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Ministère des Affaires Etrangères
Ambassade de France
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FRANCE

MISSION EN OUGANDA

à l'occasion du

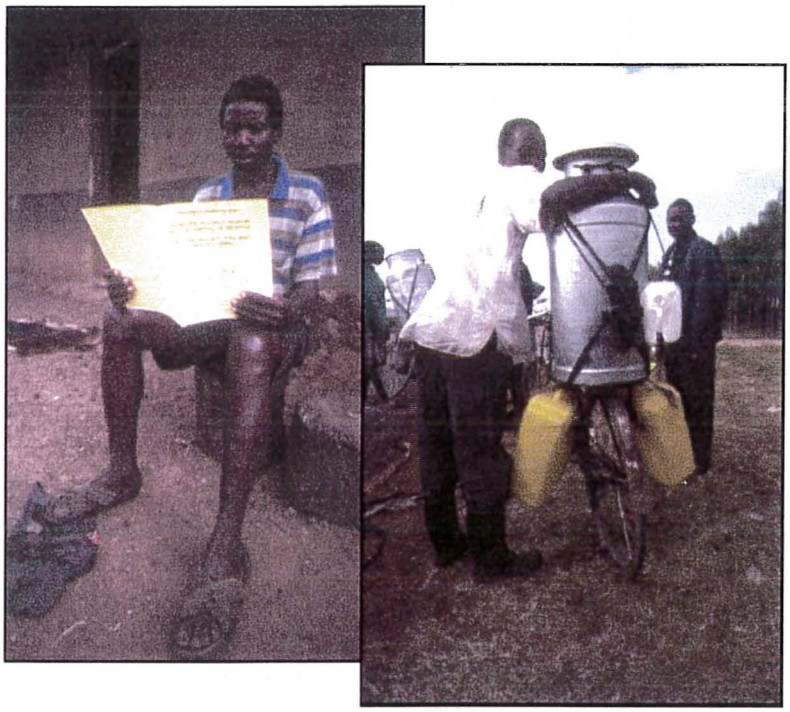
SEMINAIRE DE LANCEMENT DU PROJET FSP

« Concertation agricole et structuration des filières en Ouganda »

Du 14 au 19 avril 2002

Par

Bernard FAYE



Rapport CIRAD-EMVT N° 2002-022 Mai 2002

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RESUME :

La convention de financement du projet FSP « Concertation agricole et structuration des filières en Ouganda » a été signée le 15 avril 2002. Le séminaire de lancement du 16 avril en la présence de Mme la Ministre de l'Agriculture avait pour objet d'informer les partenaires et acteurs principaux de l'agriculture et du développement agricole en Ouganda de l'engagement de la Coopération Française. Les acquis de la phase pilote à laquelle a fortement contribué le CIRAD-EMVT ont fait l'objet d'un exposé au cours de ce séminaire. Des propositions d'action de recherches d'accompagnement pour le futur sont faites dans le présent rapport. Elles concernent l'alimentation des vaches laitières, la valorisation de la sérothèque, la méthodologie de suivi d'élevage, la qualité du lait, l'analyse de la dynamique des systèmes laitiers, l'analyse du développement territorial induit, l'interaction homme/animal en matière de zoonoses, la recherche d'indicateurs d'impact sur l'environnement.

SOMMAIRE

REMERCIEMENTS

La continuité des actions et le suivi régulier des opérations a eu l'avantage de tisser peu à peu des liens amicaux avec les partenaires du projet de développement de la production laitière dans le bassin de Mbarara. Il est donc toujours agréable de retrouver les éleveurs laitiers de la zone d'intervention même dans le cadre un peu formel des séminaires et réceptions. Je remercie donc tous ces éleveurs pour leur chaleureuse présence.

Un grand merci également à Mme Baherle, Conseiller de Coopération et d'Action Culturelle près de l'Ambassade de France, ainsi qu'à S.E l'Ambassadeur de France et Madame pour la chaleur et la simplicité de leur accueil, ce qui a rendu ce très court séjour à la fois efficace et agréable. Merci aussi pour leur reconnaissance appuyée publiquement aux opérations menées par le CIRAD-EMVT dans le cadre du projet.

INTRODUCTION

Il s'agissait au cours de cette mission très courte de participer au séminaire de lancement du projet FSP sur la « Concertation agricole et la structuration des filières en Ouganda ». Ce séminaire au cours duquel, en présence de tous les acteurs proches ou lointains de la phase pilote conduite par le CIRAD-EMVT sur les aspects scientifiques, les principaux acquis ont été brièvement exposés, devait officialiser l'engagement de la Coopération Française en matière agricole en Ouganda. Ce séjour a été mis à profit pour profiler quelques propositions d'actions de recherche d'accompagnement paraissant aussi utiles qu'indispensables à maintenir dans la prochaine phase du projet.

LES ACQUIS DE LA PREMIERE PHASE

Initié en 1998 par une enquête typologique des élevages laitiers, le projet laitier de Mbarara s'est présenté dans sa conception comme un projet « pilote » de recherche développement. Il s'est traduit concrètement par une batterie d'études comprenant :

- un volet zootechnique avec un suivi longitudinal de 24 éleveurs laitiers du bassin de Mbarara et de Kabalé permettant d'établir un premier référentiel des performances zootechniques locales en fonction de la diversité des systèmes de production en référence,
- un volet épidémiologique avec une enquête transversale réalisée dans les règles de l'art permettant d'affirmer l'importance de la prévalence de la tuberculose et de la brucellose, principales zoonoses transmises par le lait, dans le bassin laitier de Mbarara,
- un volet hygiène alimentaire complémentaire des études précédentes et qui a débouché sur l'appui à la création d'un laboratoire d'hygiène alimentaire à l'Université de Mbarara dont l'équipement a été assuré par l'Ambassade de France,
- un volet alimentation avec la mise en place d'essais fourragers en milieu paysan, et de pratiques d'alimentation complémentaire pour contribuer à l'amélioration du statut nutritionnel des vaches en production pendant la période de soudure,
- un volet économique avec un suivi des coûts et des bénéfices permis par la commercialisation du lait dans les élevages en suivi.

Toutes ces études réalisées dans le cadre de stages et pendant le séjour de J. Chalimbaud (CSN) ont été consignées dans de nombreux rapports dont on trouvera la liste exhaustive en annexe. Une première synthèse de ces travaux a fait l'objet d'un document présenté à l'occasion d'un atelier à Mbarara en novembre 2000.

Cette première phase du projet visait sur le fond à établir un diagnostic aussi précis que possible de la situation dans le bassin laitier de Mbarara. A l'issue de ces travaux, nous disposions :

- ✓ d'un référentiel zootechnique sur un échantillon d'éleveurs représentatifs de la diversité des systèmes de production laitiers,

- ✓ d'un référentiel sanitaire (mammites subcliniques, inventaire des principales contraintes sanitaires) sur le même échantillon,
- ✓ d'un référentiel sur la situation épidémiologique à l'égard de deux zoonoses majeures (tuberculose et brucellose) sur l'ensemble du bassin laitier,
- ✓ de résultats fourragers encourageants par l'introduction de nouvelles variétés adaptées au contexte agro-écologique de la région de Mbarara,
- ✓ d'un référentiel économique permettant d'identifier des stratégies d'éleveurs, différenciées par rapport à la production laitière.
- ✓ d'un laboratoire d'hygiène alimentaire équipé pour des analyses de base.

Deux aspects majeurs méritent d'être valorisés dans les plus brefs délais par des publications scientifiques. Il s'agit de l'analyse des stratégies économiques des éleveurs (un premier texte a été élaboré par V. Alary avec l'appui de J. Chalimbaud et de moi-même) et les résultats de l'enquête de prévalence des zoonoses (l'idéal étant que cette valorisation soit assurée par V. Castel, le stagiaire vétérinaire ayant réalisé cette étude, ou à défaut par moi-même). Ces publications doivent être faites en anglais pour en permettre une audience locale et internationale. A noter que la seconde est urgente pour éviter les confusions, notamment dans la presse qui, confondant prévalence troupeau et prévalence animal titre que « la tuberculose affecte 70 % du cheptel de Mbarara » alors qu'il s'agit du pourcentage de troupeaux atteints (la prévalence animal est de 6 % environ...).

Ces acquis étant obtenus, la seconde phase du projet devait s'investir sur les aspects institutionnels, en contribuant notamment au renforcement des capacités de l'organisation paysanne dont le noyau dur a été constitué à partir du réseau d'éleveurs laitiers ayant bénéficié du suivi zootechnique et sanitaire. C'est ainsi que s'est constituée la SUMPCA (*Southwestern Uganda Milk Producers Cooperative Association*). Sur un plan plus général, le projet devait contribuer à un appui à la structuration de la filière. Cette seconde phase a fait l'objet d'un projet FSP (Fonds de Solidarité Prioritaire) dont on trouvera en annexe la copie de la fiche de prise en considération.

Le projet a été signé avec le Ministère de l'Agriculture ougandais le 15 avril 2002 pour un montant de 1 190 000 Euros. Sur le plan des ressources humaines, le projet devrait être géré par un assistant technique senior, chef de projet basé à Kampala, et deux assistants techniques juniors basés à Mbarara.

PROPOSITIONS POUR LA PARTICIPATION DU CIRAD

Les éléments du projet FSP sont présentés en Annexe et ne seront pas discutés ici. Le présent rapport se focalisera sur quelques propositions d'études et de recherches d'accompagnement qui nous paraissent utiles de poursuivre :

- d'une part, pour bénéficier de la dynamique relationnelle établie avec la SUMPCA dans le contexte agro-écosystémique du bassin laitier de Mbarara, ce qui devrait faciliter la continuation d'actions de recherches en milieu paysan,
- d'autre part, pour contribuer au renforcement des capacités de la recherche agronomique et vétérinaire dans le domaine de l'analyse des systèmes laitiers.

Les propositions sont relatives aux contraintes identifiées lors de la première phase du projet :

1. **Amélioration du système d'alimentation des troupeaux laitiers notamment en saison sèche :** il s'agit à ce stade de poursuivre et achever les analyses des essais fourragers entrepris en milieu paysan, de piloter des essais d'alimentation à partir de sous-produits agricoles disponibles, de mettre en place une enquête sur le statut minéral du cheptel laitier[1] (pratiques de complémentation, analyse du statut minéral au niveau sérologique). D'autres propositions pourront être faites lors de la mission de Philippe Lecomte (CIRAD-EMVT / Programme Productions Animales) prévue en juillet.
2. **Valorisation de la sérothèque des Services Vétérinaires de Mbarara :** la totalité des prélèvements de sang réalisés pendant l'enquête zoonose est disponible. Elle concerne près de 15 000 bovins prélevés de manière aléatoire et peut-être la base de différentes analyses de prévalence par la recherche d'anticorps spécifiques de différentes maladies à définir en fonction des possibilités locales d'analyse.
3. **Analyse de risque de la qualité du lait de la production à la transformation :** nous disposons d'éléments analytiques intéressants sur les pratiques d'hygiène à la production et sur les conditions de transport. Mais une réelle analyse de risque afin de déterminer les facteurs de construction de la qualité du lait parvenu à la laiterie n'est pas faite. La présence du laboratoire d'hygiène alimentaire est parfaitement susceptible de faciliter une telle activité.
4. **Méthodologie de suivi de troupeau laitier dans le cadre du programme national de suivi des performances laitières** : apparemment resté à l'état de projet, le programme national de suivi laitier n'est pas parvenu à mettre au point un dispositif durable de collecte, d'enregistrement et de valorisation des données provenant des élevages laitiers ougandais. Le CIRAD a mis au point un outil (en cours de perfectionnement) concernant ces aspects (LASER) qui pourrait, moyennant des adaptations à la demande locale, répondre au souci de l'Etat ougandais (et le projet FSP) de disposer d'indicateurs fiables sur le développement de la production laitière.

[1] L'Ouganda est intégré dans le système géopédologique du système du Rift en Afrique dont on connaît les liens avec des déficits minéraux spécifiques (cf Faye *et al.*, 1991. *Copper deficiency in ruminants in the Rift Valley of east Africa*. Trop. Anim. Hlth. Prod., 23, 172-180)

5. **La part du bétail dans l'incidence de la tuberculose et de la brucellose humaine :** vrais problèmes de santé publique dans un pays où la pandémie du SIDA imprime une forte immuno-déficience de la population, la tuberculose et la brucellose humaine devraient faire l'objet d'une enquête croisée homme-bétail afin de déterminer la part liée à la contamination directe de l'homme par l'animal. Un tel projet de recherche devrait pouvoir s'envisager dans le cadre d'un travail de thèse car il nécessite la mobilisation de ressources humaines sur un pas de temps assez considérable.
6. **Analyse de la dynamique des systèmes de production laitiers :** on dispose déjà des typologies fonctionnelles sur la base des stratégies des producteurs. Il conviendrait d'établir une seconde typologie sur la base d'une collecte d'informations similaires afin de positionner les exploitations dans le temps et d'anticiper les évolutions probables à moyen terme. L'idéal serait de modéliser des dynamiques économiques des exploitations en vertu de l'évolution des stratégies d'éleveurs. Un partenariat fort avec l'Université de Makareré devrait être assuré sur ce thème.
7. **Analyse de l'intégration territoriale liée à l'implantation des petites entreprises laitières :** il s'agit de comprendre les mécanismes de construction de territoire (notion de bassin laitier) à partir de l'émergence de petites entreprises dans la filière lait. Ce type d'analyse peut être fort utile en matière d'aide à la décision pour les responsables de la politique sectorielle en élevage laitier (un atelier sur le thème des « systèmes agro-alimentaires localisés » sera organisé au CIRAD à l'automne prochain par nos collègues du département TERA).
8. **Détermination des indicateurs d'impact du développement de la production laitière sur l'environnement :** le développement de la production laitière aura forcément des conséquences sur l'utilisation de l'espace tant en milieu pastoral (dynamique de sédentarisation) qu'en milieu agro-pastoral (place des cultures fourragères dans les systèmes de culture, intégration de l'agriculture et de l'élevage). Il sera indispensable de disposer d'indicateurs d'impact sur l'environnement (dynamique des parcours, transfert de fertilité, construction des paysages,...) dans des terroirs en partie saturés.

Les modalités d'intervention du CIRAD dans ces différents domaines de recherche d'accompagnement doivent se discuter avec le futur chef de projet en fonction des orientations prioritaires qu'il donnera au projet et des facteurs limitants au développement laitier auquel il sera confronté.

Afin d'évaluer les possibilités de financements pour les appuis scientifiques au projet, un contact a été pris avec la délégation de l'Union Européenne. Celle-ci a indiqué qu'elle n'agissait pas directement sur les politiques sectorielles (en l'occurrence l'élevage), mais bien en amont par l'appui au programme de modernisation de l'agriculture (PMA), relevant directement du budget de l'Etat et pratiquement « co-géré » par le gouvernement ougandais et les bailleurs de fonds. Parmi les 7 priorités retenues par l'UE en Ouganda, la Recherche et la formation apparaissent en

bonne place. Cependant, il n'y a pas d'appui spécifique sous la forme de projet, mais un renforcement des structures susceptibles de répondre à la demande sociale exprimée à l'échelle administrative de base (les *sub-counties*). Il paraît en tout cas difficile de mobiliser un appui de ce côté-là sans disposer de ressources humaines sur place, ce qui mériterait d'être discuté compte tenu de la forte implication du CIRAD-EMVT dans ce pays et notamment dans le projet laitier depuis 5 ans.

PROPOSITIONS DES TDR DE LA MISSION DE Ph. LECOMTE

Le volet « alimentation du bétail » entamé en partenariat avec l'Université de Makareré est sans doute le moins valorisé auprès des producteurs hormis les quelques paysans chez lesquels ont eu lieu les essais fourragers. Cette mission d'expertise et d'évaluation n'a pas pu avoir lieu en 2001 comme prévu. Elle s'inscrit donc assez tardivement dans le processus général des recherches d'accompagnement menées pendant la phase pilote du projet. Deux missions préalables ont été réalisées par G. Rippstein afin d'encadrer les activités « fourragères » du suivi d'élevage mené par J. Chalimbaud et deux stages concomitants ont eu lieu pour mener à bien des essais fourragers en milieu paysan.

Au cours de la mission, l'expert devra :

- prendre connaissance du contexte local en matière de développement de la filière lait, plus particulièrement des aspects liés à l'alimentation du bétail,
- reprendre contact avec l'Université de Makareré afin de discuter de la valorisation commune des essais réalisés en collaboration avec G. Rippstein, mais aussi d'évaluer les compétences locales en matière d'alimentation animale tant à la faculté vétérinaire (Pr Rutagwenda) qu'à la faculté agronomique.
- discuter de la poursuite des actions pouvant être menées dans le cadre du projet FSP en cours de mise en place en collaboration avec l'Université, sur le plan de l'alimentation des vaches laitières et des cultures fourragères,
- évaluer sur le terrain la pertinence des essais et travaux réalisés au cours de la phase pilote du projet,
- élaborer quelques protocoles de recherche d'accompagnement pour la seconde phase,
- faire des propositions d'actions pour intégrer ces travaux dans le contexte plus général de l'appui à la filière lait en Ouganda,
- prendre contact avec la délégation de l'Union européenne à Kampala

Au cours de sa mission, Ph. Lecomte bénéficiera de l'appui logistique du SCAC. La mission se déroulera à Kampala et Mbarara.

CONCLUSION

Après plusieurs années de recherche d'accompagnement dans le cadre du projet pilote consacré au développement de la production laitière dans le district de Mbarara, le projet se focalise logiquement sur le renforcement des capacités locales pour contribuer à la modernisation de la filière lait. Cette activité, inscrite dans le Plan de Modernisation de l'Agriculture de l'Etat ougandais, nécessitera la poursuite d'études pour parfaire les diagnostics sur les contraintes et analyser les déterminants des performances zootechniques, sanitaires, qualitatives et économiques de la filière lait dans son ensemble. Les propositions très génériques faites ici visent à valoriser les acquis déjà obtenus depuis le début du projet et à bénéficier d'un réseau local de partenaires tout à fait disposé à poursuivre ces travaux. A terme, l'affectation d'un chercheur du CIRAD-EMVT en Ouganda (Université de Makareré) pourrait être discutée. Une telle affectation permettrait de pérenniser un certain nombre d'actions de recherche d'accompagnement à la fois utiles pour le CIRAD dans le cadre de l'initiative LAITROP, et pour la recherche ougandaise assez coupée des travaux en milieu réel (du moins à Makaréré).

