SNV

Kenya Market-led Dairy Programme (KMDP)

CLOSE-OUT MAGAZINE

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FOREWORD

By SNV Kenya Country Director

With the completion of the Kenya Market-led Dairy Project (KMDP), we come to an end of eight years of impact on the Kenyan dairy sector, financed by the Embassy of the Kingdom of the Netherlands and implemented by SNV Kenya/ Netherlands Development Organisation with support from numerous partners.

I was only part of the last 18 months of the project. But in this short period I have seen countless farmers taking pride in showing their modest cow barns, yet constructed for maximum cow comfort as promoted by the project, their milk production that doubled or even tripled, and their silage which helps them through the dry period and smelled fresh and well preserved.

I also met managers of cooperatives and of Meru Dairy Farmers Co-operative Union, sharing the growth of their businesses through a steep increase in milk intake and sales, and - most important - the significant reduction of seasonality in milk supply. Through the project's forage interventions milk intake and production levels in the dry season have ceased to drop as dramatically as before.

The project ended its field activities through close out events in Eldoret and Meru with all the partners and staff involved in the project. While attending the closing ceremony in Meru, I was impressed by the testimonies of the farmers and the service providers present. Farmers spoke proudly in public about their achievements in calf rearing, increased milk production per cow, and the shift in mind-set from doing dairy as a side activity to running it as a business. Service providers gave testimony of their emerging and growing businesses, for example in fodder planning and silage making.

KMDP trained and coached smallholder farmers, extension workers, milk graders, board members and the management of the cooperatives it engaged with. It worked with medium and large scale farms, service providers and input suppliers.

This all could not have been possible without the help of SNV's qualified staff, trainers and dairy advisors, who organised farmer training, training of trainers, exchange visits, field days and demos. These local dairy consultants – paid by the project - were continuously coached and mentored by KMDP senior staff, and they received capacity building by international experts.

For these local dairy consultants and interns – 35 in number – and for the five SNV project advisors, SNV Kenya held a closing event in July. This was combined with a review of the (very positive!) external evaluation report, and involved interactive discussions on the recommendations and the lessons learned.

While attending this event in Nairobi, I was pleasantly surprised by the number of project interns that deserved promotion during the project to the level of dairy consultants. Whereas the dairy consultants were able to start up their own (part-time) dairy advisory and generate business outside KMDP. The majority of these dairy consultants had at the end of the project other paid jobs in the sector, thereby further contributing to the impact of the project and the lives of dairy farmers in Kenya. This clearly shows their relevance to the sector.

Though this project has had systemic impact on Kenya's dairy sector, the job is not yet done. As SNV we still see opportunities for further upscaling of dairy advisory and practical training concepts, of commercial fodder production and services, of interventions related to milk quality through quality based milk payment pilots, of working with the private sector to fast track innovation, and of partnering with Kenya government on policy and trade issues.

KMDP has been exemplary for SNV's way of working: to create disruptive and systemic change by focusing on the key sector issues, by collaborating with the private sector on best practices and innovations, and by partnering with policy makers and regulators for enhanced enabling environment.

SNV's approach of stimulating and facilitating private sector

involvement to invest in inclusive agricultural value chains and innovation, has been at the heart of KMDP. It was much facilitated by KMDP's Innovation & Investment Fund that provided matching grants, facilitated feasibility studies, pilots and demo projects. In addition, the project supported knowledge exchange through international linkages, study tours and trade missions on cost sharing basis. Lastly, SNV's trademark of documenting lessons learned is equally visible in KMDP.

SNV has similar projects in the three sectors agriculture, renewable and water, sanitation and hygiene (WASH). In agriculture SNV focuses on inclusive value chains, climate and business, and sustainable nutrition. SNV continues to sustain development through the typical approach of market-based interventions, while in all our projects we facilitate access to finance and improve the position of women and youth.

I wish to thank all partners, project staff and consultants for the excellent results and a great time implementing the project, and the Governments of the Netherlands and Kenya for making this project possible.

Jeen Kootstra

Country Director
SNV Kenya / Netherlands Development Organisation

WORD FROM THE EMBASSY

Kingdom of the Netherlands in Nairobi

Historically, the Netherlands and Kenya have a strong business relationship. Dairy is one of the sectors in which the Netherlands has been an important partner for many years. In 2017, 17,500 dairy farmers with 1.7 million cows, produced 14.3 billion kilograms of milk in the Netherlands. The dairy industry in the Netherlands generates a total value worth of 7.7 billion Euro and 65% of the production is for export. Next to exporting the produce, the Netherlands also exports its knowledge and best practices to the world, through enterprises that identify opportunities in the dairy sector abroad and investments in partnerships.

Also Kenya has a vibrant dairy industry with an estimated value of 3.5% to 4.5% of the gross domestic product (GDP) or 40% of the livestock sector GDP. It provides employment to over 1.2 million citizens. There are over 1.8 million smallholder milk producing households who own one to three cows, which in aggregate is over 80% of the national dairy herd. Kenya has the highest per capita milk consumption (110 litres) in sub-Sahara Africa, the equivalent of 5.2 billion litres a year (3R Kenya Project, 2018).

In this context, the Netherlands has supported the Kenya Market-led Dairy Programme, implemented by SNV in the last 8 years. The programme has successfully contributed to the development of a competitive, market-driven and private sector-led Kenyan Dairy sector, with beneficiaries across the value chain. In this programme, international business-to-business pilots were an important pillar and have produced successful business cases in feed and fodder, quality based milk payment and dairy advisory.

We would like to highlight a few of the achievements of the programme, as concluded by the final external evaluation.

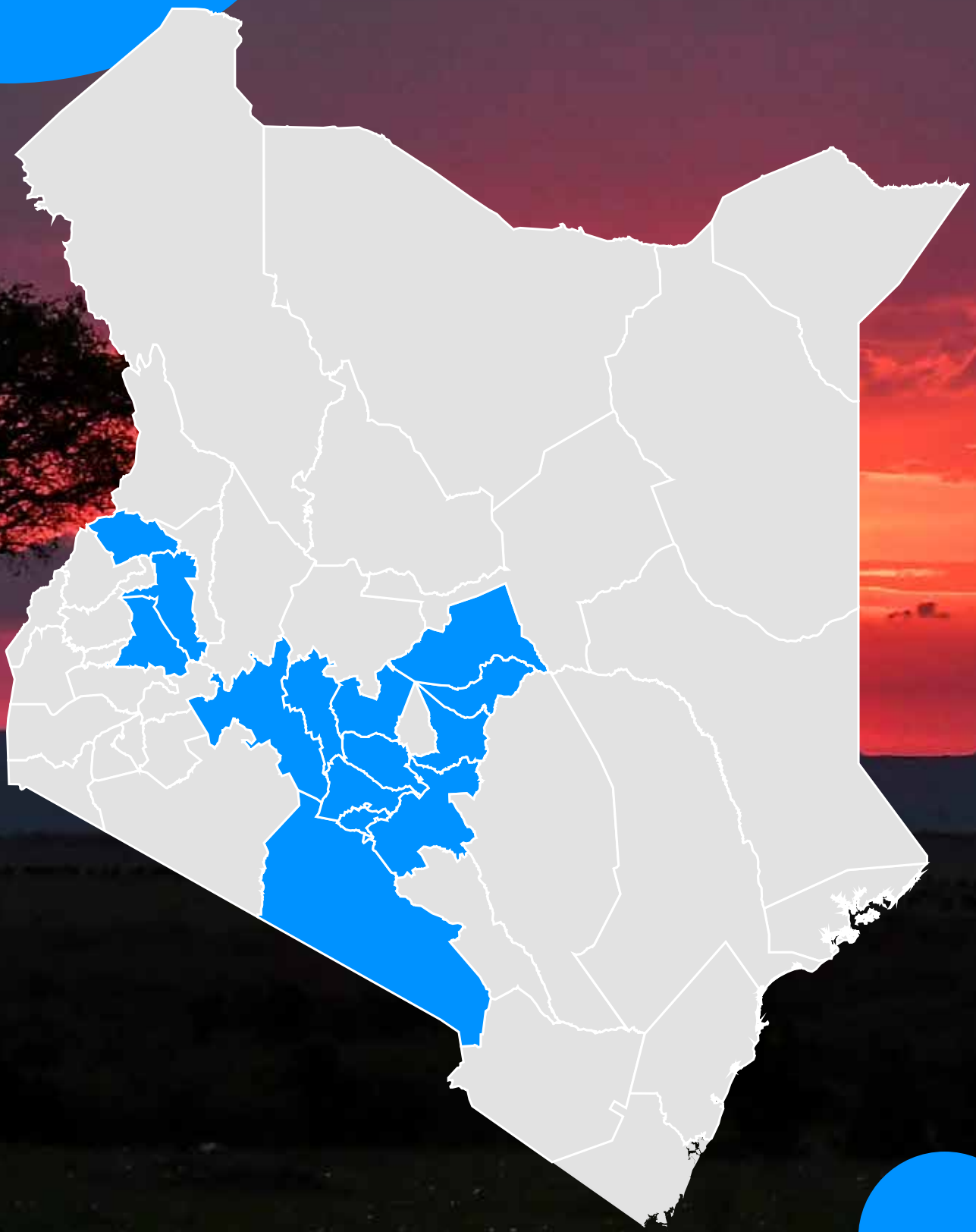
“The programme has contributed to transformative change in fodder production and distribution. It has introduced numerous innovations including the maize train and software to ration cow feed. Another legacy is that the programme has contributed to the establishment of various companies with viable service delivery models differentiated for small-, medium- and large-scale farmers. The programme also contributed to a shift in mindset with regard to the need of practical farmer training, the use of maize for silage and the importance of milk quality.”

Further, KMDP’s activities regarding networking, partnership brokering and advice were highly valued by Dutch companies and was very complementary to the Netherlands’ policy shift from aid to more trade. In conclusion, the programme has supported the dairy sector in its professionalization and commercialization, while making it more climate resilient and supporting the process of ensuring milk quality. The Netherlands’ government continues to commit itself to further strengthen the cooperation between our private businesses and to contribute to more inclusive and safe food supply chains in the dairy sector in Kenya.

