

# Study on the Kenyan Animal Feed and Fodder Sub-sectors

## Summary Report

(Sub-report I)

BLGG Consortium



BLGG RESEARCH



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## 1. BACKGROUND OF THE STUDY

This report is the result of the study: “Animal Feed and Fodder Sub-Sectors in Kenya”. This study was commissioned by the SNV Netherlands Development Organisation (SNV). SNV is an international not-for-profit development organisation that provides capacity development services to nearly 2,500 organisations in over 30 countries worldwide.

In the East & Southern African region, SNV operates in 9 countries: Ethiopia, Kenya, South Sudan, Uganda, Tanzania, Rwanda, Zambia, Zimbabwe and Mozambique. In Kenya, SNV focuses on horticulture, dairy and extensive livestock, water and sanitation and renewable energy (biogas). In the dairy sector SNV Kenya is implementing the Kenya Market-led Dairy Programme (KMDP).

### 1.1 Kenya Market-led Development Programme (KMDP)

The Kenya Market-led Dairy Programme (KMDP) is a 4.5 year programme funded by the Embassy of the Kingdom of the Netherlands. The programme started 1st July 2012 and is implemented by SNV Netherlands Development Organisation in collaboration with stakeholders in the dairy industry.

The overall goal of KMDP is to contribute to the development of a vibrant dairy sector with beneficiaries across the value chain. KMDP acknowledges and appreciates that the dairy industry in Kenya is private sector driven. The programme will aim to work with all value chain actors to enhance growth and efficiency that will eventually lead to increase in production, incomes and employment. KMDP has two pillars also termed as project objectives:

#### **Objective 1: Increase efficiency, effectiveness and inclusiveness of the dairy value chain.**

Under this objective, the project will work in milk sheds, with processors and farmers’ Collection and Bulking Enterprises (CBEs), willing to invest in extension, improved input and service provision, milk quality and building strong mutual business relations by honouring milk supply contracts. KMDP will also work with input suppliers and service providers with an aim to promote inclusiveness and sustainability.

#### **Objective 2: Promote innovative models that address systemic issues in the sector**

There are numerous systemic issues that constrain the growth of the value chain. Though there are sector institutions mandated to address the sector issues, capacity and resource constraints, as well as overlapping mandates, have incapacitated these institutions from effectively addressing systemic issues. Under this objective and during its Inception Phase (1 July 2012 – 1 April 2013), KMDP has commissioned a number of studies for analysis and recommendations at sector level. This study on the animal feed and fodder sub-sectors in Kenya, was part of the Inception Phase and provides recommendations for interventions during the Implementation phase.

During the Implementation phase (1 April 2013 – 31 December 2016), KMDP will strive to facilitate public and private sector players to pilot innovative solutions, aimed at addressing some of these the systemic issues identified during the Inception Phase.

## 1.2 Objectives of the study and Terms of Reference

The general objectives of this study were:

- To get a deep insight in the current state of affairs, trends and factors that affect the performance of the animal feed and fodder sub-sectors.
- To trigger actions and interventions policy and producer level directed to enhancing growth, competitiveness and quality within these sub-sectors.
- To develop a project(s) with industry stakeholders to build capacity in these sub-sectors, for growth and competitiveness of both the animal feed industry and livestock sector.

This study can be conceptualized as (contributing to) a value chain analysis of both feed and fodder supply chains. The value chain concept puts all the concerns raised on systemic and efficiency issues in a more structured framework that makes it easier to highlight bottlenecks and intervention areas. In this study, focus will be on the systemic (policy) and value chain issues (input/output) in the framework, and less on support services.

This study is partitioned in to two sub-studies, one that addresses the feed manufacturing industry and the other looking at aspects of fodder commercialization.

### 1.2.1 Sub-study I: Feed manufacturing industry or sub-sector

The feed study focused on policy issues that hamper growth of the industry and objective mapping - through sampling and analysis - of inconsistencies and anomalies in raw materials and end products.

The objectives of this part of the study are therefore:

- a) Validate the concerns of the feed industry in bringing out the raw material “gap” in terms of availability and affordability of quality ingredients.
- b) Analyse and depict the industry’s cost structure of production.
- c) Inform the feed industry and policy makers about the nutritive value and variation in nutrient composition of key feed ingredients and dairy meals, and provide the basis for policy changes on importation of ingredients and conducting routine feed and ingredient analyses.
- d) Inform the feed manufacturers of the dangers of using formulations based on book values against varying ingredient nutrient composition, and consequences of lack of a consistent product quality control program.

### 1.2.2 Sub-study II: Fodder sub-sector

The fodder sub-study had the following objectives:

- a) Inform the industry on trends and opportunities in specialization and commercialization of fodder production in Kenya and in the Netherlands.
- b) Inform the industry on nutritive value of main conserved fodders like hay, Lucerne and maize silage for both large scale and smallholder dairy farming.

## 2. BLGG CONSORTIUM

To effectively address the wide scope of the study a consortium of both national and international companies was formed consisting of the following parties:

- BLGG Group
  - BLGG Research bv (project leader)
  - BLGG Kenya Ltd
  - AgriQ Quest Ltd
  - BLGG AgroXpertus bv
  - Sica AgriQ S.L.
- ABS TCM Ltd
- Perfometer Solutions

### 2.1 BLGG Group

BLGG Group has its headquarters in Wageningen, the Netherlands, but operates various laboratories in European and African countries, such as Germany, Russia, Spain, Kenya and Morocco. Five members of the BLGG Group contributed to this study: BLGG Research bv. ([www.blgg-research.nl](http://www.blgg-research.nl), project leader) BLGG Kenya Ltd., AgriQ Quest Ltd. (<http://www.agriq-questlaboratory.com>), BLGG AgroXpertus bv. ([www.blgg.agroxpertus.nl](http://www.blgg.agroxpertus.nl)) and Sica AgriQ S.L. (<http://www.sicaagriq.com>).

BLGG Group and its daughter companies hold a range of accredited (ILAC) analyses on feed nutrition (both classic as well as with Infra-Red Spectroscopy), and contaminants such as pesticide residues, mycotoxins and heavy metals. The European laboratories of BLGG Group are all accredited by full member accreditation councils of ILAC. The Kenyan Laboratory within BLGG Group holds an accreditation of KENAS, this body is not a full member of ILAC but an affiliate member. The analyses for this study are performed by the ILAC accredited laboratories.

