

Economics

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# Integrated farming systems for the improvement of smallholder dairy production in milk shed areas of Malawi and Zambia

(abbreviated project title: IFS-SMADAP)

## Illustrated Report

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## Summary

IFS-SMADAP was an ERA-ARD project within the seventh framework program of the European Union. Starting in November 2012 the project was concluded in May 2016. The project was funded by the Swiss Agency for Development and Cooperation (SDC) and the Belgium government. Together with partner institutions in Malawi dairy production was analysed on the basis of a baseline survey in which more than 500 farmers participated. Farm economic analyses revealed unsatisfying results on several farms, especially in the Blantyre region. Low milk yield was associated with severe problems especially related to feed production, feed quality, hygiene management and fertility problems. By means of a participatory research approach three main interventions were tested and implemented by lead farmers in the three main regions: Forage conservation techniques, improved feed ratios and installation of concrete floors. Further outputs of the project were research capacity building by realizing four master theses and the creation of documentation materials (video-clips, poster displaying several implementation recommendations) in order to train farmers.

## Zusammenfassung

IFS-SMADAP war ein ERA-ARD Projekt im Rahmen des 7. Rahmenprogramms der EU. Das Projekt dauerte von November 2012 bis Mai 2016 und wurde von der DEZA (Direktion für Entwicklung und Zusammenarbeit) und dem Belgischen Staat finanziert. Zusammen mit lokalen Partnerinstitutionen wurde die Milchproduktion in Malawi auf Basis einer Umfrage mit mehr als 500 teilnehmenden Landwirtschaftsbetrieben analysiert. Betriebswirtschaftliche Analysen ergaben auf einigen Betrieben unbefriedigende Ergebnisse, v.a. in der südlichen Region „Blantyre“. Schlechte Milchleistungen standen in Zusammenhang mit schwerwiegenden Problemen insbesondere bei der Futterproduktion und Futterqualität, beim Hygiene Management und bei der Fruchtbarkeit. Über einen partizipativen Forschungsansatz wurden drei Hauptmassnahmen in den drei Schwerpunktregionen getestet und bei sogenannten „Lead-Farmern“ (Betriebsleiter mit Vorbildfunktion) umgesetzt: Futterkonservierungstechniken, optimierte Futterrationen und Einbau von Zementböden in den vorhandenen Paddocks. Das Projekt stärkte zudem die lokale Forschung über die Finanzierung und Betreuung von vier Masterarbeiten sowie die lokale Ausbildung von Milchviehhaltern und -halterinnen über die Herstellung von Dokumentationsmaterialien wie Videoclips und Postern mit praktischen Handlungsempfehlungen.

## Résumé

L'IFS-SMADAP était un projet ERA-ARD réalisé dans le cadre du 7e Programme-cadre de l'UE. Il a duré de novembre 2012 à mai 2016 et a été financé par la DDC (Direction du développement et de la coopération) et le gouvernement belge. En collaboration avec des institutions partenaires locales, la production laitière au Malawi a été analysée sur la base d'une enquête à laquelle ont participé plus de 500 exploitations agricoles. Selon les analyses économiques réalisées, la situation a été qualifiée d'insatisfaisante dans certaines exploitations, situées en particulier dans la région du Blantyre, dans le sud du pays. Les mauvaises performances laitières constatées ont été associées à des problèmes graves, surtout dans le domaine de la production et de la qualité du fourrage, de la gestion de l'hygiène et de la fertilité des vaches. Dans une démarche de recherche participative, trois mesures principales ont été testées dans les trois régions les plus importantes du pays et en collaboration avec des «lead farmers» (agriculteurs avec un rôle d'exemple): techniques de conservation du fourrage, optimisation des rations alimentaires et construction de sols en ciment dans les paddocks existants. Par ailleurs, ce projet a permis de renforcer la recherche locale grâce au financement et à l'encadrement de quatre travaux de Master de même que la formation des détenteurs-trices de vaches laitières, grâce à la création de supports documentaires comme des vidéo-clips et des posters comportant des recommandations pratiques.



