FORAGE AND FODDER IN THE UGANDA DAIRY VALUE CHAIN

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1. DEFINTIONS/TERMINOLOGY

Forage is plant material (mainly plant leaves and stems) eaten by grazing livestock. Historically, the term *forage* has meant only plants eaten by the animals directly as pasture, crop residue, or immature cereal crops, but it is also used more loosely to include similar plants cut for fodder and carried to the animals, especially as green chop, hay or silage or haylage. (Wikipedia, ed).

Forages can include grasses, cereal crops, legumes, brassicas, trees and crop residues.

Fodder or **animal feed** is any agricultural foodstuff used specifically to feed domesticated livestock, such as cattle, goats, sheep, horses, chickens and pigs. Most animal feed is from plants, but some is of animal origin. "Fodder" refers particularly to food given to the animals (including plants cut and carried to them), rather than that which they forage for themselves (see forage). It includes green chop, hay, straw, silage, haylage, compressed and pelleted feeds, oils and mixed rations, and sprouted grains and legumes. (Wikipedia, ed).

Fodder can include forage species, and other feedstuffs – especially agro-industrial by-products such as molasses, spent brewers grains, bran, fishmeal, oilseed cakes and meals, vegetable and fruit wastes, etc.

2. HISTORICAL PERSPECTIVE

Most forages and fodder materials are available only on a seasonal basis – and for this reason there are the annual great migrations of wildlife (e.g. waterfowl, wildebeest, reindeer, butterflies, etc). Most ancestors of modern man were nomadic hunter-gatherers. Even when man first domesticated livestock he adopted nomadism in search of "greener pastures" and water – a practice that is still common in some locations. With the domestication of crops and animals, man became more sedentary, and land tenure was introduced where individuals or society were able to enjoy rights of access and use. Pastoralism continues to exist in the more

harsh environments. Ranching (ranches) evolved from the Spanish and Graziers (stations) from the English. Overgrazing of the open-range "the tragedy of the commons" eventually led to homesteading or appropriation of individual grazing rights, and eventual fencing into paddocks or restrictions on animal unit grazing months in order to better manage the range resource.

Since food was seasonal in nature, as the human population expanded and humans became more sedentary, they had to cope for the lean season, which led to food preservation in its various forms. Livestock also face similar nutritional deficits during the lean seasons and droughts, so man also developed fodder conservation techniques for his domestic livestock. These include destocking through offtake of surplus animals before the lean season, and Fodder – such as deferred grazing, planting of seasonal fodder crops, foraging in crop stubble, hay, silage, haylage, supplemental feeding with off-farm fodder, protein & mineral licks, and combinations thereof, etc. With confined livestock (e.g. zero grazing) the animal relies entirely on a balanced ration provided by the livestock keeper.

3. FEED REQUIREMENTS

Herd nutrition is the binding constraint in increasing total milk production in Uganda, and causing the wide seasonal variation in milk flow. Investment in improving herd nutrition during the dry season does pay, since the return is higher from better milk prices, and maximizing the genetic potential of dairy breeds (especially cross-breeds and exotics). Dairy farmers under grazing conditions should be targeting an **average** of 15 litres/day over a 305 day lactation period (current Uganda average is probably 5-6 litres/day). The target for zero-grazed exotics should be 25 litres/day. Those targets discriminate between dairy farmers or cattle keepers, and performing or under-performing cows in the herd.

We cannot underestimate the quantity (and quality) of biomass required – especially for lactating cows.

It is a physiological fact that a cow will consume between 2% and 4% of its bodyweight in Dry Matter Intake (DMI) per day.

For a cow weighing 350 kg, and being fed conserved fodder at 88% dry matter content. and with limited access to dry pasture, the amount of feed required over a 3 month dry season is:

> *350 x 0.03 / 0.88 x 90 = 1,074 kg (> a ton of biomass before taking into account spoilage, etc).*

Dairy farmers grossly underestimate the volume of conserved fodder required – whether a zero-grazed farmer or a rancher. The indicator is a drop in productivity (milk yield) and even

loss in the bodyweight of the cow – including in-calf cows, and mortality from starvation in extreme conditions.

4. FORAGES

Cattle evolved as ruminants and with 4 legs, so it is best to maximise on the utilisation of these features by providing nutritious forages for grazing. Fodder crops and supplementary feeds can play a role, but the biggest benefit can be realised from improved pasture over hundreds of thousands of acres. Pastures can be improved with the addition of better grass species and incorporating legumes. Improved tropical grasses for the mid-altitudes of Uganda include Chloris, Brachiaria, Cenchrus, Panicum, etc. Some of the companion legumes include Desmodium, Cenrosema, etc. The simplest and most economical means of establishing improved pastures is by no-till broadcast overseeding at the beginning of the rainy season. Improved pastures need to be managed through paddocks so there is rest-rotational grazing, and some paddocks retained as "standing hay" for dry season grazing. There should also be several night paddocks so manure and pasture seed is recycled. Some of the improved pastures can also be harvested for hay, silage or haylage during seasons when growth is abundant.

5. FODDER

As the above definition shows, fodder is a broad term. But, we must plan in terms of fodder filling the lean season gaps so milk flow is maintained.

Crop residues, such a maize stover, are largely roughages and will not meet the nutritional deficit.

The "cattle corridor" is not the optimal zone for producing fodder crops because of generally drier rainfall and prolonged dry seasons – including seasonal droughts. But, there are some hydromorphic areas that would be reasonably suited for permanent fodder crops such as Napier (*Pennisetum*) because of its drought tolerance, and avoiding the necessity of having to replant every season. It can also be fed as green-chop (cut and carry). However, the trade-off is lower nutritional value compared to fodder crops such as whole maize silage.

Whole maize silage is the most suitable fodder for dairy cows, and should be harvested not when it is in a green state, but when the grains are in the late milk-early dough phase (similar to "roasting maize"). It must be chopped finely (<3/4 inch), diluted molasses can be sprayed during ensiling to enhance fermentation, urea can be added as a non-protein nitrogen source to increase protein content, and the silage must be made quickly and densely compacted and covered.

Hay can also be made with grasses and legumes. Rainfall and humidity can disturb hay curing and storage. It has a short "shelf-life".

Haylage (conserving high moisture hay in round bale plastic or socks) has much potential for Uganda but it does require fields that are clean of obstructions and of gentle slope and a minimum of maybe 30 acres for the equipment to be efficient.

Agro-industrial by-products (brans, oilseed cakes/meals, etc) and cereal grains are not cheap in Uganda compared to the terms of trade with raw milk prices, their supply is relatively scarce and outside the main milk sheds (involving inward transport costs) and many of the products are feedstuffs for the monogastric animal feed markets.

Commercial concentrate dairy meals and licks are cost-prohibitive in Uganda.

6. CONCLUSION

Herd nutrition is the bending constraint to increased milk production in Uganda, and flattening out seasonal milk flow.

There are many options for fodder in Uganda. Individual situations may provide a comparative advantage. This paper is superficial in nature. At the time that an individual farmer decides to change to become a modern dairy farmer then his/her enterprise can be assessed from a holistic perspective and "best-bet" recommendations made.

From an industry value chain perspective, the greatest opportunity is improved forages (pastures) and their proper management, with fodder as a supplement.

Raw milk price will never substitute for inefficiency in dairy production. Target the average 15 or 25 litres/day.