

2016

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RUFORUM Working Document Series

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<https://dspace.nm-aist.ac.tz/handle/20.500.12479/2027>

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Research Application Summary

**Overview of feed resources condition and feeding practices among the  
smallholder dairy farmers in Tanzania**

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**Abstract**

In Tanzania, most smallholder dairy farmers rely on on-farm resources for feeding their livestock. These on-farm feed resources include grasses, legumes, crop residues, cereals and oilseed byproducts. These feed resources, in particular pasture and crop residues, do often fluctuate seasonally both in terms of quantity and quality. For example, pasture tends to be plenty in wet seasons but becomes very scarce in dry seasons. This fluctuation results in a reduction of over 40% in milk yield during the dry season. Despite a number of research and development interventions for curbing the problems of dry season fodder scarcity, the culture of forage production and preservation in terms of hay or silage, leaf-meal or feed blocks as a dry season feeding strategy is still limited among the Tanzanian smallholder dairy farmers. This study aimed at getting an overview of feed resources and dairy cattle feeding resources in two districts of Tanzania. It is hoped that information generated would inform development of future innovative solutions for curbing the identified challenges. A reconnaissance survey was conducted in eight villages in Tanga region including six in Lushoto and two in Korogwe district. The survey revealed that feed resources are plenty in the wet season (December to July) but very scarce in dry season (August to November) in both two districts. The findings suggest that poor feeding strategies and inadequate knowledge on dairy nutrition exists among the smallholder dairy farmers. Therefore, promoting on-farm research and development interventions in the areas of feeding strategies, fodder production and conservation are of paramount importance if sustainable dairy production is to be achieved in the study sites.

**Key words:** Dairy farming, feed seasonality, fodder, forage conservation, Tanga, Tanzania

## Résumé

En Tanzanie, la plupart des petits producteurs fermiers laitiers comptent sur les ressources de la ferme pour nourrir leur bétail. Ces ressources alimentaires à la ferme comprennent des graminées, des légumineuses, des résidus de récolte, des céréales et des sous-produits oléagineux. Ces ressources alimentaires, en particulier les résidus de pâturages et des cultures, font souvent des fluctuations saisonnières à la fois en termes de quantité et de qualité. Par exemple, les produits de pâturage ont tendance à être beaucoup dans les saisons humides, mais deviennent très rare dans les saisons sèches. Cette fluctuation se traduit par une réduction de plus de 40% de la production laitière au cours de la saison sèche. Malgré un certain nombre d'interventions de recherche et de développement pour lutter contre les problèmes de pénurie de fourragère pendant la saison sèche, la culture de la production de fourrage et de conservation en termes de foin ou d'ensilage, feuille-repas ou des blocs d'alimentation comme une stratégie d'alimentation en saison sèche est encore limitée parmi les petits producteurs laitiers tanzaniens. Cette étude visait à obtenir une vue d'ensemble des ressources alimentaires et des ressources d'alimentation des bovins laitiers dans deux districts de Tanzanie. On espère que les informations générées instruiront le développement de solutions innovantes pour l'arrêt de futurs défis identifiés. Une étude de reconnaissance a été menée dans huit villages dans la région de Tanga dont six en Lushoto et deux dans le district de Korogwe. L'enquête a révélé que les ressources alimentaires sont abondantes dans la saison des pluies (décembre à juillet), mais très rare en saison sèche (août à novembre) dans les deux districts. Les résultats suggèrent que les stratégies d'alimentation pauvres et des connaissances insuffisantes sur la nutrition laitière existent entre les petits producteurs fermiers laitiers. Par conséquent, la promotion des interventions de recherche et de développement à la ferme dans les domaines des stratégies d'alimentation, la production de fourrage et de conservation sont d'une importance primordiale si la production laitière durable doit être atteinte dans les sites d'étude.