Ms Sanne Willems

First Secretary Food Security & Water
Embassy of the Kingdom of the Netherlands, Nairobi

COUNTIES WITH KMDP INTERVENTIONS



INTRODUCTION

Kenya dairy sector profile

Kenya is the leading milk producer in East Africa and dairy is the largest agricultural subsector in Kenya in terms of income and employment creation. It contributes 4% to overall GDP and 12% to agricultural GDP. The high-potential dairy areas are concentrated in the highlands (> 1,400 m elevation) of North Rift, Central and Eastern Kenya which have a very conducive climate for dairy cows (Kenya Ministry of Agriculture, Livestock, Fisheries and Irrigation, 2013).

There are over 1.8 million smallholder milk producing households and the sector provides income and employment to farmers, transporters, traders and vendors, employees of dairy societies, milk processors, input and service providers, retailers and distributors. In terms of food and nutrition security, milk is consumed by almost all Kenyans on a daily basis, with an average annual per capita consumption estimated at 110 litres milk equivalent (3R Kenya Project, 2018).

Kenya's dairy industry is private sector driven. According to the World Dairy Situation report (IDF, 2016) milk production from dairy cows was 3.9 billion litres in 2014, whereas Kenya Dairy Board refers to total annual milk production of 5.2 billion litres (KDB, AfDA Nairobi 2018). Smallholders with 3-5 cows – the majority under zero grazing as part of a mixed crop/livestock farming system - produce around 80% of this. The dominance of the smallholder production systems poses great challenges to the industry in terms of skills development and productivity, land to grow forages, milk collection and chilling, and milk quality. There is a fast-growing segment of entrepreneurial smallholders and medium scale farmers, who invest in modern commercial dairy production with an estimated 2-4,000 commercial dairy farms with more than 20–25 cows (SNV KMDP, 2018).

The dairy sector is dynamic with strong market pull due to population increase, urbanisation and growing middle class. There are high growth figures in marketed milk and investments by farmers, dairy societies and processors in raw milk production, collection and cold chain and in processing of pasteurized milk, long-life products, yoghurts, cheese, butter and milk powder. Yet it is widely reported that still about 70% of milk that reaches the market, is sold as raw milk (KDB, AfDA, 2018).

In the formal sector, Kenya currently has close to 30 active milk processors that package milk and produce value-added dairy products. In addition, there are circa 1,200 registered milk dispensers where pasteurized unpacked milk is sold by so-called mini-processors. The 5 largest processors are Brookside, New KCC, Githunguri, Daima and Meru Central Dairy Cooperative Union Ltd, which together process around 85% of the 1.7 million kg of milk processed daily (3R Kenya Project, KDB website, 2015).

The industry's growth and competitiveness are constrained by low productivity and high cost of raw milk production, seasonality, low quality feeds and forages, milk quality issues, a huge knowledge and skills gap and lack of inclusiveness in the dairy value chain.

The Kenya Market-led Dairy Programme (KMDP)

The Kenya Market-led Dairy Programme (KMDP Phase I and II, July 2012 – August 2019, EUR 9.5 million) is implemented by SNV Kenya and funded by the Embassy of the Kingdom of the Netherlands. The overall goal of KMDP is to contribute to the development of a competitive, market-driven and private sector-led Kenyan dairy sector, with beneficiaries across the value chain.

In spite of its socio-economic importance and growth the sector is hindered by a number of systemic bottlenecks, which result in low productivity at farm level, high cost price and low quality of raw and processed milk. Together with the many inefficiencies in the supply chain from "grass to glass", this poses a significant threat to the industry's competitiveness. Poor farming practices also lead to environmentally unsustainable dairy farming systems.

In line with the bottlenecks faced by the industry, KMDP chose to focus its interventions on the following themes:

a Practical skills and farm management
b) Feed and fodder
c) Milk quality
d) Functional dairy value chains
e) International linkages

The approach or strategy of KMDP, whilst addressing these themes, has been promotion of marketed-based solutions and entrepreneurship, strengthening of formal markets and inclusive business models, dairy sector transitioning and commercialisation, driving innovations and demonstrating best practices. Cross cutting issues are inclusion of women and youth and climate smart agriculture.

In KMDP a shift in thinking from "aid-to-trade" was promoted, where mutually beneficial business relations and partnerships

between local an international stakeholders, are seen as a more sustainable way to spur sector development than a continuous aid relation. KMDP therefore facilitated business-led networks and collaborations between Kenyan and Dutch dairy sector stakeholders for enhanced trade, exchange of knowledge, skills development and innovation. The Dutch dairy sector has valuable knowledge and technology to offer, provided these are adapted to local needs and are affordable. The transitioning from aid to trade relations in the dairy sector, was used by the project as a strategy for increased sector growth and competitiveness, and for achieving food security and food safety.

Hence KMDP worked with a wide range of local and international stakeholders: farmers (smallholder, medium and large scale), dairy cooperatives and farmers associations, processors, input suppliers and service providers, training, knowledge and research institutes, and policy makers and regulators, including Kenya Dairy Board, the State Department of Livestock and the Kenya Dairy Processors Association.

This magazine

This magazine is a Close-Out Magazine for the KMDP project Phase I and II. The Magazine combines description of a selection of key interventions by KMDP with pictures and illustrations.

Under KMDP a vast collection of project reports, publications, handbooks, manuals and other documents for learning has been created. The reader will find more and more detailed information on the KMDP interventions, including those highlighted here through the link: www.cowsoko.com/programs/kmdp/publications. Many of these reports and learning events were the result of close collaboration between KMDP and Wageningen University and Research / Livestock Research (WUR LR) and the 3R Kenya Project. WUR LR also supported the project in strategic management and WUR CDI assisted KMDP with monitoring & evaluation.

The Magazine is structured around the 5 Themes or intervention areas of KMDP referred to above. In the annexes the reader will find lists of clients and Counties the project worked with, the partners from the Netherlands that KMDP collaborated with, the KMDP staff and field teams, and a list of all reports and videos prepared under KMDP. Finally the magazine includes a section called “KMDP in Numbers” which gives quantitative information on KMDP’s realisation of targets and impact indicators.

Wishing you good reading,

Yours sincerely,

Anton Jansen

KMDP Teamleader
SNV Kenya - Netherlands Development Organisation

Key figures on demography/market and the dairy sector in Kenya

Land size	: 580,367 km2 (14 x Netherlands)
Population	: 2000: 31 million; 2015: 46 million; 2050: 85 million
Distribution	: 80% of population on 20% of land space
Urbanization	: 4.3% annually; 2015: 27% in urban centres; 2050: 50%
Nairobi	: 2015: 3.5 million inhabitants
Middle class	: 2014: 8% lower middle class and middle class; 2030: 18%
Dairy pockets	: Kenyan highlands (> 1,400 m elevation), good temp., soils and rainfall
Milk production	: 2014: 3.9 billion litres cow milk/year (IDF, 2016)
Consumption	: 110-120 litres per capita per year
Number smallholders	: Est. 1 million smallholders with 3–5 dairy cows (cross/purebreds)
Number MSFs/LSFs	: Est. 2–4,000 farms with > 25 cows
Number of dairy cows	: 3.8 million purebreds and crossbreds (2014)
Number of dairy coops	: > 200 (collection, bulking, marketing, inputs and services)
Number of processors	: 28
Big five	: Brookside, New KCC, Githunguri, Daima, Meru Dairy Farmers Union
Milk processed	: 2001: 152 million litres / 2016: 625 million litres
Milk marketed	: 55% of total production; approximately 70% as raw milk and 30% processed

Strengths and weaknesses of the Kenyan dairy sector

Key strengths:

- Robust private sector-driven processing industry and investments and growing interest by international players
- Nationwide availability and high variety of dairy products for all consumer groups
- Ongoing investments in value added products, including long-life milk and milk powder
- Growing demand for processed milk and milk products due to a growing urban middle class and an emergin dairy export sector
- 365 days/year milk collection by traders, dairy societies and processors in all high-potential dairy production areas from hundreds of thousands of smallholders
- Emerging segment of commercial dairy farmers with ability to invest and innovate
- Wide distribution network and good access to commercial input and service providers
- Conducive fiscal policies and status of key economic sector at the macro level
- Available dairy genetic base that can be improved with proper breeding policies

Key weaknesses:

- Low level of skills and knowledge of almost all farmers (small, medium and large scale)
- Low level of commercialization by smallholders (dairy is not the core business)
- High cost and seasonality of raw milk production due to low ability/skills to produce and preserve quality fodder
- Inefficient and high cost of milk collection
- Substandard milk handling and cold chain resulting in poor milk quality and food safety
- Lack of loyalty between value chain actors and high fragmentation
- Lack of credibility of input suppliers and services providers (“pushing products”)
- Large raw milk market and lack of level playing field for the formal sector
- Oligopolistic nature of the processing industry
- Lack of common vision to steer the dairy industry into a sustainable growth path
- Ineffective sector regulation: policies are not enforced on the ground

Theme 1

PRACTICAL SKILLS AND FARM MANAGEMENT

1: Introduction

There is a large knowledge and skills gap in the Kenyan dairy sector . To address this KMDP used different approaches and strategies, all geared to bring knowledge closer to the farmer, and with a focus on practical skills.

In this theme KMDP supports local dairy advisors and it facilitates linkages between them and international dairy experts for continuous capacity building. Amongst others this is done through the collaboration with PUM Netherlands Senior Expert Programme. These local dairy advisors are also linked to Dutch input suppliers and service providers who have set up business in Kenya.

Dairy advisory focuses on smallholder lead farmers and medium and large-scale farmers. It is being professionalized by equipping and training the dairy advisors with tools for advising on the most optimal feed ration for different categories of cows and monitoring key performance indicators in the farm.

In the dairy value chain, KMDP supports dairy cooperative societies and milk processors with setting up their own training & extension (T&E) units, financed through the sales of milk to the processor. This is done through a Trainer of Trainer (ToT) intervention and by developing and implementing a training strategy and calendar for Training & Extension staff with the dairy cooperatives and the Union who employ them.

A third intervention in the field of practical skills development is the concept of Practical Dairy Training Centres (PDTCs). This concept evolved over time during KMDP-II into a model where a local dairy training company collaborates with host or training farms and offers one-week structured training for farmers, farm managers, extension staff and other target groups. A 10 module curriculum for practical training was developed and is used during this training.