#### 2.1.1 BLGG Research bv

BLGG Research bv (the Netherlands) is the research group of the BLGG group. BLGG Research is responsible for the knowledge development and knowledge implementation of activities related to sampling, analysing and advice. Animal nutrition and feed/fodder quality is an important research area of BLGG Research. BLGG Research is the project leader of the AECF project entitled: "Improved small holder farmer livelihoods by using infrared spectroscopy for soil analytical advisory services" which is carried out in Kenya.

#### 2.1.2 BLGG Kenya Ltd

BLGG Kenya Ltd. (Kenya) is the subsidiary company of the BLGG Group and represents BLGG in East Africa. The objective of BLGG Kenya is to implement the technologies and knowledge developed by the BLGG Group companies in Eastern Africa. Currently BLGG Kenya is leading a project dedicated to offer affordable and easy to understand fertilization recommendations for small holders in Kenya.

### **2.1.3 AgriQ Quest Ltd**

AgriQ Quest Ltd. (Kenya) has been established in 2008 as an agricultural, environmental and food safety laboratory in Nairobi, Kenya. As part of the AgriQ Group its emphasis is with the analyses of contaminants in food and the environment such as pesticide residues and heavy metals. AgriQ Quest also operates an independent sampling team with Kenya and neighbouring countries and has been working as such for various companies and organizations such as the IRC, RTI International, Albert Heijn, MPS and KEBS, etc.

### **2.1.4 BLGG AgroXpertus bv**

BLGG AgroXpertus bv (the Netherlands) has over 80 years' experience in sampling and analysing feed, soil and manure/compost for the agricultural sector, including additional advice and recommendations concerning fertilization and feed rations in the animal husbandry sectors. Yearly around 500.000 samples are analysed.

With its sampling, analytical and advisory activities, BLGG AgroXpertus plays a supportive role in agricultural and horticultural production, thereby improving production, quality and reducing production costs. BLGG AgroXpertus offers sampling, analyses and advice on nutrient content and quality of raw materials, feeds, soil, manure, water, substrate and crops to a majority of farmers in North East Europe. In addition, BLGG AgroXpertus analyses fresh produce for food-safety purposes and offers advice regarding pesticide residues or other contaminants and microbiology to primary producers as well as the (agro-)food and feed processing industry. BLGG AgroXpertus is ISO 17025 accredited for the analyses of a wide range of nutritional value parameters in feeds and raw materials with both classic as well as Infra-Red Spectroscopy methods. BLGG AgroXpertus forms the centre of excellence in nutritional values for feeds and fodder within the BLGG Group.

### **2.1.5 SiCa AgriQ S.L.**

As a subsidiary of the BLGG Group, Sica AgriQ S.L. (Spain) is a specialized laboratory for contaminants in food/feeds. The lab is ISO 17025 accredited for a wide range of pesticide residues and mycotoxins. Sica AgriQ forms the centre of excellence of contaminant analyses within the BLGG Group.

## **2.2 ABS TCM Ltd**

African Breeders Services/Total Cattle Management Limited (ABS TCM Ltd [www.abstcm.com](http://www.abstcm.com)) is a distributor for American Breeders Service (ABS Global) based in Nairobi. ABS TCM Ltd has partnered with development organisations like and O'Lakes Inc., Heifer Project International, Technoserve Inc, International Livestock Research Institute (ILRI), ICRAF, SNV and AESA Consulting in over 10 of dairy programmes in Sub Sahara Africa. In Kenya, ABS TCM Ltd. maintains fully staffed facilities for genetics distribution, liquid nitrogen production and a feed analysis laboratory, all backed up with competent teams of milk quality service and nutrition consultants.

## **2.3 Perfometer Solutions**

Perfometer Solutions (Kenya) is a young firm whose founder has been engaged in various dairy development programmes in Kenya, notably in the area of extension and local service provision on fodder establishment and management for smallholder dairy farmers. Prior to this study Perfometer Solutions carried out an inventory of development actors engaged in feed and fodder management and prepared a listing of publications and training materials on the same.



### 3. METHODOLOGY & APPROACH

The study was conducted using several methodologies and approaches and was action-oriented rather than academic. The following were the methods of data collection and analysis:

- Review and analysis of various relevant studies and reports on animal feed and fodder in Kenya, including their recommendations with focus on filling the gaps.
- Desk study and literature review on animal feed policies and regulations in Kenya.
- Linking up with existing knowledge and initiatives of relevant stakeholders in Kenya.
- Analysis of approximately 150 animal feed and fodder samples for nutritional value and contaminants (pesticides, mycotoxins, salmonella and heavy metals).
- Interviews and questionnaires with relevant stakeholders in the Kenyan animal feed and fodder sub-sectors.
- Two workshops in Nairobi, one at the start of the study (23<sup>rd</sup> October 2012) to validate and prioritize the objectives and methodology of the study with the stakeholders. And a second workshop the end of the study (25<sup>th</sup> April 2013) to present and discuss the study findings with the stakeholders.

## 4. STRUCTURE OF THE STUDY AND THE REPORT

The study was divided in a number of sub-studies that resulted in the sub-reports that are listed in Table 1. The current document is sub-report I: Summary report.

**Table 1.** Study on the Kenyan animal feed and fodder sub-sectors: Overview of sub-reports

No	Title	Author
I	<b>Summary report</b>	<b>BLGG Consortium</b>
II	Dairy sector structure	BLGG Research bv
III	Kenya feed industry policy and regulatory issues	ABS TCM Ltd
IV	Interviews and HACCP audits of Kenyan feed manufacturers	BLGG Kenya Ltd/ AgriQ Quest Ltd
V	Quality analysis of animal feedstuffs and fodders in Kenya	BLGG Research bv
VI	Trends in the Kenyan fodder sub-sector	Perfometer Solutions
VII	Trends in the Dutch fodder sub-sector	BLGG Research bv

### 4.1 Sub-report I: Summary report

This sub-report is the overall summarizing report of this Animal Feed and Fodder study. It describes the consortium contracted for this study and gives information on the study background, objectives, and methodology. In addition, the structure of the report (including its sub-reports) is clarified and all the summaries of the sub-reports are included. This summarizing report ends with the main conclusions and recommendations of the study.

