

Research Application Summary

**Development of management practices for sustainable improvement of indigenous goats in Tanzania**

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**Abstract**

In recent years exotic breeds and crossbred goats of the indigenous breeds and some European breeds (mainly dairy goats) have been distributed in rural areas of Tanzania to increase goat productivity and alleviate poverty. However, the distribution of these breeds has been carried haphazardly without taking into consideration the environmental conditions in rural areas. No efforts have been done to match the genotype with the right environment. On the other hand, efforts for searching for appropriate feeding regimes that are both economical and sustainable have also been sought with varying achievements in the diverse farming systems. However, more is still needed in ensuring that exotic breeds and crossbred goats receive proper feeding or supplementation strategies under farmers' conditions. This project will assess the existing goat breeding programmes and institutions in the country, with a view of strengthening them and make them more effective to sustainably carry out the genetic improvement of goats. The project will evaluate the biological performance and profitability of the breeds introduced in semi-arid areas and identify the reasons for success and failure of goat improvement programmes in the villages. The project will also develop a simple recording scheme and introduce it to goat keepers in rural areas for utilization in genetic evaluation. In addition, this project will develop quality and cost-effective feed rations based on locally available feed resources that can be used to feed improved goat breeds in rural areas. Furthermore, the project will train small-scale goat farmers to formulate good quality rations using indigenous tree and shrub leaf meals and pods as protein supplements to replace conventional oil cake supplements.

Key words: Biological performance, good quality feed rations, improved goat breeds, locally available feed resources, profitability

## Résumé

Ces dernières années, les races exotiques et les chèvres croisées des races autochtones, et quelques races européennes (chèvres laitières principalement) ont été distribués dans les zones rurales de Tanzanie pour accroître la productivité de chèvre et réduire la pauvreté. Toutefois, la répartition de ces races a été effectuée au hasard, sans prendre en considération les conditions environnementales dans les zones rurales. Aucun effort n'a été fait pour équilibrer le génotype son environnement approprié. D'autre part, les efforts de recherche des régimes alimentaires appropriés qui sont à la fois économique et durable ont également été recherchés avec différentes réalisations dans les systèmes agricoles diversifiés. Toutefois, il reste encore beaucoup à faire pour s'assurer que les races exotiques et les caprins croisés reçoivent une bonne alimentation ou une stratégie de supplément sous les conditions des agriculteurs. Ce projet permettra d'évaluer la chèvre en vigueur des programmes de sélection et des institutions dans le pays, en vue de les renforcer et de les rendre plus efficaces pour mener à bien de manière durable l'amélioration génétique des chèvres. Le projet permettra d'évaluer les performances biologiques et de la rentabilité des races introduites dans les zones semi-arides et d'identifier les raisons de la réussite et de l'échec des programmes d'amélioration de chèvre dans les villages. Le projet va aussi développer un système d'enregistrement simple et va l'introduire aux éleveurs de la chèvre dans les zones rurales pour une utilisation dans l'évaluation génétique. En outre, ce projet permettra de développer la qualité et le coût-efficacité des rations alimentaires basées sur les ressources alimentaires localement disponibles qui peuvent être utilisés pour nourrir les races de chèvres améliorées dans les zones rurales. En outre, le projet permettra de former les éleveurs de caprins à petite échelle pour formuler des rations de bonne qualité à l'aide d'arbres indigènes et des repas de feuilles d'arbustes et les gousses que des suppléments de protéines pour remplacer les suppléments en tourteaux classiques

**Mots clés:** Rendement biologique, bonnes rations de nourriture de qualité, améliorer les races de chèvres, de ressources alimentaires localement disponibles, la rentabilité

## Background

Goat keeping forms an important and integral part of smallholder agriculture in Tanzania and is undertaken mainly by farmers who keep local goats. Local breeds of goats have low growth rates of 5-7 g/day (Payne, 1990), small mature size of 20-25 kg (NEI, 1999) and low carcass weights (6 to 13 kg) (Chenyambuga

*et al.*, 2004). They also have low milk production potentials such that they seldomly reach milk production levels beyond the needs of their kids. Improvement of the genetic potential of the local breeds through crossbreeding has been shown to result in animals that can give reasonable returns for the money spent in raising them. Crossbred goats have high growth rates, bigger mature size and better reproductive performance than the pure local breeds (Das and Sendalo, 1991). Consequently, goat improvement strategies to alleviate poverty to rural people have been based on the introduction of improved breeds, either pure exotic breeds (especially dairy goats) or their crosses. The distribution of these breeds has been carried haphazardly without taking into consideration the environmental conditions in rural areas. No efforts have been done to match the genotype with the right environment. The animals supplied to farmers by development partners have no pedigree information; hence, their performance or expected performance is not known. No study has been done to demonstrate the comparative advantage of the various breeds. This project will determine the biological performance and profitability of the different breeds and their crosses introduced in semi-arid environments, where the availability of feed resources is limited. Also the project will assess the existing goat breeding programmes and institutions involved in the country, with a view of strengthening them and to carry out the genetic improvement of goats.

