

# Smallstock in Development


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## Little Bag Silage

Ian R. Lane  
 Ian Lane Associates  
 Lower Kenfield Cottage, Petham, Canterbury ,  
 CT4 5RN, UK .  
 ianlaneuk@aol.com

### Summary

With care, LBS allows small-holder farmers to conserve fodder green and carry it into the dry season or winter. LBS can be made over extended periods which suits family labour, from surplus fodder and green crop residues as well as special fodder crops and pastures. LBS can be fed in small amounts as a green fodder supplement to dry foddors over long periods, with minimal disturbance to the remaining silage stock.

## Introduction

This paper concerns the development of LBS during 1988 – 92 in N Pakistan and Nepal . It relates to the mechanics of ensiling on a small scale, and how this fits within overall livestock and farming systems. The problem was how to improve the nutrition of farmers' milking animals when each family keeps only one dairy cow or buffalo. During the cold dry winter the major foddors were crop residues and poor quality hay, but green fodder was needed to enhance rumen function. Strong plastic shopping bags were available, and these could hold 5 kg of fresh chopped fodder. If these were used to make silage, one buffalo or cow could be fed one bag a day in addition to existing feeds as a green fodder supplement.

## Methods

1. Purchase strong high density plastic shopping bags to hold at least 5 kg of chopped green fodder;
2. Cut 10 – 100 kg of green fodder crop or pasture and carry it to the chopping floor;
3. Chop the fodder by hand with a large knife / guillotine, or use a chaff-cutter with a rotating blade;
4. Carefully pack 5 kg of chopped fodder into one of the plastic bags without making any holes in it;
5. Gently but firmly squeeze the bag by hand to expel air; while compressed twist the neck of the bag then turn it over and tie it tightly with twine;
6. Invert the bag of silage into a second empty bag, close and tie it as in #5;
7. Invert the bag of silage into a third empty bag and seal as in #5. Each bag of silage is now triple wrapped, and seams which might be expected to leak air are doubly protected;
8. Stack the bags carefully in a room protected against rats, mice and other pests;
9. After at least one month feed the LBS to buffaloes or cows at a rate of one bag per head per day;
10. Keep the outer two plastic bags of each LBS for re-use.

## Photos

### Method for making LBS, Terai Nepal (100 metres above sea level)



Fodder crop of Napier grass + Centro



Chopping fodder with guillotine and knife



Squeezing and sealing first bag layer



Tying third bag layer



Finished LBS with various bag types and sizes

### LBS from Paspalum grass at Jiri (1800 metres above sea level)



Collection of grass



Inspection of LBS before opening



Sampling the bag; note fungal growth at top of bag



Paspalum conserved green as LBS

**Fodder crop trial, Jiri site**



Multicut fodder sorghum, basal fertilizer



Multicut fodder sorghum, with 200 kg N/ha

## Results

In N Pakistan the method was developed with a farmer who had a Nili-Ravi dairy buffalo who had planted 0.1 ha to a local multi-cut Sorghum hybrid. 120 kg of fodder was chopped with a chaff cutter and made as LBS; this was compared with 120 kg of fodder conserved in a single bag made from heavy gauge plastic. Both lots ensiled well, and milk yields increased from the buffalo fed silage. The farmer was especially pleased with LBS since it was much easier to feed individual bags instead of having to untie and re-tie the large bag of thick plastic. Neighbours were impressed he had green fodder when they only had dry fodder.

In Nepal Trial 1 was on-station at Jiri (1800 m.a.s.l.); leafy Paspalum grass was harvested, chopped and ensiled as LBS. Conservation was moderate, with low lactic acid and fungal growth at the top of the bags (Photosheet II). In Trial 2, LBS was made from Napier grass / Centrosema in the Terai (100 m.a.s.l.) (Photosheet I), and from maize grown for fodder harvested at the soft dough stage with chopped cobs included at Kathmandu (1,400 m.a.s.l.) and Jiri. After two months excellent lactic acid fermentation resulted from all lots of LBS, and undamaged bags kept well for six months with little mould. However LBS from fodder maize appeared to attract every mouse within a km radius. Once in the store, mice hid between the bags, which they chewed through, so most silage was lost through aerobic spoilage.

