

The potential of bovine somatotropin to increase milk production in developing countries

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Introduction

In developing countries the demand for milk is high and considerable emphasis is placed on its rôle as a provider of high quality protein, for improved human nutrition, lower disease incidence and better overall health. *Bos indicus* cows, characterized by low yields and short lactations, dairy crossbreds with increased milk yield potential, and now widely used on smallholder dairy schemes, and high yielding *Bos taurus* cows all play, to a varying degree, a significant rôle in the dairy industries of developing countries. A programme of work has been initiated in Zimbabwe, Kenya and Malaysia to determine the effect of bovine somatotropin (bST) on milk production and health of *Bos indicus*, dairy crossbred and *Bos taurus* cows.

Material and methods

Cows treated with bST received up to eight subcutaneous injections of 500 mg of sometribove, a prolonged release formulation of bST produced by Monsanto. Injections were administered at 14-day intervals either post-scapular or into the ischio-rectal fossa which lies lateral to and either side of the anus (tailhead).

Bos indicus cows

At Henderson Research Station in Zimbabwe, 24 multiparous *Bos indicus* cows of the Mashona/Nkone breeds were divided into two groups, 1 and 2, which contained cows that had completed 75 to 95 and 96 to 125 days of lactation, respectively. All cows grazed Bermuda grass pastures and received no concentrate supplement.

Crossbreds and cows on smallholder dairy units

Thirty-six Mashona X Friesian cows at Henderson Research Station were divided into two balanced groups and allocated to control or bST treatment. On

average, cows had completed 118 days of lactation at the start of treatment and all cows had access to Bermuda grass pastures and received 3 kg/day of a concentrate containing 200 g/kg crude protein. Smallscale dairy farmers on a resettlement scheme in the Eastern Highlands of Zimbabwe also participated in the trials, stallfed cows receiving chopped napier grass and 0.5 kg concentrate per kg milk. In Malaysia, trials are in progress on smallholder dairy units with Friesian X Sahiwal crossbreds receiving a diet based on chopped napier grass, oil palm sludge and brewers' grains. In Kenya under commercial ranching conditions cows received an inadequate supply of forage in the dry season.

Bos taurus cows

Several trials have now been completed with *Bos taurus* cows on largescale commercial dairy farms in Zimbabwe, where concentrates are generally given according to yield. Trials examined the effect of bST on milk yield in a range of breeds under different management conditions and studied the effect of stage of lactation on response in milk yield. Similar trials are in progress in Kenya.

Results

Health

In all trials cows remained in excellent health throughout the trials and the incidence of mastitis was low in both control and treated groups.

Bos indicus cows

The administration of bST to cows in group 1 significantly increased milk yield by 1.5 kg/day ($P < 0.05$). Although all control cows were dry by week 12 of the trial, four of the six treated cows were still in milk at week 14. This suggests that bST will increase lactation length. The combined result was

that during the 14-week trial total milk produced by treated cows was 987 kg compared with 204 kg for the control cows. In group 2 bST did not affect milk yield. This was probably due to the late stage of lactation at which treatment was initiated.

Crossbreds

The administration of bST significantly increased milk yield from 8.6 to 11.0 kg/day ($P < 0.01$), which equates with a 280 g/kg increase in milk production. On the small scale dairy farms of Zimbabwe bST increased milk yield by 2.3 kg/day. Preliminary results indicate that under these conditions the use of bST can increase milk yield by 200 g/kg but the conditions in Kenya restricted the response in Friesian crossbreds to 6%.

Bos taurus cows

With Jersey and Friesian cows of mixed parity, having completed 130 days of lactation and having access to pasture, bST significantly increased milk yield by 2.9 ($P < 0.05$) and 3.6 ($P < 0.001$) kg/day. A subsequent trial was conducted in the same Friesian herd using multiparous cows in excellent body condition and having completed 200 days of lactation prior to treatment. With access to irrigated ryegrass pasture, bST significantly ($P < 0.001$) increased milk yield by 6.1 kg/day. On two further farms in Zimbabwe 48 Holsteins, housed all the year and receiving a complete diet based on maize silage, and 48 Friesians with access to irrigated pasture were divided into

three groups based on stage of lactation. Groups 1, 2 and 3 contained multiparous cows that had completed 90 to 120, 121 to 150 and 151 to 180 days of lactation prior to treatment. bST significantly increased milk yield of Holstein cows in groups 1 and 2 by 3.9, and 3.6 kg/day ($P < 0.05$) but not in group 3. The corresponding values for the recently completed trial with the Friesian cows were 3.2, 3.4 and 3.2 kg/day. Where milk composition was recorded bST did not affect either milk fat or protein concentration. The body condition of treated cows was in general slightly lower than that of control cows at the end of the trial period, although it was not considered excessive and could easily be recouped.

Conclusions

These results show that under current management practices bST has the potential to increase substantially the milk yield without impairing health of *Bos indicus*, dairy crossbred and *Bos taurus* cows in developing countries. Increased production must, however, be matched by the provision of appropriate processing and manufacturing facilities. Every effort should be made to ensure that increased production generated by smallholder dairy schemes is readily available and easily accessible to the local rural communities in which they are based and where the demand and need for milk is high.