Comparing the EXTRAPOLATE and TIPI-CAL Models in Analyzing Policy Impacts on Ugandan Dairy Farms

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INTRODUCTION

This document is based on field studies on selected stakeholders and desk comparison of results obtained from policy impact studies using two methods: EXTRAPOLATE and TIPI-CAL models.

In particular, this paper will:

Review the farm level dairy policy analysis done in the year 2006 in the Kayunga district and collect policy impact data for farm type KY-13, which together with farm type KY-3 produce more than 60% of milk in Uganda.

- Extract the differences of policy impact analysis on dairy farms in Kayunga district from two analytical models (EXTRAPOLATE and TIPI-CAL)
- Bring out the reasons for differences in results obtained in two different models
- Suggest an improved procedure for policy analysis

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Outline
1. Introduction
2. Brief description of the methods used
3. Method of comparison
4. Results of comparison
5. Proposal for a future analysis method

BRIEF DESCRIPTION OF METHODS USED

This study has been divided into two main steps: the first illustrates the results of policy analysis using the EXTRAPOLATE model and using the TIPI-CAL model (both by panel approach) and secondly, a comparison of the results from both analysis. Farm visits and interviews with stakeholders were also done in order to understand the real field situation and reasons for any differences between the results of the two models.

The EXTRAPOLATE Model

It is a communication tool for policy impact assessment. It assesses the impact of different policy measures on a pre-defined (status quo) situation of various stakeholders. The tool facilitates discussion of the relevant issues and enables users to visualize the predicted impacts of policy interventions and rank them, based on logical judgment.

The TIPI-CAL Model

The TIPI-CAL model is an on-farm policy impact assessment tool. It assesses policy impacts to a detailed extent on farm variables (cost, revenue and farm structure changes) of typical farms, using real values (changes in household income, herd size, lactation yield, etc). Impacts could be measured on a static scale (one year) or on a dynamic scale (up to ten years). A more detailed description showing differences between the EXTRAPOLATE and TIPI-CAL model is seen on Annex 1.

METHODS FOR COMPARISON

The EXTRAPOLATE analysis uses livelihood status as the unit for ranking policies. In general, it takes into consideration the factors that can affect the wellbeing of stakeholders. For this study, the following factors contribute to the livelihood status: production and sales of dairy products, profit margins, security of livestock asserts nutrition status, employment opportunities, and environmental degradation.

For the TIPI-CAL model, the Household Income has been selected as the closest parameter to livelihood status as in the EXTRAPOLATE model. The household income includes: dairy income, off farm income and other farm (crop and animal) income. More details on Livelihood status and Household income as ranking parameters are seen on Annex 2.

The results obtained for each method were attained through some assumptions which have been described on Annex 3. The TIPI-CAL model analysis was done by splitting each policy into a number of scenarios as described by stakeholders. The final results presented on Annex 3 are obtained by averaging the results of individual scenarios for each policy. This was to ease the comparability of the results with those of the EXTRAPOLATE, since the EXTRAPOLATE only presents one scenario per policy. The EXTRAPOLATE analysis considered veterinary services and extension services as two separate policies, meanwhile the TIPI-CAL assumed that extension services were provided by veterinarians hence one policy. However, the scenarios studied for this policy were on veterinary services. Therefore, veterinary services for the two models have been compared, leaving out extension service results from the EXTRAPOLATE analysis.

RESULTS OF COMPARISON

1.1 Presentation of Results

The results from both models have been presented side by side in Figure 1 and on Table 1 below. Further details comparison of results from both models is shown on Annex 4.

The key conclusions from this study are as follows:

- Policy impacts with the EXTRAPOLATE model are bigger that those of the TIPI-CAL model
- Ranking of policies within each of the two models is the same for the smallholder extensive farms as with the medium holder extensive farms
- Ranking of policies 3 – 7 (Table 1) gives the same order in the two models
- Two policies (Genetic+ and Vet services) give completely opposite results in the two models