# 1 Project Organisation

IFS-SMADAP was an ERA-ARD project within the seventh framework program of the European Union. Starting in November 2012 the project was concluded in May 2016. The project was funded by a combination of the Swiss Agency for Development and Cooperation (SDC) and the Belgium government. The following research institutions were involved:

- Department of Agricultural Research Services, DARS (Sub-Coordination), Malawi
- LUANAR, Lilongwe University of Agricultural and Natural Resources, abbr. "Bunda College Campus", Malawi
- Msekera research station of ZARI (Zambian Agricultural Research Institute)
- Institute for Agricultural and Fisheries Research, ILVO, Belgium
- Agroscope, until 31st Dec. 2013: Agroscope Reckenholz-Tänikon, Switzerland

Agroscope was responsible for the research coordination.

## 2 Status Quo and existing challenges

A spacious baseline survey provided a lot of insights into the current smallholder dairy<sup>1</sup> production systems of Malawi (529 dairy farmers from all three regions Mzuzu, Lilongwe and Blantyre) and Zambia (130 dairy farmer from Eastern Zambia), which facilitated the description of crop-dairy production systems for each region. In addition feedback meetings were held with farmers at the milk bulking group. A detailed economic analysis then revealed the problems and identified the main driving factors for economic performance.

### 2.1 Malawi

#### Illustration 1: Zero-grazing production system ("cut and carry")



*Photo 1: Animals with improved dairy genetics are not immunised against infections by tropical animal diseases, which can be transmitted by ticks during grazing. Therefore, nearly all Malawian dairy farmers in the survey practised the zero-grazing system.*

With the cut-and-carry system, feed has to be collected and carried to the cow. This system has replaced the traditional grazing system for the Zebu-breed. Farmers, especially those in the Central and Northern regions, were trained in this system by former development projects, although severe problems are still present.

<sup>1</sup>"Dairy" in this case means milk production from cows that has improved genetics in terms of milk yield.

**Illustration 2: Forage production, fodder conservation and water supply**



*Photo 2a: Only 30% of the interviewed farmers cultivated forage crops. 75% of the cultivated forage was Napier grass, followed by Rhodes grass and others. Three quarters (75%) of the farms provided feed supplements like concentrates or by-products.*



*Photo 2b: Only 37% of the interviewed farms adopted forage conservation techniques. Therefore, in most farms, dairy cows experienced feed scarcity during the dry period (of 7-8 months).*



*Photo 2c: Conserved forage is usually cut in the late growing stage and so has poor nutritional value. One reason is the lack of appropriate cutting tools that would enable more frequent cutting in the early growing stages. The main forage is natural grass, which also has to be collected far away from common areas, as well as from along the streets.*





*Photo 2d: Continuous water provision is not standard on every farm. This is not so much due to water scarcity, but more because of other reasons like e.g. the fear of poisoning by jealous neighbours.*

Cultivation of improved forage crops, appropriate cutting management and fodder conservation techniques are the key success factors for improved production. Most of the problems, in terms of animal health and fertility, are connected with insufficient feed provision, which caused huge economic losses. As a result of the dissemination activities, more and more farmers have become aware of these coherence and are trying to improve their production systems.

### **Illustration 3 : Hygiene and Mastitis**



*Photo 3a: 20% of the farmers interviewed had a poor kraal (pen) without any shade or a stabilised floor. Only 37% of the farms had "modern" kraals with a roof and a stabilised floor. The others had something in between.*



*Photo 3b: A considerable amount of cows were kept in poor housing systems. The financial situation of many households did not allow any investment. What is more traditionally farmers did not have any knowledge about dairy farming. Nevertheless, they bought dairy heifers in order to improve their household income, even in Blantyre, where no promotional programmes were in progress.*



*Photo 3c: Housing systems without the provision of shade causes severe stress for the cow, which greatly affects their fertility and milk yield. In addition, cleaning of the kraal and manure management is labour intensive and can be even impossible during the rainy season.*



*Photo 3d: Hygienic milking in such poor housing systems is a huge challenge and hardly practicable in the long run.*

A proper dairy infrastructure is a precondition of producing milk that complies with the minimal hygienic standards. This reduces the risk for mastitis. Mastitis was one of the main challenges that was mentioned by farmers at the feedback meetings. Less mastitis improves the dairy economy substantially. In general, the labour input for kraal cleaning and manure management can be improved by providing proper housing systems. These were specially constructed by lead farmers and could be emulated by neighbour farms.