Lastly, KMDP-II supports initiatives and partnerships between Kenyan and Dutch institutes for dairy education and training, with emphasis on E-Learning and development of skills based training and education materials that are contextualized to the Kenyan situation and needs. This led to the development of the now widely used PDTC curriculum and of two contextualised Cow Signals publications by Roodbont Publishers from the Netherlands.

1.1 Dairy advisory as a business

To address the gap in training and extension in the Kenyan dairy value chain, KMDP applied a strategy of engaging with local dairy advisory firms or consultants. KMDP hired them (part time) to implement the project under guidance of the SNV senior advisors, and at the same time their capacity was enhanced by linking them to international dairy experts for training and coaching.

Throughout the project, 5 dairy experts from the PUM Netherlands Senior Expert Programme, supported KMDP and the dairy consultants with in total 53 missions and a number of exchange visits and trainings in the Netherlands. In KMDP-II these dairy consultants also got coached and trained by ProDairy EA Ltd and Bles Dairies EA Ltd, two Dutch dairy advisory companies that set up base in Kenya with the help of KMDP. All were trained by Vetvice of the Netherlands and became certified Cow Signals trainers.

KMDP made it a key result area to develop the capacities of the local dairy consultants involved in the project (in total almost 40). Not only to effectively implement the project, but also to help them establish their own business model, in such a way that they could carry on their dairy advisory practice beyond the timeframe of KMDP. In the course of the project KMDP partnered in this manner amongst others with Eldosirikwa Consultants, Policy and Market Options (PMO), Perfometer Agribusiness and Mambo Dairy Enterprises, whilst at the end of the project a new dairy advisory company or partnership was formed in Eldoret named SEB Consultants. All dairy advisory companies have during the course of KMDP created own business outside the project in advisory and consultancy, often combined with selling inputs as agents for international input suppliers. Some individual consultants have been hired by ProDairy EA, Bles Dairies EA, Bio Foods Ltd or other Dutch and local input and service providers.

In the same breath KMDP started an internship programme, giving young graduates from Kenyan Colleges and Universities an opportunity to get exposed to the practical work in the dairy value chain, and receive in-house training and coaching. Most of these interns (in total 37) were graduated by the project to become part of the pool of dairy consultants, others found employment outside KMDP after their internship. Local interns were often paired with one of the 12 international students from Dutch Colleges or Universities that were hosted by the project.

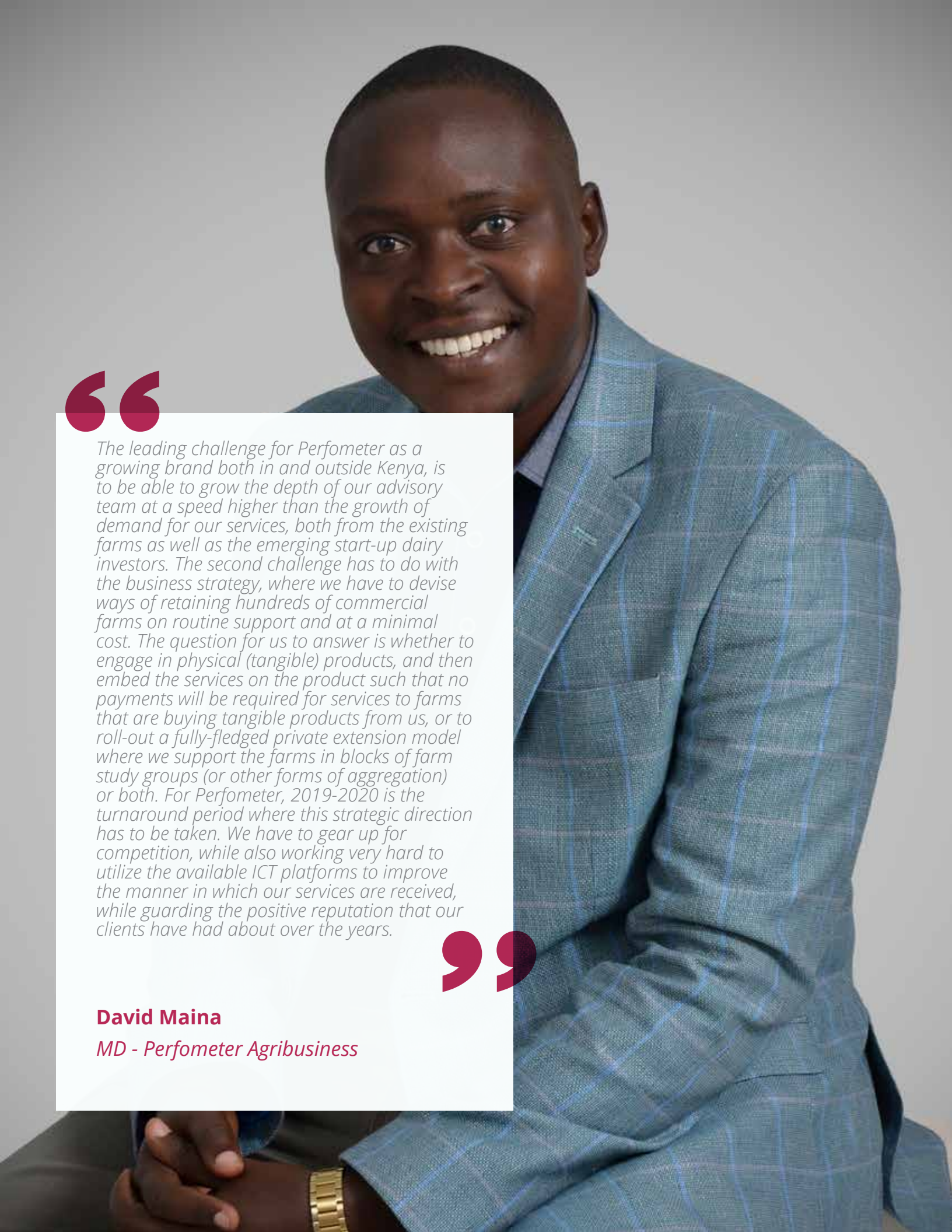
The case of Perfometer Agribusiness

Perfometer was registered in February, 2013. At inception the company had only two technical staff with general dairy sector knowledge, but with no concrete expertise in dairy. In the same year, David Maina, the founder/managing director and lead consultant was supported to join the study tour of medium scale dairy farmers from Kenya to the Netherlands, organized by SNV in collaboration with Netherlands Africa Business Council (NABC). The first contract with SNV introduced Perfometer to a segment of dairy farmers that would later become its most solid customer base. The exposure to the Netherlands gave Perfometer the clarity of what the advisory products would be. Seeing the difference between the dairy practices in the commercial farms in Kenya and in farms in the Netherlands, it became the business of Perfometer to support the commercial farms in Kenya to improve their practices towards full efficiency and optimization.

Perfometer hosted over ten dairy advisory missions with PUM on fodder and total dairy management, visiting, training and advising Perfometer's staff and clients in their farms and forming study groups. This accelerated the advisory capacity of Perfometer, while at the same time raising the client's confidence that Perfometer was "advising well and was well advised". Perfometer staff in turn visited the Netherlands for study tours and training by the same PUM experts.

It was in 2014 that Perfometer launched the commercial services unit and the Dairy Farm Benchmark (DFB) tool. Thereafter other advisory tools and products were developed, such as the Dairy Masterplan and the Handbook for Cow Barn Design, Key Performance Indicators and CowPro herd management software (supported by CTA Wageningen). Through the support of KMDP, PUM and ProDairy EA Ltd, Perfometer also has trained staff in the use of Rumen8 dairy cow ration balancing software. Perfometer launched the Visiting Farm Manager concept, the Academy of Farm Managers and the Academy of Dairy Investors (both one week training). It also publishes bi-annually the Dairy World magazine, it has launched a fodder market-place app and developed a Dairy Managers Handbook dubbed 'The Dairy How-To Handbook'.

At the end of 2018, Perfometer had an in-house dairy advisory staff-base of 12 and a total of 8 packages of dairy services (products) all tested and paid for. Some of this staff started as interns on an internship contract with KMDP. The client base, in terms of projects worked for besides KMDP, were over 10 and the number of farms (with a total dairy herd of 30 and above) that has received a paid service were 89, 45% of whom had received more than one paid service. In 2018, of the total turnover of EUR 250,000, about 30% was from KMDP project, while out of the remaining 70%, 25% (EUR 40,000) was composed of payments received directly from the owners of commercial farms for services received.



The leading challenge for Perfometer as a growing brand both in and outside Kenya, is to be able to grow the depth of our advisory team at a speed higher than the growth of demand for our services, both from the existing farms as well as the emerging start-up dairy investors. The second challenge has to do with the business strategy, where we have to devise ways of retaining hundreds of commercial farms on routine support and at a minimal cost. The question for us to answer is whether to engage in physical (tangible) products, and then embed the services on the product such that no payments will be required for services to farms that are buying tangible products from us, or to roll-out a fully-fledged private extension model where we support the farms in blocks of farm study groups (or other forms of aggregation) or both. For Perfometer, 2019-2020 is the turnaround period where this strategic direction has to be taken. We have to gear up for competition, while also working very hard to utilize the available ICT platforms to improve the manner in which our services are received, while guarding the positive reputation that our clients have had about over the years.

David Maina

MD - Perfometer Agribusiness

1.2 Dairy advisory tools and ICT

During the KMDP project a good number of tools, guidelines, standard operating procedures, and handbooks were developed, to help both the farmer and the dairy advisor or trainer to enhance his/her capacity and ability to give quality advice. Some of these tools were developed by the dairy consultancy firms hired and supported by KMDP such as the Dairy Bench Mark and other products of Perfometer. Others were developed by the KMDP project itself or were piloted by private sector under KMDP's Innovation Fund.

KMDP supported software development for farm recording and farm economics to assess farm profitability and cost price of milk through a software application Dairynomics. With support from KMDP, Uniform Agri from the Netherlands piloted UA Herd Management software. Both products appeared as yet to be too complicated for the vast majority of farmers, who lack a "culture" of record keeping.

Hence KMDP introduced simplified manual recording keeping, later followed by more sophisticated Excel based recording of Key Performance Indicators. The latter has now evolved into an app for herd management which was recently launched by Perfometer and developed with support from CTA Wageningen (CowPro).

