

Adaptation of the zero grazing concept by Luo farmers in Kenya

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The National Dairy Development Project (NDDP) of Kenya was implemented by the Kenyan and Dutch governments with the main aim of increasing milk production for the market. In 1979, the NDDP introduced a dairy farm concept based on *zero grazing* (ZG) which involves confining of dairy cattle in a stall and the development of a cut and carry fodder system. When the project ended in 1999, it had covered a total of 25 districts throughout the country and over 10,000 farmers were involved in either ZG or semi-ZG dairy farming. Many of the Luo farmers of Siaya district embraced the project as they were attracted to the additional benefit of ZG, namely replenishment of soil fertility for crop production. However, they introduced a number of adaptations to the ZG concept to fit their needs and opportunities. The ZG concept and the adaptations made are discussed below.

The zero grazing concept

The research component of NDDP produced a technology package that aimed at addressing the constraints of smallholder dairy farming in Kenya: lack of grazing land, low productivity of dairy cows, low quality of fodder, prevalence of diseases and lack of financial means (Valk, 1990; Muma 1994). The package consists of several components:

Housing (the zero-grazing unit): Fig.1 shows the floor plan of a ZG unit building as proposed by the NDDP. In the ZG system, the cows are kept inside all year round to prevent tick-borne diseases and other health hazards.

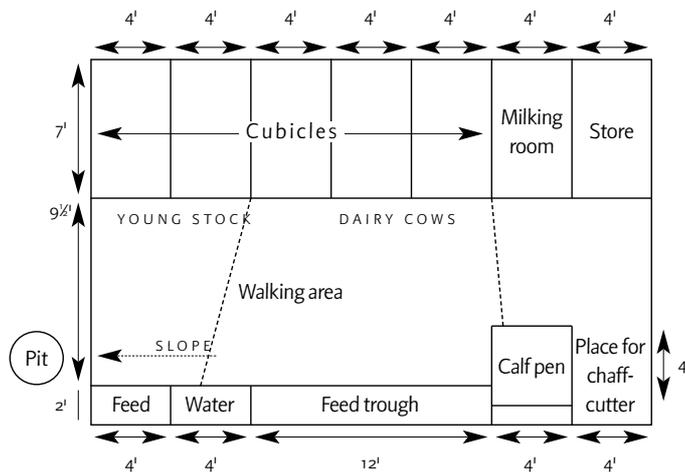


Fig.1 Floor plan of zero grazing unit

The introduction of improved dairy cattle breeds. The NDDP recommended that farmers stock their units with high milk yielding graded dairy cows. Graded cows, in this case, were not pure breeds, but animals with more than 50% 'exotic blood'. Exotics used for obtaining graded cattle were Jersey, Ayrshire, Guernsey, Friesian and Sahiwal.

Breeding and fertility: Farmers were advised to maintain the dairy breeds by upgrading their stock through artificial insemination using semen from a dairy bull.



Farmers saw many possibilities in the "zero grazing" approach. Photo: Willem van Weperen

The production of high-yielding fodder on-farm. In a ZG system all feed is brought to the animals, as they are not allowed to graze outside. Napier grass is the main fodder crop that the project recommended to the farmers. Its re-growth after cutting is rapid and establishment is relatively easy.

Utilisation of farmyard manure and artificial fertilisers to maintain soil fertility. To replenish soil fertility, NDDP recommended that farmers return all manure to the napier plot every 2 to 3 days. Farmers were also advised to apply 4 bags (@ 50 kg) of compound NPK fertiliser (20-10-10) per acre per year.

Feeding: The project advised the farmers to plant 0.75 - 1 acre of napier grass per mature cow and her offspring, and to cut it when approximately 60-90 cm long. Commercial dairy meal was to be given as the main protein concentrate supplement to the cows at milking time, the quantity depending on the production of the cow. Mineral salt lick was to be offered to the animals *ad lib* in the mineral box.

Introduction of the ZG concept to Luo farmers

Initially, dairy production with graded cows was developed in Kenya on large-scale European farms during the colonial period. Since the 1950s, it spread to African smallholdings as well. In Siaya, the first graded cows arrived in the early '50s. But, being settled pastoralists, the Luo people still highly valued its own breed of African Zebu cattle, which played an important cultural role, for example in wedding and funeral ceremonies. Free ranging animals were essential in providing manure for crop production. By bringing in nutrients and organic matter from a wider area to the cropped fields, soil fertility can be replenished. Being more expensive and needing more care, graded dairy cattle could not be used to perform these functions. As such, the Luo people did not accept these animals.

When the NDDP was launched in Siaya in 1987, farmers were actively seeking solutions for the problems they were facing: reduced land sizes, low incomes, loss of soil fertility leading to poor crop yields and market failures of cash crops like coffee, cotton and sugar. Some innovative farmers had already started with ZG, particularly after seeing its benefits in the neighbouring districts where it had been introduced much

earlier. The Luo people were getting more integrated into the money economy and cash crop production. Their ceremonies were changing as well as their opinion about graded cows. Now, most farmers have adopted the ZG concept, because they were able to adapt it to their needs and opportunities.

