



Collaborative learning for improved milk production on smallholder dairy farms

Key messages:

Smallholder dairy farmers in Kenya have not improved production performance due to lack of technical expertise on modern feeding practices;

Collaborative learning approach facilitates adoption and implementation of innovations and modern practices, leading to much higher farmers' knowledge level on feeding practices;

Feeding interventions focused on quality of dairy cows' rations using a combination of green and dry forages and concentrates, increases milk production by 20% when compared to feeding unbalanced feed ratios

Background

The dairy sector in Kenya is the single largest agricultural sub-sector, contributing 14% of Agricultural (GDP) and 3.5% of total GDP with an annual growth rate of 4.1% compared to 1.2% of Agriculture (IFAD, 2006, Tegemeo, 2015). The dairy sector contributes to food, nutrition and income securities to more than 2 million actors in Kenya. This has prompted the Government of Kenya to improve productivity of the dairy sector in order to positively contribute to livelihoods of poor households who supply more than 75% of milk in the country. Despite these efforts, the dairy sector is still characterized by low milk output and low quality. Researchers attribute this low production mostly to poor feeding, milk handling practices and contamination with

pathogens and toxins (Kashongwe et al., 2017; Makau et al., 2017). This has raised the need for improved and affordable dairy cows' feeds.

Reasons for low milk production on smallholder farms in Kenya.

Smallholder dairy farmers in Kenya typically feed dairy cows on natural pastures or crop residues from previous harvesting season as main source of feeds in rural and peri-urban areas, respectively. They also add concentrates at less than 20% of total feeds (1-2Kg/ cow/day), not sufficient to support high milk production. The current level of production cannot support the rising demand for milk products in the country. Indeed, urbanisation and the rise of the middle class require a consistent increase in milk production to match the expected consumption 150 Kg/ milk /person per year. Despite the fact that research and development organizations as well as government agencies have heavily invested in the sector over the last 20 years, productivity remains low. Smallholder dairy cow production has hardly exceeded 3 Kg/cow/ day over the last 20 years (Table 1). This renders farmers vulnerable to shocks and unable to make a living out of an activity that employs majority of workers in agriculture sector in the Country.

The situation contrasts with countries like India and South Africa whose dairy sectors have experienced an increase in milk production as shown in Table 1. Factors such as breeding and genetics, systems of production, and feeding contribute to production performance. This study demonstrates that increasing the quantity of concentrates and forage supplement significantly increase milk production.

Table 1: Milk production trends in Kenya, India and South Africa over 10 years

| Country | Variable | Year | | | |
|--------------|--------------------------|------|------|------|------|
| | | 2002 | 2006 | 2010 | 2014 |
| Kenya | Milk yield cow/ day (Kg) | 2.3 | 2.0 | 2.6 | 2.3 |
| | Number cows/farm | 6.4 | 4.0 | 2.9 | 3.5 |
| India | Milk yield cow day (Kg) | 3.0 | 3.3 | 3.6 | 3.9 |
| | Number cows/farm | 1.8 | 1.5 | 1.5 | 1.7 |
| South Africa | Milk yield cow day (Kg) | 12 | 16.4 | 18.0 | 16.4 |
| | Number cows/farm | 115 | 137 | 204 | 368 |

Source: IFCN, Dairy Report, 2015

The study established that there are efforts to encourage farmers to cultivate high quality fodder crops to improve milk yield. This approach has however not increased milk production. Dairy farmers need to be empowered to formulate correct feed rations, since only 2 out of 10 have limited knowledge of the technique (Figure 1). We also reported in Figure 1 that feed formulation was found to be highly technical and farmers could hardly understand, even less sustain formulation techniques that could help them better utilise available feed resources. Numerous interventions on feeding and feed management have used top-to-bottom approaches where researchers pour knowledge to farmers. This has had very low success, since reported adoption rates are often marginal (Omondi et al. 2017). This is possibly because of limited innovation capacity in accessing information, technology or inability to invest in recommended innovative technology.