### 4.2 Sub-report II: Dairy sector structure

This sub-report looks at the feed/fodder sector from a different perspective, not in isolation, but as part of a bigger system and – therefore – at a higher level of analysis. It takes the dairy sector as the system that drives the “industry” of input, suppliers and service providers, including the feed/fodder sub-sectors. In doing so, this synthesis report tries to:

- Describe, analyse and understand the deeper underlying causes and forces at work in the system, and how they impact upon the industry, both on the larger dairy sector and the feed and fodder sub-sectors.
- Identify key factors in the structure of the industry that pose barriers for development of the dairy and the feed and fodder sectors;
- Give recommendations and propose solutions to address bottlenecks in the structure of the industry.

Chapter 2 of this report shortly describes the structure, trends and emerging issues of the Kenyan dairy sector. Chapter 3 introduces a conceptual tool to analyse and better understand the structure and development phases of a dairy industry, and the interaction between private and public initiatives and demands for policies and regulation. Chapter 3 introduces the Dairy Sector Life Cycle concept and describes the dairy sector development phases in NW Europe/the Netherlands.

Chapter 4 contains a system analysis to describe and better understand the behaviour of (interacting) entities and stakeholders in the dairy sector. The concept of the Maturity Index (MI) is used to explain the “inability” of entities to effectively align and interact in one and the same system, if they are operating in different development phases and have diverging Maturity Indices. This chapter also gives recommendations and suggestions on how this non-alignment could be addressed and overcome. Chapter 5 revisits the former sections and tries to benchmark the present day Kenya dairy sector against the Dairy Sector Life Cycle, in order to see what lessons could be learned as regards to the key drivers for sector integration and convergence. Finally, Chapter 6 gives a summary of the major conclusions and recommendations.

### **4.3 Sub-report III: Kenya feed industry policy and regulatory issues**

This sub-study reviews the policies and regulations regarding the Kenyan feed industry and identifies the main issues that hamper its growth and competitiveness. It identifies the gaps and issues in the policy and regulatory environment and gives recommendations for improvements. It also reviews the role and functioning of the Association of Kenya Feed Manufactures (AKEFEMA).

This sub-study was conducted using literature study (including previous relevant reports) and interviews with various stakeholders and was carried out by ABS TCM Ltd.

### **4.4 Sub-report IV: Interviews and HACCP audits of Kenyan feed manufacturers**

This sub-report consists of two parts: sub-report IV.1 and sub-report IV.2. Sub-report IV.1 covers the interviews with Kenyan feed manufacturers which were held as part of a questionnaire. In total 18 feed manufacturers were interviewed on their view of the main issues and constraints in the animal feed sector. <sup>3</sup>This sub-study was carried out by BLGG Kenya Ltd.

Sub-report IV.2 covers the HACCP audits of three Kenyan feed manufacturers, which was done to serve as an illustration of a high, medium and lower level company in the sector. The survey has no statistical value. This sub-study was carried out by AgriQ Quest Ltd.

### **4.5 Sub-report V: Quality analysis of animal feedstuffs and fodders in Kenya**

This sub-study covers the quality analysis of several animal feedstuffs and fodders in Kenya. Samples of animal feedstuffs and fodders were taken and analysed for their nutritional value and the presence of contaminants: pesticides, mycotoxins, heavy metals and salmonella. In addition, an existing database of nutritional value of Kenyan dairy meals was analysed. Results are presented and compared with the KEBS standards regarding nutritional value and contaminants. This sub-study was carried out by BLGG Research BV.

### **4.6 Sub-report VI: Trends in the Kenyan fodder sub-sector**

This sub-study reviews trends in Kenyan fodder sub-sector and describes initiatives and opportunities in specialization and commercialisation of fodder production. It also describes the bottlenecks for smallholders to establish and preserve own fodder on-farm, and extension models that have been practised by development agencies. This sub-study was carried out by Perfometer Solutions.

**4.7 Sub-report VII: Trends in the Dutch fodder sub-sector**

This sub-study gives some major trends in the development of the Dutch dairy sector, notably on the use of the major fodder crops, increase in nutritive values and the introduction of new farm mechanisation and fodder preservation technologies.

## 5. SUMMARIES OF SUB-REPORTS II - VII

### 5.1 Sub-report II: Dairy sector structure

The growth and competitiveness of the feed and fodder sub-sectors largely depend on the structure and functioning of the wider dairy (or livestock) sector in terms of the latter's competitiveness, regulatory environment, policies, consumer demands and growth path.

Although portraying a simplified structure of the Kenyan dairy industry, Chapter 2 of this report shows that the sector's structure is complex and consists of many entities with different production systems, levels of organisation, marketing channels, products of varying quality and levels of value addition and differentiated end-markets and accompanying consumer demands. The structure is characterized by fragmentation and segmentation, and stakeholders that operate at different levels of development and maturity.

Chapter 3 introduces a conceptual tool to analyse and better understand the structure and development phases of a dairy industry, and the interaction between private and public initiatives and demands for policies and regulation. Chapter 3 introduces the Dairy Sector Life Cycle concept and describes the dairy sector development phases in NW Europe/the Netherlands. It shows amongst others the important roles of the public and the private sector, and how these roles shifted over time in line with increased maturity level of the sector. It also highlights how this impacted on the feed sector and how this sector developed and matured hand-in-hand with systemic changes in the dairy industry, consumer awareness and demands, and in turn also spurred growth of the dairy industry through technology breakthroughs.

Chapter 4 contains a system analysis to describe and better understand the behaviour of entities and stakeholders in the dairy sector. The concept of the Maturity Index (MI) is used to explain the "inability" of entities to effectively align and interact in one and the same system, if they are operating at different stages of development and have diverging Maturity Indices. It is shown that cooperation between companies and sub systems, is more successful when MIs are more uniform (the closer the MI of the companies/sectors, the more successful their cooperation will be).