Figure 1: Policy impacts on household income of smallholder (KY-3) and medium holder extensive (KY-13) farms
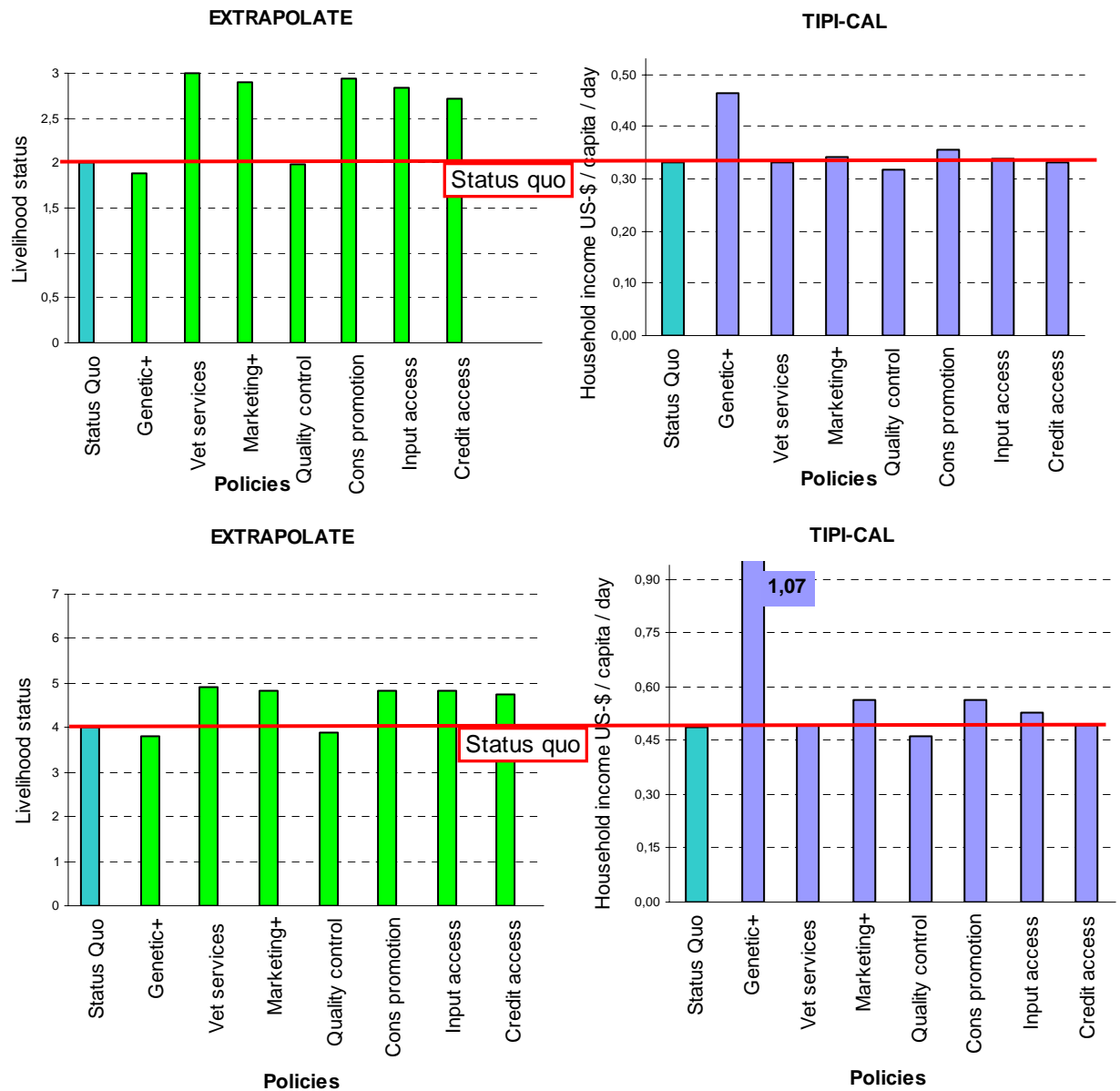
Table 1: Ranking of policies by extent of impact (1 = best policy)

POLICIES	EXTRAPOLATE		TIPI-CAL	
	KY-3	KY-13	KY-3	KY-13
1. Genetic+	7	7	1	1
2. Vet services	1	1	5	5
3. Marketing+	3	2	3	3
4. Quality control	6	6	7	7
5. Cons promotion	2	2	2	2
6. Input access	4	4	4	4
7. Credit access	5	5	5	5

1.2 Elaboration of Results

1. Genetic Improvement

While the results from the extrapolate model show that the implementation of genetic improvement policies will bring about a reduction in the livelihood status of the KY-3 and KY-13 farmers, the TIPI-CAL model showed that these policies will greatly improve on the household incomes of the same farmers, hence their livelihood status.

