Systemwide Livestock Program (SLP) and Swiss Centre for International Agriculture (ZIL)

Realizing the benefits of cover crop legumes in smallholder crop-livestock systems of the hillsides of Central America

Improving milk yield with *Canavalia brasiliensis*

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1. INTRODUCTION

- In the dry season in Nicaragua cattle often have to rely on crop residues for feeding. The maize stover left on the field after the manual cob harvest contains high fibre, low energy and few protein.
- Because of the poor feed quality milk production decreases.
- The inclusion of legumes in the maize field could improve the nutrient offer.
- *Canavalia brasiliensis* as a legume with a broad adaptation to different sites was chosen for testing. The successful *Vigna unguiculata* served as positive control.
- The aim of the specific study in Colombia was to verify the expected positive effect under rather controlled conditions of an experimental station.

2. MATERIALS & METHODS

Fig. 1: Sowing of *Canavalia* between maize rows

- Three plots of 1 ha each were sown with maize at Santander de Quilichao experimental station in April 2008 serving as 1) negative control (maize only), 2) treatment (intercropped with *Canavalia*), 3) positive control (intercropped with *Vigna unguiculata*).
- The maize-legume fields were sub-divided by 3 each.
- *Canavalia brasiliensis* CIAT17009 and *Vigna unguiculata* 9611 were sown in the maize plot in May and June 2008 consecutively (Fig.1).
- The grazing trial started at the end of August 2008 with 6 HolsteinxZebu cows at around 153 days of lactation divided in 3 groups for a 3x3 latin square design experiment.
- In each period of 10 days, after 5 days of adaptation another 5 days of milk measurement followed.
- Milk quantity, fat, non-fat solids and milk urea nitrogen (MUN) were determined.
- Feed quality was analyzed.

3. RESULTS

- A vigorous growth of *Canavalia* was observed, the supply exceeding by far the demand (Fig.2 & 4) in contrast to the *Vigna*-maize association (Fig.3).
- The maize had a crude protein (CP) content of around 4.4 % in dry matter (DM), *Canavalia* 16 % and *Vigna* 14 % CP.
- The in-vitro digestibility of the two legumes was about 70 % of DM, their fibre content about 65 % NDF.
- The fat corrected milk yield was significantly higher with *Vigna* (8.2 kg/cow*d) and *Canavalia* (7.5 kg/cow*d) supplement than with maize stover only (6.1 kg/cow*d) (Fig.5). The difference between the legumes was not significant. The slightly higher milk yield with *Vigna* as supplement might be explained by the high palatability in comparison to the one observed with *Canavalia*.
- No significant difference was found in the milk fat (4.1-4.6 %) nor in the other contents (7.7-8.3 % non-fat solids, 16.7-18.5 mg/dl MUN).

Fig. 2: *Canavalia* –maize plot during grazing trial

Fig. 3: *Vigna* –maize plot during grazing trial

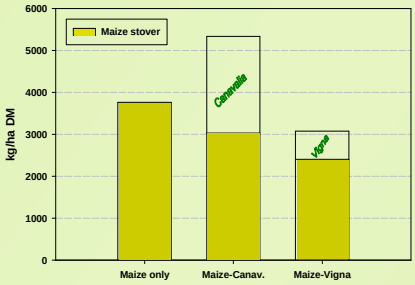

Fig. 4: Biomass availability in the three different treatments

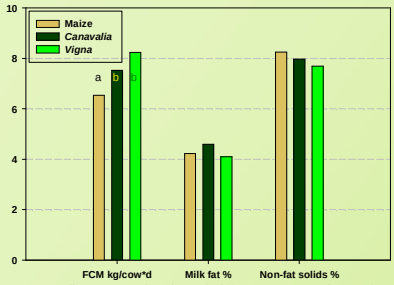

Fig. 5: Milk quantity and quality with different treatments (FCM = fat corrected milk), bars with different letters are significantly different ($P < 0.01$) according to the Ryan-Einot-Gabriel-Welsch Multiple Range Test

4. CONCLUSIONS

- **The inclusion of *Canavalia brasiliensis* in the maize field can increase the milk yield by 1 kg/cow*day during times of drought compared to the maize stover only which is commonly offered in Central America.**