

# Dairy cattle feeding trial protocol in Njombe 2019- Tanzania

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## *Introduction*

There are forage demonstration trials in Mufindi, Rungwe and Njombe district of Tanzania. Up to 14 treatments are involved including intercrops where applicable. Two Brachiaria hybrids are involved namely Cobra and Cayman. Forage legumes included are Desmodium and Stylosanthes guianensis and Lablab. To demonstrate the use of improved forages on animal productivity improvement, on-farm participatory trial will be done with farmers' cows within the project in Njombe district. The farmers will be assisted to establish the hybrids in readiness for feeding.

## *Methodology*

The trial design will be crossover where the experimental unit (lactating cow) will be trailed under farmers practice (FP) then crossover to experimental feeding intervention (IN) before reverting to FP. The treatments details are stipulated in Table 1.

Because of the complexity of animal trials and especially in an on-farm participatory set up, where breeds may be different e.g. local, crosses etc. would be easier to show milk changes regardless of which breed the farmers have in lactation. As such, having the trials within animals and not between animals becomes more feasible to compare the test forage (intervention- IN) with the farmers' practice (FP).

**Measurements:** After selecting animals (described below), the animals will be monitored under FP for 2 weeks and measure feed intake, feed quality, milk and milk quality. To capture these, the following will be undertaken.

On a daily basis we shall record the type of feeds and quantities (kg) given to the animals and refusals (kg) in the morning of the next day. Daily milk yield in both the morning and evening milking will be measured with a graduated container (liters). Weekly milk sample will be analyzed for quality including; fat content, total solids, protein. Samples of feeds fed (300 grams) will be collected for dry matter determination and for measurement of nutritive value each week. After the initial two week period, test forage (IN) will be introduced at 50% IN and 50% FP for 1 week (week-3) followed by 100% IN at week 4 before getting back to 50:50 at week 5. For IN herbage will be estimated at 3% DM of the live body weight ( $\approx 300$  kg) for local zebu equivalent to 9 kg DM/day. During IN, forage quantities fed as well as the milk production to be quantified as in FP. During the last phase feeding phase feeding will revert to FP for 2 weeks. Therefore, the total experimental period is seven weeks (Table 2). Clean water will be made available throughout the experiment. Where supplementation and mineral licks were offered under FP, the same regime will be maintained during IN, such that the only difference between FP and IN is the roughage source.

Farmers and cows' selection: - In Njombe farmer involved in the project and have their cows in early lactation (2-3 months since parturition) and in 2<sup>nd</sup> to 4<sup>th</sup> parity by the time the forage is ready for feeding (June 2019). Forages could take 4 months to get a harvestable crop. The farmers are those who keep their animals in stall-feeding only, otherwise if grazing outside is involved; will be difficult to account for feed intake from grazing. We shall assist the selected farmers to establish about 0.5 of an acre of the respective intervention forage on their farms.

To collect data as enumerated above, farmers will be sensitized about the data collection as well as the extension officers in the respective wards. This will enable participants to understand the breadth and expectations of the study including the care required during data collection. CIAT staff (Beatus Nzogela) will closely monitor the data collection on each farm. In each farm, simple spring balance, to take weigh forages will be available.

Table 1. On-farm animal feeding trial arrangement for Tanzania- Njombe

Country	Site	Cow	Period 1 (2 weeks)	Period 2 (3 weeks)	Period 3 (2 weeks)
Tanzania	Njombe	1	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	2	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	3	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	4	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	5	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	6	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	7	FP	Brachiaria + desmodium	FP
Tanzania	Njombe	8	FP	Brachiaria + desmodium	FP

Table 2. Activities weekly schedule

Activity	Week						
	1	2	3	4	5	6	7
<b>Farmer practice monitoring (FP)</b>							
Weighing feed and forages (kg) daily							
Take sample of the Feed/Forage (300g daily)							
Weighing feed refusal daily (kg)							
Weighing morning milk daily (liters)							
Weighing evening milk daily (liters)							
Measure milk quality (Butter fat, solids, protein)							
<b>Intervention feeding (IN)</b>							
Weighing feed and forages (kg) daily			50% FP	100% IN	50% FP		
			50% IN		50% IN		
Take sample of the Feed/Forage (300g daily)							
Weighing feed refusal daily (kg)							
Weighing morning milk daily (liters)							
Weighing evening milk daily (liters)							
Measure milk quality (Butter fat, solids, protein)							

**Data sheet**

**Farmers name**.....

**Week No:**.....

**Date:**.....

*Record weight of feed as fed, and refusals in the next morning and, trough cleared off refusals after weighing for present day feeding*

Day	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	Morning milk (kg/liters)	Evening milk (Kg/liters)
1															
Refusals (kg)															
2															
Refusals (kg)															
3															
Refusals (kg)															
4															
Refusals (kg)															
5															
Refusals (kg)															
6															
Refusals (kg)															
7															
Refusals (kg)															

- *Sample for laboratory analysis for each feed type applicable @ approximately 300 grams. Samples to be collected weekly*
- *The form to be filled daily for the 7 weeks experimental period*
- *During farmer practice, fill the 1<sup>st</sup> row above with specific feed type the farmers is feeding (week 1 and 2), then intervention- IN (week 3, 4 and 5) it will Brachiaria + desmodium and then back to farmer practice in week 6 and 7.*

## **Data analyses**

We shall perform regression analysis to examine the relationship between; feed quality and milk quality; feed intake and feed quality feed quality and milk yield.

Comparison of FP and IN on milk yields and quality; feed quality, and means separated by least significant difference.