According to the EXTRAPOLATE, the negative impact is due to: higher input costs and labour input with improved breeds, increased exposure of improved breeds to theft and hence reduced security of livestock resources and increased susceptibility of animals to diseases. The TIPI-CAL also considered these aspects and after assignment of numerical values, the overall impact is positive. From field observations, many farmers have discovered the importance of graded cows and are now buying a graded bull to breed their local cows so as to obtain more milk from its offspring.

2. Veterinary Services

From the extrapolate method, improvement on the provision of veterinary and extension services would increase the livelihood status of the small scale extensive (KY-3) and medium scale extensive (KY-13) farmers by 67.5% and 33.75% respectively. With the TIPI-CAL, this same policy does not show any impact on the farmers. Discussions with farmers show that they won't go in for more vet expenses, even if they could reach these facilities easier or even at a half price. This is because they didn't find any benefit from further investments on their local animals, which already had some resistance to natural conditions and were not productive enough to be allocated higher vet costs. Therefore the EXTRAPOLATE analysis did not consider the farmer's willingness in this case. Farmers also confirmed a substantial impact from extension services by public veterinarians, which the TIPI-CAL analysis didn't show.

3. Marketing Improvement

Marketing improvement policies lead to an increase of livelihood status by 45% and 21% for the small and medium farms respectively, using the extrapolate model. The same policies bring about an increase by only 3.3% and 15.9% respectively, in household incomes of the same farmers with the TIPI-CAL model. The extrapolate analysis shows that marketing policies have a greater impact on the KY-3 farmer than on the KY-13 farmer; meanwhile the TIPI-CAL shows a greater impact on the KY-13 farmer. This difference could be explained by the fact that, extrapolate also considers the relevance of the impact of policy implementation on stakeholders while the TIPI-CAL only shows the potential impact on stakeholders. Therefore with extrapolate, the same policy could show a higher impact on stakeholders with a greater need for the given change than to those who have less need. This could be so, even if the real impact (for example increase in income) is greater on the stakeholders with less need. This method is of importance especially when qualitative assessments intended for poverty alleviation are targeted. However, if the benefits are to be assessed on a quantitative basis, the TIPI-CAL approach will show more.

4. Quality Control

The results from the extrapolate model show that the implementation of a milk quality control policy will slightly reduce the livelihood status of the KY-3 and KY-13 farmers. The TIPI-CAL model showed the same policy impact, though the basic assumptions for both methods varied slightly. In the TIPI-CAL approach, adulteration was seen as a major cause of poor quality milk, hence its elimination was seen very helpful in quality control. Meanwhile the extrapolate approach considered production and marketing constraints.

5. Consumption Promotion

Both models reveal that the implementation of policies that enhance milk consumption will bring about a positive impact on both the KY-3 and KY-13 farmers. However, the extrapolate analysis showed a much higher impact (46% and 21% respectively) as compared to 6% and 23% with the TIPI-CAL model. As with marketing policies, EXTRAPOLATE shows

a higher impact on the KY-3 farmers than on the KY-13 farmers due to the relevance of the policy impact to KY-3 farmers.

6. Input Access

The implementation of policies that improve KY-3 and KY-13 farmers' access to farm inputs has a positive impact on the farmer, using both models. However, there is a higher impact (+42% and +21% respectively) using the extrapolate model than with the TIPI-CAL model (+0.6 to +15.2), for the same reasons as in the previous case.