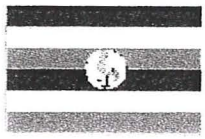
ANNEXES

1. Calendrier de la mission.
2. Rapport de présentation du projet FSP.
3. Discours de Mme la ministre de l'Agriculture au séminaire de lancement du projet le 16 avril 2002.
4. Présentation du laboratoire d'hygiène alimentaire à l'Université de Mbarara (Pr Isharaza).
5. Présentation des actions du CIRAD-EMVT dans le cadre de la première phase du projet.
6. Liste des publications relatives au projet Mbarara.
7. La filière lait en Ouganda : proposition pour l'outil multimédia du Mémento de l'Agronome.
8. Article soumis pour publication concernant les stratégies laitières.

1. CALENDRIER DE LA MISSION

Dimanche 14 avril	Départ de Montpellier-Paris-Londres.
Lundi 15 avril	Arrivée à Kampala. Accueil par C. Moulis (CSN – service de coopération).
	Préparation du séminaire de lancement du projet FSP avec Mme Baherle (SCAC)
	Réception chez Mme Baherle (éleveurs de la SUMPCA, personnalités ougandaises de l'Agricultural Council - ACU, des services vétérinaires, des associations d'éleveurs, Ambassade de France, Ministre de l'Agriculture)
Mardi 16 avril	Tenue du séminaire à l'Hôtel Africana sous la présidence du DR J.J. Otim (ACU), inaugurée par Mme Mugyenyi (Ministre de l'agriculture).
	Présentation des actions du CIRAD-EMVT dans le cadre du *Mbarara Milk Project.*
	Réception à la résidence de l'Ambassade de France (S.E. J.B. Thiant).
Mercredi 17 avril	Rédaction du rapport.
	Entretien avec le SCAC.
Jeudi 18 avril	Entretien avec l'Université de Makaréré (Faculté vétérinaire et Faculté des sciences agronomiques).
	Entretien avec Mr Gilet, délégation européenne à Kampala.
Vendredi 19 avril	Départ pour Paris via Londres.
Samedi 20 avril	Départ pour Montpellier.

2. RAPPORT DE PRESENTATION DU PROJET FSP



Government of France | **Government of Uganda**

French ministry of Foreign Affairs
General Directorate of International
Co-operation and Development

Priority Solidarity
Fund

GENERAL PRESENTATION OF THE PROJECT AGRICULTURAL CONSULTANCY AND SECTOR STRUCTURING IN UGANDA

Co-operation Department
Embassy of France, P. O. Box 7212

April 2, 2002

Summary

Uganda has undertaken an ambitious step to modernise agriculture through the Plan for Modernisation of Agriculture (PMA) program. PMA aims at eradicating poverty among farmers through modernisation and professionalisation of agricultural practices. It encourages active participation of the private sector to provide the required professional services.

This project is meant to complement the objectives of PMA through promotion of farmers' associations, sector structuring and creation of a conducive agricultural policy. This contribution will be based on the experience gained from the baseline study that was carried on a sector (dairy sector) and regional (Mbarara) levels. The proposed project will remain at these levels. The choice of Mbarara region is based on the strong local dynamism in the dairy sector that was realised in the field during a pilot project carried out between 1998 and 2001.

The pilot study elucidated the numerous constrains that affect the sector. These constraints were mainly attributed to the fragile and poor local and national infrastructures which resulted in high production costs, poor milk quality, weak quality regulatory mechanisms and importation of dairy products.

The proposed project aims at improving the organisational and technical efficiency in the dairy sector. This requires collaboration with various actors within their local environment and support to the structuring and consultation processes on a national level. The proposed support has the following elements:

- **Support towards the organisation of producers**, to facilitate the solving of common problems through collective effort, most especially to market and access production inputs and services.

- **Strengthening the statutory and technical environment**. This involves promotion of linkages between the different stakeholders in order to facilitate joint problem resolution: formulation of demand-driven programmes, participation of farmers in quality assurance and reinforcement of the epidemiosurveillance mechanism.

- Support for capacity building to the **Agricultural Council of Uganda** (ACU), an apex organ that co-ordinates the different stakeholders and acts as a plat-form for evolution of agricultural policies through concesus.

- Capacity building will be done in partnership with Ugandan institutional structures and in line with their goals.

Under that perspective, the Priority Solidarity Fund (PSF) contribution amounts to 1.19 million Euros.

CONTENTS

1. PROJECT REFERENCE STRUCTURE

1.1. General Background and Project Justification

Agricultural development is highly prioritised by the Ugandan government due to the critical role agriculture plays in the national economy. The farming sector constitutes 30% of agricultural GDP and 9% of the national GDP. There has been an annual growth in GDP of 4.9% between 1986 and 1993 mainly attributed to the dairy sector which realised an increase in milk production of 60% during the last 6 years and reached 718 million litres in the year 2000. Despite this impressive increase in milk production, 90% of cattle livestock is held by traditional cattle keepers or small-scale farmers. Government has made the Plan for Modernisation of Agriculture (PMA) as a general strategy to develop the agricultural sectors.

The dairy industry has in the past received financial support from government. The Dairy Corporation (DC), a public enterprise, had the monopoly over the milk business including processing and marketing. Additionally, DC also played development and regulatory roles in the dairy industry. However, in the 90s, there was a restructuring programme by the MAAIF[1], which led to privatisation of DC to become Dairy Corporation Limited (DCL), and creation of a regulatory authority, the Dairy Development Authority (DDA), to spearhead the development of the industry.

Uganda is one of the East African countries with real potential for milk production and processing. However, the dairy sector is faced with numerous constraints that hinder its development. These constraints include the supply and demand imbalances, poor milk quality, subsistence production and general inefficiencies along the production chain.

The general supply and demand picture suggests that there is insufficient production compared to the national demand. For instance the country imports milk three times the equivalent of national production. This supply/demand problem is further complicated by localised milk production in the country. There exists a notable consumption gap between 1 and 10 among regions that produce and those that do not produce milk, which demonstrates a serious distribution problem in the national market. Development of this sector seems justifiable to satisfy the likely increase in demand indicated by the low *per capita* milk consumption by Ugandans (30 EQL/per/year as opposed to 90 EQL/per/year recommended by FAO), the high urban population growth and low production by the neighbouring countries.

There is a constant break up of numerous health problems linked to milk-borne diseases. Diseases like tuberculosis and brucelosis present great risk to a country like Uganda, which has already been strongly hit by AIDS, a virus that destroys human immunity.

Given that the majority of farmers are peasants and relatively poor, increase in production and improvement in handling and marketing will increase their household incomes due to the increase in sales. Farmers need to organise themselves into groups to benefit from collective access to production inputs and services and to have a unified voice to negotiate for suitable conditions for their business.

The Agricultural Council of Uganda (ACU) should be instrumental in coordinating the inputs

[1] MAAIF : Ministry of Agriculture, Animal Industry and Fisheries

of various stakeholders and restructuring of the sector to create conducive environment for development of the sector.

1.2. Request (Initiation of the project)

In 1998, the Co-operation Department of the French Embassy (SCAC)-Kampala, with the help of CIRAD-EMVT[2], launched a combined research and development project in Mbarara district, one of the most important milkshed in Uganda, supplying the bulk of milk marketed in Kampala and all major towns in that region. At the end of this research phase an evaluation seminar was held in November 2000. The seminar brought together a cross-section of stakeholders including professionals and other categories of actors in the dairy sector. The seminar was presided over by the Minister of Agriculture in charge of animal industry, among other diginitories. The technical, economic and organisational analyses of the sector, elucidated the major constraints facing the sector. This insight provided the basis for focused deliberations during the seminar. Participants at that seminar resolved that the project principle be a national reference. Hence a sector and region based project was requested.

1.3. National Policy(ies)

The current Ugandan government agricultural policy follows the principles of the PMA[3]. The plan aims primarily at eradication of rural poverty through increased agricultural productivity, rigorous marketing, improvement in conditions of living of the rural populations and lastly, environmental protection. Further, the plan promotes increased involvement by the private sector to spearhead development through provision of services and conducting other economic functions.

The NAADS[4] was established as a tool to implement PMA. NAADS, essentially is run by farmers in collaboration with the private sector for services delivery and operate at district and sub county levels to create agricultural fora that generate demand and organise the provision of agricultural services.

Under the decentralised system, a district is a unit for implementation of rural development policies. Hence location of the project in Mbarara is in accordance with the decentralisation policy.

1.4. French Co-operation Policy

Uganda happens to be a country where France does not hold a tradition of co-operation but the extension of the priority solidarity zone allows her to now envisage more significant co-operation. In that context, France priotises a co-operation aspect that is more specific by concentrating resources on a particular region, but at the same time contributing to the strengthening of national institutional framework.

As far as agricultural development is concerned, French Co-operation priotises the professionalisation of the actors. The support being offered in this sector is therefore complementary to PMA.

In the region, France supports the Regional Action for Livestock in East African (RALEA)

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[2] Elevage et médecine vétérinaire

[3] PMA :Plan for the Modernisation of Agriculture

[4] NAADS : National Agriculture Advisory Service

under IGAD to develop poultry and dairy production sectors, particularly by supporting the establishment of relevant professional and institutional frame-work. On the other hand, the French Development Agency (AFD) supports Centenary Rural Development Bank (CERUDEB) which will collaborate with the project on the micro-finance level.

1.5. Other Donor Programmes

Some of the donor agencies involved in related agricultural activies as those supported by France include the World Bank and FIDA which finance the NAADS programme ; DANIDA which supports UNFA and rural development projects; GTZ which supported a semi-pastoralist herdsmen programme in Mbarara district that ended in 2001 and the EU which supports agricultural development to promote export. The EU also supports a regional animal-disease control programme – PACE (Pan African Control of Epizooties) aimed at controlling animal diseases (epidemo-surveillance network) and privatisation of veterinary services. USAID has also supported private dairy development enterprises through Land O'Lakes country programme since 1994, HPI and the SPEED projects.

1.6. Evaluation of the pilot project (ended December 2000)

The Pilot programme (§1.2) led to three studies which generated results as summarised below.

Study 1: Diagnosis of production systems and constraints to milk production
This study generated results on milk production typology of the district of Mbarara and elucidated constraints on milk production. Strategies best suited to farmers needs were suggested.

Study 2: Determining zootechnic, sanitary and technico-economic references
This study furnished critical information on farm management, herd zoonotic diseases, productivity and other technical and economic aspects. The study also led to the establishment of a pilot system for collecting zootechnic data.

Study 3: Development activities and tips on good farming

This study generated the following outputs:

- Development of a manual (guide) of good milk production and handling practice. The manual was distributed to farmers.
- Code of good hygienic practice for on-farm milk handling practice was developed.
- Creation of food hygiene laboratory at the Mbarara University of Science and Technology (MUST) and training of MUST laboratory technicians in microbiogical analytical techniques by UNBS.
- Experimentation on utilisation of local forage for feeding animals.

The significance of the results of the project demonstrates its applicability at a wider scale.

1.7. Project Participants/Collaborators

MAAIF will be the over all in charge of the project (at higher levels of representation) and ACU the principal partner. Other relevant institutions such as Department of Veterinary Services, NARO[5], DDA, milk processing enterprises will be represented on the project.

[5] NARO : National Agriculture Research Organisation

At the operational/technical level the following institutions will be involved in the project:
- Authorities of Mbarara and neighbouring districts.
- Relevant departments of Makerere and Mbarara Universities.
- Milk processing enterprises
- Veterinary service providers.
- Farmers' associations.
- NAADS and NARO.

1.8. Project Beneficiaries

- **Famers:** Farmers will be the major beneficiaries of the project particularly through their organisations.

- **Veterinary Service Providers :** The role of veterinary services providers will be strengthened by support towards the creation of an epidemiosurveillance network and mechanisms for milk quality assurance.

- **Milk Processing Enterprises**
- The milk processing industry will benefit from improved milk production and quality.

- **Agricultural Council of Uganda (ACU) :** ACU will be supported to facilitate its roles of coordining the various stakeholders and creation of an enabling environment for sector activities.

2. PARTNERSHIP PROCEEDINGS DURING THE PROJECT PREPARATION PROCESS

As earlier indicated (§ 1.2) the pilot programme created strong interest among the various actors who were involved at both district and national levels. Under the CIRAD-EMVT programme, the Co-operation Department of the French Embassy (SCAC) created strong collaborations among the following actors:

- Makerere University (Faculty of Veterinary Sciences) whose laboratory was involved in the diagnosis of production and feeding systems among farmers.
- Mbarara University which benefited from support for the construction of a Food Hygiene laboratory.
- Veterinary services providers who were involved in the setting up of an experimental mechanism for the monitoring of brucellosis and tuberculosis.
- SUMPCA (Southwestern Uganda Milk Producers Co-operative Association) an association for and founded by the producers who were already involved in the project.
- The ACU, which showed interest regarding the approach based on a sector level and the grassroot-intervention project approach.

3. PROJECT LOGICAL FRAMEWORK

3.1. Objective :

To participate in the implementation of the Plan for Modernisation of Agriculture in Uganda by contributing to an informed national think tank on peasants' organisations, sector structuring and an agricultural policy given the experience gained from activities in a particular sector level (milk) and region (Mbarara).

3.2. Objectives and indicators :

Principal Objective: To contribute to the professionalisaton of the dairy sector using Mbarara as a pilot region.	**Measurable success indicator(s):** • Improvement of the global productivity of the milk sector (productivity level and sanitary quality). • Section of the commercialised production most especially by Professional Organisations (Pos). • Availablity of demanded services to dairy farmers in the Mbarara region in line with the national mechanism.	**Underlying hypothesi(e)s important for the success of the du project** • Implementation of NAADS • Milk consumption increases • Road infrastructure in the rural areas has improved.
Component 1 (S/Ob.j. 1) : To support the formation of dairy farmers' organisations capable of undertaking technical and economic functions adapted to production and market systems.	**Measurable result indicator(s):** • Number of POs and their membership. • Cost and contracts obtained by POs compared to the buyers. • Number of consulted popularisation operations carried out by the POs • Level of women participation	**Underlying hypothesi(e)s important for the attainment of the following objective :** • The concerned Administrative and Organisational structures to facilitate the formation of POs.
Component 2 (S/Obj. 2) : To facilitate the implementation of epizootic and milk quality controls and regulatory mechanisms suitable (applicable) to the Ugandan dairy industry.	**Measurable result indicator(s):** • Existence of an epidemiosurveillance network and information circulation. • Evolution of application of quality standards at the different levels. • Number at type of proposed training. • Research programme evolution in relation to demand.	**Underlying hypothesi(e)s important for the attainment of the following objective :** • Concerned administrative structures to facilitate the formulation and implementation of control standards. • The agricultural research system is strengthened
Component 3 (S/Obj. 3): To consolidate a national consultation mechanism (ACU) in charge of the elaboration of agricultural policies. (*not clear*)	**Measurable result indicator(s):** • Existence of a programme and monitoring. • Existence of statistics on the milk sector • Number of meetings held • Application of methodological measures on a national level;	**Underlying hypothesi(e)s important for the attainment of the following objective :** • The ACU is recognised by the professionals

3.3. Description project content

Component 1 (S/obj. N° 1): Support to Producers' Organisations

Activity designation	Expected benefits
Plan of action 1.1: Diagnosis of technico-economic structural needs for production 1.1.1 Historical and economic categorisation of existing farmers' groupings (formal and informal) 1.1.2 Organise a study on the possibility of a collective undertaking for the different types of farmers. 1.1.3 Participatory approach for needs' formulation by a council / popularisation.	**Benefit 1:** Functions (commercialisation / agricultural services / trade unions) for which collective action is needed are evaluated for the different groupings. **Benefit 2:** The needs of farmers in council and in groupings are evaluated. **Benefit 3:** The identified needs serve then as information for agricultural management.
Plan of Action 1.2: Formation & strengthening of producers' organisations. 1.2.1 Legal help for the formation of new groupings 1.2.2 Methodological support for activity planning (workshops meetings). 1.2.3 Evaluation of formation offers and requests by producers' organisations. 1.2.4 Organising formation programmes.	**Benefit 1:** Farmers' groupings are operational for marketing **Benefit 2:** The different groupings involve themselves in information and advice on agriculture. **Benefit 3:** The groupings are self-controlled. **Benefit 4:** Groupings are represented on a national level.
Plan of Action 1.3: Reflection on production support means and services. 1.3.1 Credit to farmers and producers' groupings in partnership with CERUDEB. 1.3.2 Marketing conditions for farmers and groupings. 1.3.3 Farmers'/farmers' associations training to improve milk quality.	**Benefit 1:** Some complementary studies are also achieved. **Benefit 2 :** Circulation and use are programmed together with local actors. **Benefit 3 :** There are gained benefits for the elaboration of adapted agricultural policies

Component 2 (S/obj. N° 2): Strengthening the environmental technical and regulatory system

Activity designation	Expected benefits
Plan of Action 2.1: Facilitate technico-economic consultation within the milk sector. 2.1.1 Organising workshops between the different direct and indirect sector actors, in line with the ACU 2.1.2 Visits and exchanges with French interprofession (CNIEL, ONILAIT, ACOFA[6]...)	**Outcome 1:** Interprofession workshops are organised. **Outcome 2 :** The interprofessional organisation is outlined **Outcome 3:** Existing professionals participate in the sector management.
Plan of Action 2.2: To participate in the implementation of research/popularisation programmes on animal production and feeding. 2.2.1 A participative elaboration of a research programme (researchers, NAADS agents, farmers, POs) 2.2.2 Foreign expertise in support to research centres 2.2.3 Popularisation programme design. 2.2.4 Formation of popularisation agents/ agriculture advisers	**Outcome 1:** Research programmes are carried out in response to demand. **Outcome 2:** The link between popularisation/ research is strengthened. **Outcome 3:** Advisors and popularisation agents are trained **Outcome 4:** Producers' organisations are capable of taking charge of agricultural services.
Plan of Action 2.3 : To contribute to the formation of a national epidemiosurveillance mechanism. 2.3.1 Methodological support to veterinary services in Brucellosis and Tuberculosis monitoring 2.3.2 Advise on monitoring pathological eradication network both on national and regional levels.	**Outcome 1:** Brucellosis and Tuberculosis are monitored regularly in Mbarara region. **Outcome 2:** Those pathologies are catered for by the national epidemiosurveillance network.
Plan of Action 2.4: Strengthening of milk quality control and monitoring mechanism. 2.4.1 Support to the UNBS on the determination of milk quality. 2.4.2 Analysing the involvement of producers' organisations in quality monitoring. 2.4.3 Research on control system to be implemented	**Outcome 1:** Existence of milk quality standards, and they are publicised. **Outcome 2:** The control/monitoring mechanism for the quality of standard is created and it also involves producers' organisations.