Another successful tool introduced in Kenya by KMDP is the Rumen8 software application to calculate dairy cow rations. It operates on Microsoft Windows and allows dairy advisors to manage forage based dairy cow diets to increase production and/or to reduce feed costs. Rumen8 software has been specifically designed to be easy to use, educational and to provide visual feedback to the user. The software has been adjusted and a feed library of tropical forages has been compiled to fit the needs and context of the dairy sector in East Africa.

CAN WE MAKE KPIs PART OF THE DNA ON OUR FARMS?

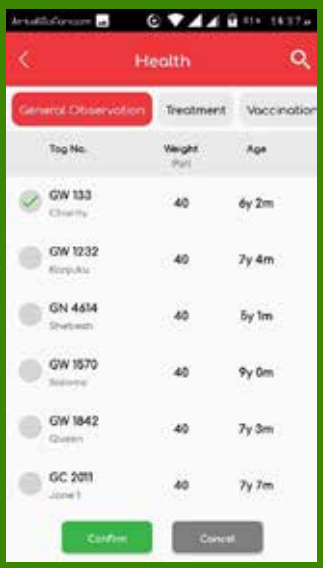
Jos Creemers - ProDairy EA Ltd

An important drawback on assessing performance and advising dairy farms in Kenya, is a lack of records.
The service offered by the dairy consultants to date is mainly based on regular farm visits/walks, where the consultant gets a subjective impression of the farm management as observed during the visit and advises on that basis. In some cases (Perfometer Agribusiness), these observations are categorized and summarized in a Dairy Farm Benchmark report.

Farmers managing their dairy herd/farm without records are likely to make wrong decisions due to lack of information on their herd dynamics and farm activities. For example, breeding and reproductive performance can only be improved, if a farmer is willing to put time and effort into starting and maintaining herd/farm records. The record-keeping program can be done manually using cow cards, using mobile apps or herd management systems.
KMDP invested in farm record keeping and collecting key performance indicators to improve dairy advisory in Kenya. A key performance indicator (KPI) is a value used to monitor and measure effectiveness of herd/farm activities. Systematic collecting, comparing and sharing of dairy herd key performance indicators, allows better insight in the herd dynamics and performance and serves as an important management tool. It also allows for benchmarking performance with other farms/peers. The ultimate objective of KPI record keeping and benchmarking is to maximize profit by optimizing inputs (quality feeds, AI, health care, labour) and outputs (milk production, reproduction and calf growth).
The introduction by KMDP of the KPI Project started with Perfometer, one of the dairy advisory firms under KMDP. Perfometer developed the Dairy Farm Benchmark report, which is very successful and quite effective to point out areas for improvement on farms and encourage farmers to improve practices and invest in better facilities. However, at a certain point, once the Dairy Farm Benchmark report has been used a couple of times on a farm, tracking and tracing and measuring

the effect of changed farm management practices and its effect on the farm's performance, will be needed.

At this point farm records need to be kept and analysed at regular intervals (monthly or bi-monthly) with key performance indicators (KPI) as an output to follow historical progress in the farm, guide ongoing processes and give future direction. The KPI report can now be integrated in the Dairy Farm Benchmark report to support it with historical and measurable data. Eventually once the farmer adopts and embraces record keeping he will see and understand that KPIs can give a "benchmark report" from his farm records at any given time. Perfometer took this a step further. In June 2019 it launched an app for farm record keeping that was developed with the support from CTA in the Netherlands. This app uses and builds upon the KPI Project and indicators that was piloted under KMDP. Compared to former herd management software piloted under KMDP this application is more user friendly and contextualised to the Kenyan farm situation.



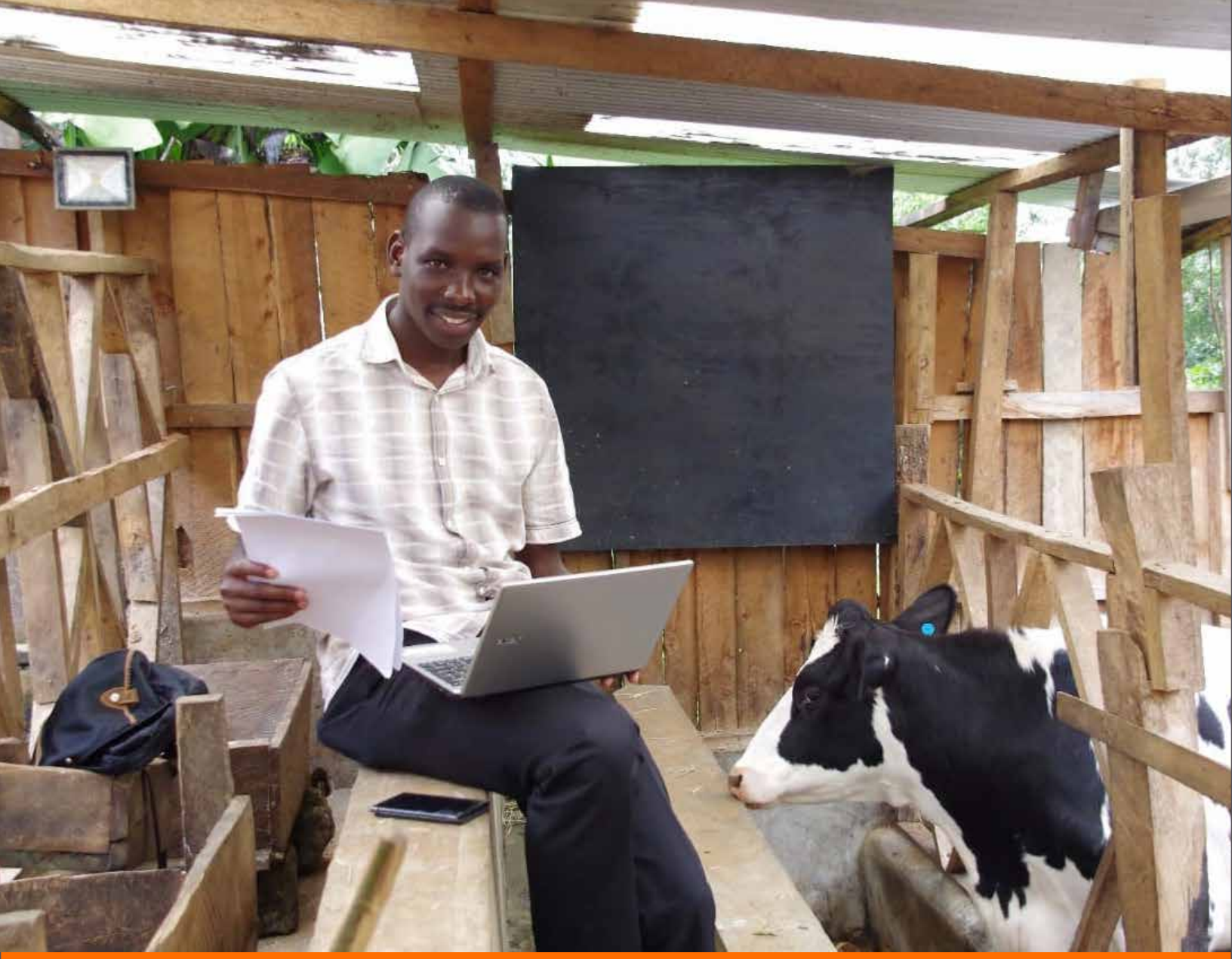
Jos Creemers came to Kenya in 1993 and has since worked for 24 years as the farm manager of Baraka Farm near Eldoret – now a vertically integrated farm with own forage production and milk processing. Jos is the founder of the Practical Dairy Training Centre model. With support from Stichting Habari from the Netherlands 10 modules for practical skills development were developed, to be used for one week on-farm training at Baraka and by other PDTCS. Many lead-farmers from KMDP dairy cooperatives were trained here.

In 2017 Jos joined ProDairy EA Ltd - a dairy advisory company advising private investors, NGOs, processors, government organizations and other players in the dairy sector in Kenya and East Africa, on dairy farm investment plans, barn design, forage production and ration balancing, and improvement of farm management. Since then, Jos Creemers was hired by KMDP to support its teams of local dairy advisors and build their capacity through training in the use of Key Performance Indicators (KPIs) and Rumen8 ration balancing software for dairy cows. He also developed a Breeding Strategy for Meru Union and is responsible with Wageningen University and Research, for carrying out forage quick scans for Kenya, Uganda and Ethiopia. This is under the umbrella of the NEADAP project (Netherlands East African Dairy Partnership).

Throughout KMDP the focus has been on quality improvement in the dairy sector. To be able to improve quality at various levels in farming systems it is important to have reliable, accurate and regular sets of data. We all know if you can measure it, you can manage it.
More important it is to analyse these data sets to derive at key figures to assist farmers with feedback about heir own management decisions in the past, how the farm is faring on at present and to enable him to make informed and knowledge-based management decisions in the future. These key figures can also be used to compare farms with each other (benchmarking). In the Kenyan education system benchmarking is very common to compare performance of students, classes, schools, and Counties. Here there is a culture of continuously comparing performance of students and schools vis-a-vis their peers, with key performance indicators published in the national newspapers. The lack of it in agriculture and dairy is quite surprising and a sign of a sector that is not yet mature and needs to further professionalize and commercialize.
Young farmers need to be encouraged to borrow benchmarking from other sectors, and to continue comparing their technical results as they become professional farmers. To enhance the performance of their dairy enterprises they also need to continuously search to improve practical skills level and knowledge with the aim to produce quality feeds and milk. Farmer study groups can be a tool for both benchmarking with – and learning from – peers. The fastest way to multiply is to learn how to share!

Jos Creemers

Dairy Advisor - ProDairy EA Ltd



PILOTING RUMEN8 IN KENYAN FARMS

JULIUS KOSGEI AND FRIDA NJOKI

Ration formulation can be a very effective means of identifying and correcting imbalances in supply and demand of nutrients to the cow such as energy, protein and minerals. Together with a PUM expert in ruminant nutrition, SNV-KMDP identified a software application that could help take out the tedious work of multiple ration calculations by dairy farm advisors and farmers. Rumen8, ration balancing software is a very user friendly application (www.rumen8.com.au/) that was developed for use in temperate areas.

With support of the SNV-KMDP program it was possible to adapt the Rumen8 software for use in Kenya and the wider East African region, to develop a feed library for tropical forages and to pilot Rumen8 in 25 farms. The piloting of the software and its adaptation could not have taken place without the intensive support from Dr Hink Perdok (PUM), the Australian developers and the KMDP Rumen8 Team of dairy advisors that was put together for this purpose.

