Supporting farm decision making by modelling the impacts of policies and farm strategies on sustainability of dairy farms in Uganda

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Abstract

Dairy production has been envisaged as an important means of improving the nutrition status of, and income generation by African families. The need for a better understanding of the role of various policies and farm strategies on dairy farms in Africa has become more important especially as policy makers and donors wish to optimise the impact of their projects on livelihoods of farmers. This study applies an adapted version of the TIPI-CAL (Technology Impact Policy Impact model) to analyse the impact of different policies on the most typical dairy farming system in Uganda. In general, the policy impacts are very little on farms with local cows but can be magnified up to threefold, if the farms have graded cows. Policies which improve farmers' accessibility to markets have the greatest impacts. Genetic improvement of cattle breeds is recommended as an initial strategy, which will improve the impact of other farm policies.

Key words: Africa, Dairy, Household income, Policy impacts, TIPI-CAL model

1. Introduction

Studies on the priorities for agricultural research in Eastern and Central Africa concluded that milk was the most important commodity for research and development in the region, based on its potential contribution to agricultural GDP (ASARECA/IFPRI 2005). According to Staal (2004), cattle ownership improves child nutrition either by increased milk consumption or by increased family income. He also highlighted that, for a better realisation of these potential benefits, more understanding is needed firstly, on allocations of milk and control of resources within households and, secondly, on policy directions that encourage milk availability and consumption (Staal, 2004). Several policies have been suggested for development of the dairy sector of African countries, with each country laying emphasis on different parts of the dairy chain (Ndambi et al, 2007). Most policies sprout from a concept that the dairy sector will realise a great impact if milk production is increased at national level, thereby reducing imports (Ngwoko, 1986). The decrease in funds from sponsors over the years and the desire to cover a broader scope has pushed policy makers to be more cautious in project expenses.

There are many national and foreign support institutions in Uganda, whose intervention on the dairy sector could increase its chances of supplying milk to a potential export market which has recently been favoured by the lowering of export tariffs to Kenya and Tanzania in 2005 (Dobson, 2005). Also, Uganda being part of the COMESA (Common Market for Eastern and Southern Africa) opens its possibilities to trade with many other Southern and Eastern African

states due to preferential trade agreements. In order to exploit these potentials, adequate policy measures need to be taken, including the provision of support services to farmers who are at the centre of dairy production. According to the International Livestock Research Institute, the right policies, marketing systems and technical support must be sought in order to foster dairy development in Africa (ILRI, 2003). This therefore implies that there is a need for understanding on the best policies and/or technical support services which support organisations can apply in order to improve on dairy production while maintaining minimum investment. For selection of these policies and support services, adequate analytical tools must be developed and applied especially in typical African agricultural systems where farms are very complex units. It is for this reason that this paper applies a systematic methodology to analyse the impact of different policies and support services on typical Ugandan dairy farms. It is alleged that other African countries, especially Sub-Saharan nations which have similar production and socio-economic patterns as Uganda could equally benefit from the outcome of this research.

This paper has been divided into five main sections covering an introduction, a description of methodology applied, presentation of results, discussion of the results and conclusions arising from the study.

2. Materials and Methods

The TIPI-CAL model was selected for this analysis for the following reasons:

- It enables ranking and comparability of results at farm, national and international levels on an unlimited sample of farms.
- It can be applied in areas where very little data on dairying is available.
- It runs an in-depth micro-economic analysis at the farm level and produces results which cover several parameters that can be selected and grouped as desired by its user; issues concerning farmers' response to innovation can be incorporated in the analysis, making the results look more real and, finally, the model can be applied for analysing policy impacts, both at a static and dynamic scale.

2.1 Model description

The TIPI-CAL model (Hemme, 2000) is a production and accounting tool which was developed by the International Farm Comparison Network (IFCN). It applies the concept of typical farms, where a typical farm represents the most common farm type within a

production system which has an average management and performance and produces the largest proportion of milk. This approach of typical farms and panel approach has been proven to be very practical and to produce in-depth results at the international scale (Isermeyer et al. 2003). The criterion used to compare policy impacts on typical farms was the household income. This was calculated from the TIPI-CAL model as described in the next paragraphs.

The **household income** was selected as an indicator of the financial situation of the family. It is given by the simple function:

HI = FI + OI ……..……..1

Where **HI** is the total household income, **FI** is the farm income and **OI** represents off-farm income.

Farm income is obtained by deducting farm costs from farm revenue and adjusting non-cash components (depreciation, inventory changes, etc) as in equation 2 below:

FI = (rc + rd + gp) - (vc + vd + ft + pw + lr + il) - (δV + δH + δK) ……..2

Where **rc** is the return from crops, **rd** is the return from dairying, **gp** comprises government payments, **vc** is the variable cost of crop production, **vd** is the variable cost of dairy production, **ft** is the total fixed cost of the farm, **pw** includes all paid wages on the farm, **lr** is the paid land rent, **il** consists of paid interests on liabilities, **δV** is depreciation cost, **δH** represents changes in inventory and **δK** comprises capital gains/losses. Substituting FI into Equation 1 yields:

HI = (rc + rd + gp) - (vc + vd + ft + pw + lr + il) - (δV + δH + δK) + OI ……..3

The above equation summarises the parameters considered for household income calculations by the TIPI-CAL model.