Mots clés: agriculture laitière, fourrage saisonnier, fourragères, conservation des fourrages, Tanga, Tanzanie

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## Background

Globally small-scale dairy production supports the livelihoods of about 150 million households and 750 million people, mostly the poor in developing countries. Small-scale dairy production is characterized by few livestock, about two cows, small land sizes often less than two hectares and average milk yield per farm per day is estimated to be about 11 litres (FAO, 2010). In Tanzania, most smallholder dairy farmers rely on on-farm resources for feeding their livestock. For example, pasture tends to be plenty in wet seasons but becomes very scarce in dry seasons. This fluctuation results in a reduction of over 40% in milk yield during the dry seasons (Kavana and Msangi, 2005). Despite a number of research and development interventions for curbing the problems of dry season fodder scarcity, the culture of forage production and preservation in terms of hay or silage, leaf-meal or feed blocks for feeding during dry seasons is still limited among the Tanzanian smallholder dairy farmers (Kimambo *et al.*, 2014; Lukuyu *et al.*, 2015). The low uptake rate of improved dairy feed technologies

despite their technical merits is attributed to the existing tendency of most of them being developed and tested in laboratories and on-station with limited emphasis to suite smallholder needs and local environments (Lukuyu *et al.*, 2011).

This study aimed at validating this claim through interviewing, observing and listening to the small dairy farmers themselves at their farm on feed resources, feed technologies, and associated constraints and opportunities. This survey was a part of the RUFORUM Community Action Research Project (CARP) activities for gathering information towards effective students' research proposal development, as well as identifying and validating research gaps. This information was deemed necessary for informing future initiatives and plans towards improved dairy nutrition and productivity under smallholder environments. In particular, the results of the survey is expected to inform a robust and detailed research study aiming at developing innovative feeding strategies for enhancing sustainable dairy productivity that is compatible with the smallholder farmers' conditions.

### **Study description**

The study was conducted between March and April, 2016 in Lushoto and Korogwe districts in Tanga region, Tanzania. The overall aim of this study was to get the preliminary information from farmers and to understand their current dairy productivity problems that were to be addressed under the RUFORUM CARP Livestock Project. The focus areas of interest included innovative feeding strategies, animal health, innovative manure management technologies and innovation platforms. The main aim of the study was to identify the study villages as well as collecting all the relevant information/facts pertaining to feed resources and feeding practices in the selected smallholder dairy farms.

Lushoto is located between 4.78° South and 38.28° East, and at an altitude of 1498 m above sea level (asl). Lushoto receives high rainfalls averaging between 1500 and 2000 mm per annum. The average annual temperature and relative humidity are estimated to be 14°C and 70% respectively (Kamugisha *et al.*, 2007). Most of the land in Lushoto is categorized as arable and thus suitable for growing various crops including maize, banana, beans, fruits and vegetables. Moreover, due to its high productivity Lushoto is an ideal region for intensive smallholder farming systems that include crop growing and keeping of few highly producing livestock such as dairy cow and goats. In particular the cool climate offers favourable condition for successful introduction crossbreeds of dairy cattle and goats that are adapted to temperate environment. Consequently, the Sambiaa people who are the major ethnic group in Lushoto have adopted dairy farming among their livelihood choices. Whilst, Korogwe is located adjacent Lushoto between 4.97° South and 38.23° East, and at an altitude of 311 m asl. In Korogwe, smallholder dairy farming is common in areas along the Pangani river basin where pasture and crop residues are sufficient for maintaining dairy cattle.

A total of eight villages were surveyed, six and two villages in Lushoto and Korogwe respectively. The pre-set criteria for study villages selection was presence of adequate number of dairy farmers/cattle. Study households selection criteria include having at least two dairy cows, 0.25 ha land and willingness to adopt new practices or innovations. The

surveyed villages in Lushoto districts include Mbuzii, Ubiri, Bombo, Ngulwi, Hambalawei and Viti. Likewise, in Korogwe district the surveyed villages were Hale and Makuyuni. Thereafter, three households from each of the eight villages were selected for informal interviews and household visits using preset criteria for research gap identification through informal interviews. Thus, a total of 24 smallholder dairy farmers were interviewed at their homestead in which the head of the household or somebody else with ample knowledge on the dairy cattle management was interviewed. The key themes in the checklists included probing on year round dairy feed conditions, feeding strategies, challenges, constraints and opportunities towards improved smallholder dairy nutrition. The checklists were prepared in close collaboration with relevant study districts livestock officials through a meeting that was held before embarking on actual field activities.