entre National Interprofessionnel de l'Economie Laitière (CNIEL), Office National Interprofessionnel du Lait et des produits laitiers (ONILAIT), Agence Centrale des Organismes d'Intervention dans le secteur Agricole (ACOFA)

Component 3 (S/obj. N° 3): Strengthening of the national consultation mechanism (ACU) for the elaboration of agricultural policies

Activity designation	Expected immediate outcomes
Plan of Action 3.1: Strengthning of the ACU strategic plan. 3.1.1 Support to programming of activities 3.1.2 Determining formation needs 3.1.3: Organisation of training 3.1.4 Exchanges with similar structures in sub-Saharan Africa (Senegal, Ivory Cost, Mali....)	**Outcome 1:** The ACU's programming, monitoring and control plan of activities are already put in place. **Outcome 2:** The ACU workers or professionals are already trained.
Plan of Action 3.2: Support to the implementation of sector consultation 3.2.1 Support to the organisation of consultation between professionals of different sectors. 3.2.2 Organisation of workshops between the ACU, and representatives of research/popularisation institutions.	**Outcome 1:** The ACU facilitates the encounters between a number of professionals and government officials. **Outcome 2:** Sector development policies outlined and applied in respect to professionals' advice. **Outcome 3:** There is consultation between professionals, central and local administration and research/development
Plan of Action 3.3: Analysis of Methodological support 3.3.1 Analysis of sectors' information monitoring systems. 3.3.2 Support to market research.	**Outcome 1:** The studies have been done and recommendations implemented by the ACU

›mponent 4 (S/obj. N°4): Project Management

Activity designation	Anticipated immediate outcomes
Plan of Action 4.1 : Management 4.1.1. Installation and logistics 4.1.2. Functioning 4.1.3. Meeting of the management committee	**Outcome 1:** The management committee meets regularly and makes deliberations. **Outcome 2 :** Minutes of the management committee meetings are circulated.
Plan of Action 4.2: Monitoring of the evaluation. 4.2.1. Elaboration of management charts 4.2.2. Communication / technical publications 4.2.3 Co-ordination between donors 4.2.4. Mid way internal evaluation 4.2.5. Final evaluation	**Outcome 1:** Donors and other partners are all informed. **Outcome 2 :** Reports are handed in time **Outcome 3:** Complementary contribution by other donors is made known and the latter are informed of project outcomes.

4. MEANS OF ACHIEVING PROJECT OBJECTIVES AND EXPECTED PARTNERSHIP.

Organigramme, responsibilities and implementation strategy with the partners

Overall project control is entrusted to MAAIF whose high level representative will preside over the management committee. Other bodies will assist in directing the project.

4.1. Strategic Bureau of Orientation (SBO)

The SBO will be attached to the ACU and its membership will be composed of:

- an official from the ACU
- a French technical assistant, adviser to the ACU
- a representative of the Producers' Organisations
- a secretary, in charge of administration

The SBO will be charged with the following duties:

- Evaluating work done on the ground
- Link between institutional partners (NAADS, DDA)
- Monitoring and evaluation of actors
- Secretariat to the management committee
- Examining bids for effecting the realisation of different activities

4.2. Technical Centre of Operation (TCO)

The TCO will be attached to Mbarara district and will be charged with the implementation of components 1 and 2. Its membership will be composed of:

- two French junior technical assistants, on open recruitment basis
- a secretariat

Component 3 will be implemented by ACU in collaboration with the head of the project.
Makerere and Mbarara Universities and the local beneficiaries will work closely with the TCO.

4.3. Management Committee

The management committee will comprise representatives from MAAIF (Chairman), SCAC and ACU (members).

The assistant technical advisor to the ACU will be in charge of the committee secretariat. Representatives from the other partner organisations may be invited by way of communication or information, just as the other donors.

4.4. Monitoring Committee.

A monitoring committee comprising members of the management committee and among others, representatives of NAADS, DDA, APO, UNFA, POs of farmers in Mbarara region, Veterinary Service Providers and Mbarara district (production department). It will give advice on thematic orientation, results and communication arising from the project.

5. SITUATION AND PERSPECTIVES AT THE END OF THE PROJECT

5.1 End of project status and expected added value

- At the end of the project the Mbarara region milk sector will be better structured.
- Increased milk production due to reduced seasonal flucuations due to adapted good feeding practices.
- Improved market for milk.
- The hygienic and over all quality of milk will be improved and regularly monitored.
- Farmers' fora will be stronger in negotiating on issues of benefit to them.
- ACU will have improved capacity to conduct its business for benefit of farmers.

5.2 Impact on poverty reduction, the integration of women in development, civil society and the environment.

- Farmers will realise increased and stabilised incomes.
- Farmers interests will be better represented in national policies.
- Effective women participation and representation will be realised in various economic activities in the sector.
- Environmental assessment of the impact of the existing farming systems will be made and better practices will be promoted.

5.3 Knowledge transfer

- Strengthening of competencies will be realised on different levels, from grassroot to administration levels.
- Participating institutions will benefit from training adapted to their needs.
- The ACU will basically be assisted in the laying out of its programme and management structure.

6. PROJECT EVALUATION

There will be a mid-term project evaluation to evaluate the progress made and conformity to project objectives pocedures. Following the evaluation, recommendations will be made for any necessary adjustments for the success of the project.

The final external evaluation will mainly focus on the attainment of project objectives and on both the direct and indirect effects on the beneficiaries.

7. ANNEXES

7.1. List of abbreviations

ACU	Agricultural Council of Uganda
AFVP	Association Française des Volontaires du Progrès
ADB	African Development Bank
CIRAD-EMVT	Centre International en Recherche Agronomique pour le Développement- Elevage et Médecine Véterinaire
DCL	Dairy Corporation Limited
DDA	Dairy Development Authority
FAO	Food and Agriculture Organisation of the United Nations
IGAD	Inter-Governmental Action on Development
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NAADS	National Agriculture Advisory Development Service
NARO	National Agriculture Research Organisation
PO	Producers Organisation
PSF	Priority Solidarity Zone
OAP	Organisation of Agricultural Professionals
PACE	Pan Africain Control of Épizooties
RALEA	Regional Action for Livestock in East Africa
PMA	Plan for Modernisation of Agriculture
SCAC	Co-operation and Cultural Development Department
SUMPCA	South western Uganda Milk Producers Co-operative Association
UNBS	Uganda National Board of Standards
UNFA	Uganda National Farmers Association

3. DISCOURS DE MME LA MINISTRE DE L'AGRICULTURE D'OUGANDA AU SEMINAIRE DE LANCEMENT DU PROJET FSP

HARNESSING THE POTENTIAL OF UGANDA'S AGRICULTURE FOR INCREASED MILK PRODUCTION

A Paper presented at the launching of the "Agricultural Consultation and Sector Structuring in Uganda" Project at Hotel Africana, Kampala 16th April 2002

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HARNESSING THE POTENTIAL OF UGANDA'S AGRICULTURE FOR INCREASED PRODUCTION.

1.0 Introduction

Agricultural is the main stay of Uganda's socio-economic development. It accounts for 42% of the National Gross Domestic Product (GDP) and employs over 80% of the population especially in the rural areas. Livestock accounts for 17 to 19% of the Agricultural GDP and 7 to 9% of the National GDP. The livestock resource base is composed of 6.0 million Head of cattle, 6.6 million goats, 1.0 million sheep, 1.6 million pigs, 30 million poultry and 50,000 rabbits. The traditional system of production dominates the industry, with about 90% of cattle, goats and sheep held by pastoratists and smallholder farmers. Only 9% of the cattle are on improved ranches and farms.

It is estimated that the annual production for the year 2001 was 900 million litres of milk, 140,000 metric tonnes of meat, and 18,000 metric tonnes of Hides and Skins.

It should be noted that the *per capita* milk consumption in Uganda is 22 litres, while that of meat is 5.6 kg. This is very low compared to what is recommended by World Health Organisation (WHO) and Food and Agricultural Organisation (FAO) which is 200 litres and 50 kg, respectively.

Uganda has a big potential for increasing the production of livestock and livestock products considering its natural resource base and agro-ecological conditions. It also has potential for increasing marketing of livestock and livestock products because of the existing large consumption gap and its strategic location to supply the regional and international market.

The challenge, therefore, is to increase production and ensure good quality of products to satisfy the local demand and export.

2.0 Government Policies And Strategies

Since the NRM Government came to power in (1986), it has been implementing macro-economic and public service reforms, aimed at improving the welfare of the people. These include Liberalisation, Privatisation, Decentralisation and democratisation. In addition, Government has identified poverty eradication as the major driving force for economic development. Under the Poverty Eradication Action Plan (PEAP, 2000), one of the goals is to increase income of the farmers through agricultural transformation. Therefore, a Plan for Modernisation of Agriculture (PMA, 2000) has been put in place. PMA is a holistic multi-sectoral policy framework whose objective is to eradicate poverty by transforming subsistence farmers into market oriented commercial producers.

In conformity with PMA, Government has identified milk and milk products as one of the commodities to be addressed under the Strategic Interventions to promote export of selected enterprises. Government, therefore, encourages investment by private sector and donors in the development of the dairy industry, especially in addressing the constraints to production, processing and marketing.

3.0 Constraints To The Dairy Industry

The key constraints to the development of the dairy industry can broadly be classified as production and marketing constraints.

3.1 Production Constraints

These include animal diseases, poor feeding, poor breeding methods and lack of credit for the farmers.

The key diseases that hinder milk production especially in South Western Uganda, are Foot and Mouth Disease (FMD), Contagious Bovine Pleuro- pneumonia (CBPP), Lumpy Skin Disease, Tick-borne Diseases (ECF), Worms and Mastitis. In addition, there are some diseases which are of public health importance (they can be

transmitted from animals to man). These are: Tuberculosis, Brucellosis and Salmonellosis. A recent survey, supported by French Government, showed that over 70% of the sampled herds in Mbarara District were positive Tuberculosis, while 50% were positive to Brucellosis.

The South Western milk shed is based on range lands, and these are infected with obnoxious weeds such as Sympopogany afranadus (Omutete) and unpalatable shrubs such as Acacia howkii (Obugando). These have reduced the grazing area available to cattle, hence affecting animal nutrition. This is worsened by the seasonal variation in the fodder and water availability.

The lack of appropriate breeding methods such as selection within the local herds, and guidance on the use of suitable exotic breeds, has affected animal genetic improvement and, consequently, productivity and production of milk.

Most credit institutions are beyond the reach of the poor farmers due to their conditionalities for procuring loans (e.g. colateral, feasibility studies). In addition, most banks are reluctant to invest in the agricultural sector in general and livestock in particular, due to the high risks and the long time taken to generate dividents.

3.2 Marketing Constraints

Experience in other countries has shown that one of the key factors in the successful marketing of milk is the formation of strong farmers organisations/co-operatives. Through these associations, farmers can access farm inputs, develop milk quality, organise milk collection and group marketing and burgain with processors/consumers on pricing. Unfortunately, these institutions are either lacking or very weak in Uganda.

As a consequence, raw milk vendors have taken advantage to flourish in the illicit trade. They sometimes hold the farmers at ransom by offering very poor prices.

For example, in the flush period, the price is less than shs 100 per litre. Several milk processing plants have been established arising out of the government liberalisation and privatisation policies. By the 2001, there were eight plants with a total processing capacity of 380,000 lts of pasteurised and Ultra Heat Treated Milk. However, due to competition from the vendors, all these are operating below capacity and others have actually closed.

The other problem is the laxity in the enforcement of regulations in the dairy industry. Following the operationalisation of the Dairy Act (1998), the Dairy Development Authority (DDA) has embarked on awareness creation, registration of stakeholders, licensing and enforcement of milk quality regulations. However, DDA is limited in terms of resources (manpower and funds). We need support and co-operation of other stakeholders such as donors, universities, private institutions and the extension service providers in the local governments.

Another constraint to marketing is the low purchasing power of the population. The *per capita* income in Uganda is U$ 330. The situation is worse in the rural areas. This erodes the effective demand for milk. Thus, while milk sometimes remains unsold in South-Western Uganda during the flush periods, most of the people in the East and North of the country are unable to but it. This partly explains the low *per capita* consumption.

4.0 The Contribution of the "Agricultural Consultation and Sector Structuring in Uganda Project" to the Dairy Industry.

According to the project document, the main objective of this project is *"To participate in the implementation of PMA in Uganda by contributing, to an informed national think tank on peasant organisations, sector structuring and an agricultural policy given the experience gained from activities in a particular sector level (milk) and region (Mbarara)".*

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) is convinced that this project is PMA compliant in that it addresses some of the key priority areas such as Research and Technology

Development, Advisory Services and Marketing. Its implementation will support services rendered by other government institutions such as National Agricultural Advisory Services (NAADS), National Agricultural Research Organisation (NARO), Dairy Development Authority (DDA), Uganda National Bureau of Standards (UNBS) and MAAIF especially as regards to Policy, regulations, standards and research.

This is illustrated by the following components of the project:

- Support to producers organisations (marketing, advisory services).
- Strengthening of regulatory and technical environment (disease control, advisory services, milk standards, research).
- Consolidation of the national consultation mechanism for the elaboration of the agricultural policies (support to Agricultural Council of Uganda).

Another benefit this project with bring is the strengthening of Uganda-French bilateral co-operation into which future programmes can be built.

5.0 Issues for Consideration to Improve Project Effectiveness.

As stated above, the project will significantly contribute to government's efforts to develop the dairy industry in the country in general with particular reference to the South-Western milk shed. This will be mainly through capacity building. However, in order to make the project more effective, the following issues need to be considered:

- According to the budget, the project management component accounts for about 46% of the total project cost. This is too high in relation to other components which will directly contribute the outputs and outcomes of the project.
- Provision of rural credit through Centenary Rural Development Bank is briefly mentioned in the project document, but is not provided for in the budget outline.

- The project is confined to Mbarara District. Is there a possibility of expanding it in future to include other milk producing districts especially in South-Western, Western, Central and Eastern milk sheds?

6.0 Conclusion

Government of Uganda recognises the potential of the livestock sub-sector in general and dairy industry in particular to contribute to the eradication of poverty and improvement in the quality of life of especially the rural population. It is hoped that the implementation of the "Agricultural Consultation and Sector Structuring in Uganda" project, will supplement government effort to address some of the key constraints to agricultural production. Government is grateful to the French Government for the support. We look forward to strengtheining this bilateral co-operation.

4. PRESENTATION DU LABORATOIRE D'HYGIENE ALIMENTAIRE PAR LE PR ISHARAZA

ROLE OF MBARARA UNIVERSITY IN MILK QUALITY CONTROL AND MONITORING OF DAIRY PRODUCTS IN MBARARA, UGANDA

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PREAMBLE

Mbarara University always identifies itself with public concerns in aspects affecting human health and general social-economic welfare of communities. When the Co-operation Department of the French Embassy in Uganda initiated the Mbarara milk project in 1998, MUST linked up with the other participants namely CIRAD-EMVT (International Centre for Agronomic Research for Development, Montpellier-France), Mbarara District Veterinary office and dairy farmers in the region who have now formed an association called SUMPCA. The overall objective of the project was to promote milk production and growth of the dairy industry in the region.

During the first phase of the project one of the major factors which was recognised was strong need to urgently address the public health problem that is linked to the quality of milk and milk products. This long term plan for sanitary prevention measures necessitated creation of a food hygiene laboratory at Mbarara University and training of scientists to run this laboratory. This was realised through financial support of the French Embassy in Uganda after a memorandum of understanding was signed with MUST in June, 2000. Other key partners in this project are: primary producers (dairy farmers), milk processors and traders, local authorities of Mbarara and neighbouring districts and the national regulatory body i.e. Dairy Development Authority (DDA).

Food hygiene laboratory at MUST

Personnel

The laboratory is currently run by the following personnel: Project Cordinator, one assistant lecturer, two technicians and one technical assistant. All these are full time employees of MUST. The laboratory is run alongside other regular teaching assignments of the University and the University Teaching hospital.

Laboratory inputs

Miscellaneous equipments, laboratoryware and reagents have been stocked through financial support of the French Embassy in Uganda. These have been augumented with other University inputs.

Analytical tests at hand

Tests that can now be carried out on milk quality in the laboratory are:

Total plate count
Total coliforms
Fecal coliforms
E.coli
Staphylcoccus aureus
Brucella (Milk ring test)
Salmonela (qualitative)
Vibrio cholera (qualitiative)
pH

Other analyses that can be done-subject to more laboratory facilitation

(i) Tests on Milk

Phosphate
Peroxidase
Yeast and molds
Moisture
Ash
Fats
Pesticide residues (organochlorides)
Pesticide residue (organo phosphates)
Antibiotic residues
M.tuberculosis
Vitamins
Minerals

(ii) Tests on Process water

Total plate count
Coliforms + E. coli
Salmonella (qualitiative)
Fecal enterococci
clostridia
Vibrio cholerae

(iii) Tests on non process water

PH
Conductivity
Nitrates
Nitrites
Ammonia
Iron
Chlorides
Hardness
Phosphates

Accessibility to laboratory facilities by stakeholders

Laboratory services are available to interested parties. DDA have expressed intention to make linkage with the laboratory in order to carry out their routine milk quality control and regulatory activities in Western Uganda. Milk/dairy products quality control in the country is one of the statutory obligations of DDA. A formal protocol of collaboration is yet to be signed. It is noteworthy that MUST has no powers to monitor quality of milk and dairy products in the general public. DDA together with the Uganda National Bureau of Standards (UNBS) are yet to set up and publicise milk quality standards before MUST can fully engage in regular activities of milk quality control and monitoring mechanism. However, the facilities now at hand can be availed to all interested stake holders. This laboratory can also be put to use for training scientists and technicians in dairy industry in addition to carrying out research leading to postgraduate qualifications.

