cattle. The crop/livestock farmer has to make a choice between two forms of output and to balance the value of timely ploughing/other sources of field power against the potential lost return from having fewer calves and less milk.

Cross-breeding In cross-breeding studies the three indigenous breeds (Tuli, Nkone and Mashona) and their crosses with exotic breeds have performed well in terms of weaner output, the Mashona, the smallest breed, being the most efficient.

This was an on-station trial over 10 years (Moyo *et al*., 1993) with animals stocked at approximately 1 livestock unit (LU, 500 kg) per 10 ha compared to 1 LU per 2.5 ha in the communal lands. Veterinary inputs were available but cattle did not have access to road side verges or crop residues.

Cross-breeding to a small exotic dairy breed, such as the Jersey, produces relatively small progeny. In trials at Matopos, under similar conditions to those described above, F1 crosses of Tuli and Nkone females bred to Jersey bulls were prolific and milked better than their pure-bred indigenous contemporaries (Garwe *et al. 2001*). However, in the same study, on-farm and research station, supplementation and, or, adequate rainfall were the major determinants of reproductive performance and yield. In an on-station trial, in which indigenous and cross-bred cows were supplemented with medium quality silage, daily yield and lactation length were higher in the cross-breeds, resulting in more than doubling the lactation yield. Intakes and quality of grazed forage and re-conception rates are not available (Nyoni *et al.* 2001*)*. Calf birth weight, growth and survival rates of the F1s were comparable to the indigenous calves and, in the females, conception was at a younger age in a trial on-station (Smith *et al*. 1996). Responses to supplementation in back-crosses (F2) are likely to show a fall in heterosis in the second generation. The value of cross-bred cattle must be determined by their sustained performance on-farm and maintenance of the heterosis effect. Uncontrolled cross-breeding has been encouraged by:

- 'Borrowing of genes' from neighbouring commercial farms, regardless of their suitability
- Sales of unsuitable bulls across the sectors
- Donations of unsuitable stock, often given following drought.

Heifer-in-trust-programmes These consist of giving a farmer a breeding female which becomes the farmer's property when a female progeny is passed on to a second farmer. Such schemes are usually implemented by NGOs and have considerable merit, but depend on the suitability of the animals involved for their success. Such schemes can also be linked to dissemination and training programmes.

Importations Environmental conditions do not favour imported stock, especially that of temperate breeds.

Conclusions Although on-station research shows advantages in the use of cross-bred dairy cattle, for resource poor farmers cross-breeding of indigenous cattle with exotics to increase production is not a recommended option, because of the relationship between breed, level of inputs and the environment, and the consequent loss of control of the composition of a communally managed herd. Indigenous breeds should be subjected to selection for specific production traits and an explanation of 'adaptation' is needed. Cross-breeding does have a role when resources and market demands allow the potential of such stock to be exploited.

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