The Rumen8 software assists dairy advisors to give the farmer recommendations regarding well-balanced rations for dairy cows. Dairy cows in Kenya often produce well below their genetic potential, especially where exotic dairy breeds or crossbreeds have been introduced. Rapid gains in milk yield and in efficiency of conversion of feed into milk can be attained by removing imbalances in the ration.

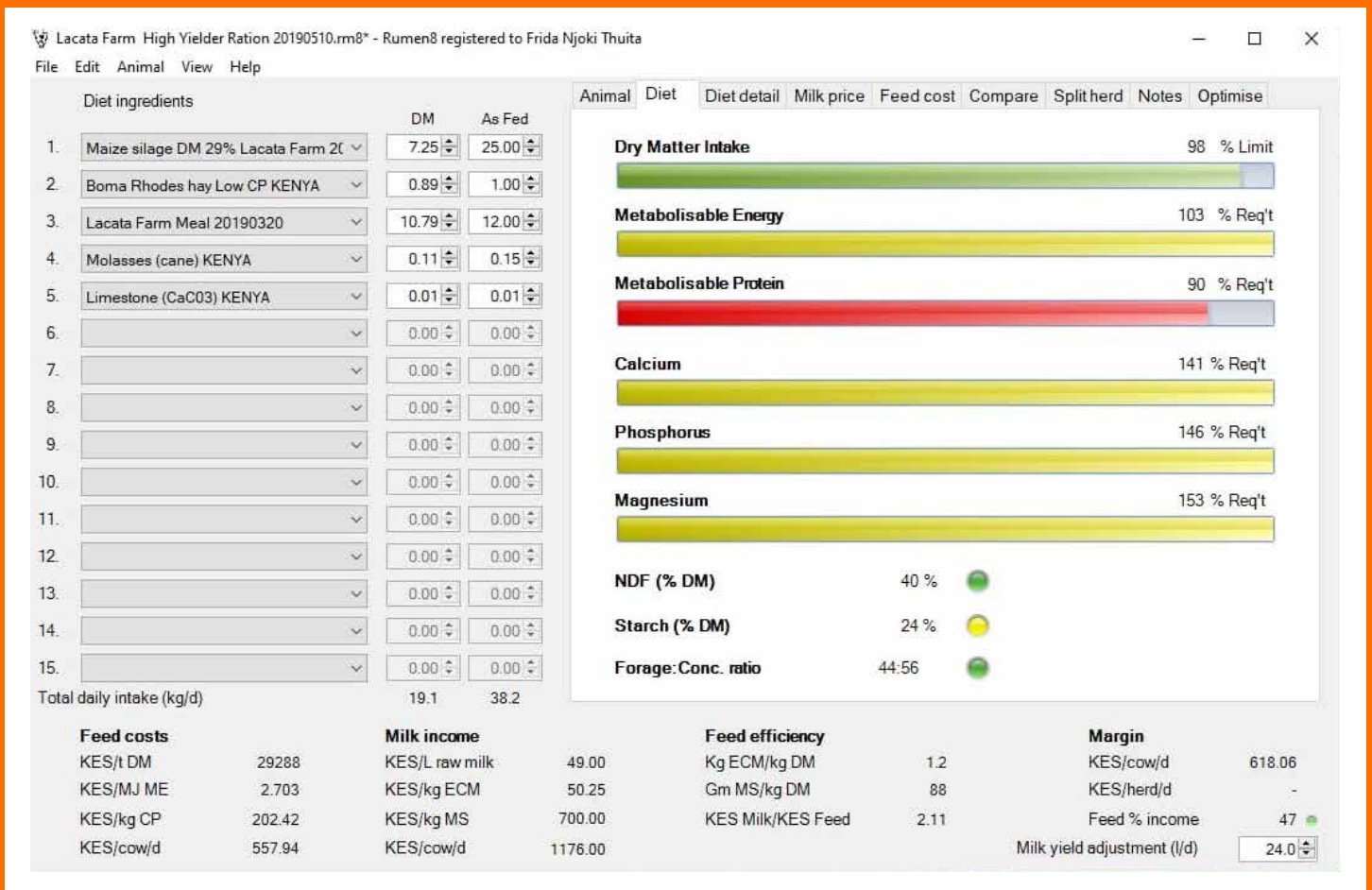
The software considers (amongst other factors) breed, weight of the cow, days in milk, milk production, the feed ingredients (weight and price) of the ration, and the milk price. Rumen8 helps in maximizing the margin above feed costs and to optimize the productivity of the cow, hence it seeks to increase economic performance of the dairy farm. Rumen8 stands out from other ration calculation methods and/or software in use in Kenya and

other countries, because contrary to other systems, it balances the total ration fed to the cow including and based on the nutritive value of forages used on the farm. This is essential because the variation in nutritive value in forages is far wider than in industrial by products or in compounded feeds.

The KMDP Rumen8 team started by putting together a feed library with over 225 feeds and forages grown in tropical climate. After finalizing the feed library in June 2018, 3 SNV Rumen8 team members trained other KMDP dairy consultants from Eldoret, Meru and Central Kenya.
The SNV Rumen8 Team from there on started piloting the Rumen8 software on 25 dairy farms in 3 geographical areas in Kenya. The focus was on all types and sizes of farms from small to medium and large-scale farms with repeat visits/advisory and impact measurement of the balanced rations as regards feeding costs, productivity of the lactating herd, body condition, and margins above feed costs.
An important part of using Rumen8 as an advisory tool is the "walk around the farm", during which the advisor makes an assessment of the dairy cattle and the management practices on the farm. Depending on visual assessment of the feeds in a farm, the nutritionist calculates with values below or above those in "his" feed library. The Kenyan team found that this software is very helpful in diagnosing and correcting shortcomings in the rations fed by the farmers.

Rumen8 helps dairy advisors in Kenya to interact with farmers on their feeding practices, encourage farmers to grow and improve, or buy good quality forages based on cost per unit Metabolizable Energy or kg Crude Protein, and to help farmers with a fodder crop and feed plan.

The high fiber content of roughages such as hay of mature grass, stover, wheat and rice straw make these feeds difficult to digest and it limits voluntary intake of the cows. It is therefore important to introduce in the ration more digestible feeds such as maize silage and fodder crops such as Brachiaria and young Napier grass. This also has a positive effect of reduced enteric methane intensity, which can be calculated and predicted by the Rumen8 software application. Rumen8 enables formulation of balanced diets that lower the cost-price of milk and raise productivity and farm profitability. It also is an excellent teaching aid for training students in dairy cow nutrition. SNV plans to roll it out, together with other agencies, to projects in Ethiopia, Uganda, Tanzania and Zambia.



1.3 Vocational skills development (VOSD)

Vocational Skills Development (VOSD) as an agenda was introduced by KMDP in 2013. Initially to support the formal institutions for dairy training and education in Kenya, to improve the quality of training, and make it more skills-based, market-led and demand-driven. Investments were made in a Dairy Sector Labour Needs Assessment and a business plan and road map for privatization and revival of the Dairy Training Institute (DTI) Naivasha, and in linkages with Dutch dairy training institutes through an E-Learning franchising concept. The response from the Kenyan institutions was however low.

As a result, KMDP shifted its focus to the so-called PDTC-concept (Practical Dairy Training Centers) that evolved from an emerging trend in Kenya, where successful dairy farms started organizing farm tours and training of peer farmers in their farms. It was observed that this generates an extra income for the farmer and a channel for knowledge exchange and skills development at the grassroots levels.

PDTCs became the prime target for KMDP, because it opened eyes to see that the farms could actually provide practical training, and that the farmers were comfortable learning from their colleagues. Three PDTCs were identified based on the fact that they were already providing some form of training and had the requisite facilities, viz. Mawingu Farm in Nyeri, Willens Farm in Eldoret and Baraka Farm in Eldoret. The latter had been working with the Habari Foundation from the Netherlands to develop skills-based training curriculum for the smallholder farms in Kenya.

KMDP supported these PDTCs on 3 fronts:
a) Good farm practices
b) Qualified trainers and training materials
c) Marketing of training

KMDP supported over 1,500 farmers with a 50% contribution to get one week training in one of these three PDTCs, and also mobilized PUM and other experts from the Netherlands to

support the PDTCs specifically in regard to good farm practices, and training of trainers. Interestingly farmers from other parts of Kenya trained at these PDTCs, started their own practical dairy training farms (PDTFs) in for example Meru and Nakuru counties. In these PDTFs usually one day training and exposure is provided at a modest fee catering for “chai and chapati”.

In spite of the success of the PDTCs, it became clear that farm owners at some point have inadequate capacity to handle complex training activities, including curriculum development, hiring and guiding of competent trainers, and marketing. Hence KMDP-II supported an initiative by Rabobank Foundation and GAD Foundation from the Netherlands, that entails a further development and professionalization of the PDTC concept.

In this “upgraded” PDTC model, GAD in partnership with ProDairy EA Ltd from Kenya has become responsible for the content of the training, the training material (10 modules), the hiring of qualified trainers and the marketing of the trainings, whilst using and paying a (pre-screened) host farm to serve as training ground.
In this new set-up so far 22 one-week trainings for groups of 18 farmers and extension workers have taken place in the period October 2018 – June 2019, mostly at Sikiru PDTC in Meru and some at Risa Farm in Limuru near Nairobi. This concept has also been embraced by Perfometer as its Academy of Farm Managers one week training, is quite similar to the GAD/ ProDairy initiative.

Under this chapter of VOSD, KMDP through its Innovation & Investment Fund also facilitated the publication of two Cow Signals East Africa publications by Roodbont Publishers from the Netherlands. This concerns Cow Signals Advanced East Africa version and Cow Signals Basic East Africa version. In 2019 a Kiswahili version of the latter was published.


28 11 2013


SNV

Theme 2

FEED AND FODDER

2: Introduction

In the predominant zero grazing dairy (mixed) farming system in Kenya, the share of feed costs in the total cost price of a litre of raw milk produced, is at 65% or more. The gap in availability of quality forages - and even quantity during the dry season - is the most critical bottleneck affecting productivity and profitability at farm level, and responsible for high seasonal fluctuations in raw milk supply.