Work has been initiated in investigating quality control points in the milk delivery chain i.e. during transportation, processing and marketing.

Way forward

These milk laboratory facilities are housed in limited space modified from a room previously used for storage of equipment and chemicals of the Department of Biochemistry. There is need to expand the physical facilities by putting up a laboratory to meet international standards as was recommended during the French/MUST workshop held in August 2000 at Mbarara University. Highlights of these recommendations are appended.

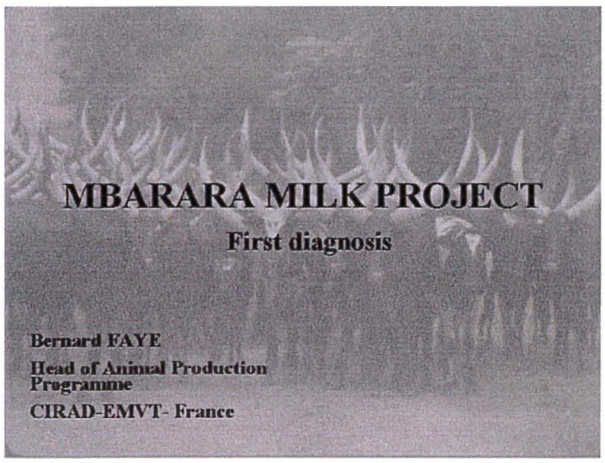
Core personnel envisaged to run this facility are as follows:

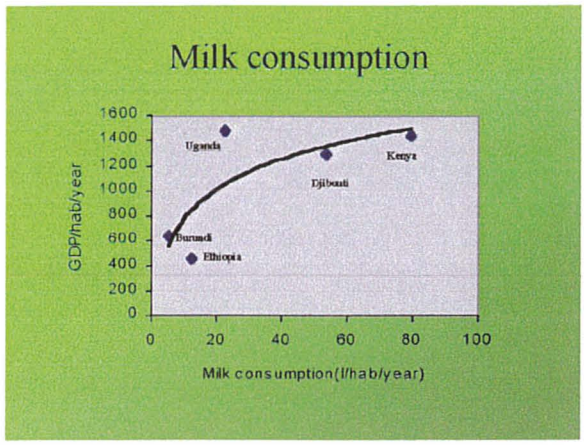
- Co-ordinator for overall management of the laboratory
- Biochemist to run the biochemistry/chemistry analytical section
- Microbiologist for microbiological analyses
- Two laboratory technologists and
- Two technical Assistants for each of the two sections.

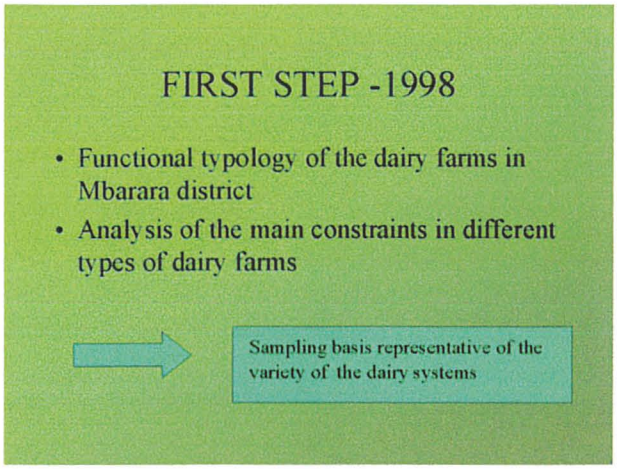
Collaboration with other national and international institutions is envisaged. Contact has already been made with the Joint Clinical Research Centre (JCRC) in Kampala to this effect. Others are Makerere University and DDA as aforesaid.

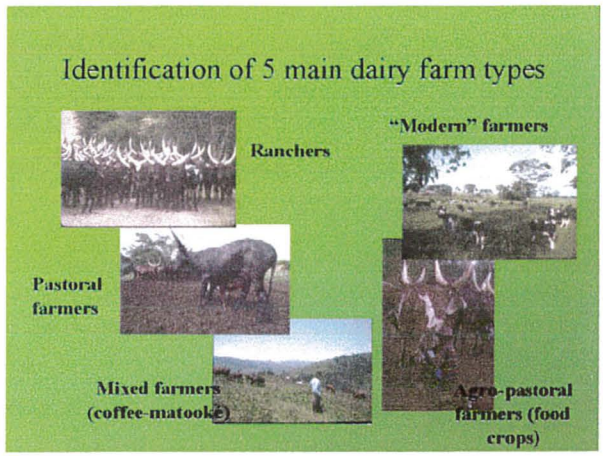
Laboratory equipment will be needed in order to use the laboratory for Research Development and Research Projects leading to postgraduate qualifications. Zoonotic diseases, like tuberculosis and brucellosis which have already been identified as major health risks to both animals in the field and humans (as evidenced in the high proportions of patients admitted at the University Teaching Hospital) are envisaged to take centre stage in the epidemiological studies at this laboratory.

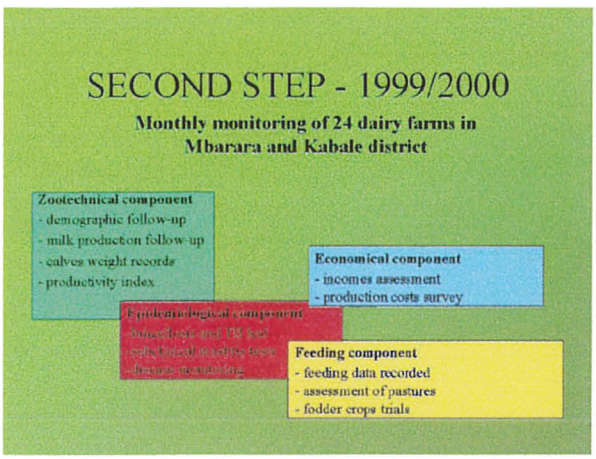
5. Présentation des actions du CIRAD-EMVT lors de la 1ère phase du projet, présentation faite lors du séminaire de lancement le 16.05.02

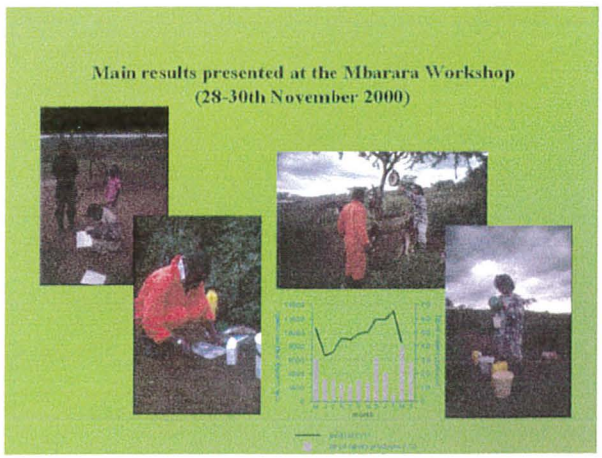












THIRD STEP 2000-2001
First actions

- High prevalence of TB and brucellosis → Epidemiological survey at district level
- Risk factors for mastitis → Extension booklet for milking hygiene
- Shortage of pasture during the dry season → Fodder crops trials
- High stocking rate → Pasture and herd management
- Complementary strategy for milk and meat marketing → Economical study and diffusion to technical commitee

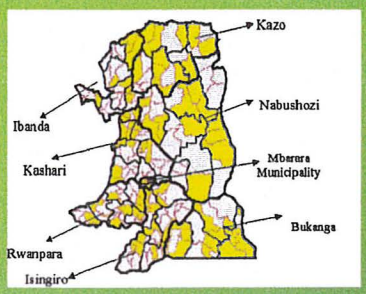
Implementation of the food hygiene laboratory at the Mbarara University

Equipment of the lab

Training of the technicians

Development of the capacity building

Prevalence survey of brucellosis and TB in Mbarara milk basin



Sampled parishes (in yellow)

For TB
340 herds
11858 tested cattle
For brucellosis
315 herds
10529 tested cattle

TB and brucellosis prevalence (not including doubtful)

TB herd prevalence: 74.1 %

TB animal prevalence: 6 %
(10.6% if doubtful included)

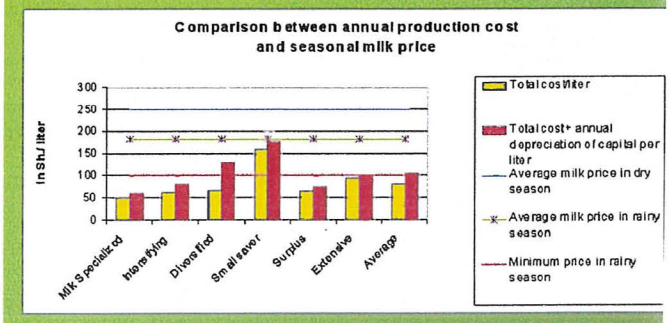
Bruc. Herd prevalence: 55,6 %

Bruc. Animal prevalence:15,8%

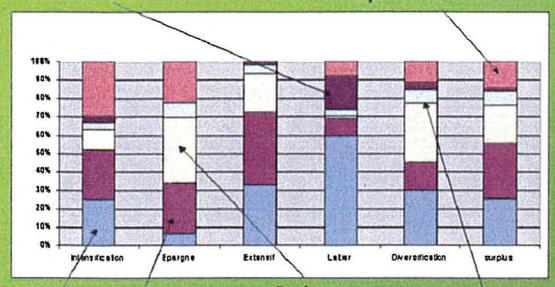
Main risk factors for mastitis

Mbarara district-Uganda

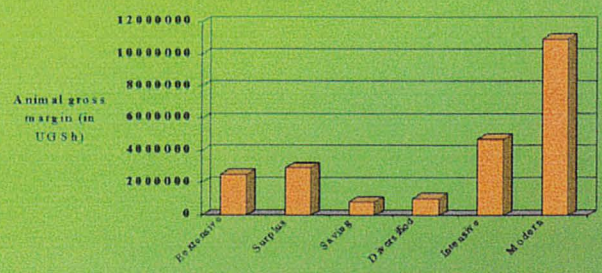
Economical rentability



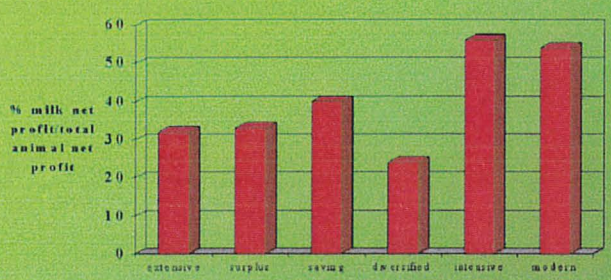
Origin of incomes



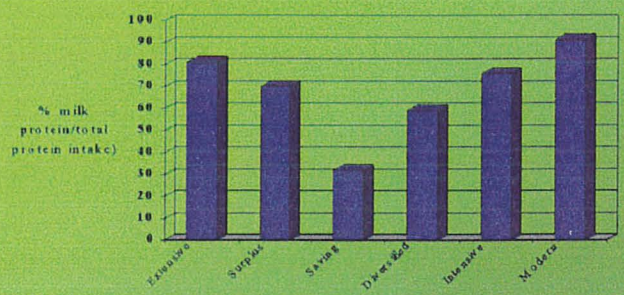
Annual Animal Gross margin



The part of the milk in incomes



Nutritional aspect



To remove the nutrition constraints in dry season

OBJECTIVES
Improvement of forage crops techniques
Improvement of the pasture quality and range management
Improvement of water supply for cattle
Using of by-products for animal feeding

ACTIONS
- Implementation of new varieties of fodder crops
- Training of farmers to the range management and animal nutrition
- Rural credit for the development of rural water supply

To control the health constraints and the milk products safety

OBJECTIVES
To facilitate the access to veterinary medicine
To support local veterinary services
To improve the material for milking, collecting milk and carrying
To motivate the farmers for the milk quality
To facilitate an independent milk quality control system

ACTIONS
Development of co-operative or private veterinary pharmacy
Institutional support of local veterinary services and diagnosis lab
Rural credit for supplying milk and transportation equipment
Epidemiology of main zoonotic diseases
Implementation of a food hygiene lab at University of Mbarara
identification and management of the critical points (HACCP)
for the implementation of a global milk quality improvement strategy

To improve the zootechnical and economical productivity of dairy farms

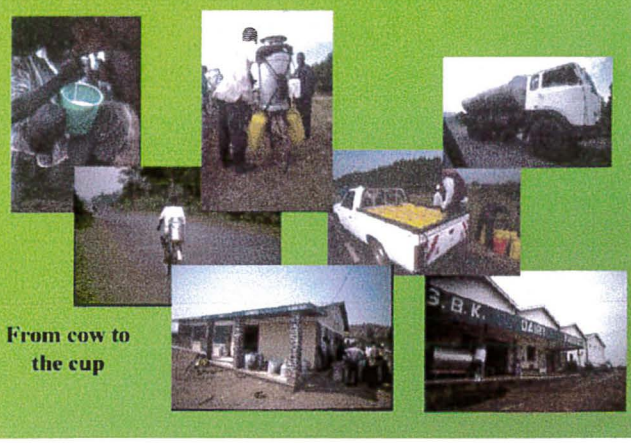
OBJECTIVES

To increase the growth and milk performances of dairy farming system in Mbarara milk basin
To identify the economical constraints for the development of the milk sub-sector
To evaluate the productivity of the Ugandan dairy farms

ACTIONS

Technico-economic follow-up
Training of the farmers for management of dairy farms
Economical analysis of the milk sub-sector (market study, consumption survey)
Contributing to the national monitoring programme of Ugandan dairy farms

To improve the performance of the milk sub-sector



From cow to the cup

Conclusion

The current project aims to contribute to the professionalisation of the dairy sector by:

*** supporting the capacity building of dairy farmers organisation**

*** facilitating the implementation of epizootic and milk quality control**

*** strengthening the national dairy policy**

A French-Ugandan co-operation

One Ankolé in Paris!

Paris Agricultural show 2000

6. LISTE DES PUBLICATIONS RELATIVES AU PROJET MBARARA

MEMOIRES ET THESES

BELLENGER C., 2000. Etude sur « l'exploitation des pâturages, gestion du surpâturage utilisation d'une filière de production de semences ». ESITPA

BOUDJABI S., 2000. Suivi du volet sanitaire et d'hygiène alimentaire dans le bassin laitier de Mbarara. Mémoire de stage DESS « Productions Animales en Régions Chaudes », CIRAD-EMVT, Montpellier.

CASTEL V. 2001. Enquête sur la prévalence de la tuberculose dans le cheptel bovin du bassin laitier de Mbarara (Ouganda). Mémoire De CEAV (Certificat d'Etudes Approfondies Vétérinaires), CIRAD-EMVT, Ecoles Vétérinaires d'Alfort et Toulouse.

DABUSTI N., VANCAUTEREN D., 1998. Les systèmes d'élevages du district de Mbarara et leur contribution à la filière laitière. Mémoire de Mastère Développement Agricole Tropical, option « valorisation des productions, CNEARC, Montpellier.

DEVAUX S., 2000. Contraintes hygiéniques et sanitaires de la production laitière dans le district de Mbarara en Ouganda. Action pour la maîtrise de la qualité. Thèse pour le doctorat Vétérinaire, Ecole Nationale vétérinaire de Toulouse, 96 p.

DOMERGUE M., 2000. Etude sur « l'alimentation des vaches laitières et leur complémentation – analyse économique de la production de semences. Essai de cultures fourragères en milieu rural». ESITPA.

PASTEL B., 2001. Etude de la filière lait dans la zone de Mbarara (Ouganda). Mémoire de DESS Economie agricole internationale Développement durable et sécurité alimentaire, Paris XI-Orsay.

RAPPORTS DE MISSION

FAYE B., LETENNEUR L., TULASNE J.J., 1997. Mission d'étude des filières de production animale en Ouganda. Rapport de Mission CIRAD-EMVT n°97-027, Montpellier.

FAYE B., 1999. Mission d'appui pour la mise en place d'un suivi zootechnique sanitaire des élevages bovins laitiers dans la région de M'Barara (Ouganda). Rapport de mission CIRAD-EMVT n°99-005, Montpellier.

FAYE B., 2000.Stratégie du dépouillement des données et préparation d'une seconde phase du projet laitier de Mbarara. Rapport de mission CIRAD-EMVT n°2000-17, Montpellier

FAYE B., 2001. Appui aux enquêtes sanitaire et économique. Rapport de mission en Ouganda. CIRAD-EMVT n°2001-39, Montpellier.

LEBAS C., TULASNE J.J., 2002. Mission d'appui au projet de développement de la filière laitière dans le bassin de Mbarara (Ouganda). Rapport de mission CIRAD-EMVT n° 02-15, Montpellier.

LETENNEUR L., 1998. Amélioration des productions animales en Ouganda. Mise en place du programme d'amélioration laitière dans le district de Mbarara. Rapport de mission CIRAD-EMVT, Montpellier

RIPPSTEIN G. 1999. Rapport de mission d'appui en production fourragère et en alimentation au projet d'élevage bovins laitiers dans la région de M'Barara et Kabalé (Ouganda). Rapport de mission CIRAD-EMVT, Montpellier du 22 février au 2 mars 1999.

RIPPSTEIN G. 2000. Projet d'élevage bovin laitier dans la région de M'Baraba (Ouganda) : appui à deux stagiaires en production fourragère et en alimentation. Rapport de mission CIRAD-EMVT, Montpellier.

TULASNE J.J., 1996. Mission d'identification des priorités d'intervention en production et santé animale en Ouganda. Rapport de mission CIRAD-EMVT, Montpellier.

TULASNE J.J., 1999. Mission d'appui à la filière dans le bassin de Mbarara : enquête sanitaire et contrôle de la qualité du lait. Rapport de mission CIRAD-EMVT, Montpellier.

TULASNE J.J., 2000. Mission d'appui à la filière laitière dans le bassin laitier de Mbarara. Volets santé animale et contrôle de la qualité du lait. Rapport de mission CIRAD-EMVT, Montpellier.

