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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Silage making by smallholder dairy farmers in Kenya : potential and constraints of small bag silage

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Introduction In Kenya more than 80% of the marketed milk is produced by smallholder dairy farmers .Dry season feeding has been identified as a major constraint to dairy production among smallholder dairy farmers . Milk production and pricing in Kenya fluctuates with the climatic seasonal patterns , resulting in over-supply during wet season and shortages in the dry season . Conservation of forage is a potential solution to better feeding of dairy cows during the dry season . Forage conservation technology , especially silage making has not been adopted by smallholder dairy farmers as the methods currently available depend on the availability of machinery and a large amount of forage . In an effort to improve adoption of silage small bag silage was developed and popularized among smallholder farmers in Kenya .

Materials and Methods After the testing of small bag silage making on-station and showing that it works , the challenge was to the scaling up the technology . Participatory partial budgets (PPB) were used to demonstrate the potential of small bag silage . The PPA helps to compare the current farmer practice and the " new " technology . In the central highlands of Kenya farmers purchase extra maize/wheat bran , hay and dairy meal during periods of forage shortage . This practice was compared with the cost of conserving Napier grass (*Pennisetum purpureum*) in polythene bags . The bags used can hold up to 400 kg of silage per bag . Two scenarios were used in the comparisons ; price of milk remain the same or the price increases by 3 US cents per litre during the dry season . The calculations are based on a 90 day dry period experienced in central Kenya .

Results The farmers purchased 3 extra bags of maize bran and grass worth KES 200 per day during the 90 days dry period but the yield dropped from 8kg/cow/day during the wet period to 4 kg . If the farmer purchased 3 tonnes Napier grass during the wet period and conserved as small bag silage the milk yield is maintained at 8 kg/cow/day due to the high quality feed available . The farmer therefore makes money by making small bag silage compared to current practice (Table 1) . With a price increase of 3 US cent the farmer makes an extra KES 900 if making small bag silage and reduces the loss by KES 450 when using current practice .

Table 1 Cost of extra inputs for dry season feeding in central Kenya (USD=62 KES) .

Conservation	Extra cost-dry season feed (KES)			Cost KES	Milk yield (kg/cow)	Revenue per cow (KES)	Difference (KES)
	Grass/Napier grass	Maize bran	Silage				
Farmer practice	18 ,000	1350	-	19 ,350	360	7200	12 ,150
Small bag silage	4 ,500	-	3 ,040	7 ,540	720	14 ,400	6 ,860

Conclusions The small bag silage would enable the farmer to purchase Napier grass during the wet season when it is cheap and conserve to use it during the dry season . It is clear that even at the same level of production the farmer still makes a loss and even at the same level of production small bag silage was still more profitable . The main constraint in silage making is the manual chopping of Napier grass which is labour-intensive and inefficient . The technology has a lot of potential among smallholder dairy farmers if affordable forage choppers are available . In central Kenya where the maize crop is managed to produce extra forage the small bag silage would help conserve the maize forage .

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