Chapter 5 revisits the former sections and tries to benchmark the present day Kenya dairy sector against the Dairy Sector Life Cycle, in order to see what lessons could be learned. Compared to the situation in the Netherlands in the mid-20th century, the Kenyan dairy sector is much more heterogeneous. A key factor for integration and harmonization of the dairy sector in the Netherlands in the 1950-ies was the role of Government. Despite the more complex present day situation of the dairy sector in Kenya as compared to the Netherlands 60 years ago, it is argued that in the current dispensation of the dairy and the feed sector, the Kenyan government should play a much more pro-active role in sector governance. This involves both policy making and regulation, and sector development. As for the latter, notably the important role of government in dairy education, training and knowledge transfer, was key in the Netherlands for driving development in the sector. It is further concluded that a second pillar for sector integration and bringing sanity and order into the dairy and feed industry, concerns the need for value actors to organise themselves in effective cooperatives, industry associations and sector platforms.

The private sector can take more initiative to tackle systemic issues that affect the sector as a whole, be it productivity at farm level, breeding, feed and fodder, milk quality and costs and quality of feeds and fodder. Even in the absence of effective government regulation and enforcement (and thus level playing field), there is scope for self-regulation and investing in stronger more quality-driven and integrated milk and feed/fodder supply chains. The same applies for AI services, for example if importers and distributors of semen would employ, train, certify and supervise “own” inseminators. Rather than to depend on private technicians - of dubious skills and business ethics - over which they have no control.

In chapter 5 the model of the Dutch Product or Commodity Boards is introduced, as an example for creating strong and effective public-private institutions, to spearhead the dairy and the feed industry. These Boards have a wide mandate for policy making, sector regulation, enforcement and sector development. They are managed by the private sector but supervised by government. The Boards have a mandate to levy contributions from the industry and – during the first decades of their existence - received robust additional government funding. The Boards have representation from stakeholders across the sector or production column.

Chapter 6 gives conclusions and recommendations for the dairy sector and the animal feed sector. Not surprisingly considering the previous chapters, these centre on:

- a) The need for a more prominent role for government in sector governance and sector development, the latter especially with regard to training and knowledge transfer.
- b) Establishing effective sector institutions with shared public-private representation and a wide mandate.
- c) Private sector organisation and self- regulation.

As for the feed sector the following recommendations are made:

- a) Government should be more pro-active in creating the necessary structure and legislation for example regarding raw material imports and quality standards, chain management and licensing of feed manufacturers (crowding out the informal sector).
- b) Access of feed manufacturers to year round quality raw materials can be improved by reforms in import regulations and duties and stimulating local production and processing of raw materials.
- c) Independent, credible, laboratories should be created to ensure the quality of animal feed via regular testing and analysis.
- d) Leading animal feed manufacturers – within and outside AKEFEMA - should cooperate to create and lobby for the necessary structure and legislation for further development of the Kenyan feed sector. They could also work together on putting internationally accredited animal feed and fodder testing facilities in place. Possibly in partnership with international laboratories and donor agencies.
- e) The concept of an Animal Feed Board that brings together all policy, regulatory and sector development issues in one institution could be a way out for the systemic bottlenecks that are plaguing the feed industry. Such an institution should be governed by all major stakeholders in the sector like Government, AKEFEMA, farmers’ associations (dairy, meat, poultry), animal products processing industry (e.g. KDPA), consumer platforms. The Dutch Animal Feed Board could serve as an example of such an institution.

Lessons learned from other - more mature - dairy economies show that fodder or forage - and proper preservation of it – forms the backbone of sector competitiveness and growth:

- a) In Kenya there is a pressing need and high potential for expansion and optimization of commercial fodder supply chains across the chain from use of high yielding variety seeds, increased production per hectare, improved mechanisation and preservation, enhanced nutritive value and logistics for transport.
- b) Benchmarking with fodder crop production in the Netherlands and other countries with a developed dairy and fodder sector (e.g. South Africa) is recommended.
- c) Investment in innovation, knowledge and skills for commercial mechanised fodder production, is recommended as one of the most strategic and important intervention choices for the Kenyan dairy sector.

## **5.2 Sub-report III: Kenya feed industry policy and regulatory issues**

This part of the study was mainly a desk-study with the aim to understand the policy and regulatory environment for manufactured animal feeds. The report documents current knowledge of Kenya's feed industry operations, policy and regulatory issues and the perceived role of the Association of Kenya Feed Manufacturers (AKEFEMA).

Issues discussed include practices in manufactured feeds and livestock production in Kenya, inadequate regulations and enforcement, feed-ingredient supply chain constraints, efficacy and quality of animal feeds and ingredients, feed and food safety and the effect of partial liberalization of the feed sector on sector governance and regulation.

The Ministry of Livestock Development (MoLD) and other government agencies regulate the feed industry by development and enforcement of relevant Acts of Parliament. The mandate to regulate feed quality is mainly with the Kenya Bureau of Standards (KEBS) and MoLD.

Reforms in the 1980s led to industry liberalization, but no strategic steps were taken to ensure this step-wise exit from public authorities. Fragmentation of the regulatory framework and the regulatory bodies, combined with limited financial resources in both public (MoLD, KEBS) and private sector (AKEFEMA) organisations, appear to prohibit an integrated approach for effective legislation and enforcement.

The Kenya feed industry imports over 70% of its raw materials, the bulk of which consists of grain and oil seed cake by-products. It is extremely difficult to purchase high quality inputs and fraud is common. Although feed product standards have been defined, they need to be reviewed in order to conform with nutrient requirements of existing improved livestock breeds. The quality standard framework for raw materials is inadequate which makes it difficult to enforce controls on the quality of by-product raw materials imported into the country.

Issues that affect the level of operations and the competitiveness of the Kenya livestock industry include:

- Inadequate laboratory services due to the absence of effectively operated accredited feed laboratories with the ability to test and analyse for a wide scope of parameters.
- Lack of knowledge by both feed manufacturers and raw material producers on importance of feed purchase agreements that demand certificates of conformity to standards.
- Limited access to consistent and quality raw materials year round and at competitive (world market) prices, both from the domestic and the international market. This can be referred to as the ingredient supply chain constraint.
- The weak and fragmented institutional framework for sector governance and regulation, and the lack of enforcement. This can be referred to as the institutional gap.

