

Introduction to the conference on silage making in the tropics

L.'t Mannetje

Department of Agronomy, Agricultural University, Wageningen, The Netherlands. E-mail: ltmannet@bos.nl

1. Introduction

Forage, crop residues and by-products products are usually consumed fresh by domestic animals. However, it is possible to conserve them for use during future periods of feed shortages. Conservation can be achieved by sun drying (hay), artificial drying (meal), and addition of acids or fermentation (silage).

Hay making is difficult in tropical regions because at the time when the forage is of acceptable quality (early in the wet season) to conserve it, the weather is likely to be too unreliable for sun drying. Artificial drying is expensive and facilities are not widely available. Addition of acids may be beyond the resources of small holders and can be dangerous. Remains fermentation by silage making, which can be done of fresh or, preferably, wilted material.

Silage is forage, crop residues or agricultural and industrial by-products preserved by acids, either added or produced by natural fermentation. Fresh forage is harvested, or crop residues and by-products are collected, the material may be chopped or conditioned, additives may be added, and it is then stored in the absence of air so that facultative anaerobic bacteria, present on the forage, or added as inoculants, can rapidly convert soluble

carbohydrates into acids. The quality of the ensiled product depends on the feeding value of the material ensiled and on the fermentation products present: the types of acids and the amount of ammonia. The resulting pH of a well-ensiled product becomes so low that all life processes come to a halt and the material will be preserved so long as it remains in airtight storage.

There are three important considerations to take into account before embarking on a silage making program:

- Is there a need for silage making?
- If so: Are there enough good quality forages or other products available to ensile?
- If so: Can the conditions for good silage making be met?

2. Is there a need for ensiled forage?

Silage making is practised widely in intensive animal production systems in temperate regions, mainly for two reasons. Firstly, because during the winter period there is no high quality feed available in the fields and secondly in order to feed high quality conserved supplements (e.g. maize) at any time of the year to complement grass to improve milk production and/or nitrogen utilization.

Whether silage making is recommendable in the tropics depends on the type of farm system and on the climate. For a start, feed conservation is generally only a proposition for intensive farm systems, such as milk production for a liquid milk market. Secondly, in humid and sub-humid climates with green forage available year-round, forage conservation is generally not profitable. If the quality of forage from permanent sources (pastures, road-sides) is inadequate, it is nearly always possible to

grow a fodder crop (Saleem 1985) or harvest stockpiled forage (Andrade *et al.* 1998) or use fodder banks (Milera *et al.* 1994, Peters *et al.* 1994).

Materials to be ensiled can be grasses, legumes, fodder crops (sorghum, maize), crop residues or by-products. The storage period, after which the silage is fed, depends on the purpose of the silage making. If silage is made of forage or a fodder crop of exceptional quality that is only available at a certain time of the year, it will most likely be used in a matter of months. It may also be used for an annual recurrence of periods of shortage or for unseasonal droughts that occur every number of years. Silage can also be a standard feed supply in feedlot systems.

3. Is there enough good quality forage to ensile?

Only excess forage, crop residues or by-products for which there is no other economic use should be ensiled. In other words, if rainfall is unreliable, farmers will not know until late in the growing season that there will be excess forage. This points to a conflict between availability of forage to ensile and its quality. The quality is high early in the growing season, but the farmer cannot take the risk to preserve forage if he is not sure there will be excess. Once he can be sure of that, the quality is too low to make it worthwhile to conserve it. To overcome this problem it is possible to grow a fodder crop to be harvested, or crop residues and by-products or other waste materials to be collected for silage making.

4. Can the conditions for good silage making be met?

Silage making is useful only if the ensiled product is of good quality, i.e. well preserved and of high digestibility and

protein concentration. The main prerequisites for ensilable forage are that it should be harvested at a young stage of growth from a feeding value point of view and that it should contain enough sugars for fermentation. The material to be ensiled should be easily compactable and covered to exclude air. If the material is of adequate quality, but lacking in sugars, molasses or another source of sugar may be added. Chopping before ensiling will also help to compact the material. Tropical grasses (C₄) are inherently low in soluble carbohydrates, with the exception of maize and *Sorghum* species. To ensure good quality silage it may be better to grow a crop of maize or sorghum for silage than to ensile tropical grass. Problems with silage can also arise when it is being fed out due to spoilage caused by moulds that grow particularly fast at high temperatures, common in the tropics. Therefore, silage pits or heaps for smallholders should be small, so that they can be fed out in a very short time (1 or 2 days). Poorly made silage can cause health problems in animals and man.

Catchpoole and Henzell (1971) wrote an early review, which clearly sets the scene for silage making from tropical forages.

5. The conference

The aim of the conference is to review the potential of silage making for livestock production in the tropics with special reference to smallholders.

There will be main papers and posters to cover the main issues of silage making under these conditions. The first main paper will deal with the theory of silage making, the fermentation processes, and what problems will be encountered to meet the requirements for good silage making. This will be followed by other main papers and posters on silage making in large and small scale animal production systems, of grass-legume mixtures, of

cereals and fodder crops, of agricultural by-products and industrial, non-agricultural, residues, of harvesting and ensiling techniques, on the use of additives to improve the silage making process of tropical forages and case studies.

There will be ample opportunity for discussion.

6. References

- Andrade, I.F., Atkinson, L.G., Sollenberger, L.E., Ruegsegger, G.J., Misley, P. and Kalmbacher, R.S. (1998). Stockpiling herbaceous tropical legumes for dry season feed in Jamaica. *Tropical Grasslands* **32**, 166-172.
- Catchpoole, V.R. and Henzell, E.F. (1971). Silage and silage-making from tropical herbage species. *Herbage Abstracts* **41**, 213 - 21.
- Peters, M., Tarawali, S.A. and Alkamper, J. (1994). Evaluation of tropical pasture legumes for fodder banks in subhumid Nigeria. 1. Accessions of *Centrosema brasilianum*, *C. pascuorum*, *Chamaecrista rotundifolia* and *Stylosanthes hamata*. *Tropical Grasslands* **28**: 65-73.
- Saleem, M.A.M. (1985). Effect of sowing time on the grain yield and fodder potential of sorghum undersown with stylo in the subhumid zone of Nigeria. *Tropical Agriculture* **62**, 151-153.