Actes de séminaire

CHALIMBAUD J. 2001. Mbarara Milk Project Workshop Proceedings. 28th – 30th November 2000. Rwizi Arch Hotel, Mbarara. Ministère des Affaires Etrangères/ République d'Ouganda/ Cirad-Emvt. Mars 2001.

Publications scientifiques

ALARY V., CHALIMBAUD J., FAYE B., 2002. Diversity of dairy farming systems in Mbarara area (Uganda) and the multideterminants of dairy production and commercialisation at the farm level. Submitted for publication

CASTEL V., FAYE B., 2002. Tuberculosis and brucellosis seroprevalence survey in Mbarara milk basin (Uganda). Submitted for publication.

FAYE B., LHOSTE P., 1999. Le conseil en élevage en milieu tropical. Renc. Rech. Ruminants, 6, 63-67.

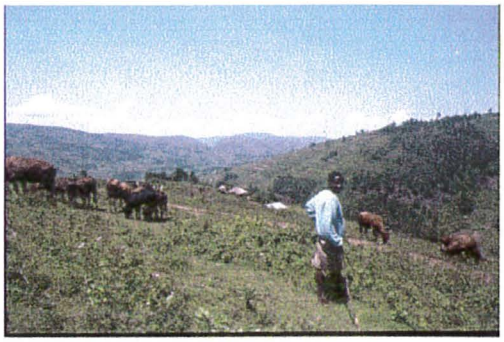
Documents de vulgarisation

Brucellose et TB

Hygiène du lait

7. Proposition pour le mémento de l'Agronome

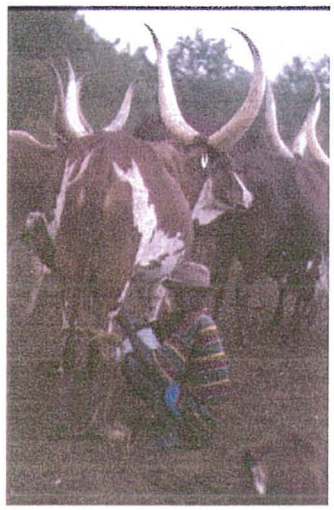
LA FILIERE LAIT EN OUGANDA : l'exemple du bassin laitier de M'Barara



1. L'élevage le plus populaire en Ouganda est celui des bovins Ankolé, principalement dans le Sud-Ouest du pays dans les régions de collines sous l'équateur. L'Ankolé est aussi utilisé pour le lait que pour la viande. Son potentiel laitier est faible, mais il s'agit d'un animal bien adapté au contexte alimentaire et sanitaire de la zone. Les modes d'élevages sont de type pastoral extensif dans les zones à vocation non agricole (pratique de la transhumance notamment) ou associant l'agriculture et l'élevage avec un degré d'intégration plus ou moins poussé.

2. L'Ankolé est un animal de type Sanga, issu d'un métissage très ancien entre un zébu à longue corne et un taurin (vache sans bosse). Son berceau d'origine est la région des Grands Lacs en Afrique (Ouganda, Rwanda, Burundi). C'est un animal placide en débit de ses cornes monumentales. Il peut s'adapter à différents modes d'élevage (pastoral, agro-pastoral, intensif). Une grande variabilité au niveau des performances est enregistrée (croissance des jeunes, production laitière) ce qui laisse suggérer un potentiel de sélection.

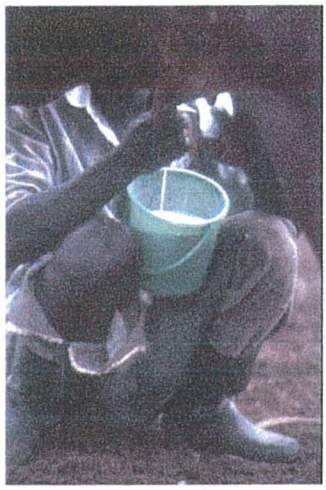
3. Autour des grandes villes, mais aussi dans certaines régions d'altitude, se développe des systèmes qualifiés de « modernistes » basés sur l'élevage de vaches laitières exotiques (principalement de race Holstein-Frisonne) originaire d'Europe. Ces types ont tendance à se spécialiser sur la production laitière pour approvisionner le marché urbain, voire pour exporter. Le climat tempéré par l'altitude, un régime de pluies plutôt favorable, tend à amortir les contraintes classiques des milieux tropicaux à l'expression du potentiel génétique de ces races.



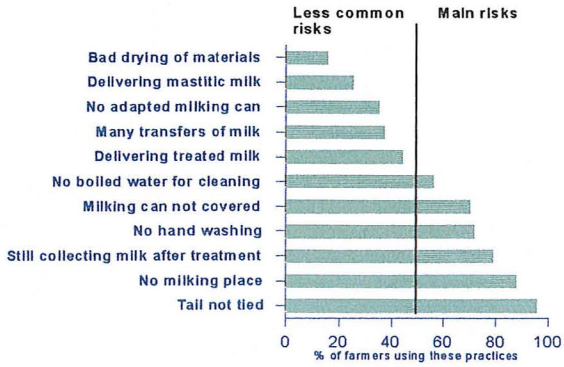
4. La traite est manuelle et l'hygiène de traite est encore largement insuffisante. La production individuelle est fortement variable selon les races. Chez les vaches Ankolé, des productions journalières de l'ordre de 4-5 litres (soit de 1 000 à 1 500 litres par lactation) ne sont pas rares.

5. L'une des contraintes au développement de la production laitière dans la région de M'Barara est la faiblesse des ressources fourragères pendant la période sèche (de mai à octobre). La diminution de la production qui s'en suit se traduit par une pénurie de lait sur les marchés locaux et de ce fait par une augmentation du prix du lait payé au producteur. Par ailleurs, pour assurer une bonne croissance des veaux, une part non négligeable est prélevée par les jeunes. L'éleveur doit donc gérer la compétition entre croissance des jeunes et commercialisation du lait. La possession d'un effectif plus important de bovins est un facteur favorisant la diminution de la pression de traite sur les vaches en production. Autrement dit, plus les troupeaux sont petits, plus les vaches en production sont traites au dépend du veau.

6. La traite est de plus en plus pratiquée en utilisant des récipients lavables et gradués afin de vérifier les quantités prélevées pour les laiteries. Contrairement à beaucoup de régions d'Afrique, la traite est majoritairement le fait des hommes.



RISK FACTORS FOR MASTITIS



7. Depuis les fermes ou les campements isolés, le lait est transporté à bicyclette dans des bidons métalliques, soit vers un ramassage par pick-up, soit vers un centre de collecte, soit directement à la laiterie. Généralement, c'est le propriétaire qui emporte le produit de la traite deux fois par jour.

8. Le lait peut être aussi confié à des petits transporteurs qui se chargent dès lors de convoyer le lait de plusieurs producteurs. Un convoyeur peut acheminer ainsi jusqu'à 80 litres de lait et parfois plus.

9. Les bidons sont acheminés vers la route principale où ils pourront être repris directement par le transporteur de la laiterie dans un véhicule de type pick-up. Entre 500 et 600 litres peuvent ainsi être transportés jusqu'à Mbarara.

10. Pour bénéficier de la production de zones plus éloignées de la ville de M'Barara, les laiteries ont installé des centres de collecte disposant de tank réfrigérés. Ces centres disposent d'une capacité de stockage permettant de limiter le nombre de voyages par camions réfrigérants. Par ailleurs, des contrôles simples (lactodensitomètre pour vérifier le mouillage et test à l'alcool pour vérifier la qualité hygiénique du lait) peuvent être effectués sur place.

11. Dès lors, le lait peut être apporté à la laiterie par camion réfrigéré moyennant un passage tous les deux jours dans les centres de collecte. Si les centres sont gérés par les associations de producteurs ou directement par les laiteries, les camions, eux, appartiennent aux laiteries.

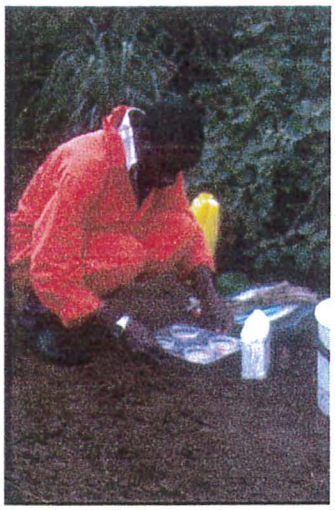
12. Mbarara dispose de 3 laiteries industrielles. La transformation permet de disposer de lait pasteurisé en sachets de plastiques, de yaourt, de crème. Une chaîne UHT est en cours de montage (2001). Cette production vise la population urbaine de Mbarara, mais aussi celle de Masaka et de Kampala, la capitale.

13. L'une des contraintes identifiées pour le développement de la production, est l'importance des zoonoses transmises par le lait (tuberculose et brucellose). Aussi, une enquête de prévalence sur échantillon représentatif a été réalisée. Près de 15 000 bovins ont été prélevés dans la zone afin de tester la présence d'anticorps anti-brucellique dans le sang. Les analyses ont été réalisées par les Services Vétérinaires de Mbarara. Pour la bonne marche de l'enquête de nombreux couloir de contention ont été construits. Tous les animaux ont été marqués.

14. La tuberculination consiste à injecter de la tuberculine, une protéine provoquant chez les animaux atteints de tuberculose, une réaction cutanée (épaississement de la peau) mesurable par un pied à coulisse.

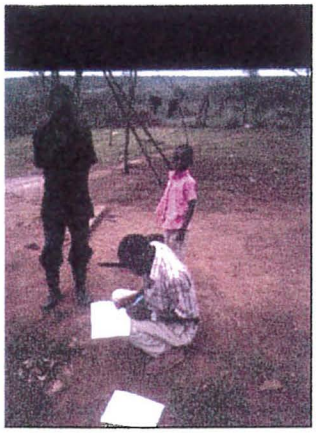
15. Les résultats des analyses sont aussitôt fournis aux éleveurs, puisque la tuberculination nécessite une lecture 2 jours après l'inoculation, ce qui laisse le temps de faire la sérologie brucellose. Dans l'échantillon, plus de la moitié des troupeaux présentait au moins un animal brucellique et près de 70% au moins un animal tuberculeux. La prévalence individuelle était de l'ordre de 10% pour la brucellose et de 7% pour la tuberculose avec de fortes variations inter-troupeaux. Une rapide enquête sur la description de l'exploitation a également été faite.

16. Un second aspect du projet de développement a consisté à évaluer les performances laitières des troupeaux. Le lait trait est donc mesuré dans des récipients gradués.



16. L'importance des infections mammaires, élément de la qualité hygiénique des laits livrés à la laiterie, est testée par le Californian Mastitis Test (CMT) : en cas d'infection, le mélange du lait et d'un produit spécifique dans des cupules à fond plat (une par trayon) forme des globules colorés.

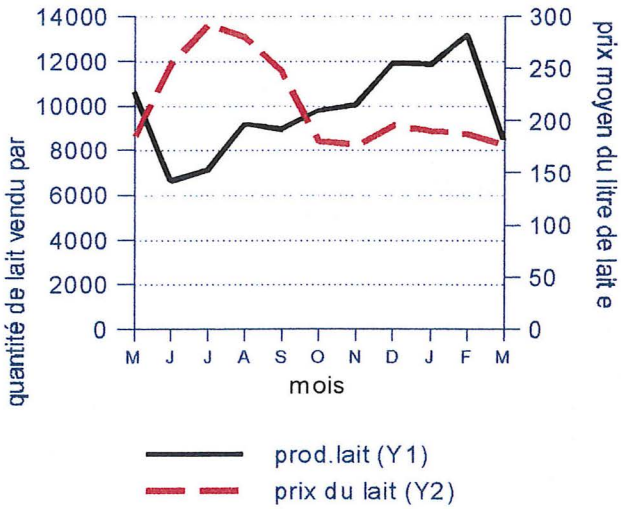
17. Pour estimer d'une part la croissance des veaux et l'importance de la prise du lait, les jeunes sont pesée entre la naissance et 6 mois (c'est-à-dire environ au moment du sevrage : au-delà la croissance de dépend plus de la production de la mère).



18. Le travail d'enquête se poursuit sur des aspects liés à l'hygiène de la traite, les conditions d'alimentation et les pratiques de prévention des maladies.

19. Un manuel d'hygiène de la traite et des risques sanitaires en anglais et en langue locale est édité à l'attention des producteurs pour la plupart scolarisés. Des sessions de démonstration sont également organisées.

20. La demande urbaine en lait croît de façon importante dans bien des pays du Sud. Pour satisfaire cette demande il faudra agir aussi bien sur la productivité des animaux que sur les contraintes alimentaires (accès aux ressources en saison sèche) et sanitaires (zoonoses, infections mammaires).



LE BASSIN LAITIER DE MBARARA (OUGANDA)

M'Barara est une des grandes villes de l'Ouganda située à 250 km de la capitale Kampala. Autour de M'Barara (environ 70 000 hab.) s'est développée une production laitière pour l'approvisionnement de la ville mais aussi celle de la capitale. Il s'est ainsi constitué un véritable bassin laitier que l'installation récente de laiteries privées ou privatisées a contribué fortement à structurer. Les producteurs de la région et les industriels se heurtent cependant à différentes difficultés : fort saisonnement de la production, irrégularité de la qualité, difficultés dans l'acheminement, cas de contamination bactérienne, statut sanitaire des animaux , etc...

Les systèmes de production laitier et de leurs contraintes

En s'appuyant sur les méthodes classiques de l'analyse systémique prenant en compte les caractéristiques des éleveurs, de leurs troupeaux et de leurs pratiques, un diagnostic a pu être porté aboutissant à une typologie des exploitations laitières et des contraintes spécifiques à chaque type de producteurs. A partir de l'analyse portant sur plus de 250 exploitations laitières dans le bassin laitier de M'Barara 5 grands types ont pu être identifiés :

- un groupe qualifié de gros ranchers, non-transhumants, situés en zone pastorale, possédant des animaux croisés et/ou des animaux de race Ankolé, et pour lesquels l'objectif principal est plutôt la production de viande de façon extensive, le lait n'étant qu'un sous-produit (22% des exploitations de la zone);
- un groupe d'éleveurs traditionnels de la zone pastorale, souvent récemment installés et sédentarisés dans la zone, disposant de troupeaux d'Ankolés à faible production laitière et n'ayant aucun autre revenu que ceux tirés de l'élevage (26% des exploitations);
- un groupe (15% des exploitations) représenté par des petits éleveurs-caféiculteurs pluri-actifs sédentaires possédant un petit troupeau à dominante Ankolé ou croisé, mais avec une production laitière un peu améliorée;
- un groupe prédominant (33% de l'échantillon de départ), intermédiaire entre les deux groupes précédents, qualifié d'agro-pasteurs sédentarisés dans la zone pastorale et composés d'éleveurs pour lesquels l'activité d'élevage (animaux croisés ou Ankolés) se combine à une importante activité agricole diversifiée;
- un groupe minoritaire (3% de l'échantillon) composé d'éleveurs « modernistes » possédant des troupeaux de race européenne (vaches frisonnes) à forte production laitière, et demandeurs de technologie moderne.

Cette répartition reflète a priori la diversité des situations rencontrées dans la région de M'Barara.

Production

La production varie fortement selon les élevages, les vaches Ankolé étant moins bonnes productrices que les vaches croisées Ankolé x Holstein et surtout que les vaches Holstein pure. L'élevage des races exotiques pures est possible dans certaines zones de montagne au climat tempéré (région de Kabalé par exemple). Dans tous les cas, la traite est manuelle. Les règles classiques d'hygiène de la traite ne sont pas toujours respectées. Ainsi, la pratique de l'attache de la queue pour éviter les souillures du lait lors de la traite n'est jamais observée. Près de 60% des éleveurs n'utilisent pas d'eau bouillie pour nettoyer les récipients. Plus de 40% des éleveurs continuent d'utiliser des récipients traditionnels pour la traite, fabriqués en bois et difficiles à nettoyer.

Transport

Le lait est amené généralement en vélo, dans des récipients de facture diverse une fois par jour, parfois deux, soit en un point de rassemblement au bord de la route où le transfert est effectué directement dans des bidons de plastique ou métallique pour être acheminé vers les laiteries, soit dans un centre de collecte disposant d'un tank réfrigéré si la zone est éloignée de Mbarara. Dans tous les cas, l'acheminement est assuré directement par la laiterie. Parfois, ce sont des collecteurs intermédiaires qui procèdent au ramassage du lait dans les zones éloignées et l'emportent vers les points de rencontre où dans les centres de collecte. Les éleveurs proches de la ville approvisionnent directement les laiteries de Mbarara. Les premiers contrôles de qualité (test à l'alcool) sont réalisés dans les centre de collecte réfrigérés.

Laiterie

Il existe deux importantes laiteries à Mbarara (GBK et Countrytaste) qui assurent l'acheminement et le contrôle du lait par des méthodes classiques : test à l'alcool pour évaluer l'importance de la contamination bactérienne, et dosage de la teneur en matières grasses. Le lait est transformé en divers produits (lait pasteurisé, lait UHT, yaourt) dont une part importante est exporté sur Kampala, la capitale.

LES STRATEGIES LAITIERES DES PRODUCTEURS

Les stratégies laitières comme le degré d'intensification apparaissent extrêmement dépendants de la situation familiale de l'exploitation et du stade et mode de développement de l'exploitation. Ce degré d'intensification est fortement lié aux proximités de marché ou aux traditions de commercialisation sur les marchés. Les exploitations d'agriculteurs éleveurs, qui ont un peu faible niveau d'intensification ainsi que les éleveurs du groupe « intensif » ont des avantages notables en terme de commercialisation Cependant ce processus de spécialisation ou d'intensification n'est viable à terme que s'il assure un revenu suffisant pour la famille.

