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## Smallholder innovation and adoption of hay and silage technologies in Honduras

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**Key words:** promotion, extension strategy, forage conservation, little bag silage

**Introduction** In the tropics and subtropics, adoption of forage conservation methods has been limited, especially under resource-poor smallholder conditions (Mannetje, 2000). From 2004 to 2006, CIAT and its partners applied different participatory extension strategies to stimulate innovation and adoption of hay and silage technologies in long dry season environments of Honduras: (1) Promotion of innovation was applied with groups of smallholders in locations where hay and silage were unknown or not used. Low-cost alternatives such as little bag silage (LBS) were offered during farmer trainings and their adaptation to local conditions was fostered; (2) Promotion of adoption was applied in locations where farmer trainings had been previously undertaken and at least one innovator had adopted silage technology. Field days and demonstrations at innovators' farms were held in order to exchange experiences and stimulate farmer-to-farmer technology diffusion. This study seeks to point out effects, potentials and constraints of forage conservation technologies for resource-poor farmers and investigates innovation and adoption processes as a result of different extension strategies.

**Materials and methods** Basic farm data were gathered during farmer meetings using structured interviews with quantitative and qualitative questions. Semi-structured interviews were applied to adopters, non-adopters and key informants both during and at the end of the project period. Innovation and adoption processes were monitored. The effect of silage supplementation was evaluated by comparing dry season milk production of 49 farms feeding silage with 139 farms without silage.

**Results & discussion** As a result of the first strategy, up to 24% of farmers, mainly medium-scale farmers, had adopted silage technology after two years of promotion. LBS technology was constrained by high variability of spoilage losses, and only adopted by 5% of the farmers, of which 30% were smallholders. LBS proved however useful as a demonstration, experimentation and learning tool for silage novices. Appropriate plastic material and storage facilities protecting from pests were prerequisites for success. Main reasons for non-adoption of silage by smallholders include risk avoidance, general reluctance to adopt new technologies, little to no start-up capital, non-availability of choppers, other farmer priorities, and the availability of alternative cheaper feeds, i.e. maize residues, sorghum straw, natural herbage and improved pastures. Referring to the second strategy, a study in Yoro department showed high adoption rates with an increase from 21 to 96 farmers using silage over the last three years, whereas the share of small-scale farmers preparing silage reached over 20%. The most relevant factors boosting the spread of silage use are forage scarcity, increased use of dairy breeds, market demand for milk, promotion of the technology, technical assistance and the presence of key innovators and farmer associations. The most decisive advantages of conserving forage in the form of silage perceived by the farmers are the availability of high quality feed during the latter half of the dry season (March-May) and the obvious effects on livestock production, e.g. faster growth of young cattle, reduced weight losses of adult cattle and an increased milk production estimated to 40-60% (about 2 liters/cow/day). Smallholders adopted mostly sorghum ensiled in pit and heap silos. About 5% of the farmers adopted manually produced hay from improved pasture grasses, which was mainly fed to calves. Further promotion and cutting equipment such as scythes and choppers are needed to facilitate smallholder adoption of hay and silage made from pastures.

**Conclusions** Forage conservation proved effective to improve feed availability and livestock production during the dry season. Stimulating farmer-to-farmer diffusion of adapted hay and silage innovations in long dry season environments can lead to rapid diffusion, including smallholder adoption, if favoured by infrastructure for market-oriented cattle production.

### Reference

Mannetje, L., 2000. Silage making in the tropics with particular emphasis on smallholders. *FAO Plant Production and Protection Paper No. 161*, Rome, Italy.