Utilizing indigenous breeds: Improving the reproductive potential of smallholder dairy herds and enhancing earning potential

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In 1991, a director of The International Livestock Commission for Africa (ILCA) stated that, "Amongst the smallholder farmers in Africa, the indigenous breeds produce their first calf at four years old and thereafter produce one calf every three years," (Philip Chigaru, 1991, personal communication). This statement provides the basis for the arguments made in this article for interventions that can improve the reproductive potential and milk production of smallholder dairy farmers in Africa. The evidence provided is based on the author's years of experience working on the continent.

Under a communal grazing system, the norm for smallholder livestock herders in Africa is that the stocking density of cattle on the grassland reaches a level 300% higher than that of commercial farmers. At this high stocking rate, a balance is reached at which the number of calves born equals the mortality rate plus an off-take of 7%. The conception rate is about 30% and the majority of the off-take is utilised for ceremonial purposes; only 1-2% is marketed for cash. In contrast, the annual conception rate for commercial farmers is 90% and the off-take is 30% or higher, all of which is marketed.

The indigenous cattle, e.g. the East African Zebu, are not milking breeds (such as Holstein and Jersey). They are small cows, weighing ≤300 kg at maturity and producing 6 litres of milk per day; 4 litres for the calf, with the remainder generally used for home consumption. Natural selection has yielded this small cow with low milk production and maintenance requirements, which ensure its survival, especially under adverse conditions. In the dry winters, for example, in South Africa and Swaziland, the milk supply from indigenous cattle drops even further; the calves are very small and there is no milk for the family. In Oman and Ethiopia, smallholder farmers have calves with a weaning weight of 90 kg, while calves from commercial farmers, where there is adequate feed, average 200 kg at weaning.

Milk contains energy, protein and other nutrients, and is extremely valuable in helping meet the nutrition needs of the household, resulting in a huge demand among the rural communities. This demand can only be met if the dairy genetics of indigenous breeds is improved and additional feed is made available. The challenge for improving small-holder dairy production under communal systems is therefore clear; introduce dairy genetics and supply the quality and quantity of feed required for the cows to reach their reproductive and yield potential.

Herd structure

The typical smallholder has 14 head of cattle made up of 3 cows, 1 calf, 1 weaner, 1 young heifer, 1 older heifer, 2 young oxen, 2 older oxen and possibly 3 bulls. In this case, one cow is lactating and producing 6 litres per day, with 4 litres going to the calf and 2 litres available for the family. If this structure could be changed to 3 lactating cows alone, the fodder utilised by the other 11 head could be utilised by the 3 cows. In this case, the crossbred heifer would have to be produced outside the communal area commercially or by governments and then sold into the community. This has been done in South Africa and is in the process of being developed in Swaziland.

Dairy genetics and nutrition

There are substantial amounts of semen from dairy bulls (primarily Holstein or Jersey) available for the smallholder farmer, whether freely supplied or paid for. The Holstein, a large animal (≥600 kg), produces significant quantities of milk (40 litres per day) under intensive feeding conditions (primarily maize-based). The Jersey is a smaller animal (400-450 kg), producing 25 litres per day and generally on grass pastures. It therefore seems obvious that the Jersey is the ideal breed to crossbreed with indigenous cattle in Africa (Boxes 1 and 2).

Box 1

A farmer in Kenya has one East African Zebu × Jersey cross. This mature cow weighs less than 300 kg and is zero grazed. The lady farmer cuts fodder daily from the communal grazing area for this cow, a calf and yearling heifer. She uses a private technician to artificially inseminate her cow. This cow produces 6 litres a day above the requirements of her family and the calf. This extra milk is sold locally for a total of $6 daily. The only costs she incurs are for artificial insemination (AI), and the income earned is mainly profit. With the cow being adequately fed, she calves annually and provides an income to the household that lifts the family above the poverty level (Paterson, 1994).

Box 2

A farmer in Swaziland is friendly with the local Nduna (chief) who has given him the right to fence off 2 hectares of grassland for his two small Jersey-Nguni crossbred cows. During the summer he grazes his cows on the communal grassland and in the winter utilises the 2 hectares and supplements with 2 kg of a concentrated ration. Because milk is in great demand in the rural areas, the price he receives is 40% higher than in the city. In addition, his costs are very much lower than in the city, where the milk must be pasteurised, bottled and transported. His cows calve annually and his profit margin on milk sold was $1,300 per annum in 2005, a substantial amount in the rural areas of Swaziland (Paterson, 2005).

Smallholders usually keep only one or two cows for productive and particularly for social purposes, and their households are widely spread over the rural areas. Using artificial insemination (AI) is expensive under these conditions. In Ethiopia, a large trial is in progress using synchronisation of oestrus to bring many of the smallholder cows together to be inseminated by a team led by a veterinarian, making it economically feasible to inseminate 200 cows on one day (Edmealem Shitaye, 2012, personal communication). The initial trial in 2011-2012 resulted in a disappointing 13% conception rate, while a second trial in 2012 resulted in a 60% conception rate, equivalent to commercial producers. By late 2012, 40,000 cows had been inseminated using synchronisation (K. Nigussie, 2012, personal communication).

Semen from Holsteins is more freely available in the rural areas than Jersey semen. The Holstein crossed with the indigenous cows produces a relatively small calf with the ability to grow into a cow larger than the indigenous cattle. Some, including the author, question whether it would be better to use the smaller Jersey breed to crossbreed and produce a cow similar to the small indigenous cattle common to Africa under communal grazing, since the feeding requirements may be lower (Box 3).

Box 3
Purebred Holsteins were evaluated in Kenya. The farmer had three large purebred Holstein cows. These were allowed to graze on the communal grasslands and fed large amounts of Napier fodder (*Pennisetum purpureum*). Only one litre of milk per day was available from these cows for household consumption. The fodder supply was mainly utilised in maintaining these large cows rather than for the production of milk. In Ethiopia, where Holstein semen is widely used, the indigenous crossbreds sometimes produced more milk but they were also fed substantial amounts of extra fodder from irrigation projects (Paterson, 2012).

Entrepreneurial spirit and risk

The smallholder farmer is strongly risk-averse, so any interventions that expose the smallholder to financial risk are unlikely to be successful. Of far greater importance is the less appreciated fact that only 3% of a rural population has the entrepreneurial spirit (ES) required in bringing about change. In areas such as Johannesburg, South Africa and New York, USA, city centres that attract entrepreneurs, entrepreneurial spirit may reach 11% of the population, and this 11% employ much of the other 89%. Interventions in rural areas to bring about change must take the lack of ES into account. This may require identification of those with ES to assist them to operate more efficiently within the communal system or to move to where there are more opportunities to operate commercially.

Conclusions

In the communal grazing system, there is a shortage of feed required for improving the reproductive rate of the cows. However, very few smallholders manage to overcome the shortage of feed within the communal system. Even if adequate feed is available, dairy genetics needs to be improved to increase the potential for milk production. Dairy breeds can be introduced into the indigenous cattle through AI and it appears that synchronising oestrus can be used to improve the results of AI. Crossing the more adapted Jersey breed with indigenous cattle is preferable to using Holstein for producing crossbreeds. Purebred dairy cattle are unlikely to survive in the communal sector.

Few rural farmers have the entrepreneurial spirit to attempt to change the status quo and they may have to be identified and supported or relocated so that their ES can be fully expressed.

References

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