7. Credit Access

According to the analysis using extrapolate; credit provision will increase the livelihood status of KY-3 and KY-13 farms by 36 and 18% respectively. The TIPI-CAL model showed that, for the same policy there was no impact on both KY-3 and KY-13 farms. The difference in this case probably comes from the perception of the panel on credit access. Credit access could be looked upon from two points of view: making credit institutions and formalities reachable to farmers and secondly making interest rates affordable to farmers. Discussions with farmers show that, at the current interest rates (about 14% per annum), these groups of farmers will not take loans even if credit institutes are at their disposal. This was the case as shown by the TIPI-CAL model. On the other hand, the same farmers will take loans if the interest rates were halved to 7%, which will prompt them expand the farm and realise a positive change in livelihood status as revealed by the EXTRAPOLATE model. One major difference which we can observe from this case is that the TIPI-CAL model equally considers restrictions due to farmer adoption of the given policy, meanwhile the EXTRAPOLATE only shows the potential benefit of farmers and society if the policies were implemented and adopted.

PROPOSAL FOR A FUTURE ANALYSIS METHOD

From all understanding, both methods have a strong background on policy analysis, though each has strengths and weaknesses. Though some differences are model based, others are based on approach, since both methods use expert estimations in evaluating policies. The perceptions of panel members and researchers are guided by their past experiences, which will differ among a group of experts and between different expert groups. This can strongly influence the outcome of the analysis especially when several outcomes could result from the implementation of one policy. To reduce errors from this, it is therefore advantageous to have the chance of creating scenarios so as to show and explain each possible outcome separately as is the case with the TIPI-CAL model.

In general, the EXTRAPOLATE model identifies stakeholders and influential policies and also provides a general picture of policy impacts, enabling ranking with strong emphasis on societal benefits and little on farmer adoption. The model however, does not reveal policy impacts in real terms for example, actual change in family income ($), actual change in herd size (number of cattle), etc. The TIPI-CAL model on its part does not identify stakeholders and policies, but provides a more detailed policy outcome of known policies in real terms and does ranking with strong emphasis on farm benefits and farmer perceptions. Suggestions for an ideal future analysis method will be to first of all identify stakeholders and policies and get a general ranking of policy impacts using the EXTRAPOLATE model and secondly to do a more in-depth analysis to have a real quantification of policy impacts at farm level, using the TIPI-CAL model. This approach will not only be time and money saving, but also efficient as large amounts of data are produced within short periods.

ANNEXES

PARAMETER	EXTRAPOLATE	TIPI-CAL
Brief description	It is a communication guide tool for policy impact assessment. It assesses the impact of different policy measures on a pre-defined (status quo) situation of various stakeholders. The tool enables users to visualize the predicted impacts of policy interventions and rank them, based on a simple logical judgement.	The TIPI-CAL model is an on-farm policy impact assessment tool. It assesses policy impacts to a detailed extent on farm variables (cost, revenue and farm structure changes) of typical farms, using real values (changes in household income, herd size, lactation yield, etc). Impacts could be measured on a static scale (one year) or on a dynamic scale (up to ten years).
Identification of stakeholders and policies	The method incorporates identification of stakeholders and influential policies in its analysis	Method deals with stakeholder groups (farmers) and/or policy areas which need to be known or identified (separately), prior to analysis
Weighting of policy impact	By weighting the differences using a logically virtual scale with relative values with respect to stakeholders. For example, farmers in rural areas have less access to inputs than urban farmers. Therefore provision of farm inputs will have an impact of +3 to rural and +1 to urban farmers	By assigning of real values. For example, improved access to water will lead to increased milk yields of 80 litres per cow per year. This will also lead to increased labour costs of $3 per cow per year and reduced vet costs of $1 per cow per year.
Scenario formation	All policy impacts under one policy type (for example, input provision) are analysed together as one scenario.	More than one scenario could be examined per policy. For example, input provision could be split to farm machinery, vet inputs and feed inputs provision
Ranking of policies	Though several aspects are considered, an overall ranking is based on one factor: change on livelihood status. No precisions are made on farm economics, though they are considered hierarchically	The method allows for flexibility in the choice for a base for ranking. It could be based on one or more parameters as desired by user for example household income, dairy income, farm costs,
Social and environmental parameters	Considerations are made on parameters like environmental degradation, security of livestock and nutritional security of the household	These parameters are not considered directly, as it is difficult to attach an economic value to each
Method Application	Broad application on different stakeholder groups (farmers, traders, processors, etc)	Application limited only to different farmer groups
Result Application	Gives a general image on policy impacts as an overall assessment in comparison or in combination with other policies	Gives a detailed specification on impacts of different policy areas on various farm parameters