Options for improvement are presented by comparing industry competitiveness and benchmarks of the Kenya feed regulatory framework, against that of SADC and the South Africa feed industry.

The report highlights the need for a strong institution that governs the industry with regard to policy development, regulatory framework, systems for Good Manufacturing Practice, Quality Assurance Quality Control (QA/QC) and auditing, feed quality control, training and investment.

In this light also the role of AKEFEMA to date and its ability to engage and self-regulate the feed sector is discussed. AKEFEMA members are willing to play a key role of feed industry self-regulation, however so far have not succeeded or taken up this task vigorously.

Apparently with a retreating government and privatisation of the sector, an institutional gap was created and responsibility for regulation (and development) of the sector was largely shifted to the AKEFEMA with an appeal to self-regulate, but without proper mandate. It is concluded that AKEFEMA as a lobby and membership organisation cannot be expected to govern the sector and represent all stakeholders, nor does it have the mandate and the resources.

As much as AKEFEMA will continue to play an important role as an industry association and lobby organisation for the benefit of its members, a more appropriate body to govern the sector would be an Animal Feed Board, or a similar organisation with adequate mandate to regulate, enforce, promote and levy the sector. And with sector-wide representation by all relevant stakeholders, i.e. raw material and pre-mix suppliers, feed manufacturers, farmers, processors of animal products and consumers.

### **5.3 Sub-report IV: Interviews and HACCP audits of Kenyan feed manufacturers**

Sub-report IV of the study and consists of two parts, sub-report IV.1 and sub-report IV.2.

Sub-report IV.1: covers interviews with Kenyan feed manufacturers which were held by BLGG Kenya as part of this study. Sub-report IV.2: describes the HACCP audits of 3 Kenyan feed manufacturers that were performed as part of this study. This sub-study was carried out by AgriQ Quest Ltd.



### 5.3.1 Sub-report IV.1

In December 2012 and January 2013 BLGG Kenya visited 18 feed manufacturers at site, who were interviewed using a structured questionnaire. The objective of this was to get their views of the main issues and constraints in the animal feed sector. In the pages below a summary of the main findings and issues raised by the feed manufacturers is presented. The issues raised by the feed manufacture evolved around the following themes:

- Seasonality in supply, inconsistent and often sub-standard quality, and price of raw materials, which mainly consist of by-products from the domestic market and neighbouring countries. Especially with reference to protein rich raw materials and maize. Proposed solutions were to allow duty free imports of soy and other alternative protein rich raw material, and the importation of yellow maize for the feed industry. It was also suggested to lift the ban on import of GMO soy and others raw materials. Next to reforms in the regulatory framework for raw material importation, feed manufacturers urge government to stimulate development of local supply chains of crops for animal feed sector, such as yellow maize and sorghum. Government is also requested to set up a quality controlled “national reserve” of raw materials for the feed industry to enhance quality and reduce seasonal fluctuations in availability and price.
- The absence of credible laboratory facilities with fast turn-around time for sampling, analysis and results. This was another area of high concern and requires immediate action to support the industry.
- Lack of effective institutional environment for training of staff of all calibre - across the feed industry.
- Farmers’ general lack of knowledge and low skill level regarding their ability to differentiate between high and poor quality feeds and feed rationing – and thus to make informed decisions that would maximize dairy farming profitability.
- Lastly reference was made to the weak governance of the sector, general absence of surveillance and enforcement and low entry levels, all leading to crowding-in of unskilled unprofessional businesses that supply low quality sub-standard feeds. In addition to this there was a general consensus that the feed industry (AKEFEMA) was not timely and properly consulted in regard to policy formulation in the livestock sector. AKEFEMA’s role was marginalized and the organisation was under-funded.

### 5.3.2 Sub-report IV.2

Product safety management systems designed in line with HACCP principles have a clearly defined structure and benefits. A controlled operating environment and an effectively implemented product safety system, enhances customer and consumer confidence in the quality of feed and food products. HACCP uses a systematic approach covering all aspects of production from raw materials, processing, storage, distribution and point of sale to consumption and beyond. It moves a company from a solely retrospective end-product testing and sampling approach, towards a preventative approach that is designed to reduce product losses and liabilities.

As part of this study AgriQ Quest carried out an audit of three formal feed manufacturers of different size and levels of capitalization. The selection of firms was based on willingness to cooperate. The audit is therefore not representative of the industry but merely serves to give an illustration on the different levels of implementation of HACCP based quality control mechanisms in place.

The audit was carried out using checklist, observations within the company and interviews with site management and workers, along the criteria of HACCP DZ 3027 STANDARD (Codex Alimentarius standard). The audit was done on 3 different firms based on market strengths (high, medium, low).

#### Company A, high market strength

Company A is a prime feed processor serving up-end market customers in the livestock, poultry, fish and pig industry. Upon auditing against the HACCP standard the firm was found to be compliant on the following HACCP aspects:

- Compliance level: The company has considerably higher levels of compliance to HACCP system requirements.
- Documentation: Systematic documentation on all systems available as a sign of conformity to requirements as per HACCP Standard.
- Auditing: There is evidence of internal and external audits.
- Training: Highly trained professionals recruited, on job training emphasized by the management.
- Traceability: Product traceability system in place.
- Certification: HACCP certified by Kenya Bureau of Standards. The company is in the process of implementing ISO 22000 standards (food safety management system).

#### Company B, medium market strength

Company B is a medium level feed processor serving customers in the livestock, poultry, fish and pig industry. Upon auditing against the HACCP standard, the firm was found to have significant draw backs in the following areas:

- Compliance level: The Company has not implemented the HACCP system in its operations.
- Documentation: Only operational documentation are captured in the company's records.
- Auditing: neither external nor internal systems audits done.
- Training: Senior staff trained on legal/technological and operational issues in the sector through participation in various government/NGO seminars.
- Traceability: No product traceability system in place.
- Certification: No certification process in place.

#### Company C, low market strength

Company C is a low level feed processor producing also for various livestock sub-sectors. Upon auditing against the HACCP standard the firm was found to have significant draw backs in the following areas:

- Compliance level: The Company has not implemented the HACCP system in its operations.
- Documentation: Only operational documentation is captured in the company's records.
- Auditing: Neither external nor internal audits done.