KMDP invested heavily in addressing this key issue, and has built-up and shared much knowledge and experience as regards good practices on forage production and preservation for smallholder, medium and large scale dairy farms. This includes on-farm production and preservation and fodder commercialisation. Besides, in collaboration with CIAT demos were set up in different parts of the country to introduce farmers to a number of brachiaria and panicum varieties.

Silage contracting services were introduced at both sides of the spectrum. The Service Provider Enterprise (SPE) model was upscaled in the smallholder dairy supply chain, where youth groups are trained and establish silage making enterprises that assist farmers by harvesting, chopping and ensiling maize, oats or other suitable crops at a fee.

On the other end of the spectrum KMDP introduced the concept of “maize train” for medium and large scale farmers, where contractors use 4 or 6 row harvesters and offer fully mechanized professional agricultural contracting services for large scale maize production, harvesting and silage making. In addition to this, KMDP supported a joint venture of Dutch and Kenyan investors with the introduction of innovative machinery for making high quality baled silages of 350 kgs.

The impact of these innovations and pilot projects for those farmers who benefited from it, is access to quality forages, higher milk production, increased productivity and income. These business models are now being replicated and upscaled, ensuring enhanced access of quality forages for small, medium and large-scale dairy farms.

In 2018, KMDP-II also started a pilot on 25 farms that entailed the introduction of feed rationing software to help optimize cow rations and margin above feed costs (Rumen8). This involved amongst others setting up a Feed Library for tropical regions and adapting the software to the local needs in Kenya and/or East Africa. The pilot showed significant impact in terms of increased production and margins above feed costs at those farms that implemented the recommendations.

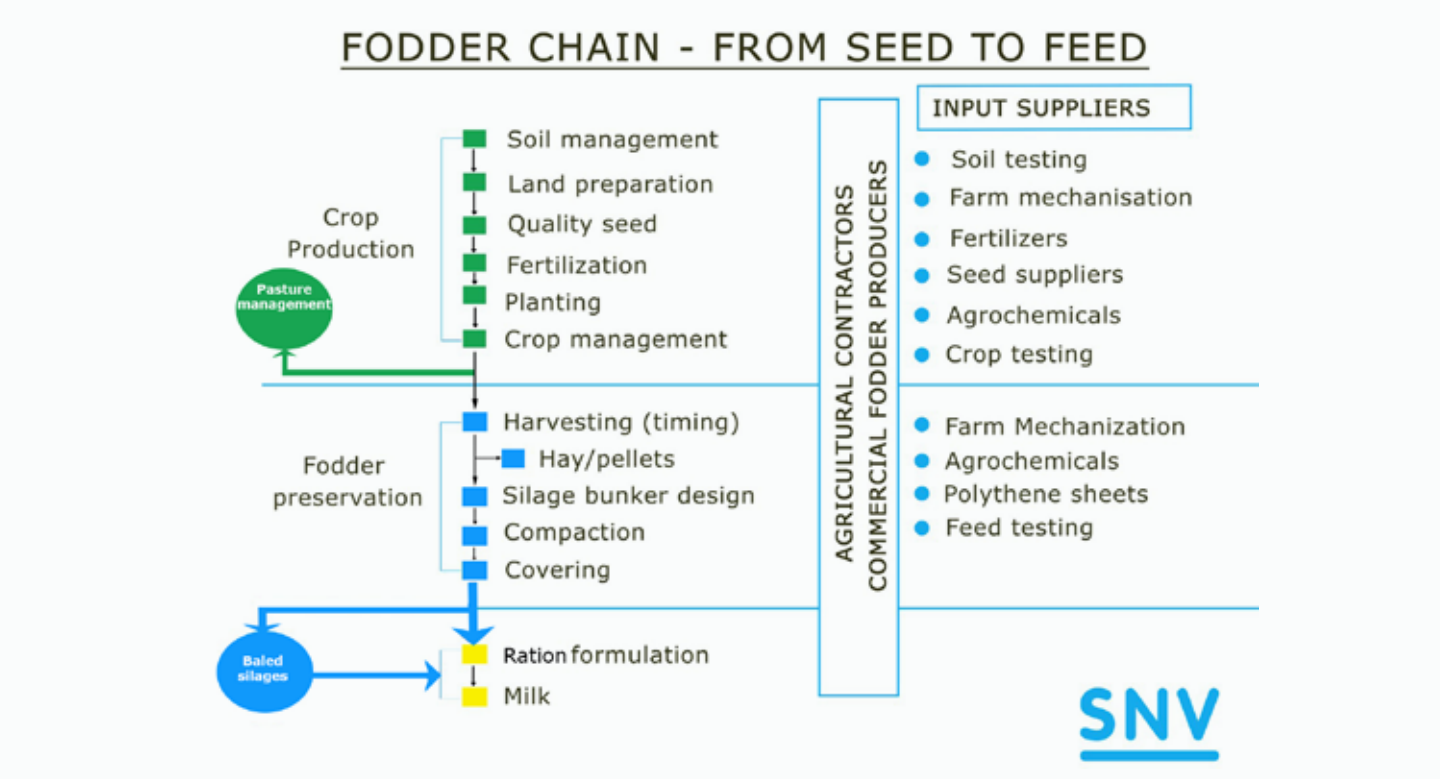
2.1 KMDP interventions in forage

One of the main factors that leads to seasonality in milk supply, low productivity of dairy cows and high cost per litre of raw milk produced in Kenya, is poor access to - and availability of - good quality fresh and preserved forages. This applies equally to smallholders and medium or large scale farmers, as also where land for forage production is abundant, forage planning and management is generally poor. The lack of quality fodder is partly due to land size and competition with other crops. But also it is directly related to low skills and knowledge as regards to fodder management and preservation, mechanisation and unavailability of high energy and protein fodder seed varieties. Most important however is that farmers and dairy extension workers do not make the link between forage production (agronomy) and the feeding requirements or the dairy cow. The huge demand for forage, especially in the dry season, has led to commercial forage supply chains of mainly low quality hay, and investments in on-farm forage production and preservation for maize silage.

KMDP's fodder interventions aim to have year-round availability to good quality fodder on-farm and from Commercial Fodder Producers (CFPs), through the following approaches and interventions:

a) Stimulate the farmer to increase on-farm production of quality forages, fresh (e.g. cut and carry and improved pastures) and preserved.
b) Connect farmers to agricultural contracting services supported through KMDP: maize train and service provider enterprise network (SPE).
c) Connect farmers to KMDP supported commercial forage producers.
d) Partner with CIAT and seed companies for demonstration and scaling-up brachiaria and panicum hybrids and cultivars for small and medium scale farms.
e) Pilot Rumen8 ration balancing software for dairy cows.

In all interventions, the leading principle is to approach forage production and preservation from the perspective of the nutritional needs of the dairy cow, and to assure environmentally sustainable forage production and use of land and water resource base. Improved forage quality and well balanced cow rations increases productivity and reduces enteric methane intensity. This is referred to by KMDP as the "from seed to feed approach".



"In a maturing dairy sector, the professional production, supply and use of fodder and feed is provided by specialised knowledge and service providers with adequate machinery and management skills ((Gjalt de Haan, "Quick scan of the business opportunities for commercial fodder production and supply centre in Kenya."). **- Gjalt de Haan, Feasibility Study for Commercial Forage Production and Service Centre in Kenya, 2014**

2.2 Service Provider Enterprises

The Service Provider Enterprise (SPE) is an innovative youth-led business model in which young men and women form groups and register companies, to offer commercial support services to entrepreneurial smallholders and medium-scale farmers in the vibrant Kenyan dairy value chain.
The model was initiated as a pilot in 2010 with the support of SNV Kenya's core subsidy-funded dairy programme. Interested recruits received short-term practical training on technical aspects of maize silage making and some areas of dairy cow management. This was upscaled by KMDP and in 2019 over 30 KMDP trained SPE groups were operating in six Counties, in high dairy potential regions in Kenya, more than half of them in Meru County. KMDP continued training the youth, assisting them with the formation and registration of groups, and linking them to the market. KMDP also co-financed the purchase of semi-manual stationary maize choppers which costs range from KES 200-400,000 depending on the size and capacity. In KMDP-II 16 of these groups were equipped with this equipment in Meru County. In the course of the programme over 200 youths were trained and many more were recruited and trained on the job by the groups on the ground, whilst expanding their services.

SPE groups are linked to dairy farmer cooperative societies (DFCSs) to provide services to their members to help address feed-related challenges. SPE members range in age from 18 to older than 35, with the majority (53%) falling in the youth bracket (18–35 years). The main services, provided by all SPEs, are silage making and fodder establishment. Maize silage making was the initial value proposition for establishing SPEs, as most farmers in the KMDP regions were not using maize silage to feed their dairy cows. The SPEs also offer a range of other services, including fodder establishment, farmer training and input supply e.g. forage seeds/cuttings, molasses and plastic sheeting or bags for silage. A few SPEs offer new and more specialized services such as biogas installation, design and construction of zero grazing units.

A study conducted in 2017 (3R Kenya Project) showed that in general SPE services have contributed positively to the dairy supply chain where they are operational. Farmers who sought SPE services reported increase in productivity. In Meru, where most silage was made, productivity was up to about 8−9.5 ltr/cow/day. This is in comparison with the average productivity of 5-6 ltr/cow/day in Meru's dairy producing areas. Farmers in Meru also generated a higher average daily income from milk sales and experienced reduced fluctuations in their milk volumes during the dry season, noting that silage contributed to this nominal increase.
Increased production at farm level resulted in an increase in the volume of milk collected by Dairy Farmers Cooperative Societies (DFCS). Where more silage was produced, for example in Meru, DFCS managers indicated that their daily milk collection was stabilizing in all seasons.

2.3 Maize Train

When KMDP started in 2012, in North Rift maize silage making was a common practice for the medium and large scale farmers Uasin Gishu, Trans Nzoia, Nandi and Bomet Counties. However the existing practices of silage making, were poor. Use was made of forage harvesters with a capacity too small for the acreage planted (from 10-100 acres), maize was harvested too early, with too long chopping length, no kernel crushers were used and the interval between start of making the silage pit and final sealing was too long. These existing practices result in enormous losses during ensiling and feed-out and greatly reduce nutritional value of the silage and voluntary dry matter (DM) intake of the cows. Added to this is the risk of poor anaerobic fermentation giving yeast, moulds and Basciluss chances to spoil the silage.