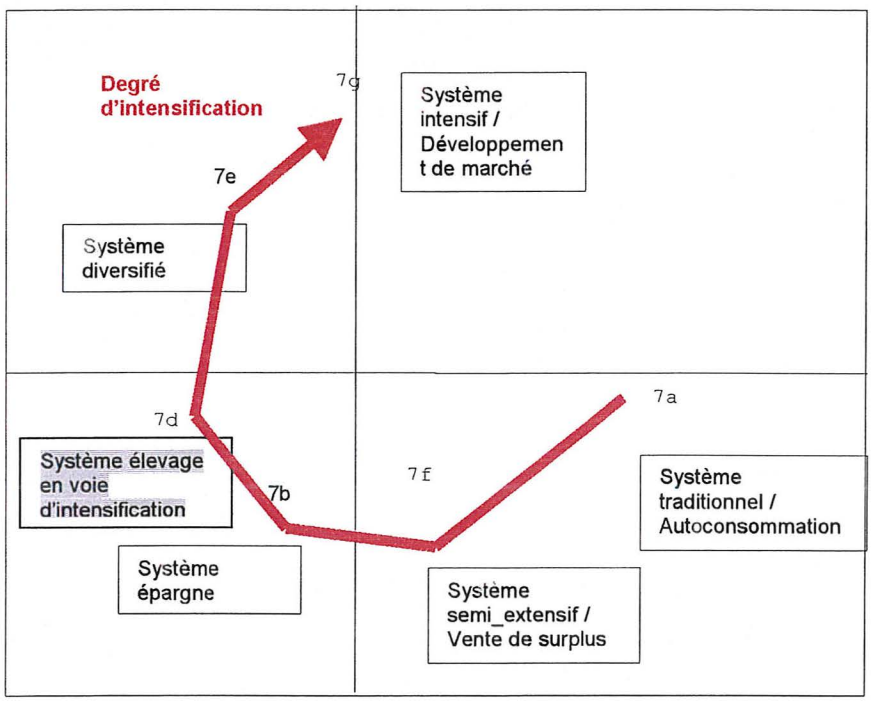
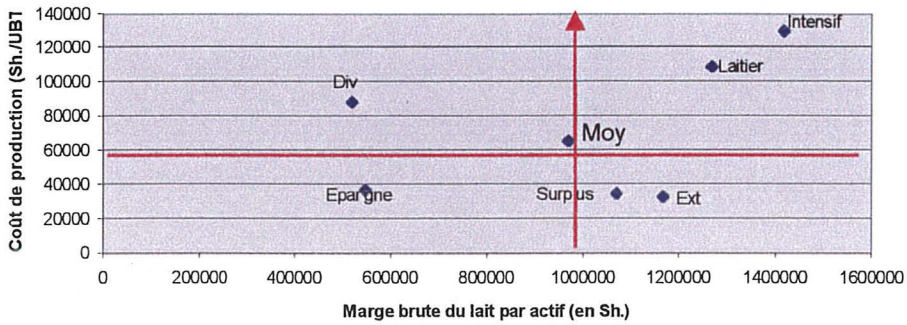
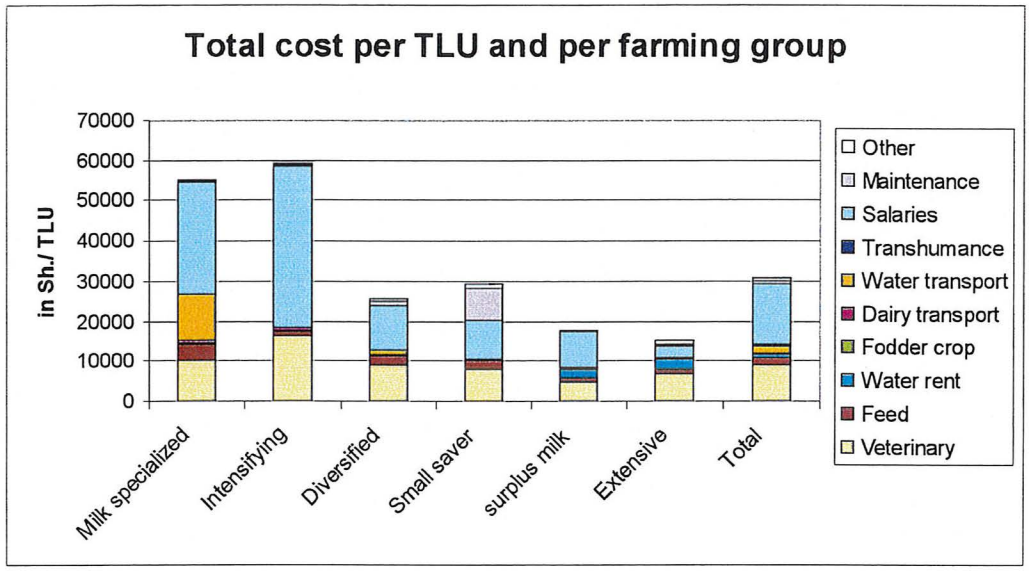
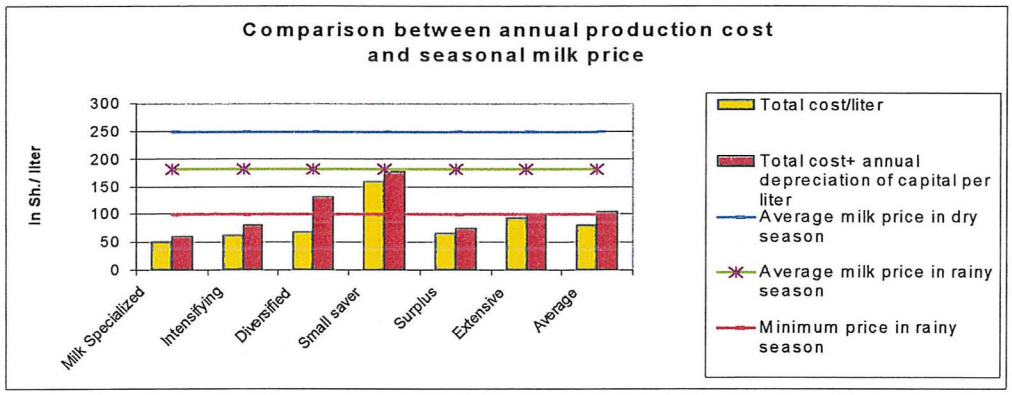


Figure 24 : Etude comparée de la productivité moyenne par actif et des coûts de production par UBT





Charges totales par UBT (Unité Bétail Tropical)



8- Article soumis pour publication sur les stratégies laitières (en cours de finalisation)

Auteurs : V. Alary, J. Chalimbaud, B. Faye

Diversity of dairy farming systems in Mbarara area (Uganda) and the multi-determinants of dairy production and commercialisation at the farm level

Abstract :

Animal products supply, in developing countries, constitutes a very high challenge for the two next decades. Many researchers point out the necessity of a "reasoned intensification", especially in agricultural area by the integration of agriculture-livestock activities. But intensification only occurs on specific farms with secure source of income. And it is not limited to agro-climatic areas or social communities. How to explain the different dairy developments or technical options between farms submitted to similar agro-climatic or institutional conditions?
The analysis of the diversity of dairy farming systems according to family or community parameters, the choice and intensity of diversification in and out agriculture sector, the breeding practices have been conducted from a cross-sectional survey of a sample of 22 farmers. Separated factorial analysis on different groups of variables or parameters relative to one aspect of the farm system allows to identify the specific impacts of each factor on the development and the role of the dairy activity at the farm level; the use of the multi table factorial analysis allows a thorough analysis of the interactions and points out some causal relationships between the determinants of dairy production and commercialisation and the functioning of each type of farm. Moreover, it helps too to identify key factors of intensification as genetic improvement or possibilities of engaging outside workers. In fact intensification does not seem to step on being a necessary passage to a better work productivity in housekeeping, but it seems being a decisive factor as the level of valuation of milk on market is concerned.

In Africa, milk activity at the level of the farm and the household has been for a long time confined to a mean of diversification and intensification in mixed farming systems or considered as the main social component of traditional pastoral systems. In some research works, livestock is only a bank for the farmers. But few research studies approach milk production as a component of the overall strategy of the farm. Milk production or commercial strategies could be explained by social or societal, economic, agronomy and institutional factors.

This study is conducted in the Mbarara region in the south west of Uganda which provides, with four others districts, more than one third of the national milk production. Besides the disengagement of the Uganda government in agricultural financing, an important dynamic of the private sector all around of dairy activity is quickly developing, including the transport and the distribution, with the implantation of 5 new dairy plants since the mid-90ies. However, the rapid development of intensive and productive dairy activities around Kampala and the weak level of milk consumption by inhabitant at the national level[1] constitute in the same time a threat to dairy systems viability of Mbarara and an encouragement in production. Development of dairy production is strongly encouraged by Ugandan government as means to increase rural income, beyong his disengagement. So, increasing returns,

[1] Milk consumption is estimated at 21.5 litre / year /capita in 1999, against 25.8 in Africa and 28.1 in East Africa (FAOSTAT, 2000).

poverty and malnutrition alleviation are the main expectations of this dynamic in a more and more competitive sector.

One first survey of about 180 dairy producers distributed in three agro-climatic zones differentiated heterogeneous systems of breeding. From pastoral systems of dry area, Nyabushozi, in which milk production accompanies daily consumption and family activities to intensive and market-oriented systems of the agro-pastoral area of Kashari, near Mbarara, exists a variety of more or less complex systems in which milk can become so (i) a mean of valorisation of the agricultural products as matooke (banana variety), coffee or (ii) an agricultural product as one could be hoping for a matooke plantation. Sometimes it can be difficult to appreciate the importance of each factor in the making decision to produce milk: what are the various logics which explain the differentiated milk developments at the farm level? Livestock saving might not be a safety strategy for all the farmers? Are determinants of milk production only confined to market opportunities? But then how to explain different degrees of intensification in one very particular zone ?

The objectives are understanding animals' roles at the farm and household level and they are set in relation to quantifying and taking into account all benefits of livestock keeping, meaning production as well as approaching the alternative or intangibles roles of livestock.

1) Appreciation of milk activity in farming systems : methodological approach

1.1 Approach of the various farming systems in the province of Mbarara

The determinants of milk production in African livestock systems have been greatly described in pastoral systems and would be a pattern of living more than an economic or lucrative activity, apart from a few milk productive basin near urban area. Milk has been largely considered as a social product, and animal embody key cultural and social roles (Van Ecbert *et al.*, 1989; Moll, Dietvorst, 1999). Some research works also underline the dairy activity as the main determinants of breeding making decision (Boutonnet, 2000); the meat consumption or sale concerns only old and unproductive animals and the animal sale intervenes only in case of extreme need. Therefore, the breeding system and livestock capitalization is conducted so that the milk production covers the family and social needs in the traditional pastoral society.

Besides, livestock is often considered as cash box or live saving for agricultural farmers by providing a form of financing, insurance or credit or a capital/ an asset for pure breeders (Slingerland, 2000; Bosman and Moll, 1997). Live saving in the sense that producers place agricultural income surplus in livestock investment. Through the by-products (milk, veal), this capital provides more safety and available interest than saving through the banks that register many defections and sometimes fraudulent bankruptcy. Animals are risk safe investment (Slingerland, 2000) and resistant to situations of shock. With animals, producers can thus face up to urgent social needs. Capital for pure breeders in the sense that livestock represents both a live saving but also the productive capital (as the land) from which they extract own consumed and cash products. Therefore in the two cases, milk would be the capital profit. Self consumed, milk always brings an equivalent protein that is difficult to estimate in a low protein ration. Moreover it is difficult to estimate the real benefit in term of maintaining of the family work, the social consequences following to milk

donation in the traditional society. When milk production becomes more regular with marketing opportunities, it provides a daily cash flow even in unproductive agricultural season as in time of drought, up to making up for income losses from other sector, animals providing a means of "banking' resource (Starr, 1987).

However, within these traditional farms, exist modern dairy farmers who tempt to increase milk production by way of genetic improvement, auto-selection of more productive cows, increasing feed resources (fodder crops implanting, pastoral and water management), investment to improve milk quality (pick up transport, metal can). Milk becomes the main activity and livestock a productive capital although it always remains a live saving to cover technical or social urgent needs. The passage from a social or self consumed product to a real economic activity is often attributed to the development of networks of collection, so at the channel organization compared with the dairy development in the developed countries (Vatin, 1996). So it is interesting to estimate the importance of the infrastructure in milk collection to explain the differentiated strategy of milk valuation at the farm level.

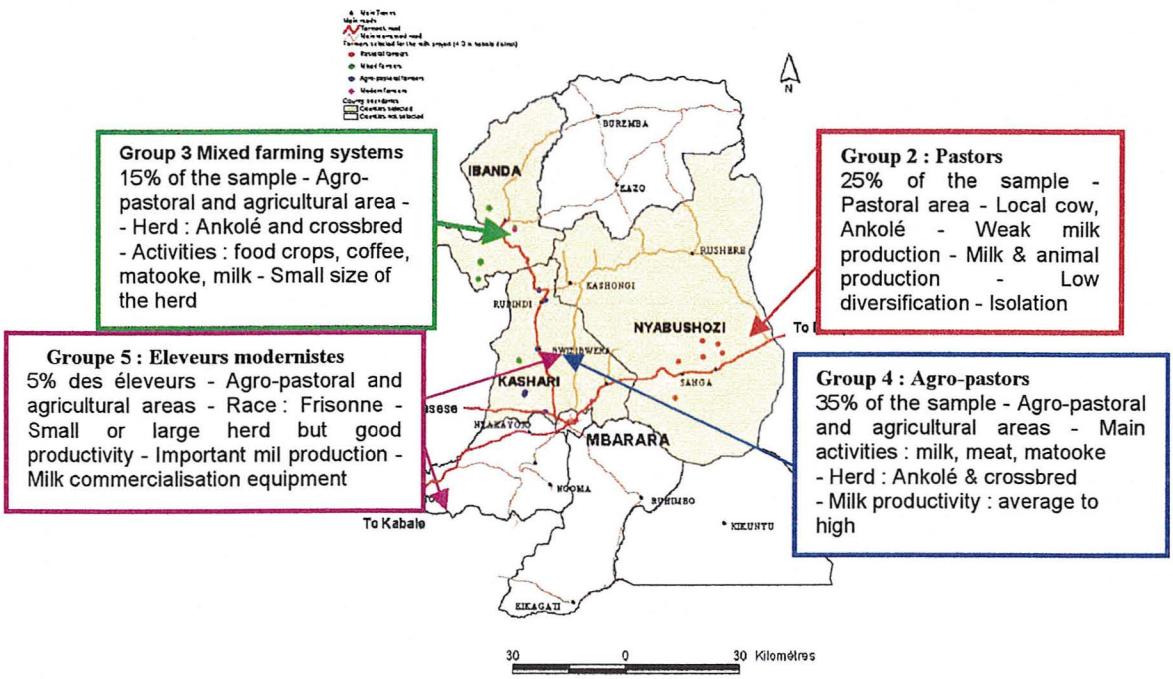
Our hypothesis is that milk production or milk strategy may participate at the overall dynamic of the farm development and the driving forces of its development come out of both internal farming making decision and external factors (infrastructure, milk demand, etc.). Beyond this, milk production represents a non negligible by-products from the investment and saving processing.

The approach of the farmers' making decision needs to search and analyse the type and the nature of linkages between the milk strategy and management and the global socio-economic functioning of the farm and the household. For homogeneous groups of farmers according to milk strategies, the analysis will be focused on the explanation of the degree of investment in milk activity according to labour structure, land size, breeding systems, etc.

1.2. Materials and method

One first clustering conducted in 1998 at about 180 farmers in three "Counties" permits to identify 4 large groups of breeders which are differentiated according to different degrees of agricultural diversification, herd structure and breeding (Dabusti *and al.*, 1999; Chalimbaud *et al*, 2001; Faye, 2000). The authors distinguish 4 main groups :1) extensive systems of breeding in pastoral area, Nyabushozi, based on animal sale and milk consumption; 2) mixed farming systems in the agricultural area of Ibanda which invest agricultural surplus in livestock ; 3) agro-pastoral farmers located in the county of Kashari, which are improving milk performance through genetic and pastoral management; 4) and, finally, the "Modernists" who are specializing in dairy activity (Figure 1).

LOCALISATION OF THE PROJECT FARMERS



To understand the differentiated logics of investment or not in milk production and the role of milk as mean to generate income, improve rural livelihood, a monitoring survey of 22 breeders chosen in the 4 identified groups has been conducted from June 1999 to May 2000. Its follow-up registers on a monthly basis zootechnical performances (birth/mortality, disease, calving weigh, lactation curve, decision of sale and purchase, etc.), but also economic decisions like investment and economic results (animal sale and purchase price, milk receipt). One supplementary survey allows to estimate the livestock activity and role at the farm and household level.

Measuring or approaching the social and economic importance and role of milk activity at the farm level means to estimate the functions of saving and of investment and their relative weigh in the productive logics of farmers. To distinguish these two functions (live saving or investment), the rate of numeric yield at the flock level is usually used as an indicator of saving level and the structure and genetic composition of the flock which reflects the milk decision investments. The degree of milk specialization will be approached by the rate of milking cows in the herd, the milk productivity and the level of capital investment per Tropical Livestock Unit (TLU).