- Training: No evidence on any form of staff training, the will is evident but firm lacks resources and capacity.
- Traceability: No product traceability system in place.
- Certification: No certification process in place.

#### 5.4 Sub-report V: Quality analysis of animal feedstuffs and fodders in Kenya

This sub-study covers the quality analysis of animal feed and fodders in Kenya regarding their nutritional value and presence of contaminants.

The report is made up of two parts. The first part describes the analysis of an existing animal feed database that was provided by ABS TCM Ltd. The database contained in total 78 dairy meals of feed manufacturers from Kenya which were analysed by Near-Infrared Spectroscopy (NIRS) on nutrient composition in 2011/2012.

The second part of this study covers the analysis results of approximately 130 feedstuffs and fodder samples collected in Kenya 2013, including dairy meals and raw materials. All samples were analysed for nutritional value by BLGG AgroXpertus (Wageningen, the Netherlands) using wet chemistry according to the ISO standards for each nutritional parameter. The nutritional value of the fodders were analysed by BLGG AgroXpertus using Near-Infrared Spectroscopy (NIRS).

Mycotoxins and pesticides were analysed by SiCa-AgriQ (Vicar, Spain) using LC-MS/MS and LC-MS/MS or GC-MS/MS, respectively. The heavy metals were analysed by BLGG Deutschland (Parchim, Germany) using inductively coupled plasma (ICP) and the presence of salmonella was analysed by CCL Nutricontrol (Veghel, the Netherlands).

The results of the nutritional analysis of both the dairy meal database from ABS and dairy meals analysed by BLGG, show a relative high variance in the different nutrients, with a high percentage of dairy meals that did not meet the KEBS standards for crude ash ( $\pm 50\%$ ) and crude protein ( $\pm 30\%$ ).

For the raw materials wheat bran and wheat pollard, most samples met the KEBS standards for the different nutrients, except for dry matter, which can cause problems when stored for a longer period of time ((moulds and/or mycotoxins).

The results for maize germ meal show that a high percentage of samples did not meet KEBS standard for dry matter (90%), crude ash (90%) and crude protein (70%).

For both cotton seed cake and sunflower seed cake 60% of the analysed samples did not meet the KEBS standard for crude fat, indicating an inefficient fat extraction. In addition, for sunflower seed cake 90% of the analysed samples did not meet the KEBS standard for crude fibre, indicating inefficient de-hulling of the sunflower seeds.

None of the examined fish meal samples met the KEBS standards for ash and crude protein. The average crude ash and protein content of the fish meal samples were  $\pm 50\%$  and  $\pm 40\%$  where the KEBS standard stipulates a maximum ash content of 20% and a minimum of 60% for crude protein. This shows that the fish meal samples that were analysed are of very poor nutritional quality.

The analyses of the fodders show that the maize silages that were analysed are of relative good quality in terms of nutrition, except that starch content was generally low. This indicates that the maize silages might have been harvested too early, before the cob (kernels) was fully developed, whereas the cob to stem ratio may also play a role.

The Boma Rhodes hay samples show a relative low protein and high crude fibre content, indicating that fertilization was not optimal (not enough nitrogen) or that the grass was cut too late (high stem to leaf ratio).

Results of the Lucerne hay samples show that the fibre content is relatively low and that the protein, OM digestibility and the net energy content are relatively high. This indicates that the Lucerne hay samples that were analysed are high quality fodders in terms of their nutritional composition.

The mycotoxin analysis revealed that for both dairy meals and maize germ cake/meals, 3 out of the 5 examined samples contained aflatoxins above the maximum level (KEBS; 10ppb) for dairy feedstuffs. None of the 10 examined maize silages contained mycotoxins above the maximum levels.

The presence of pesticides was examined in 10 dairy meals, 5 cotton seed meals and 5 sunflower seed meals which were randomly selected as part of this study. In the dairy meals that were investigated only a low amount of pesticides (just above the detection limit) was found. In the cotton seed meals only 2 very low pesticide residues were found in the sunflower seed meal no pesticide residue at all was found. These results indicate that pesticide residues are not a major issue in the animal feeds that were analysed as part of this study.

The presence of heavy metals was tested in 10 limestone, 7 fish meal and 2 bone meal samples which were randomly selected as part of this study. Out of the 10 limestone samples, 1 sample exceeded the maximum limit for lead and arsenic stipulated by the EU.

Seven fish meals and 2 bone meals were selected for testing on the presence of salmonella. In none of the analysed fish and bone meal samples salmonella was detected.

### **5.5 Sub-report VI: Trends in the Kenyan fodder sub-sector**

More than anything else, year round access to quality fodder or forage determines the competitiveness of the dairy sector. Fodder is the backbone of the industry, largely because dairy cows are ruminants, making them highly dependent on forage for milk production. Dairy producers need to be as proficient in the management of forages as in the management of their cows. Development of a high quality innovating forage sub-sector will reduce farmers' production costs and seasonal fluctuations in milk supply, thereby improving operational profits.

This sub-study looked at the place of fodder in the smallholder dairy context and the factors that expose many smallholders in areas with a prolonged dry season, to a vicious cycle of seasonal fluctuations in milk production, as well as diminishing profits.

While there has been a lot of effort to encourage and to build the capacity of smallholders to establish their own fodder, the study aimed at looking beyond the smallholders' ability, thereby bringing in the segment of commercial fodder producers.

It emerged that smallholders risk facing a diminishing profitability in their dairy enterprises if they continue to feed low quality fodders and supplement with more concentrates (whose quality is also inconsistent). As compared to locally available fodder, dairy meals and concentrates are (more) expensive and cannot perfectly substitute forages in the dairy production process.

Some of the reasons why feeding practices have not improved have been attributed to lack of information as well as ineffective extension and skill development practices. As a result most smallholders continue to use traditional feeding systems e.g. use of Napier grass whose contribution in milk production is much lower as compared to maize or other more energy or protein rich fodders.

A study referred to in this report shows that the exposure and awareness of different fodder crops is high amongst the smallholders. In practice however over 55% of the farmers in the survey had only two or three types on their farm. Whilst only one was specifically established as fodder and the others would be the crop residue after harvesting of the crop for human consumption (e.g. maize or sweet potato vines). This discrepancy is an indication that it is not exclusively the level of awareness that determines whether a good practice is adopted or not. There could be other factors including land space, shortage of labor and availability of seeds or clean planting materials.

