

Forage production and conservation for dry season feeding of dairy cattle in the semi-arid region of Zimbabwe- a review and report on recent work for a DFID project.

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Abstract.

Trials on the feasibility of producing and conserving high quality forages at low cost are on-going, and include a number of studies aimed at achieving this objective. So far, results shown that a low-cost high quality silage can be produced using adapted forages and legumes in semi-arid areas and in sufficient quantities to supplement small holder dairy cows through the dry season and in a good year, into lactation. Insufficient data has been produced to date on how this can be used to maximum benefit for the small holder dairy cow but it is now known that in severe drought conditions, only 6 kg DM silage a day fed for two months before calving will significantly improve body condition, while 3 kg a day fed for a month will prevent severe loss in condition and death.

Introduction

It has been recognised that the potential for a livelihood from the production and sale of milk from cattle in the semi-arid region of Zimbabwe is good, provided the major constraint, that of insufficient feed in the dry season, is overcome. Studies aimed at overcoming this limitation to dairying in the semi-arid areas have, for the past three years, been part of a DFID project on meeting this challenge. Trials carried out on station have shown that high yields of up to 10 tons of silage per hectare can be produced from intercropping forage sorghum or pennisetum and herbaceous legumes (Mhere et al., 1999) and technology has been developed to ensile those forages which are affordable to the small holder and are suited to the woman and children in the farming family. Subsequently, this technology has been tested in participatory and verification trials on farms. Trials to determine optimum silage feeding strategy have been carried out and are on-going. The inclusion of forage legume tree protein as an alternative to herbaceous legume has been tested.

Review of recent trials

Verification trials (researcher controlled and farmer managed) and participatory trials (farmer controlled and managed and researcher monitored) were carried on the production and conservation of intercropped forages and herbaceous legumes for dry season feeding of dairy cows in Gulathi communal area in Matabeleland South Province. (Mhere, *et al.*, 2000) Verification trials showed that yields and quality of ensiled forage intercropped with legume were similar to those achieved on station and that liming appeared to have no benefit. On nineteen farms in the wet area an average of 5.3 tons silage per ha. in the first season and 6.3 tons in the second season was produced on an average of 0.2 ha and 0.4ha respectively. 102 bags and 176 bags of silage per farm were made in the first and second seasons respectively producing sufficient for supplementing two animals for three months and six months in a

drought and good year respectively . On seventeen farms in the dry area, 1.8 and 3.4 tons of silage were produced per ha. in the first and second season respectively. 36 and 83 bags of silage per farm were made in the first and second seasons respectively, producing sufficient for supplementing two animals for one month in a drought and two and a half months in a good year. (Mhere, *et al.*, 2000). Animals supplemented for one month in the first year on very poor grazing (due to the drought) maintained body condition of score average 2.0 at calving. All animal supplemented survived to the rains while there were cattle lost on control farms which did not produce and feed silage. Lactation records and fertility data are being analysed. It has been decided by the farmers that this year, supplementation will take place at the same time as last year, since the grazing is still good, leaving surplus silage to be fed as a supplement during lactation. A strong dissemination programme has been followed (Mhere, 2000) resulting in many other communities reportedly announcing that they intend to produce silage for milk production.

While the production and conservation of forages on smallholder dairy farms has been shown to be feasible, supplies of silage will be limited in some years due to drought and erratic rainfall. It is important to determine how best the store of silage should be husbanded in order to realise maximum returns in cow productivity (milk yield and fertility) to the farmer. In a feeding trial on Matopos Research Station, indigenous and cross bred Jersey-indigenous cows were supplemented on grazing with one bag and two bags and with no grazing on ad-lib silage per day for two months pre-partum on station and their body condition pre-partum and body condition, lactation yields and persistency post partum were compared with non-supplemented cows (Nyoni, *et al.*; 2000) There was a significant improvement in body condition score (BCS) over control and one bag per day (BCS 2.0 for cross bred cows and 2.5 for indigenous cows) when two bags and ad-lib silage was fed per day. Two bags of silage provided 6 kg DM silage to the cow and resulted in an average of BCS 2.4 for cross-bred cows and 3.3 for indigenous cows. Ad-lib silage intake averaged 4 bags per day (12 kg DM silage) and resulted in BCS 3.5 for cross bred cows and 4.0 for indigenous cows. Breed effect was very marked: indigenous cows on the same treatment as cross bred cows showed better condition at calving. However, in both breeds, improved body condition at calving did not result in significantly higher milk yields or greater lactation persistency. There is more likely to be an effect on fertility; here, metabolite and progesterone profiles are still to be produced on each animal to measure the effect of body condition at calving on energy balance and fertility post partum .

The importance of forage legume trees as an option for providing the protein in silage as an alternative to herbaceous legumes because of their high protein content, drought resistance and perennial rather than annual growth characteristics was recognised in studies carried out on their ensilage with a forage crop. Since there were trees already established at the University of Zimbabwe farm, they were mixed with maize and ensiled. Studies were aimed at determining whether the anti-nutrient properties of tannins in these legumes could be reduced through ensilage and whether it was feasible to replace other proteins in the diets of dairy cows. Maasdorp and Titterton (1999) showed that the fermentable and nutritional quality of silages of maize mixed with calliandra, acacia, glyricidia and leucaena varieties were good; however the effect on tannin activities was not measured. In a later trial, acacia and leucaena mixed silages were produced and are presently being tested for effect on tannin

activity. In the meantime, in a feeding trial with these silages, dry matter intake and milk yield and quality of Holstein dairy cows fed on cereal-forage tree legume silage were compared with those of cows fed on straight cereal silage and concentrates (Mugweni, *et al.*, 2000) It was shown that cereal-forage tree legume silage can be used to replace commercial feed supplements without loss in milk yield and quality in dairy cows. If it is shown that fermentation through ensilage does reduce the protein and fibre binding which is the characteristic of tannins in these legumes, then the potential for forage tree legumes in conserved forage is very high, especially in semi-arid areas.

Further studies

A second feeding trial on feeding strategy has just commenced. Here, indigenous, cross bred (F1) and back cross (F2) cows will be compared in their response to supplementation with silage in the dry season before calving or in lactation or both or neither (control). Simultaneously, response to feeding silage in both periods on the Gulathi farms will be compared to neither on control farms. From these studies, a final recommendation to farmers on silage feeding strategy will be produced. Dissemination will continue in the form of farm field days and demonstrations. A manual for farmers and a video for extension workers and farmers on the production, conservation and feeding of silages will be produced in the next few months.

From trials carried out over three years it was shown that it was possible to produce high quality, low-cost silage in sufficient quantities to sustain two indigenous dairy cows over the dry season in semi-arid areas. Participatory trials have been subsequently carried out on-farm and results to date show that even with severe drought enough silage was produced to maintain animals until the rains while in a good year there is enough silage to both sustain cows up to the rains and their calving time and for two months of lactation.