#### Illustration 4: Fertility and dairy economy



*Photo 4: The economic analysis revealed there were significant differences between the regions. In the South (Blantyre), a lot of farms had small or even negative income. Fertility is unsatisfactory in all regions, according to the long calving intervals. Self-sustained animal reproduction is not possible with the present fertility performance.*

Farms with bad economic performance had very long calving intervals, which was related to bad management practice in terms of feeding, animal health or animal housing. Furthermore, the widespread use of the Holstein-Friesian breed has caused problems because it has not adapted to the poor inputs that have been provided. Nevertheless, the provision of animals on loan (the pass-on program) was combined with training on animal health services, feeding and the establishment of proper housing systems that has been given to achieve an acceptable income, at least in the short term. The economic performance results, which were presented at the final project-workshop, had sensitized stakeholders.

#### Illustration 5: Breed type



*Photo 5: The pure Holstein-Friesian breed had been promoted in Malawi by the government and NGOs for the past 15 years. Currently stakeholders are realising that the climate conditions and feeding systems of smallholder farmers in general don't match the high yielding breeds.*

The establishment of a breeding strategy (a stud-book) for local Zebu that was refined with tropical breeds by emphasising milk production (Sahiwal, Gyr) is highly recommended. On this basis, heifers can be crossed with moderate high yielding breeds and, as a result, show also better secondary performing traits (such as fertility, longevity and persistence).

## 2.2 Zambia

### Illustration 6: Production systems in Eastern Zambia



*Photo 6a: Development of production systems in Eastern Zambia is behind the Malawian situation. It was obvious that programs by the government or NGO for developing dairy production were absent.*



*Photo 6b: 87 out of 130 interviewed farmers in Eastern Zambia are keeping only Zebus in a traditional system, while waiting for a dairy cow provided by an NGO or government program.*



*Photo 6c: Zero-grazing systems are practiced only by 19 of 43 dairy farms (44%). Land availability is not a problem, like in Malawi, but water availability did seem to be a real challenge.*

Development of dairy production in Eastern Zambia hasn't started yet (2013). There are some lone fighters with different breed types but no clear, unique strategy for successful dairy production in the region. Land scarcity is not a problem and the potential would be there if Zambian agriculture had the same status as in Malawi.

### 3 Identified strategies for improvement

After completing a baseline survey, the following project activities were only related to the Malawian dairy production because the collaboration with the Zambian partner was terminated.

Strategies were developed by the farmer's participatory research approach. Feedback meetings that were held after the survey resulted in 5 strategies:

- 1) adapted feed rations and water availability
- 2) feed conservation technique
- 3) prevention of mastitis
- 4) economic analysis of the present situation
- 5) manure management

While Blantyre had the worst economic results it was gratifying that implementation of the strategy was far-reaching in its success. On the other hand, the two other studies only dealt with four farmers each. It is unfortunate that the reasons for this limited extent were due to restricted funds, which was a consequence of insufficient communication by the representatives of Bunda College and their low level of commitment.

#### Illustration 7: Improving housing systems by constructing concrete floors



*Photo 7a: Thanks to the project, an on-loan program could be established in different Milk Bulking Groups (MBG) in Blantyre. Cement was provided by the MBG to selected lead farmers. The farmers paid back the cement to the MBG through milk price deductions, which also integrated other farmers within the MBG into the program.*



*Photo 7b: Prevention of mastitis has improved significantly as a result. Cleaning of the floor has also become much easier.*

The outcome of the 30 lead farmers was clearly visible. Compared to the reference group, the prevalence of mastitis found on concrete floors was significantly lower than on natural floors.