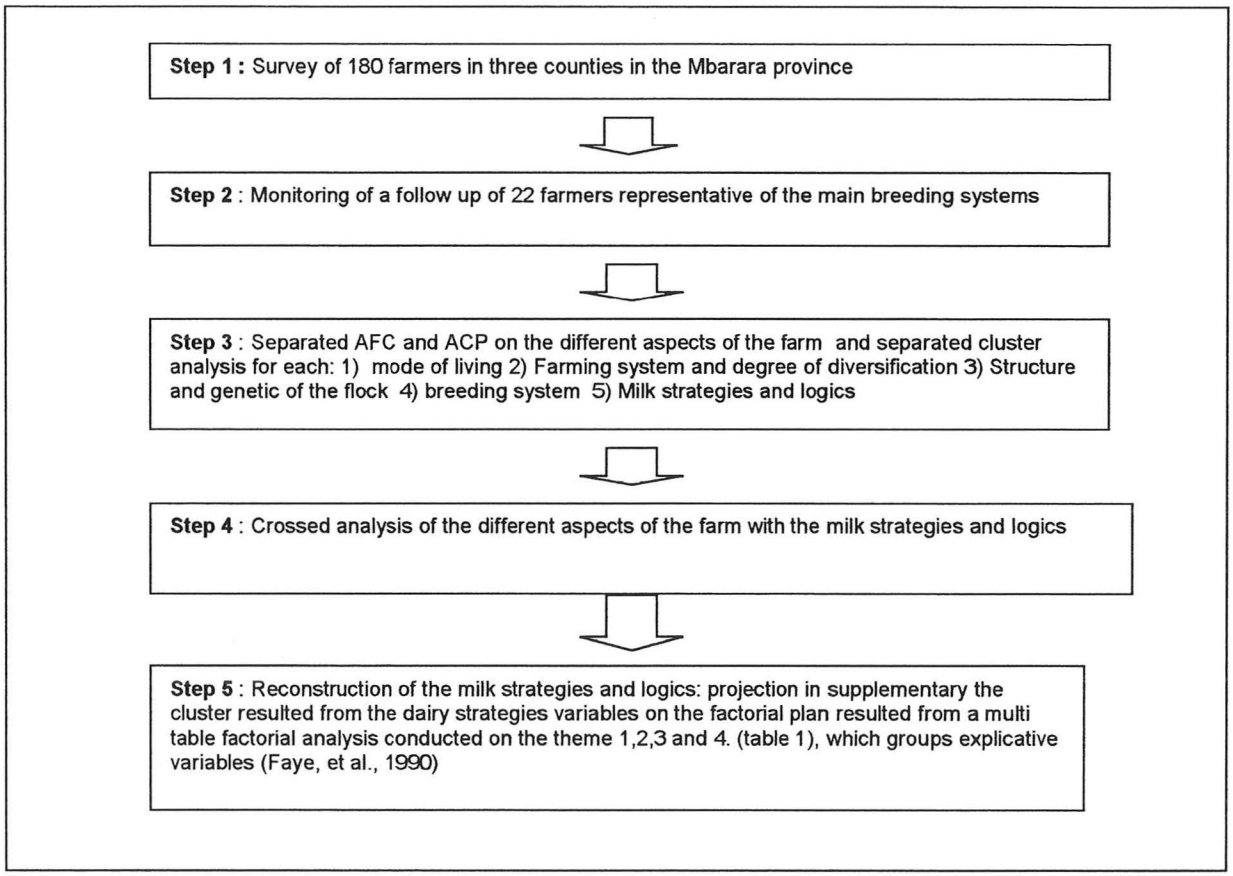
These logics of specialization or intensification are in keeping with farming strategies and household strategies. It involves to identify links or absence of links between the degree of specialization or intensification (subjects 3, 4 and 5), the mode of life and the social capital at the household level (Table 1) and the degree of diversification (subject 2) (table 1).

Table 1 : Some items of each theme

Thèmes	Variables
Theme 1 : Pattern of living	Characteristics of the head of family (age, scholar level) Family members (schooled children, number of dependants) Environment (isolation, distance to milk collect centre or market, non agricultural activity)
Theme 2 : Farming system	Cropping system (part of food crop, cash crop like coffee or matooke) Other breeding activities in 99/00 (flock, goat, sheep) Family and salaried workers on the cropping system
Theme 3 : Herd structure	Number of cows, males, young males, heifer and veal per race Milk TLU /Total TLU
Theme 4 : Breeding system	Animal sale and purchase; Charges (salaries, transhumance tax, veterinary fees, rent charges, cost of production of fodder crops, maintainance, water charges) per TLU Family and salaried workers implied in breeding management Private pastoral area/ Total area
Theme 5 : Milk strategies (intensification, specialisation, commercialisation)	Seasonal daily milk yield, milking cow/ productive animal, Material investment, average sale price, Destination of milk, self consumed part per capita.

One supposes that strategic choices of farmers in matter of intensification or specialization are strongly linked to the demographic composition of the household (notably the ratio of consumer number and active members) but also to individual characteristics of the leader/head of the household as his social origin or community which will settle some social, cultural and economic rules. This doesn't mean that intensification will be confined to only one community or only one type of leaders. But that modes of intensification or specialization will vary with family or community factors. The degree of diversification in agricultural activities or out farm has often been considered as one strategy or attitude of risk aversion. Its degree of diversification is demonstrated in particular in very vulnerable areas (hard climatic variability, decline of ground fertility) as in dynamic areas where important commercial activities are developing with the urban demand (Reardon *and al.*, 1992). But the level of diversification varies also in function of the family workers, the social and economic needs in the household or income objective and the local opportunities (Tchayanov, 1924). Moreover, purchase of animals in agricultural areas doesn't always answer to the same determinants or objectives of the cropping diversification. Generally, the first livestock investment is more satisfactory as a kind of hoarding of the agricultural surplus ; it often happens that once a good size is reached that livestock becomes an activity of diversification by product animal valuation (veals, milk, manure) and it becomes a contribution of regular income monetary. It would become to a greater degree the product or the result of the agricultural diversification in the cropping system, before becoming a way of income diversification and a factor of intensification of the agricultural activities. This is particularly true in agricultural communities which start an activity of breeding but this logic can not be extended to traditional mixed farming systems as in East Africa or Asian countries.

The different steps of the analysis are described in the Figure 2.



2) Decomposition / reconstruction of dairy strategies

The separate statistical analysis on each group of variables reflecting one aspect of the farming and family system (Cf. Table 1) reveals original profiles inside the large groups. It is possible to determine new sub-groups in which some modes of functioning are very close to each other although they are belonging to different communities or geographic and agro-climatic areas. The table 2 results from the cross of each cluster analysis on the main factorial axis from the AFC or ACP on the 4 groups of explicative variables with the clusters issued from factorial analysis on the main dairy strategies variables considered as dependent ones. For example, in the mode of living, out of the four farmers who compose the group of isolated farmers (Fiso), three of them are belonging to the dairy group of "extensive" system in which the milk is essentially self consumed.

Table 2 : Cross of the different cluster analysis

Milk strategies	*Nomen*	*Extensive*	*Surplus*	*Saving*	*Div.*	*Intensive*	*Modern*	Total
Life standard								
1. Very isolated	Fiso		3				1	4
2. Young, isolated	Fjeun			1	3			4
3. Educated head of farm, isolated	Fel			1		1	1	3
4. Large family, near market	Fagri			1		1	1	2	5
5. Isolated, Kashari, large family	Fvill		1	1		3		1	6
Sub total			4	4	3	5	3	3	22
Diversification								
2. Matooke	Dmatoo			1	2	4		2	9
1. Staple food +coffee	Dviv		1		1	1	2		5
3. Small ruminants	Dpel			3			1		4
4. no diversification	Dnon		3					1	4
Sub total			4	4	3	5	3	3	22
Herding management								
1. Herding on farm	Cbat		1	1	1	3	1	2	9
2. Fodder crops, non family workers	Cfou			1	1	1	1	1	5
3. Water & pasture management	Cparc			2	1	1	1		5
4. Low investment	Cext		3						3
Sub total			4	4	3	5	3	3	22
Herd composition								
5. Frison	Rfri							2	2
3. Cross bred	Rxxx					1	2		3
1. Genetic improvement	Rmixt		1		2	4	1	1	9
2. Unknew races	Rinc		1	2	1				4
4. Ankolé, local caw	Rank		2	2					4
Sub total			4	4	3	5	3	3	22

Legend: 1. « Extensive » : Extensive system in pastoral area oriented to milk consumption ; 2. "Surplus": traditional system in pastoral or agro pastoral area in which a small part of milk is sale ; 3. "Saving » : agricultural system with first investment in livestock ; 4. "Diversified": Mixed farming system; 5. "Intensive»: agro pastoral systems in which farmers invest in pastoral management, 6. "Modern" : Milk specialized system.

At first, it is observed deep strong relations between the herd composition in the farm and, in particular, the genetic dominance and the dairy strategies or logics. The farmers who wish to make a profit on dairy activity invest with more productive cow, like "Frison", although the farmers who consume a large part of milk production prefer keep local cow. The farmers in a saving strategy maintain local cow. But on the other hand, it is noted the weak differentiations according to the breeding systems. The 9 farmers who keep animals in stalls ('Cbat') are listed on all the dairy strategy types. Only the pastors have a common extensive system.

The cross-check of the mode of living and the dairy strategies confirms that the more isolated farmers consume the majority of milk production compared with the farmers near a market who sell a large part. The distance is an important factor but that it doesn't explain all the farmers' dispersion. In the group "diversified", 3 of them are isolated and continue to sell more than one third of their milk production. Unlikely with the group "saving" which is composed with agricultural farmers as in the group "Diversified", the majority of the family of this last group counts more than 8 members whose 6 are active members while the "saving" group gathers together young heads of household. Therefore one important factor of differentiation may be the demographic factor in the household and that can explain difference with pastoral community. In pastoral community, as soon as the sons reach the age of marriage they are encouraged to leave the father farm with a part of the herd. With this mode

of inheritance, the average number of family members doesn't exceed 6 persons in the pastoral area. But in the agricultural area, it is frequent to have two or three generations in the same farm: the father with his wife, their sons with their wife and sometimes their grandchildren. At the beginning, the young farmer is alone with his wife and his children and he cannot conduct dairy activity because of the lack of time but he tries saving the agricultural surplus. But in a second step, the sons participate to the agricultural work especially as the social and economic needs are more important with the enlarged family. Then dairy activity may participate to a way of diversification in a area that knows land pressure. The importance of farm cycle had been demonstrated by Tchayanov (1924). Here this factor could be an important factor to explain the different strategies in agricultural area without omitting the geographic factor. The demographic factor explains also why the "saving" and "Diversified" systems are both in the two groups of agricultural diversification ("Dmatoo", "Dviv").

It is also observed that the group "Rmixt" in the sub-table of herd composition is composed of farmers originated from agricultural, agro-pastoral and pastoral areas (Figure 3). From this group, there are differentiated farmers who practice permanent genetic improvement (Rfri), who are investing in pastoral or breeding management with a more and more crossed herd (Rxxx) and who have difficulty to maintain genetic improvement (Rinc). This last group is seasonally obliged to sell animals to face current expenditure. And there are the farmers whom the system fluctuates between the different positions according to the season, the un-foreseen expenditures. This group represents a large percentage of the Mbarara' farmers with a very fluctuated position in the investment or improvement process.

Finally, it is observed the individual position of the pastors who are isolated in each cluster analysis. The pastoral farmers have a very specific mode of life and of functioning, deeply established or rooted in the cultural tradition of the Bahimas. Nevertheless, one can distinguish some gaps between generations. The young generations show some interest in the economic development of milk activity. At the opposite, the non Bahimas farmers in the groups "Rinc" and "Rank" consider always livestock as a live saving and then prefer Ankolé cows because of their rusticity and resistance. Moreover the sale price of one Ankolé doesn't exceed 250000 Sh. against over than 500 000 Sh. for a Frison cow and the social need of farmers is nearer the Ankolé sale price although the rate of interest (milk yield) is least.

This crossed analysis allows to identify some close relationships and sometimes differences for one homogeneous group between the socio-economic, geographic, zootechnic and agronomic factors and the dairy strategies. It confirms the strong relations between genetic improvement, degree of specialisation and intensification and market proximity. But this analysis ever shows some rapid change for the farmers from one group to an other group according to unpredictable expenditure but also cycle of cycle. In the figure 4, are projected the centres of gravity of the clusters issued from dairy strategies analysis on the common factorial plan issued from the multi table factorial analysis (realized on the four themes). Only the "Surplus" and "Extensive" groups seem to belong to various socio-geographic context or practice different farming system. In fact in the "Extensive" group, one farmer (N°31) has a diversified system but he cannot sell milk because of the distance from the milk collect centre. In the "Surplus" group, the gaps are due to the different geographical situation.

Figure 3 : Typology of farmers function of the herd structure

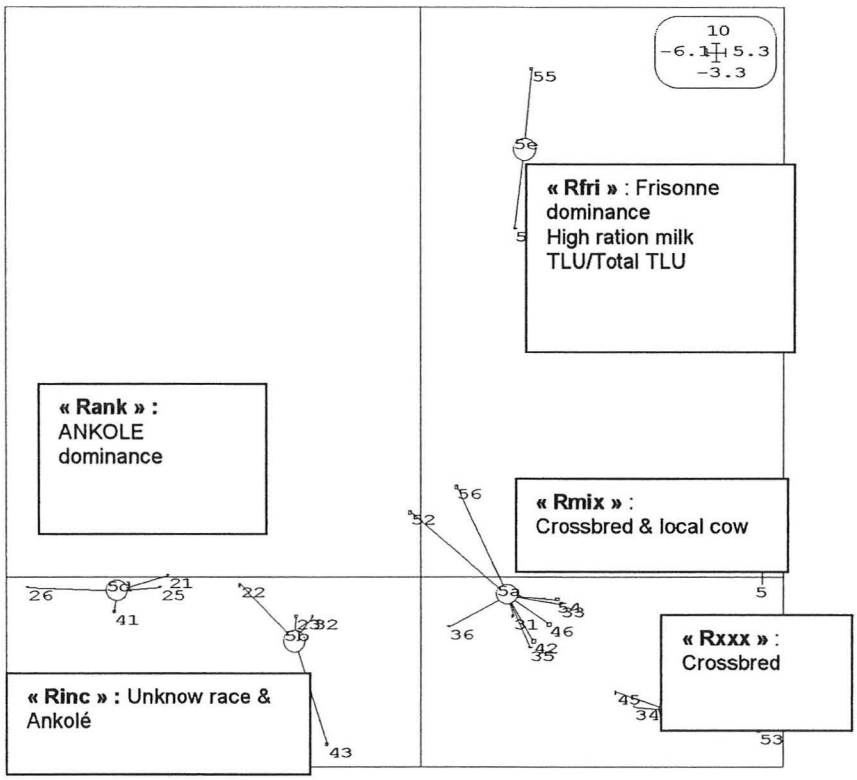
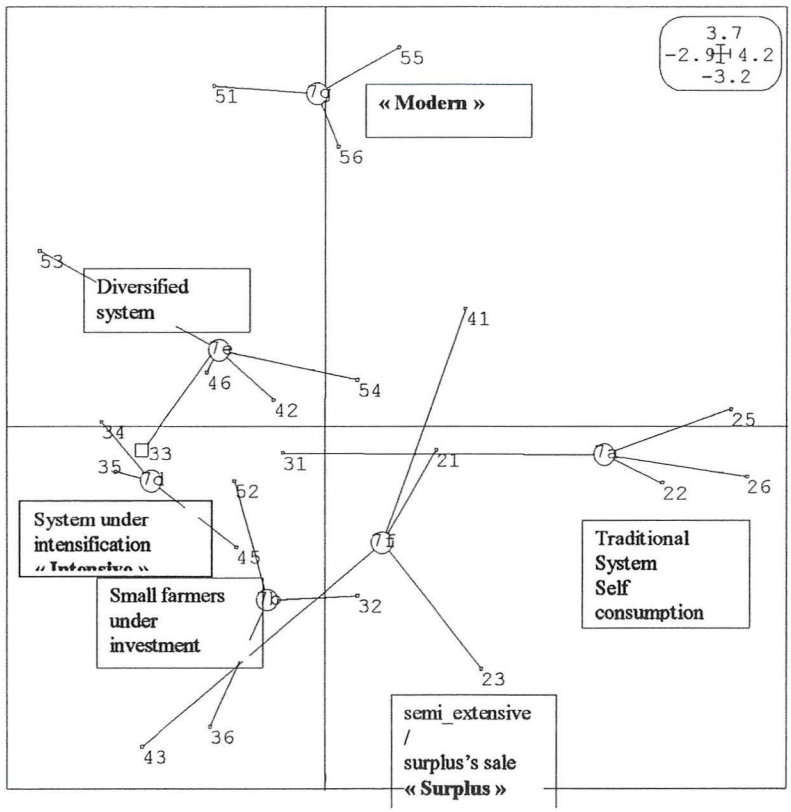


Figure 4 : Regroupement des exploitations projetées sur le plan factoriel commun de l'AFM selon la typologie « Stratégies laitières »



In resume, it is difficult to analyse the dairy strategies without taking into account the farming system and the family situation. The crossed analysis shows the strong relations between the social, cultural, economic and zootechnic factors that confirm the multiple roles of livestock in the time (economic security, social status, risk insurance, etc.). But now one can think about the milk profitability in the different dairy systems.

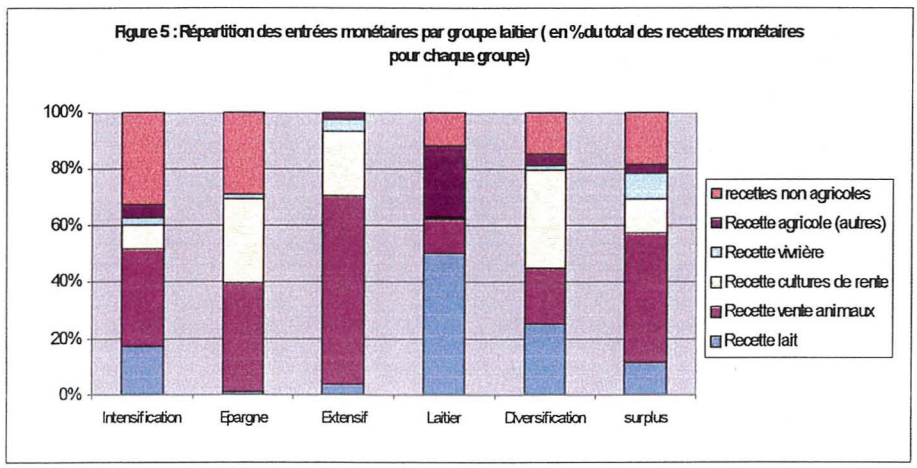
3. The socio-economic viability of the different dairy systems.