2.2 Description of scenarios analysed

The scenarios analysed have been briefly described below:

KY-3 (Baseline): Farm with 2ha owned land+20ha accessible grazing lang. Milk sold to local vendor

Graded: Farm with exotic cows which are stall-fed with Napier grass and concentrates

Sch-Milk: Farmers associate to provide their milk for the local school milk programme

>Demand: Demand for milk increases, milk price at farmer's gate increases

>Q+Price: Quality control against milk-adulteration leading to higher farm milk prices

>Q-Price: Lower farm milk prices due to adulteration control

Cooler-Coop: Farmer benefits from dividends by delivering milk to his cooperative

Cooler-Privat: Farmer delivers to a private collection centre at 12.5% higher price

Private-Vet: Intervention of private veterinary officers

>Vet-Med: Increased public veterinary units

Vet-Med Disc: A 30% discount is offered for purchase of all veterinary products

>Credit: More access is provided to credit facilities at national interest rates

FeedP-30%: A 30% discount for bulk feed purchases sales

>Water: Supplying additional water to cows in the evenings

3. Results and discussions

The results are summarised in Figure 1 below. The first 13 scenarios show policy impacts on the baseline farm with local cows, while the last 11 scenarios apply the same policies, but assuming that the farmer replaces his three local cows with graded ones, and adapt his inputs to suit this breed. The effect of changing the breed alone is very high, increasing household income by 63%. The use of graded breeds also increases the return to labour threefold and at the same time increases the cost of milk production by 30%.

Depending on the changes in milk price, these policies either increase or decrease the per capita daily household income. The highest impact was noticed for three policies: the school milk programme, increase in milk demand and quality control policies. These policies result in an increased milk price to the farmer, which in turn increases his household income. Policy impacts on the local-cow farm are quite low as compared to the impacts of the same policies on the graded-cow farm. The policy impacts for the three policies that lead to an increase in milk price for the farmer (Sch-Milk, >Demand and >Q+Price) are multiplied by a factor of up to three in the graded-cow farm as compared to the local-cow farm.

Genetic improvement by grading the animals showed enormous changes in the household income, though farm costs also increased considerably. Farmers under such situations are more likely to sense the increase in cost than the increase in returns and for this reason; they are reluctant to accept graded breeds. Lack of resources is a major constraint to adoption of these breeds. They require very high costs and more labour, which might pose a problem to farmers (Ndambi et al., 2007). Previous studies also show that the organisation of farmers into dairy cooperatives helps in linking them up to better markets (D'Haese et al, 2005). The importance of such policies was also noticed by Saamanya (2005) and Mutagwaba (2005) where the adoption of the school milk programme does not only improve the nutritional status of school children, but also improves the livelihoods of producers. In such smallholder systems with poorly developed market outlets, milk is sold through local vendors, who make

a margin on the milk sold. Usually, as the sales channel gets longer, farm gate milk price tends to decline and the farmer is also subject to price fluctuations (Ngigi et al. 2000). In addition, other findings confirm that milk quality is likely to deteriorate as it passes through several handlers who might also adulterate the milk (Daily Nation Reporter, 2003).