To address this situation, KMDP partnered with Nundoroto Farm Company and AG Harvesting, where it facilitated both agricultural contractors to offer professional and specialised maize production and silage making services to farmers. KMDP's contribution was both in terms of co-financing the initial investments in heavy duty machinery, such as 6-row John Deere maize harvesters, tractors and loaders through its Innovation Fund (EUR 50-100k), and also by providing valuable technical advice, organising feed testing, development of Guidelines and Standard Operation Procedures (SOPs), field days and market linkages. Technical advice was provided amongst others by PUM, Bles Dairies and ProDairy EA Ltd.

The experience in North Rift with the "maize train" has shown that the concept of silage making (maize, sorghum and grass) is viable in Kenya, and goes with huge benefits for the farmer in terms of increased milk production, provided the contractors follow good agricultural practice. The demand for these services steeply increased and in the course of KMDP-II new service providers entered the market. By 2019 there are five professional 6-row harvesters and two 4-row harvesters operational in these Counties and the acreage of maize ensiled by these machines increased from 247 in 2015 to over 2,500 in 2018. The costs charged by these professional contractors are about KES 15,000 per acre for chopping and ensiling of the maize, inclusive of bunker design, compaction and covering. Depending on the tonnage of fresh maize per acre and with average production costs, this brings the cost price of maize silage to KES 4-5 per kg fresh product.

2.4 Maize silage in bales

Baling silage is a new technology for the Kenyan forage market, introduced by FIT Ltd with the support of KMDP. As compared to hay in the commercial forage market (overpriced and of low quality), baling of maize silage gives opportunities to provide quality forage transportable over long distance, without losses of dry matter and nutritive value. The bales have a long shelf life. This gives high flexibility in terms of availability and sales throughout the year, with likely the highest margins in the dry season.

The principle of silage baling is to vacuum package the chopped maize directly fresh from the field, or to bale from a silage bunker. The baling machine provides high compaction, such that no oxygen can enter the bale and fermentation will start immediately or is maintained in case of baling from a silage bunker. If not opened and damaged the bales have a shelf life of over one year.

Forage Innovation Team Ltd (FIT Ltd), offers professional forage baling contracting and sales services to ensure enhanced access for small, medium and large-scale dairy farmers to quality forages and for constant milk production. It offers baling and consultancy services for farmers who wish to grow their own maize and have it baled. In addition to that, FIT grows its own maize - or buys maize from farmers - and bales it to sell in the market.

Since the concept was introduced in Kenya, other investors have replicated it, some with different machinery, technology and even different forages. Leketeton Farm near Eldoret has a machine of Turkish brand: a Celikel Perpetua2 baler, filling bags of approximately 50 kg. An investor near Eldoret started baling and wrapping maize silage with an Orkel machine making bales varying from 800 – 1,000 kgs.

AusQuest Farm near Athi River (30 kms from Nairobi) is piloting Sudan grass (a type of sorghum) to make sorghum silage or haylage. After mowing, it is on the field for wilting up to 50% DM and then baled with a Krone single purpose baler. A separate machine is picking the bales for wrapping. Depending on DM content the bale weight is approx. 400-500 kgs.

Grove Feeds in Kitale is baling maize silage, sorghum and sunflower in 70 to 100 kg bales (depending on DM content). The baling machine is from China and is modified to fit the local supply of spare parts. The capacity of the operation is 12 – 15 tonnes per day.

2.5 Forage demonstration plots - KMDP/CIAT collaboration

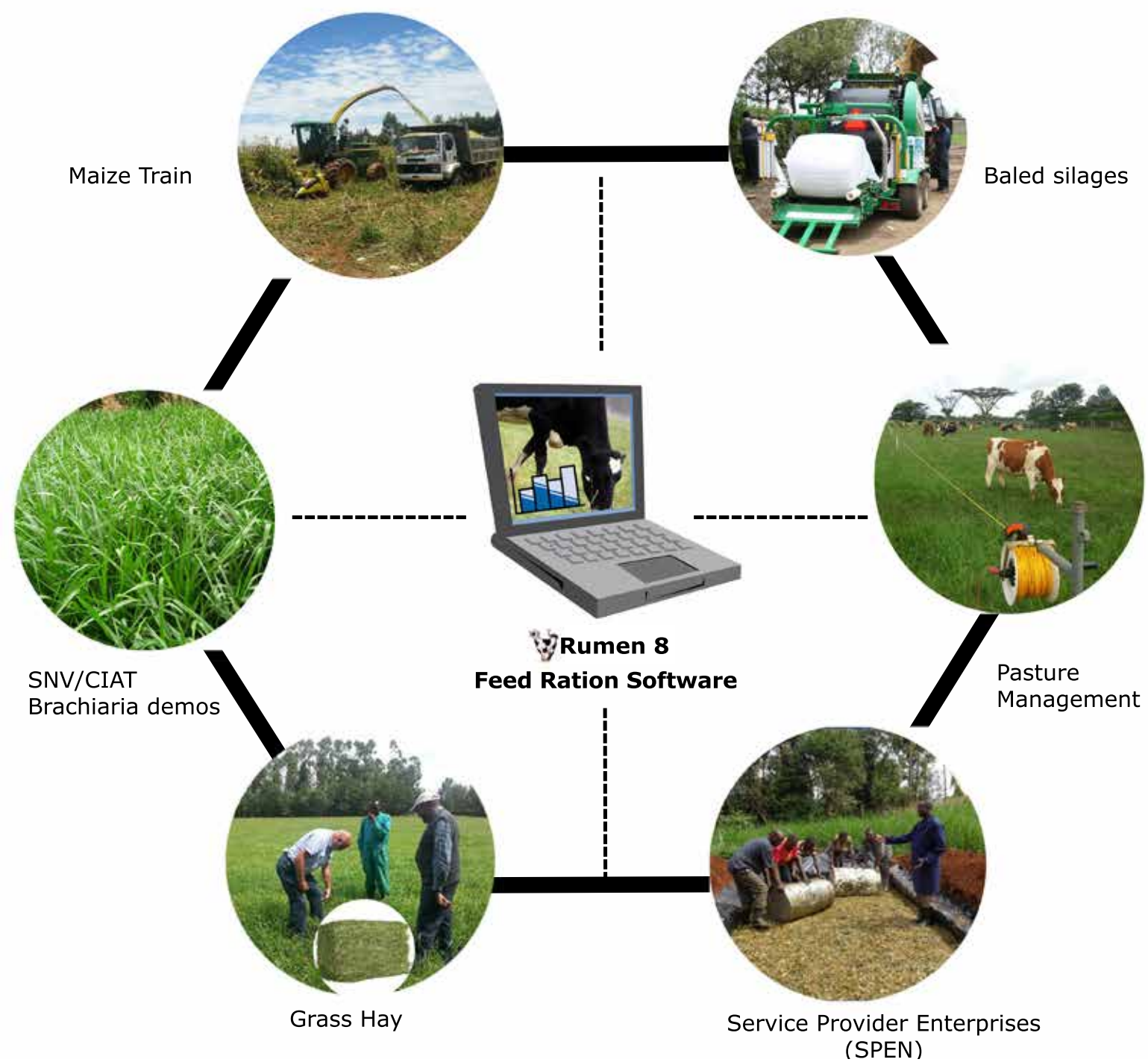
In 2018 SNV KMDP started collaboration with CIAT (International Center for Tropical Agriculture). CIAT is an organisation that does research on improved tropical forages. The collaboration entails demonstration of various brachiaria hybrids and cultivars, Panicum Maximum and other protein rich forage (desmodium, vetch) in different ecological zones and sizes of farms from small to large scale.

Various farms were selected across Kenya and by May 2019 the number of demo plots had grown to 43 in Meru (mainly for smallholders) involving 16 dairy cooperatives and Kaguru Agricultural Training Centre. The remianing 5 demos are in Muranga (2) and Uasin Gishu (3), all 5 being medium scale farms. As for brachiaria the following varieties are demonstrated: 3 hybrids (Mulato II, Cayman and Cobra) and 4 cultivars (Xaraes, Piata, Basilisk and MG4).

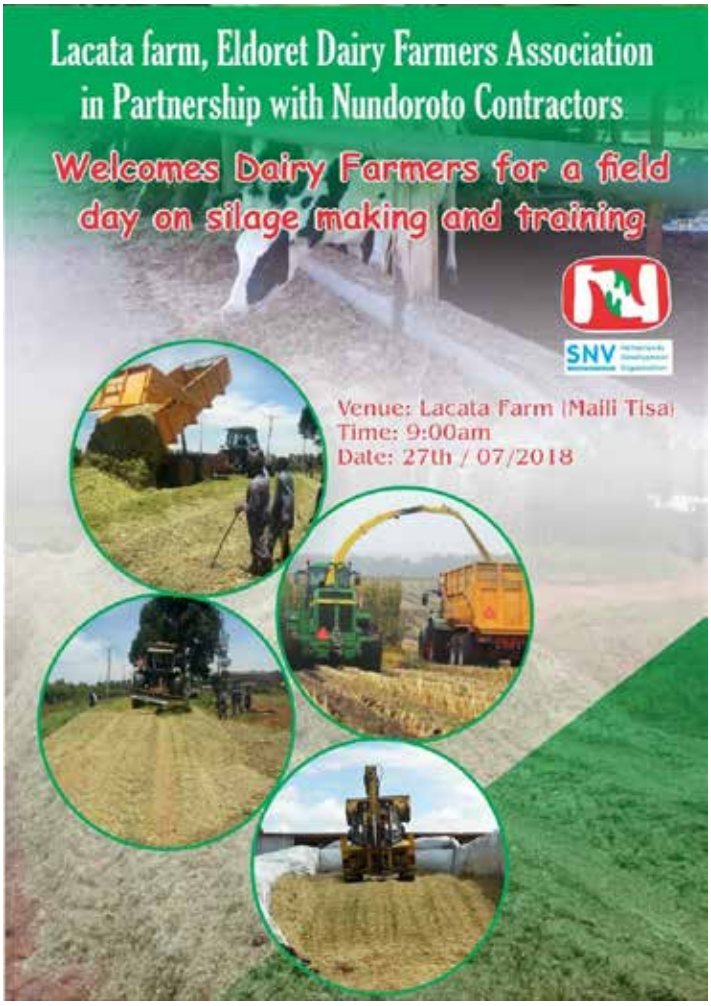
In Uasin Gishu County the demos plots of 0.5 acre to test suitability not only for cut & carry, but also for grazing and mowing (mechanised harvesting). These plots were upscaled in April 2019 at 2 farms each doing 5 acres. The farmers were guided by KMDP – notably Fredrick Muthomi in Meru and Solomon Misoi in Eldoret - on how to prepare the seed beds, how to plant, to weed and fertilize and even on gapping and sample collection procedures. CIAT monitors the demonstration plots and also takes samples at different growth stages for testing of the nutritive values.