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ANNEX: 2 LIVELIHOOD STATUS (EXTARAPOLATE) AND HOUSEHOLD INCOME (TIPI-CAL) COMPARED

Sub-components of policy impact parameters	
Livelihood status considers:	Household income considers:
Increased production and sales of dairy products	Increased income from higher production and sales of dairy products
Increased profit margins	Increased profits reflected in household income
Increased security of livestock assets	Increased animal mortality with less secure animals, hence reduced household income
Improved nutritional status	Increased on-farm consumption of dairy products (reduced income from sales).
Increased on and off farm employment opportunities	Increased (or reduced) household income from on and off farm employment
Reduced environmental degradation	No impact on household income due to environmental degradation

POLICIES	Main assumptions contributing to policy impact	
	EXTRAPOLATE	TIPI-CAL
Genetic+	-Use of high yielding breeds -High costs and low availability of inputs for graded animals -Reduced animal security and susceptibility of graded animals to theft -Increased susceptibility of graded animals to theft	-Use of high yielding dairy breeds -Higher building, machinery, feeding and veterinary costs -Higher mortality rates due to adaptation of high yielding breeds
Vet services	-Better animal health -Use of improved animal infrastructure -Reduced seasonal variation in milk production and price	-Bringing veterinary services closer to farmers -Presence of more private vets in rural areas -No change in vet medicine use by farmers they wont invest more on medicine at this scale
Marketing+	-Better access to markets -Better access to credit and capital -Improved dairy infrastructure -Reduced seasonal variation in milk production and price	-Improved market outlets through formation of farmer cooperatives -Increased income from farmers from dividends offered to the farmers from cooperatives at year end
Quality control	-Improved quality of dairy products -High costs and low availability of inputs -Insufficient labour force -Poor access to markets due to institutional restrictions	-Improvement of marketed milk quality through anti-adulteration campaigns -Reduction of milk prices to farmers because milk vendors want to maintain margin
Cons promotion	-Improved access to markets -Improved dairy infrastructure -Reduced seasonal variation in milk production and price	-Higher demand and consumption of dairy products -Adoption of school milk programme which increases milk demand
Input access	-Improved availability of inputs -Improved dairy infrastructure -Less seasonal variation in milk production and price -Better milk quality, animal nutrition and animal health	-Improved availability of water to farmers -Improved availability of feed to farmers at 30% lower cost
Credit access	-Better access to credit, farm inputs and high yielding breeds -Better milk quality, animal nutrition and animal health	-Increasing number of credit institutions accessible to farmers -Farmers still don't take credit because the interest rates are too high

ANNEX: 4 EXTRAPOLATE AND TIPI-CAL RESULTS COMPARED

POLICIES	EXTRAPOLATE		TIPI-CAL	
	% change in livelihood status		% change in household income	
	KY-3	KY-13	KY-3	KY-13
Genetic+	-6.0	-5.0	+39.2	+118.7
Vet services	+67.5	+33.75	0.0	0.0
Marketing+	+45.0	+21.25	+3.1	+14.5
Quality control	-1.0	-2.50	-4.7	- 11.6
Cons promotion	+46.5	+21.25	+6.7	+20.35
Input access	+42.0	+21.0	+1.2	+8.2
Credit access	+36.0	+18.5	0.0	0.0

NB: Status quo Livelihood Status: KY-3 =2; KY-13 = 4

Status quo Household Income: KY-3 = US-$ 729/year; KY-13 = US$1075/year

POLICY AREA	Method of analysis	
	EXTRAPOLATE	TIPI-CAL
Genetic+		
Level: - Society	+	-
- Household	-	+
- Dairy farm	-	+
Veterinary		
Level: - Society	+	-
- Household	+	-
- Dairy farm	-	+
Marketing		
Level: - Society	+	-
- Household	+	-
- Dairy farm	-	+
Quality control		
Level: - Society	+	-
- Household	+	-
- Dairy farm	-	+
Consumption promotion		
Level: - Society	+	-
- Household	+	-
- Dairy farm	-	+
Input access		
Level: - Society	+	-
- Household	-	+
- Dairy farm	-	+
Credit access		
Level: - Society	+	-
- Household	-	+
- Dairy farm	-	+

+ = Stronger method

- = Weaker method