### Findings and implications

The informal discussion with selected smallholder dairy farmers in Lushoto and Korogwe districts revealed that seasonal fluctuation in feed resources is a common problem. It was reported that pasture is plenty during wet season (December - July) while during dry season (August - November) there was very limited pasture. Average milk yields of the improved crossbred dairy cattle under smallholder conditions were reported to be 3.5 and 8 lt/cow/day in dry and wet seasons, respectively. The reported milk yields are far below the recommended 15 - 20 lt/cow/day of improved crossbred dairy cows under ideal conditions often in commercial farms (Lukuyu, 2015). The findings indicate that milk production is strongly influenced by fodder availability and there is a need to ensure its year round availability.

It was also apparent that there was poor feeding strategy being employed under the predominant zero grazing systems in the study sites. In the area green maize and beans residues, napier (*Pennisetum purpureum*) and guatemala (*Tripsacum laxum*) fodder grasses were fed to animals during wet seasons and most of the time as unprocessed feed (Plates 1 and 2). Surpluses of these feed materials during the wet season could be processed and



**Plate 1. Calf and cow feeding cut and unchopped napier grass while stepping on the feed**



**Plate 2. Cow feeding on a mixture of green maize leaves and grasses during wet season (Photo courtesy: David Maleko, NM-AIST)**

stored in form of hay or silage in order to reduce feed inadequacy during the dry season. Nonetheless, animal feed storage structures such as barns and storehouses were very uncommon to most smallholder farmers in both Lushoto and Korogwe in which pasture and crop residues are collected daily from the field and fed directly to the animal (Plates 1 and 2).

Supplementation of poor roughages with protein or mineral rich feed sources was uncommon in the two study districts, thus contributing to poor animal productivity in terms of milk and also calving. Incidences of poor conception and repeated heat were mentioned to be common. For example, calving intervals of over 3 years was reported in several farms. High labour costs, input costs for concentrate feeds, expensive artificial insemination services and limited access to farm machinery for feed processing and storage were also reported as among constraints for adopting dairy feed technologies. .

Pasture establishment and management practices in particular of *P. purpureum* and *T. laxum* grasses were practiced in Lushoto District. It was reported that pasture production initiatives were facilitated by the ongoing MoreMilk “Maziwa Zaidi” project. The MoreMilk project is being implemented through a partnership involving International Livestock Research Institute (ILRI), Tanzania Livestock Research Institute (TALIRI) - Tanga, Lushoto District Council and Sokoine University of Agriculture (SUA). The practice of cultivating napier along the contours and farm boundaries was common in the surveyed villages in Lushoto district and even some few dairy farmers had devoted small pieces of land (about 0.1 ha) solely for pasture production. Surprisingly, planting of protein rich leguminous fodder trees such as *Leucaena* (*Leucaena leucocephala*), *gliricidia* (*Gliricidia sepium*), mulberry (*Morus alba*), *calliandra* (*Calliandra calothyrsus*) and *sesbania* (*Sesbania sesban*) was limited in both Lushoto and Korogwe districts. As such leaf-meal making and feeding were uncommon at the two study districts. In one pasture plot at Ubiri village green leaf (*Desmodium intortum*) was being promoted. However, its performance was very poor, reported as a result of the long drought spell. In Korogwe, fodder production and conservation practices were uncommon and it was reportedly that farmers relied on natural grasses and crop residues mainly maize stover and rice straw as the main feed sources.

## **Conclusion and recommendations**

Based on findings of this survey it is concluded that feed scarcity and improper feeding management are the major challenges towards improved dairy productivity in both Lushoto and Korogwe districts. It is suggested that on-farm research and development interventions on improved feeding strategies, pasture establishment and management be undertaken if sustainable dairy production is to be achieved in the study sites.

## **Acknowledgement**

Funding for this research was provided by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). This paper is a contribution to the 2016 Fifth African Higher Education Week and RUFORUM Biennial Conference.

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