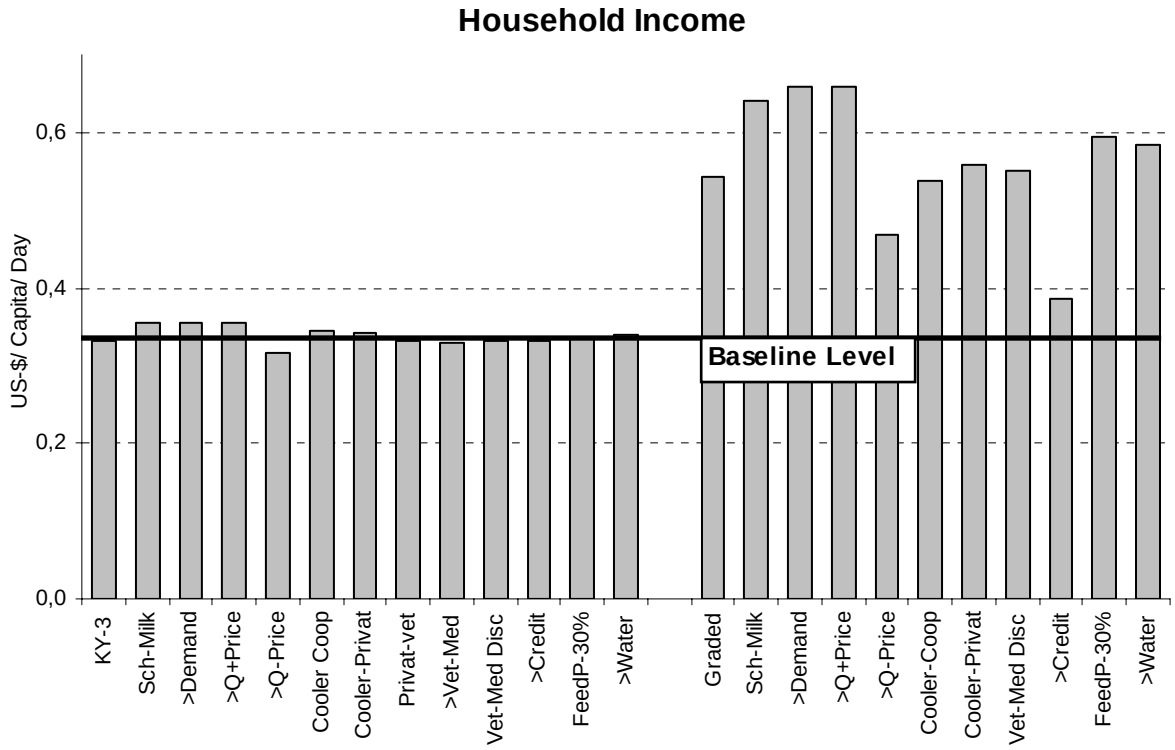

Figure 1: Policy impacts on household income of farms

Conclusion

The policy scenarios studies in this paper show very low impact on the three-cow local farm. The main reason for this is that this farm type uses a low-input system which mainly relies upon natural resources and thus responds less sensitively to improved availability of off-farm resources. Genetic improvement through the use of graded breeds does not only considerably increase household income but also significantly increases the cost of farm inputs and hence the sensitivity of the farm to resource accessibility. This sensitivity to policy could be magnified up to threefold in farms with graded animals as compared to those with local ones. Policies which lead to higher milk prices and those that increase access to markets have the highest impact on the farm. This is because most rural farmers face problems of low milk prices and a poor market network. The transition from the use of local breeds to graded animals is hindered by high input costs and with the present interest rates; farmers are discouraged from obtaining credit to acquire inputs. An incentive-based environment is required to facilitate the adoption of better managed production systems.

References

ASARECA/IFPRI (2005): Strategic Priorities for Agricultural Development and Agricultural Research-for-development in Eastern and central Africa. Association for Strengthening Agricultural Research in Eastern and Central Africa. ASARECA, Entebbe. http://www.foodnet.cgiar.org/SCRIP/docs&databases/ifpriStudies_UG_nonScrip/pdfs/Strategic_priorities_for_ASARECA/main%20report%20-%20text.pdf

DAILY NATION REPORTER (2003): Group Angered by Milk Adverts

http://www.ilri.org/ilripubaware/Uploaded%20Files/200482495570.NC_031204_082_Nation_GroupAngeredByMilkAdverts.htm

DOBSON, W.D. (2005): The dairy industry of Uganda. *Dairy Updates, World Dairy Industries no. 106.* Babcock institute, University of Wisconsin. 12pp

HEMME, T. (2000)**:** Ein Konzept zur international vergleichenden Analyse von Politik- und Technikfolgen in der Landwirtschaft. Landbauforschung Völkenrode, Sonderheft 215. 284pp

ISERMEYER, F., T. HEMME and J. HOLZNER (2003): Analysis of international competitiveness of milk production in the framework of IFCN. Agric. Econ. – Czech, 49, 2003 (2) 94 - 100

MUTAGWABA, C.M.D. (2005): Development of school milk in Tanzania. Paper presented at the third International School Milk Conference. Kunming. China. April 11 - 14, 2005. http://www.fao.org/es/ESC/common/ecg/47674_en_Development_of_School_Milk_in_Tanzania.pdf.

NDAMBI, O.A., T. HEMME and U. LATACZ-LOHMANN (2007)**:** Dairying in Africa - Status and recent developments. *Livestock Research for Rural Development. Volume 19, Article #111.* Retrieved August 11, 2007, from http://www.cipav.org.co/lrrd/lrrd19/8/ndam19111.htm

NGIGI, M., C. DELGADO, S.J. STAAL, and S. MBOGOH, (2000): Role of Market Outlet in Determining Terms for Milk Sales by Smallholders in Kenya http://www.odi.org.uk/rapid/Bibliographies/SDP/Abstracts/SDP_Abs_030.html

NWOKO, S.G (1986): The development of dairy imports in Nigeria. ILCA/LPU Working Paper No. 10. ILCA, Addis Ababa. 70 pp. http://www.ilri.org/InfoServ/Webpub/Fulldocs/WP10/Toc.htm

SAAMANYA, J.P. (2005): School milk program and national dairy development. A Paper presented to the 1st Eastern and Southern Africa Regional School Milk Conference, Hotel Africana http://www.fao.org/es/ESC/common/ecg/47676_en_School_Milk_Program_and_National_Dairy_Development___Uganda.pdf

STAAL, S. (2004): Improved Child Nutrition through Cattle Ownership in Kenya. Smallholder dairy project - Policy Brief. http://www.smallholderdairy.org/publications/Policy%20briefs/SDP%20BRIEF%205-FINAL%20R.pdf