Another problem facing goat keeping in Tanzania is poor nutrition. The improved goat breeds kept in rural areas usually depend on natural pasture from communal grasslands for their food throughout the year. The natural pastures being the major source of feed are limited both in quantity and quality, particularly during the dry season (Doto *et al.*, 2004). The situation is characterized by seasonal availability of feeds that result in growth fluctuations of the animals. This project will develop feed packages and feeding regimes for efficient utilization of locally available feed resources. The aim is to enable the small-scale farmers to formulate better quality rations for lactating goats and growing goats at an affordable cost from locally available feed ingredients.

## Literature Summary

In Tanzania, goats are an important asset to the majority of the rural populations providing meat, manure and serve as an important source of income and secure form of investment against the vagaries of the environment. Studies have shown that goats have a potential to contribute to poverty alleviation

and household food security in sub-Saharan Africa (Winrock International, 1992). In Tanzania, most goats (98%) are of the indigenous type and are raised by agro-pastoralists and pastoralists in semi-arid environment. Indigenous goats are of low genetic potential in terms of traits of economic importance like growth rates, mature size and milk production that is only enough for their young ones (Payne, 1990; NEI, 1999). Consequently development strategies for improvement of goat productivity to alleviate poverty to rural people have been based on the introduction of improved breeds, either pure exotic breeds (especially dairy goats) or their crosses. Exotic breeds and their crosses have shown a high production potential of milk (Eik *et al.*, 1985), high growth rates and better reproductive performance (Das and Sendalo, 1991).

One of the problems facing the livestock industry in Tanzania is low productivity. Poor nutrition in terms of low energy, protein and mineral intake is the main cause of low productivity. Feeding of goats in Tanzania is based on natural pastures, standing hay and crop residues. Most of these are of low nutritive value and animals reared on these feed resources may have problems in meeting even their maintenance needs (Komwihangilo *et al.*, 2005a). Since supplies of commercial concentrates and agro-industrial by-products are limited and expensive, other supplements with high protein and/or mineral contents and locally available have to be sought. Leguminous tree leaves and their pods offer appropriate alternative protein and energy sources to conventional supplements. These are mainly multipurpose trees like *Leucaena leucocephala* leaf meal (Ndemanisho *et al.*, 1998) and *Moringa oleifera* leaf meal (Sarwatt *et al.*, 2002). However, due to agronomic requirements and climatic differences in various locations of the tropics, *Leucaena* or *Moringa* trees are not widely distributed and they need to be established. Komwihangilo *et al.* (2005b) have shown that indigenous trees and shrubs could be used to replace conventional supplements. Pods from leguminous plants have also been used as supplements in goat rations with positive response. For example, Ntakwendela *et al.* (2002) demonstrated that *Acacia tortilis* pods can substitute sunflower cake up to 100% giving even higher effect in terms of growth rates of goats. The aim of this project is to develop good quality rations for goats using indigenous tree and shrub leaf meals and pods as protein supplements to replace conventional oil cake supplements.

## **Study Description**

The study will be carried out in Manyara and Dodoma regions of Tanzania. These areas are located in a semi-arid environment. In each region four villages with pure exotic breeds or their crosses will be selected for the study. Two MSc students will be recruited to implement the research activities of this project.

The first student will assess the performance, profitability and impact of exotic breeds and their crosses introduced in rural areas for the purpose of improving goat productivity and alleviating poverty. Individual interviews and focus group discussions will be conducted to collect information on lactation performance and reproductive traits, adaptive traits and farmers' preferences. Secondary data on growth, reproductive and lactation performances will be analyzed to assess the productivity of the breed. Furthermore, the input-out relationships of goat enterprises will be assessed. The main input costs will be the variable costs (amount of money used to purchase feeds, veterinary drugs, hired labour/family labour, animals). The revenues will be the amount of money obtained from sales of live animals and animal products (meat, milk, skins). Products consumed by the household will be converted into cash.

The second student will address the problem of poor nutrition for the goats kept in rural areas by developing alternative quality rations based on locally available feed materials. Farmers will participate in identifying feed materials and testing the rations. A survey will be carried out to collect information on livestock feed availability and fluctuation, local knowledge on goat feeds and feeding practices. Samples of grasses, legumes and trees / shrubs and crop residues will be collected and analyzed for chemical composition. Different rations will be formulated and tested on-farm using both lactating and growing goats. Gross margin analysis will be used to estimate profitability of the different rations and the best and cost-effective rations will be identified. Participating farmers will be trained to formulate better quality rations for lactating goats and growing goats at an affordable cost from locally available feed ingredients.

## **Research Application**

This study will evaluate the growth, reproductive and lactation performances and economic profitability of improved goats (pure exotic breeds and their crosses) in order to identify and recommend the appropriate genotypes to agro-pastoralists living in semi-arid environments. The project will develop a simple recording scheme which can be used by farmers to record data

that can be used for genetic evaluation of their animals. Additionally, the project will develop good quality and cost-effective rations based on locally available feed resources in collaboration with farmers. These rations will be recommended to farmers for supplementation of their animal feeds. The project will build capacity of researchers, students and farmers who will be directly involved in the study. It is expected that through this project the productivity and off-take of goats in the research areas will be improved, thus the rural poor farmers will improve their incomes by selling live animals, meat and milk. Their per capita consumption of livestock products (meat and milk) will in the long run increase. Also the increased level of income will improve the purchasing power of the rural poor farmers for food products thereby reducing risks of food insecurity at community and household levels.

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