Production of napier grass

Most ZG dairy farmers have an average of 2 to 3 cows, 1 or 2 heifers and 1 calf. Some have a young or full grown bull. The majority of farmers have only 0.4-0.6 acres of napier per cow and her offspring. Farmers do not find this a problem as they always supplement napier grass with crop residues such as maize stalks, sweet potato vines, banana leaves and stems, and molasses.

During times of scarcity, farmers are forced to feed the African Zebu cattle on the napier grass as well. This lowers the amount of napier grass that is available for the dairy cows. Then they harvest the napier grass even below 60cm in height. During times of plenty (wet seasons), the napier grass is allowed to overgrow as a lot of labour is required in the other areas of the farm. Farmers then cut napier grass only to feed the high-grade dairy cattle and not the African Zebu.

Replacing commercial concentrates

Most farmers use commercial dairy meal. They feed dairy meal to the cows at milking time at a rate of 2 kg per day or depending on productivity. Some farmers reduce this rate of dairy meal provision due to the availability of ample roughage. Several farmers in the district have come up with 'home-mix' dairy meal. Farmers who use this home-mix state that they get twice as much milk for the same amount of commercial dairy meal, which is sometimes adulterated with sawdust. A typical composition of a 100 kg of home-mix dairy meal is 40 kg sunflower cake, 40 kg maize grain, 10 kg sorghum, 5 kg soya beans and 5 kg dried cassava chips. The mixture is dried and milled.

Some farmers have embarked on using brewer's waste (*machicha*) as a protein supplement. Farmers get their brewer's waste from Kenya Brewers Limited some 40 km from Kisumu town. They find brewer's waste cheap to buy even though its transportation is costly. Farmers mention that the use of brewer's waste as a feeding supplement, *ad lib*, increases the milk production by 7 litres per day.

Other additional sources of protein are fodder legumes. Some farmers grow their napier grass mixed with *Desmodium spp.*. Apart from increasing the protein content of the feed, it also fixes nitrogen in the soil. Also, fodder trees like *Leucaena spp.*, *Calliandra spp.*, and *Sesbania spp.*, are used to increase the protein content of the diet.

Use of manure and artificial fertilisers

Most farmers in Siaya do not apply fertiliser to their napier. Those who do, apply an average of 39 kg per acre per growing season instead of the recommended 100 kg. Figures on the amount of manure that is returned to the napier plot in Siaya are also much below the recommended amounts. A bag of fertiliser is quite an investment, which most farmers prefer to use on cash crops, food crops or vegetable crops instead of on the napier grass. Fertilisers are also not readily available everywhere in the district. There is an apparent competition for manure between the napier grass and cash crops, especially vegetables. Farmers with sufficient manure from their ZG units have expanded farming by growing high-value crops like vegetables (kale, cabbage and onions). Some farmers prefer applying the manure to their maize crops.

Farmer innovation in napier production

A group of farmers are now using a new method to grow napier known as *tumbukisa*. This method is a response to the high

labour input required by the normal method of growing napier recommended by the NDDP at a spacing of 3 feet by 2 feet. With *tumbukisa*, farmers dig holes of 3 feet by 3 feet and 4 feet deep; they mix the topsoil with three wheelbarrows of compost manure from the dairy unit and use the mixture to fill the hole. About 10 cane sets are planted on top of the filled hole in a concentric manner. Top dressing with slurry is done every six months instead of 2 to 3 days. This method is labour intensive to establish, but requires far less labour to maintain as slurry application in only done twice a year. Since the holes are spaced 2 feet apart, some farmers plant sweet potatoes in between.

As applying slurry to the napier plots manually is labour intensive, some farmers have constructed furrow channels, that take the slurry by gravity from the unit into the napier plots, maize and vegetable fields. Some farmers just remove the dung manually from the unit and heap it somewhere to decompose and form farmyard manure.

Conclusion

Some farmers in Siaya adopted ZG with the aim of commercialising milk production. As a result of the project, they set up the Yala Dairy Co-operative Society for marketing their milk. The society also advances credit to its members to expand dairy farming. These farmers see ZG as an alternative to coffee, sugar and cotton that are now less successful in the area. ZG provides them another way to generate money for household



Farmers accepted the "zero grazing" approach but only after adapting it to their own situation. Photo: Willem van Weperen

requirements and to pay for their children's education.

Others adopted ZG in the first place to obtain manure for crop production. By buying nutrients as feed (napier grass, concentrates or other sources of protein) from outside the farm, the losses of nutrients due to soil erosion and export of products to the market, can be compensated. ZG makes it possible to still keep cattle where land is scarce. These farmers see ZG as a way of re-establishing the balance between livestock and crop production, which was largely lost due to reduction in the numbers of African Zebu cattle.

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