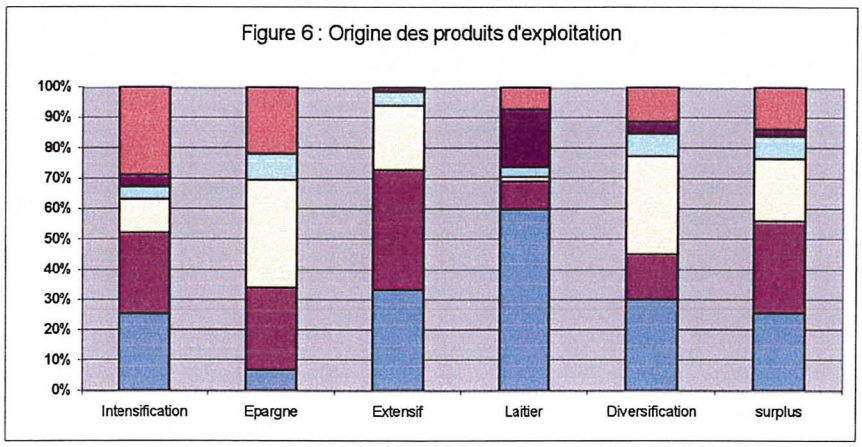
The decisions in matter of breeding system depend on all the agricultural or no agricultural activities within the farm. The taking into account of all sources of income at the farm level allows to approach the viability of the farming system but also the contribution of the dairy activity to sustain the reproducibility of the farm and the family welfare. But in a first time, it is approached the milk profitability by working out the milk cost of production and the part of the milk in the family income.

3.1. Approach of milk profitability: a potential source of income for all the farmers

The analysis of the different sources of income points out the relative importance of milk in the cash flow of the different farmers' categories. The milk receipt increases notably from the extensive to the modern dairy systems with a relative decrease of the animal sale. Moreover the modern and intensive farm benefit of an important non agricultural source of income (Figure 5).

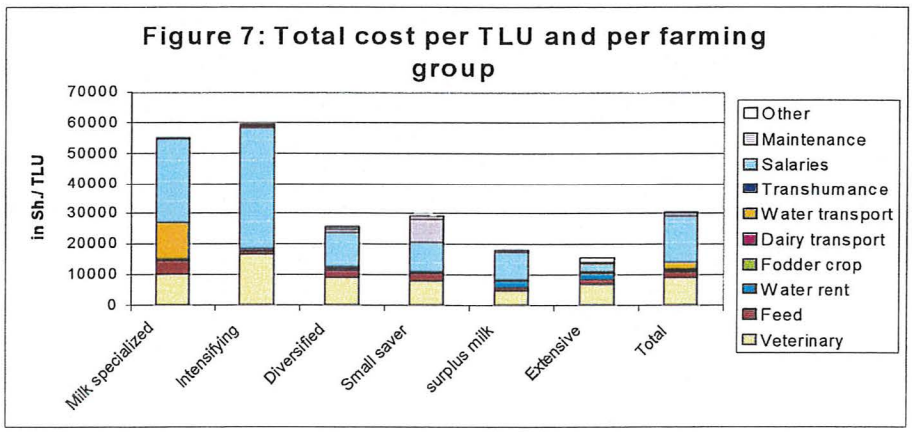
In the agricultural area, it is noted the increased part of milk cash in the revenue (more than 20% of the cash flow) with a lower level of animal sale (about 10%) compared with "saving" farmers in this area. It is also observed the important part of off farm income for the "intensive" and "modern" groups. Therefore, this important source of income beside agriculture has contributed to invest in the dairy system although the other types of farmers have short access to other financing. The non agricultural income for the « saving» group doesn't exceed 1 million Sh. against 5,5 millions for the intensive group even if the relative part of off farm income are similar.





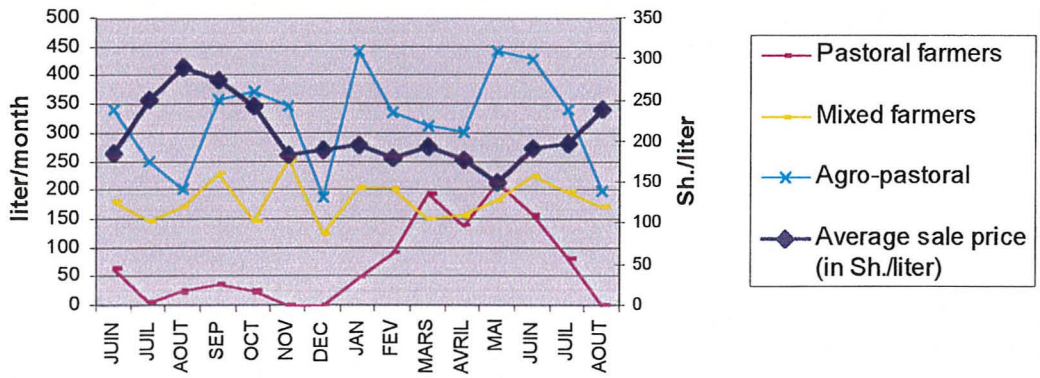
The potential sources of income estimated by the outcome of the produced milk multiplied by the average observed sale price show the relative importance of milk for the "extensive", "saving" and "surplus" farmers (Figure 6). The low commercialisation of milk in these groups answers to food and social fashions. In the « saving » group, despite the low level of sale, the milk consumption per household capita (estimated at less than 0.6 litre/day/capita) doesn't cover the recommended protein need. It is true that it is not taking into account the self consumption of meat.

The analysis of the production cost shows the importance of wage and veterinary expenditure in the market-oriented farmers. The wage expenditure reaches more than 60% for the modern and intensive farmers (Figure 7). This underlines a major handicap of the pastors whose family size is low maintained and not forgetting the physical distance of the milk centres that demand more time to assume the commercialisation. The men who are alone to milk cows and the number of which doesn't exceed 2 are most of the time going in search of feed resources. These farmers register important water charges as for the "surplus" farmers. The water shortage seasonally handicaps milk production.



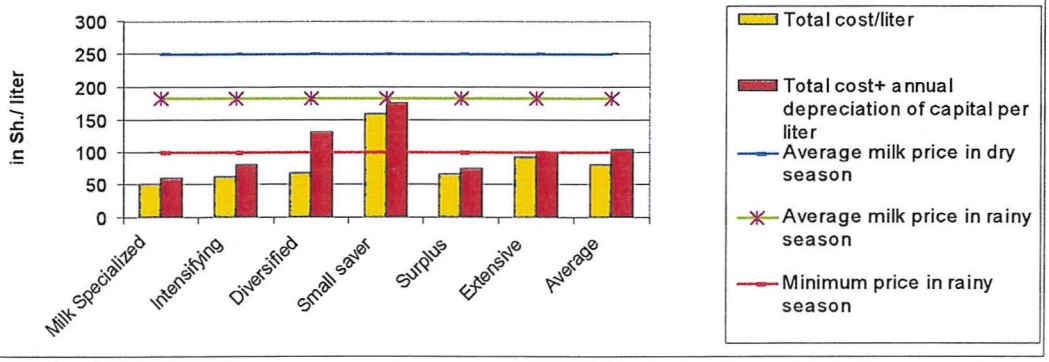
The total cost of production reduced to current expenditures (without taking into account the depreciation of the animal capital) are globally maintained below the average milk purchase price (estimated at 180 Sh./litre, survey data 1999-00) (figure 8). But the average data hides some imbalances between the geographical areas. In rainy season, the average purchased price in pastoral area (around 100 Sh./litre) doesn't allow to make profitable milk commercialisation in the extensive farms but in the "saving" farms too although farmers register the main expenditure in this period (seed, fertilizer purchases, etc.). As soon as taking into account the capital depreciation of materials and buildings, the « diversified » systems register a cost of about 150-160 Sh./litre (Figure 9). The margin is more important for the "intensive" and "modern" farms than it is observed in the graphic. The milk purchased price is established at 180 and 300 Sh./litre, respectively in rainy and dry season, compared to 100 Sh/Litre in rainy season and 200 Sh./litre in dry season in the pastoral area.

Figure 8: Trend of Milk sale (in liter/month) and milk sale price (in Sh./liter)



Therefore these results explain the weak incitation in pastoral area to sell milk, and the strong difficulties for the « saving » and « diversified » farmers to make milk profitable and advantageous. This analysis doesn't incorporate the live capital depreciation because of the strong relationships between milk and meat activities as well.

Figure 9: Comparison between annual production cost and seasonal milk price



Contrary to « diversified » systems in agricultural area in which farmers may make milk profitable by selling to neighbours or informal market at upper prices (15% to 20% are sold on private markets), the pastors are completely dependant on milk

collect centres (Pastel, 2001). Therefore milk public or private collectors may take into account the costs of production if they want to increase their milk collection but also encourage milk production in dry season with investment. The weak margin dampens investment and the herd renewal too.

But in order to understand the different logics, it is also necessary to distinguish the different objectives of animal keeping relate to farm family, regional entities or with taking into account the embodied capital value represented by animals against inflation in situations of insurance markets.

3.2. Approach of the farming viability

The farm viability is approached by the construction of the farm current account. This reconstitution has underlined different difficulties due to the strong imbrication of milk and meat activities, but also between agricultural and livestock activities (Coordonnier, 1986). If it is attempted to estimate milk contribution, the repartition of charges between the different activities are considered virtual to explain the economic advantages at the farm and family level but can help to appreciate the place of milk. The milk product is estimated by multiplying the total collected milk with the average yearly sale price. For the animal sales and purchases, the transactions relative to veal, heifers and cows (incorporated in the milk charges) and those relative to young male and male (incorporated in animal charges) are distinguished. To estimate the part of variable or structural charges in milk activity, it is used a ratio of weighting based on the milk TLU on the total TLU.

In table 3 and 4, are represented the main component of the breeding and farm current account and the contribution of milk. Firstly, it is noted the large part of milk (about 40%) in the net profit of the livestock activity for « saving » farmers. This shows the major role of milk production to the all development level of milk activity although a large part is self consumed. Milk and veal production yield interests around 8% against 3% in official bank (calcul). For the "surplus" and "extensive" farmers, livestock activities represent the main farm economic activities. If the pastors with the "diversified" farmers register the lowest net profit, the net profit per capita shows the high vulnerability of "diversified" system due to the importance of dependant family members. In term of cash flow, the pastors register the lowest level due to the weak integration to market (table 4). It is noted the good results of the farmers who decide to invest in milk activity ; therefore when financing is available, milk activity could be a very lucrative activity.

Table 3 : Current account of herd activity for the different types of farmers

	Extensive	surplus	saving	Diversified	Intensive	Modern
Milk sale	1 239 918	1359850	268463	1206874	2417570	9401124
Milk animal sale	1 038 250	978750	420000	382500	1846666	666666
Milk animal purchase	0	87500	66666	342500	263333	0
Total animal sale	1 875 750	2080500	830000	585000	3060000	2240000
Total animal purchase	0	87500	153333	412500	313333	3333
Animal Gross Product	***3 115 668***	***3 352 850***	***945 130***	***1 379 374***	***5 164 237***	***11 637 790***
Animal variable charge	574656	433350	124866	338650	447566	690466
Of which milk variable charge	261675	201523	51530	222979	197338	439550
Animal Gross margin	***2 541 012***	***2 919 500***	***820 263***	***1 040 724***	***4 716 670***	***10 947 324***
Animal structural charge	242100	580150	259000	278800	1194566	2319583
Of which milk structural charges	111969	316031	108296	180269	531480	1311690
Animal Net Profit	***2 298 912***	***2 339 350***	***561 263***	***761 924***	***3 522 103***	***8 627 740***
% Milk Net profit / Tota animal net profit	***32***	***33***	***40***	***24***	***56***	***54***
Net Profit /worker	***1 212 826***	***1 045 052***	***353 589***	***325 956***	***1 039 786***	***1 210 401***

Table 4 : Farm Current account for the different types of farmers

Item	Extensive	surplus	saving	Diversified	Intensive	Modern
Milk sale	1239918	1359850	268463	1206874	2 417 570	9401124
Animal sale	2278168	2251100	621797	1246874	4 000 903	10067790
Crop products' sale	750770	1919807	1789768	1071100	2 150 528	533653
Animal purchase	0	87500	153333	412500	313 333	3333
Total gross product	*4268858*	*5443258*	*2526695*	*3112349*	*8255 669*	*19999235*
Herd variable charge	574656	433350	124866	338650	447566	690466
Wage for temporary workers	101250	207500	11666	2000	0	36666
Agricultural charges	1250	2500	2500	2500	5000	23333
Tool, maintainance	20459	47472	29315	23459	16 296	65500
Permanent workers	67500	472500	240000	360000	240 000	390000
Herd structural charges	242100	580150	259000	278800	1 194 566	2319583
Agricultural profit	*326164*	*3699786*	*1859347*	*2106940*	*6352239*	*16473685*
Other agricultural incomes	28750	158500	13333	5000	851999	1200000
Other incomes	0	1065000	978666	750000	5720666	1200000
Total Net Profit	***3290393***	***4923286***	***2851347***	***2861940***	***12924904***	***18873685***
Net Profit / worker	***774210***	***661954***	***456215***	***289816***	***2009052***	***1811873***
Cash Flow	***1436626***	***3225084***	***2238113***	***1444128***	***10448091***	***6928463***
Cash Flow /worker	***338029***	***433624***	***358098***	***146240***	***1624055***	***665132***

But these results don't reveal all the social and economic weight of milk in the family due to the under estimation of the self consumption (Figure 5). For the 'extensive" and diversified systems, milk brings respectively 81% and 59% of daily protein intake.

Tableau 5 : Apport nutritionnel par groupe d'exploitation

	Intensive	saving	Extensive	Modern	Diversified	surplus
Calorie content / person	2202	2026	2723	2951	2420	3217
Milk Calorie content /person	1074	275	1462	2389	872	1208
% milk calorie/ total calorie intake	**49**	**14**	**54**	**81**	**36**	**38**
Protein content/ person	68	41	87	126	71	83
Mil protein content/ person	52	13	70	115	42	58
% milk protein/ total protein intake	**76**	**32**	**81**	**91**	**59**	70

Moreover it is difficult to quantify the all benefit from regular benefit when the markets for insurance are absent, but also in social term: cementing friendship, use during ceremonies, cash for immediate expenses, exchange of food. Therefore these current account under estimate the milk importance in the economic and social life for all the farmers.

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The reconstitution of the current accounts for each farm type allows to analyse and understand the milk strategies and essentially the decisions of sale or self consumption. The results confirm the weak advantage for pastors but also small farmers in agricultural area to sell milk. This is mainly due to the important degradation of the terms of exchange for these farmers (as has been already demonstrated in pastoral area) (Thebaud, 1988): the sale price doesn't exceed 100 Sh./litre in the rainy season, the main productive period. For the "saving" farmers, it is true that milk activity doesn't represent the main objective of these farmers who are in phase of investment. But if the milk market was more advantageous, they could increase their welfare. For the pastors, the milk consumption is quite a family priority and it explains the importance of milk product in the current account. Nevertheless, one cannot ignore the problems of infrastructure which explain the making decision relative to milk valuation. The weak benefit margin in the "intensive" farms must alert the deciders and developers whether milk production is a priority.

Therefore the joint statistical and economical analysis allows to think deeply about the farmers' behaviour analysis and to understand the making decision in matter of milk investment and economic valuation. Moreover the analysis of interaction between milk strategies and the different farm component by statistical factorial analysis could be an useful way to display the causal relationships without reducing information like in a regressive analysis.

Bibliography:

Bosman H.G., Moll H.A.J., Udo H.M.J., 1997. Measuring and interpreting the benefits of goat keeping in tropical farm systems, Agricultural Systems, 53.

Boutonnet J.P., 2000. Les conditions économiques du développement des productions animales. Chapitre du livre « Zootechnie comparée » à paraître. 32p.

Chalimbaud J., 2001. Mbarara Milk Project Workshop Proceedings. 28th – 30th November 2000. Rwizi Arch Hotel, Mbarara. Ministère des Affaires Etrangères/ République d'Ouganda/ Cirad-Emvt. Mars 2001. 75p. + annexes

Coordonnier, 1986. Economie de la production laitière. Technique et Documentation- Lavoisier. INRA. 218p.

Dabusti N., Vancauteren D., 1999. Les systèmes d'élevage du district de Mbarara (Ouganda) et leur contribution à la filière laitière – Diagnostic, dynamique d'évolution et recommandations pour l'action. Mémoire de Master développement Agricole Tropical option Valorisation des productions. Mars 1999. 276p.

Faye B., Grelet Y., 1990. Type d'élevage et profil de santé- Deux stratégies statistiques. Communication au colloque « Agro-industrie et méthodes statistiques ». Angers du 14-15 juin 1990. Association pour la statistique et ses utilisations, 111-125.

Faye B., 2000. Stratégie du dépouillement des données et préparation d'une seconde phase du projet laitier de Mbarara. Rapport de mission en Ouganda du 20 au 29 avril 2000. Ministère des Affaires Etrangères/ Ambassade de France en Ouganda/ Cirad-Emvt. Mai 2000. 17p. + annexes.

Moll H.A.J., Dietvorst D.C.E., 1999, Cattle marketing in Zambia, 1965-1995 : policies, institutions and cattle owners in the Western Province. In: H. Laurens Van der Laan, Tjalling Dijkstra and Aad van Tilburg, Eds. Ashgate, Aldershot 1999. Agricultural Marketing in Tropical Africa: contribution for the Netherlands.

Pastel B., 2001. Etude de la filière lait dans la zone de Mbarara (Ouganda). Mémoire de DESS Economie agricole internationale Développement durable et sécurité alimentaire, Paris XI-Orsay. (en cours)

Reardon T., Delgado C., Malton P., 1992. Determinants and Effects of Income Diversification Amongst Farm Households in Burkina Faso. Journal of Development Studies. 39p.

Starr M.A., 1987. Risk, environmental variability and drought-induced impoverishment: the pastoral economy of central Niger. International African Institute, 57(1).

Slingerland M., 2000. Mixed farming : Scope and constraints in West African Savanna. Ph D Thesis, Tropical Resource Management Papers, N°34, Wageningen UR, The Netherlands

Thébaud B., 1988. Elevage et développement au Niger. Quel avenir pour les éleveurs du Sahel ? B.I.T Publ., Genève, 138 p.

Tchayanov A., 1924. L'organisation de l'économie paysanne. Traduction d'Alexis BERELOWITCH. Ed. Maison des Sciences de l'Homme. 342p.

Van Ecbert M., Mombeshora B.G., Cousins B., 1989, Farmers objectives and livestock functions. In : people, land and livestock. Proceeding of the workshop on the sovio-economic dimensions of livestock productions in the communal lands of Zimbabwe, 12-14 september 1988.

Vatin F., 1996. Le lait et la raison marchande : essai de sociologie économique. Presses Universitaires de Rennes. 205p.