Trial 3 was with farmers' groups at three sites. Bags were ordered from a local factory with a thicker gauge and without loops for handles. At each site kits were issued to 20 farmers. Each kit had 100 bags, a guide to making LBS, and a record sheet. Project staff showed each group how to make LBS, and local livestock staff helped farmers during the trial. Details on the fodder crop, the look and smell of the silage, and the milk yield of the farmer's cow or buffalo before and during a thirty day feeding period were recorded. At Pokhara (800 m.a.s.l.) the farmers grew fodder oats so did not use the bags for LBS! At Jiri (1,850 m.a.s.l.) farmers used wet mature summer grasses which turned to compost! However there were peri-urban milk producers within Kathmandu Valley (1400 m.a.s.l.) who stall-fed buffaloes and who had to buy all their feeds, including padi straw. In the Valley there was also a tradition of threshing padi while green to make beaten rice as a snack food. These milk producers made LBS from green padi straw, and found their traditional buffalo ate a bag of silage a day on top of their normal ration of dry straw. Milk yield increased by 50%, from 2 l per day to 3 l. The extra litre of milk was worth Rs 20. It had cost Rs 3 to produce, being the cost of 3 plastic bags @ Rs1 per bag, plus the minimal cost of 5 kg of green padi straw. With care, two of the three bags could be re-used, reducing the total cost for the extra litre of milk to little more than Rs 1.

## Discussion

Making LBS is labour intensive, and needs care and attention for success. It has to fit the local livestock and farming systems, and having inputs and outputs has to be commercial. The place of LBS within the overall strategy for fodder development in N Pakistan and Nepal has been described by Lane (1999).

High quality bags need to be used, preferably from high density plastic, and without holes along the seam. If holes are present they may be sealed while filling the bags. Larger bags will allow greater quantities to be made per bag which will lower the cost of bags per kg silage stored, and reduce losses from damage and surface moulds. The amount stored per bag should, however, relate to feeding practice, although silage from individual little bags can be fed over 1-2 days even in hot climates as they are easy to reseal. Effective protection of bags of LBS is essential for up to 4-6 months. Green maize with cobs strongly attracts mice, but crop residues may be less attractive while fodder sorghums produce HCN which deters pests. Some form of construction, either within an existing store, or in the form of a specialized building, is required. Alternatively, instead of using plastic bags which are susceptible to damage, other vessels might be used.

LBS allows conservation of fodder in small quantities over a long period, in contrast to traditional silage making where large amounts of fodder must be harvested and chopped at one time. Thus a family can conserve two bags of LBS a day over a 100 day growing season, and feed their buffalo one bag of LBS a day over a 200 day dry season. This fodder might include leafy weeds harvested from crop fields, terraces and bunds, which could be partly air-dried under shelter a little at a time before chopping and ensiling. In Nepal, leaves are removed from maize plants as they start to senesce, and these would make excellent LBS.

The quality of LBS depends on the fodder being conserved, and the old saying "Rubbish in, Rubbish out" applies equally to silage made in little bags. Fodder with high sugar content conserves well.

Fodder with low sugar content rots, leading to a bad reputation for silage in the tropics, LBS included. Problem fodders include mature C4 pasture grasses harvested in the rains, and legumes in general. Wet grasses and legumes must be wilted before ensiling +/- additives, which may be used to enhance fermentation or sterilize the crop. Any compound for smallholder use must be cheap, not toxic or corrosive, and easy to apply. This rules out various acids and formaldehyde, while molasses is not widely available. Brown lump sugar appears the most applicable; where very difficult crops are to be ensiled, the use of common salt (NaCl) as a straight preservative needs evaluation, especially as many livestock are deficient in salt as a nutrient.

Summer fodder crops and grasses as used in the trials outlined above are suitable for commercial systems of animal production. The author doubled yields of summer fodder crops in Nepal with 200 kg N / ha (Photosheet II). In different ecozones it may be relevant to ensile winter fodder crops for feeding in hot dry periods. In Tanzania the author successfully ensiled leaves, roots, and a leaf + roots mixture of cassava prior to the dry season. Improved utilization of crop residues through ensiling needs further attention, since much of their nutrients are lost after physiological maturity during the final drying of the crop.

Mechanization of small-scale silage making needs to address fodder harvesting and chopping as well as ensiling. By making LBS throughout the growing season, harvesting and chopping fodder by hand is perfectly feasible. For harvesting pastures, rather than fodder crops, the Swiss scythe has been successfully introduced into the hills of Nepal . Fodders are regularly chopped by hand or electric powered chaff-cutters in South Asia . Swiss farmers now use a system of a two-wheeled mechanical mower with a tedder and hay rake, and this range has recently been extended to a mini-round baler and a bale wrapper for making silage.

## Conclusions

Little Bag Silage has been developed as a workable system for small-holder farmers, suited to the usual fodder crops harvested for silage under temperate and tropical conditions. Systems for the conservation of problem crops, and to eliminate damage by rodents, have yet to be fully worked out.

## References

Lane, I.R. 1999. [Fodder development for smallholder dairying in AJK and Nepal](#). *TAA Newsletter*, 19(1): 23-7.

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