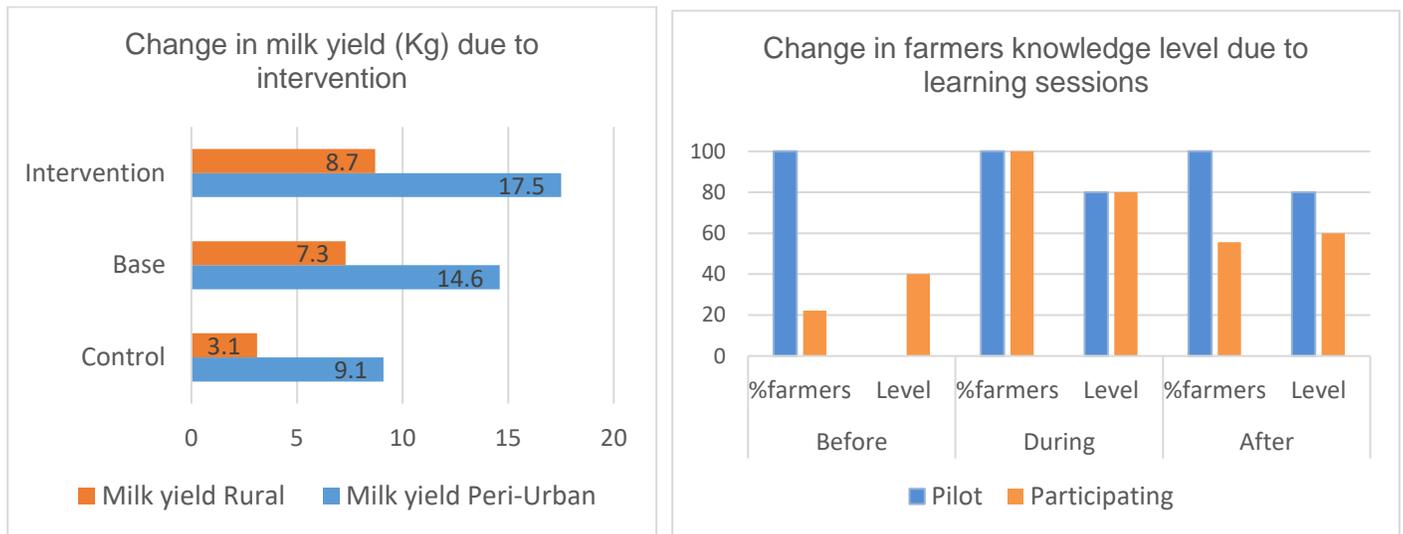


Figure 1: Knowledge level during the learning process (left) and change in milk yield due to the process (right)

Collaborative learning as a way out for improved feeding practices of dairy cows among smallholder farmers

We used collaborative learning process in participatory action research to develop with farmer groups contextualized options to improve milk production and quality. The aim of the participatory approach was to improve feeding practices through training and knowledge exchange sessions with smallholder farmers in two distinct contexts: rural (Olenguruone) and peri-urban (Mukinduri) farms in Nakuru County, Kenya. Improvement of feeding practice consisted of conserving forages/ adding value through silage making and treatment of crop residues and feed formulation (Plate 1). Collaborative learning process consists of a collective action of actors in a value chain who attempt to solve specific problems they face (Figure 1). The process facilitates farmer-to-farmer, and farmer-to-researcher exchange knowledge and experiences which can only be achieved in groups: multi-stakeholder platforms. We assessed knowledge level and noted an increase in farmers' knowledge on forage

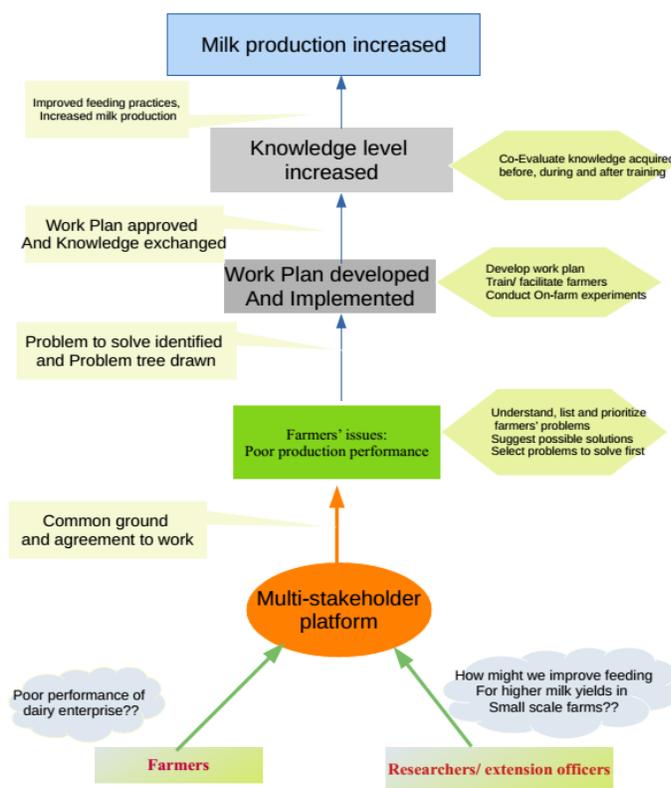


Figure 2: Collaborative learning process



Plate 1: Cows feeding on formulated feed management and feed formulation after training. Training and exchange sessions improve

farmer's knowledge since it creates a more receptive environment for application of better practices (Nampanya et al., 2012).

We observed an increase in milk production of up to 6 Kg/cow/day in the rural farms and up to 8Kg/cow/day in the peri-urban farms between the control and intervention groups (Figure 1). This could contribute to an increase of up to 915L/cow for the lactation period and increase income from milk by at least KES 27,400 if milk is sold at KES 30/Litre (Figure 1).

What farmers said ...

'... I have learnt how to make urea-treated maize stalks and I have seen it has improved milk production...' (Pilot farmer).

'...I had never seen use of urea in dairy cows' feeds, my cow ate it very well and its body condition looks better. I cannot however talk about milk production because my cow is drying off...' (Participating farmer).

Formulation of balanced diets and mixing of forages when feeding was also mentioned as positive input from training as it reduces time farmers spend cutting and carrying forages.

'...I never knew that you could mix forages together...'

To sustain knowledge gained, farmers mentioned purchasing a silage tube;

'...making silage with the tube is easier than with the pit, because when I see people making silage in a pit it often spoils because air gets in, but it is easier to keep silage tube airtight...'

(participating farmer).

They also mentioned collecting as much maize stalks as possible during next harvest (in future) and planting enough green forages to meet cows' requirements

'... in January [2017], I will have a lot of maize stalks and I will be able to prepare enough for my cows...' (Pilot farmer).

Way forward

Facilitating the process of adoption of recommended practices/ technologies in smallholder farms should aim at using collaborative learning, rather than a transfer of knowledge approach;

Improving farmers' knowledge level of feeding practices is a prerequisite to increase milk production and could lead to up to 20% increase of production;

The learning process in collaborative learning is a farmer oriented continuous monitoring and exchange experience that increases milk production.

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