### Illustration 8: Formulating adapted feed rations



*Photo 8a: Exhausting the potential of high yielding genetics is practically impossible in a tropical climate. Nevertheless, feed rations need to be optimised, not only to increase the milk yield, but also to reduce fertility problems. Due to the lack of financial resources, farmers often do not feed supplements to improve the poor diet, which is based solely on natural grass.*



*Photo 8b: Field trials resulted in appropriate feed rations, which contained Centrosema Pubescens, groundnut halms and green maize stover in order to increase milk yield at reasonable costs.*

As previously mentioned, the trials were only conducted on 4 farms. Up and coming initiatives now need to follow up on these trials, so as to achieve widespread implementation on the farms.

**Illustration 9: Forage conservation techniques**

*Photo 9a: Together with improved feed ration cultivated forage like Centrosema p., Napier grass or Rhodes grass has to be conserved for the dry period. Another important issue was the cutting stage, which was investigated by another farm trial.*



*Photo 9b: The farm trials showed the nutritional advantage of an early cutting stage. This trial was conducted only on four farms, as well. The topic is still just at the beginning and will require special attention in the future because necessary investments (such as conservation facilities, improved cutting tools for younger grass) make it more complex.*

## 4 Dissemination

### 4.1 Project activities

In the final stage of the project, Agroscope and the DARS representative were focusing on the dissemination of the baseline survey's conclusions and implementing the farm strategies. The dissemination comprised of the following outputs:

- A final workshop with stakeholders
- Video clips
- Poster
- Exchange visits between the farmers
- Presentation of the results abroad.

#### Illustration 10: Dissemination



*Photo 10a: The results from the baseline survey and master thesis were presented at a project workshop. A total of 25 stakeholders of different organisations from all around Malawi discussed the presentations and collected several messages to take home.*



*Photo 10b: The main messages for the current challenges at smallholder dairy farms in Malawi were addressed in four short video clips (forage production, feeding, fertility management and hygiene management). The clips will be free available in the web and can be used for training of experienced or new dairy farmers.*



*Photo 10c: Parallel to the video clips, the main messages were displayed on a poster which was distributed to 2000 smallholder dairy farmers and 15 milk bulking groups.*





Photo 10d: Malawi-researchers participated in the IFCN conference in 2014 (Italy) and 2016 (Belgium).



Photos 10e: The IFCN (international Farm Comparison Network) enhanced research capacity and knowledge exchange also between developing countries.

With the widespread distribution of the project findings, it's expected that daily work on dairy farms will be affected in terms of improving the performance of dairy production. But their efforts will certainly have to be continued because important aspects still have to be implemented.

## 4.2 Outlook

At the final phase of the project, dissemination was emphasised through different means. Some stakeholders affirmed the implementation of the project insights by continuing necessary management improvements in Malawian dairy production at smallholder level. This was given a special mention by a TAPP (Trustees of Agricultural Promotion Programme) representative, Winfried Chanza, Head of programmes. TAPP is an NGO that is supported by the Development Fund of Norway, among others.

In general, the project has founded a base that will facilitate in a sustainable direction. There are already several ideas for improvements that are mainly limited by financial resources. Further funding is necessary to continue the on-loan concept, which could be implemented for different production means by using:

### Cement:

This needs to be continued and enlarged in other regions of the country to improve dairy infrastructure and avoid the losses caused by mastitis and the bad quality of milk.

### Cutting tools (scythes):

Farmers should be provided with the appropriate tools (scythes) to enable several cuts in the rainy season. This will both improve the quality of forage and reduce dependence on expensive concentrates or by-products. These scythes should be produced locally if possible.

Some more efforts are needed to train farmers and the extensions workers. The following topics should be emphasised as being of priority:

- Conservation methods (such as cutting stages, conservation technique and storage)
- Appropriate cow feed rations, according to the local area
- Feeding in general during different lactation periods
- Improving cow comfort (through bedding systems and hygiene)
- Calf management
- Manure management

Last but not least, a breeding strategy for the whole country should be tackled as a priority. Therefore, official institutions have to go ahead and define the objectives and import the appropriate semen. After that, a stud-book should be introduced with records for every dairy animal.

Further information

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