To capitalize on the demand for fodder and the inability of many farmers to establish and preserve fodder on-farm, a commercial fodder sector has emerged in Kenya. The following models were identified by the study:

- Large scale commercial fodder producers supplying farmers and dairy societies.
- Dairy societies' out-grower model, whereby dairy societies produce fodder through their own members, who are supported technically under a buy back arrangement.
- Dairy societies establishing their own large scale fodder production.

The study also found extension models which include the lead farmer model, the service provider enterprise model and community's local technicians. One interesting model that is expected to influence sector growth is the development of middle level dairy farmers, who are willing to invest in mechanized fodder production and new fodder varieties and preservation techniques. Those medium sized dairy farms with sufficient land to grow fodder on large scale, are selling surplus to neighboring smallholders, and some have also started collecting milk from them, and providing training and demonstration at a fee.

Based on the findings, the study recommends support for both the demand and the supply side of an emerging commercial fodder sub-sector.

On the demand side, dairy societies and farmers who buy fodder in the market would be supported to set up efficient supply chains, storage and fodder distribution. This will go along with quality control mechanisms and access to fodder and feed analysis facilities. This form of support is expected to empower the farmers by strengthening their position as buyers on what quality of feed they need and receive. If this is implemented, the farmers will have a higher value for money as the incidences of supply of low quality fodder will reduce significantly.

On the supply side, the study recommends support to commercial fodder producers, including medium and large scale dairy farmers that want to produce for the market, and dairy societies that want to produce their own fodder, through contract farmers or establishing own fodder enterprises. This support should include access to (local and foreign) HYV fodder seeds and lobbying for more easy registration of imported seeds, piloting of new fodders varieties, enhanced crop husbandry practices, access to farm machinery and innovations in fodder preservation, and so on.

The improvement of the fodder supply chain would include formal agreements between commercial fodder producers and dairy societies, where contracts stipulate the specifics of fodder required, including volumes, quality and delivery, different from the current system where the buyers takes what is available from the seller.

The study also recommends that KMDP establishes an information platform (ICT based) where dairy societies and suppliers are able to share data on both feed and fodder supply chains, in particular laboratory analysis, market information (supply/demand), successful models and generally educate each other on the subject of (feed and) fodder in dairy.

### **5.6 Sub-report VII: Trends in the Dutch fodder sub-sector**

This short case study describes the main trends that emerged over the last 50 years in the Dutch dairy sector as regards to fodder management and technology. The developments in this sub-sector have been crucial for enhanced productivity and cost price reduction of milk in the Dutch dairy sector. The general picture is that energy, starch and protein rich yellow maize and grass silages with higher digestibility, replaced fodder beets and hay.

Due to seed breeding, soil analysis and optimum fertilization and innovations in mechanisation and ensiling technologies, nutritive value of these silages increased drastically in a relatively short time span. As a result fodder and fodder preservation form the backbone of the dairy industry in the Netherlands. Feed manufacturers adjust their recipes and feed formulations for concentrates as per the requirements of the farmer based on his “fodder profile”.

It seems obvious that Kenya can learn much from the technology developments in the Dutch fodder sector or from other dairy economies that invested and innovated strongly in fodder and fodder preservation, e.g. South Africa.

## 6. MAIN CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Dairy sector structure

Growth and competitiveness of the feed sector depends to a large extent on the performance of the livestock sector, including the dairy sector. The structure of the dairy sector in turns defines its ability to grow and prosper and the create wealth and income for its constituents parts.

This structure is characterized by fragmentation and inefficient supply chains across it various sub-ecosystems with high variance in MI (Maturity Index) levels: production, processing, marketing channels and consumers, input supply and service provision, regulatory framework and governance structures.

The larger part of the smallholder-driven dairy industry is yet to transition from start-up to growth phase, from a raw milk market to processer-led market, and from a liquid milk market to an added-value milk economy. Other more isolated segments of the industry are in the transition from growth to maturity, but this process is slowed down by other segments with low MI-levels that find it difficult or unattractive to align with the former.

The challenge for government and the industry (or parts thereof) is to develop a common vision and to put policies and standards in place that will drive the process of integration and consolidation – based on a level playing field that guarantees fair competition and credible standards and enforcement of the same across the sector and its constituent parts.

This also implies that deliberate policies and strategies need to be designed and implemented to strengthen those segments and stakeholders in the sector, that have the highest ability to transition the industry into a growth model. This means choices on how to deal with – and phase or crowd out - the informal sector in (raw) milk marketing, the feed and the AI supply chains.

This calls for a more pro-active and forceful government role, and the formal private sector to organise itself in effective industry associations and alliances for self-regulation and lobbying for government regulation and surveillance, to bring order and sanity in the sector.

Sub-report II dealt with the dairy industry structure and the following key areas for intervention and action were identified:

- The need for a more prominent role for government in sector governance and sector development; the latter especially with regard to investing in training and knowledge transfer.
- Establishing effective sector institutions with shared public-private representation and a wide mandate; the model of the Dutch Product or Commodity Boards was used as an example.
- Private sector organisation and self- regulation.

### 6.2 The animal feed manufacturing sector

As for the animal feed sector the study looked into the policy environment and the competitiveness of the sector, the raw material supply chain, the systems in place for quality control of the supply chain, the quality of raw materials and dairy meals through sampling and testing and the regulatory framework and strengths of sector institutions, including AKEFEMA .

Some of the key findings and recommendations were:

#### Raw material supply chains

Around 70 - 80% of the ingredients used by the feed manufacturing industry are by-products imported from Tanzania and Uganda. This is not sustainable in view of the development of the livestock and feed manufacturing sector in these countries, and the inconstancy in supply (seasonality), quality and composition of the by-products in terms of nutritional value and contaminants.

In view of this there is need to facilitate access to quality (GMP or HACCP certified) feed ingredients/ raw material supply chains (from both the international and the domestic market. It is argued that zero rated import of protein rich products and yellow maize – and possibly also GMO varieties - is essential for growing the industry and the livestock sector. Equally important is the development of local supply chains, for example for yellow maize and fodder sorghums.

This way Kenya will be less dependent on by-products from varying quality and availability, and with local supply chains in place, it will also be less dependent from other countries for its raw animal feed ingredients.

#### Food safety

In Kenya food safety is a growing concern and is bound to gain more importance with a growing well-educated middle class. As for products from animal origin such as milk, meat and eggs, the starting point is animal feed. Currently – and with the exception of in-house systems of a few large feed manufacturers, no comprehensive HACCP or GMP system is in place for the feed sector for quality assurance of supply chains, processing operations, feed formulation and marketing/distribution. External auditing is almost absent. There are no standards for raw materials (only for end-products), no labelling of products, and no effective mechanism for frequent unannounced sampling and analysis of raw materials or feed.

In addition, there are no credible laboratories for reliable and fast feed testing and the scope of parameters that can be tested by the local labs is too narrow.

#### Policy and regulatory environment

Both the report of ABS TCM Ltd. (Sub-study I: Kenya Feed Industry Policy and Regulatory Issues) and the interviews with Kenyan feed manufacturers (Sub-study II), show that the regulatory framework is fragmented, not comprehensive and not effective. Enforcement is weak.

Government should take a leading role in creating the necessary structure and legislation regarding raw material imports and quality standards, chain management and licensing of feed manufacturers. A solid Animal Feed Regulation should be put in place that sets minimum standards for raw material importers/traders and feed manufacturers, regarding product and processing specifications and standards for buildings and infrastructure. The adoption of minimum standards based on GMP/HACCP principles will work two ways: it will enhance quality control within the existing businesses and it will crowd out “back-door feed producers”. Legislation should not only be present but also enforced.

#### Sector institutions

Liberalization of the animal feed sector resulted in an institutional gap. On one hand there was a retreating government and on the other hand government expected a single-interest underfunded industry association with divided membership and insufficient mandate, to self-regulate the industry.



This has not shown to be an effective way of bringing order and sanity in the industry. To fill this gap, the concept of an Animal Feed Board was introduced in this study and the Dutch Animal Feed Board was used as an example.

Many bottlenecks identified in this study and that are plaguing the animal feed sector in Kenya were tackled in The Netherlands by the Animal Feed Board, for example through delegated mandate for drafting legislation and regulations, mandatory membership with binding conditions for the members, mandate to introduce sector-wide self-regulation and HACCP systems, mandate to audit and enforce standards and regulations and mandate to impose and collect levies and fees from their members for financing of the Board's operations. The Dutch Animal Feed Board brings together all policy, regulatory and sector development issues in one institution, and has representation from all major stakeholders in the sector like government, AKEFEMA, farmers' associations (dairy, meat, poultry), animal products processing industry (e.g. KDPA) and consumer platforms. The Dutch Animal Feed Board could serve as an example.

#### Industry association

Leading animal feed manufacturers need to take responsibility to review the operations of their own industry association. If industry leaders are not willing to take lead in bringing strong leadership in AKEFEMA, and self-finance a well-equipped and highly skilled Secretariat, assistance from donors or NGOs for capacity building are futile. A strong AKEFEMA will also be more able to lobby for government and donor support, once it has put its house in order and AKEFEMA's members are seen to seriously drive the organisation.

The top management of leading feed manufacturers – within and outside AKEFEMA - should cooperate to create and lobby for the necessary structure and legislation for the feed sector; this should include the introduction of HACCP systems through self-regulation. The feed manufacturers can also work together by putting up an internationally accredited animal feed and fodder testing laboratory. Possibly in partnership with international laboratories and donor agencies. In this respect, the feed manufacturers could try to link up with a Dutch funded Private Public Partnership project led by BLGG (FDOV). Next to launching a mobile soil lab with Near Infra-Red technology, this project intends to establish a modern feed lab in Nairobi with all accreditations. The project is co-financed by the Dutch Ministry of Development Organisation.

#### Training for the feed industry and knowledge level in the customer base

The feed manufacturers who were interviewed by BLGG Kenya (sub-study IV.1) mentioned the lack of effective institutional environment for training of staff of all calibre - across the feed industry - as a bottleneck. There is a serious gap in the demand and need of the sector in terms of skilled labour, and what is available in the market in terms of training courses and modules. One way to address this would be for AKEFEMA to link up with local and international training institutions (e.g. PTC+ or GMP+ International in the Netherlands), to develop in tripartite tailor-made (internationally recognized or accredited) courses for the sector for example in feed formulation, operation of equipment and HACCP systems. Farmers' – especially smallholders – lack knowledge and have a low skill level regarding their ability to differentiate between high and poor quality feeds and do proper feed rationing. This greatly affects their ability to make informed decisions and maximize dairy farming profitability. Low profitability of smallholder dairy farmer in turn affects the growth potential of the animal feed industry.

### **6.3 The fodder (forage) sub-sector**

A strong fodder or forage sub sector forms the backbone of any dairy industry that has transitioned from start-up phase into growth and maturity. Sub-study II (chapter 3) and sub-study VII illustrated the trends in the Dutch fodder/forage sub-sector, and sketched how introduction of new energy and protein rich fodder crops and seed varieties, and new technologies in harvesting, ensiling and transportability, revolutionised this sub sector and increased productivity per animal and reduced seasonality of supply and cost price of milk.

Sub study V by Perfometer Consultants) looked at the trend in fodder/forage supply chains in Kenya. In spite of an emerging commercial fodder sub sector – both for on-farm use by large scale dairy farmers and for sale to third parties – the fodder sector in Kenya is still underdeveloped.

There is a need and potential for optimization of nutritive value of fodders by amongst others introduction of new high yielding seed varieties and new crops (e.g. yellow fodder maize, high protein grasses and alfalfa varieties, lupines, fodder sorghums), improved crop husbandry practices (including soil analysis and fertilisation), innovations in mechanisation and ensiling technologies and transport and logistics. In fact it is only through robust interventions in this sub sector that the seasonality and cost price of milk production can be tackled.

It seems obvious that Kenya can learn much from the technology developments in the Dutch fodder sector or from other dairy economies that invested and innovated strongly in fodder and fodder preservation, e.g. South Africa.