A large number of trainings and field days were organised to promote the forages and for learning. In Meru for example this attracted a total of over 13,000 farmers during a period of one year and the interest by the farmers to plant brachiaria and panicum is quite overwhelming. The challenge is now with the seed companies to supply those varieties that are registered in Kenya, whilst for other varieties registration with KEPHIS is ongoing.

In the first year it has not been possible to test the different varieties for their suitability of silage making. However KMDP and CIAT recommend that this will be done in the next growing season as the practice is successfully applied outside Kenya. This may in the future become a potential forage to commercialise for baling as a wilted grass silage. Brachiaria, if well-managed, is a relatively well-balanced fodder in terms of energy and crude protein, and therefore a forage with a high nutritional value for dairy cows.


Maize Train
Baled silages
SNV/CIAT
Brachiaria demos
Rumen 8
Feed Ration Software
Pasture
Management
Grass Hay
Service Provider Enterprises
(SPEN)


AGRI ASSIST
AGRI ASSIST LTD
in collaboration with: AG HARVESTING LTD
wishes to invite you to its
— OPEN FIELD DAY —
& GRAND OPENING
A MOULDBOARD & CHISEL PLOUGH TO BE WON
GUEST OF HONOUR: H.E. HON. JACKSON MANDAGO
VENUE: AGRI ASSIST'S YARD
(along ELD-NKU highway directly opposite Gas City petrol station)
DATE: 12TH JULY 2019
FROM: 9AM UPTO 6PM
FREE ENTRY


Lacata farm, Eldoret Dairy Farmers Association
in Partnership with Nundoroto Contractors
Welcomes Dairy Farmers for a field
day on silage making and training
SNV
Venue: Lacata Farm (Malli Tisa)
Time: 9:00am
Date: 27th / 07/2018

Theme 3

MILK QUALITY

3: Introduction

KMDP (Phase I and II) worked with 4 processors and 35 dairy cooperatives on milk quality to reduce amongst others adulteration of milk (i.e. water, preservatives and other foreign substances), bacterial count and antibiotic residue levels. To mention just a few critical food safety related milk quality parameters that are often present in raw milk collected for processing, at levels way above the East African standards. The lack of safe milk goes with a significant cost for public health in Kenya, as is reported by the Kenya Dairy Board (Proposed Dairy Industry Regulations & Regulatory Impact Assessment Report, 2017).

KMDP's interventions on milk quality are related to training and giving financial incentives to dairy farmers, milk transporters, graders and cooperatives. In addition cooperatives' management and boards were sensitized and assisted with developing milk quality policies and working procedures for their staff and membership.

Next to this, KMDP had a targeted approach where it supported the milk processor Happy Cow Ltd from Nakuru and two of the cooperatives that supply Happy Cow with raw milk, with implementing a milk quality tracking & tracing system and a quality-based milk payment system. This project showed amongst successes also many challenges and yielded important lessons on the opportunities and challenges of introducing and upscaling of a payment system for raw milk based on quality. In a market that lacks a level playing field, enforcement of standards and has low consumer awareness on health implications of unsafe milk.

At policy level KMDP-II works with the Kenya Dairy Board (KDB) and the Kenya Dairy Processors Association (KDPA), where it supported studies on feasibility of introducing QBMP in Kenya, the Safe Milk Campaign and development of a strategic plan by KDPA.

Generally speaking one can say that during the course of KMDP, awareness of food safety issues in dairy – as is the case in other agro-value chains – has increased. This applies to dairy value chain actors, consumers, government and industry associations. Undoubtedly KMDP's interventions and the partnership with Happy Cow Ltd have contributed to this increased awareness and the attempts to address this important issue.

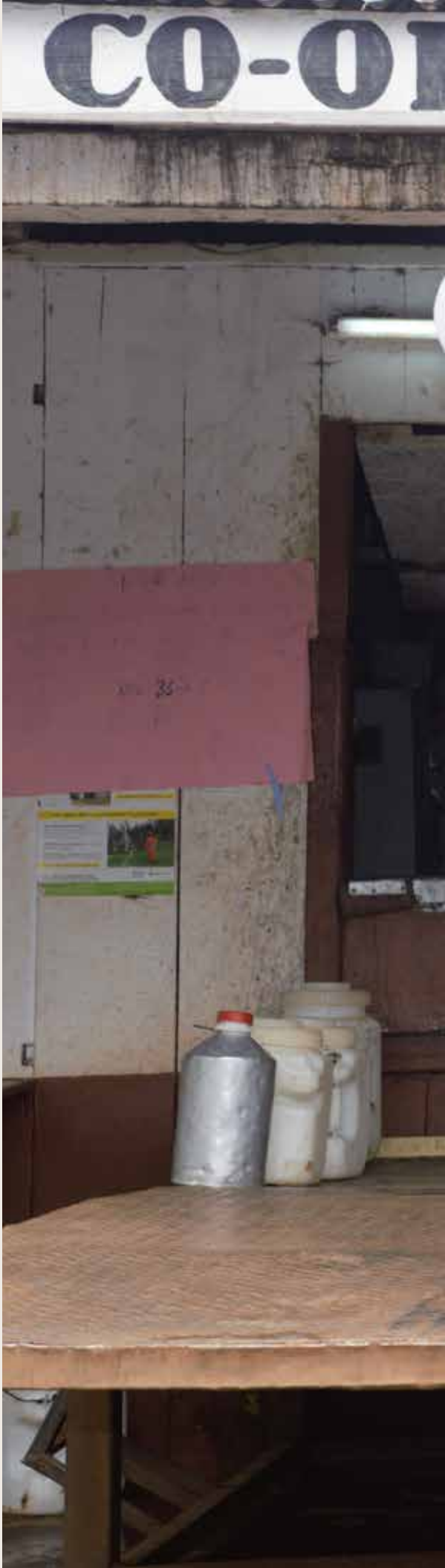
3.1 Milk quality and food safety

Abstract from the report: "Making milk quality assurance work in an un-level playing field – Lessons from the Happy Cow pilot", 3R Kenya Project, 2019

Assuring the quality and safety of milk and dairy products has been a persistent issue in the Kenyan dairy sector. This is linked to processors and traders neglecting attention to quality as they compete for milk volumes (among themselves and with traders who sell raw milk). The bulk of the marketed milk is sold as chilled or unchilled raw fresh milk directly to consumers through what are characterized as informal and semi-formal market channels. These channels are characterized by non-compliance with the regulated safety and quality standards and collection of statutory revenues (taxes, cess, levies, VAT), (Makoni et al. 2014, Rademaker et al. 2016). Some actors contend that the policies and regulations related to milk safety are repressive to the informal sector, and point at the latter's important contribution to livelihoods and nutrition security in Kenya. Various studies have shown that the dairy sector broadly faces challenges of low levels of compliance with national, regional and international standards related to quality and safety standards. This relates to microbial load and adulteration, pointing at malpractices such as poor handling (Omore et al. 2005; Foreman and De Leeuw 2013). More recently, other studies have also pointed at other safety concerns including high bacterial load, prevalence of antibiotic residue, unsafe aflatoxin content and unacceptable somatic cell count. Low levels of compliance affect both raw and pasteurized milk, including in the emerging retail innovations of milk ATMs (Bebe et al. 2018; Kosgey et al. 2018; Kashongwe et al. 2017; Langat et al. 2016; Ndungu et al. 2016a, 2016b).

The challenges of quality and safety of marketed milk persist despite efforts in intensive training and awareness creation implemented over the years. Quality and safety of milk has implications for competitive growth of the dairy industry and should concern all actors in the dairy value chain. While there has been growth in domestic demand for milk and dairy products, and there is growing potential for expanding into regional and international markets, the growth is stifled by prevalence of non-compliance to quality standards (Bebe et al., 2018). While only a tiny fraction of Kenya's milk production is exported, in recent years a number of trade conflicts have arisen when regional importing countries rejected products processed in Kenya on the grounds that Kenya's raw milk production was of insufficient quality (Foreman and De Leeuw 2013). Dairy industry actors are now paying more attention to milk quality and the safety of dairy products in Kenya. A recent study (Ndambi et al. 2018) shows the enormous costs savings and other potential benefits to society, of improving milk quality and safety. From a public good perspective, better quality milk can reduce the burden of health-care costs of treating milk-related illnesses. Poor milk quality also affects the bottom line of private investors, including processors and food companies, due to its effect on product yields and taste and longer shelf life, which affects profit margins and (local and export) market access.

There is now more interest in integrating a QBMPS as one of the options to reorient the sector from being volume-driven towards being quality-focused. This is also informed by the threat the industry is facing from regional and international markets (Woolfrey and Bilal, 2017).




PERATIVE SO

3.2 Happy Cow Ltd: Quality Based Milk Payment pilot project

Catherine Kilelu (ACTS) and Jan van der Lee (WUR LR) – 3R Kenya Project

Four years ago, Happy Cow Ltd and two dairy cooperatives - New Ngorika Milk Producers Limited and Olenguruone Dairy Farmers Cooperative Society – started out on a big adventure as business partners. As producer of cheese and yogurt, Happy Cow a medium-size milk processor in Nakuru needs consistent supply of good quality milk. This to make its products – cheeses, yoghurts and other fermented products - tasty and safe to consume. Milk from its suppliers, mostly smallholders supplying either individually or through dairy cooperatives, was not up to standards. This was mainly due to high levels of adulteration, unhygienic milk handling and storage, and antibiotic residues found in the milk supplied by the many smallholders.

Facing this challenge in their milk supply chain, the partners needed a solution that would mutually benefit their businesses. Quality-based milk payment systems (QBMPS) where suppliers receive a bonus for their quality milk is a known solution in the dairy industry. But it had not been tried in a smallholder-dominated supply chain in Kenya before. So, when Happy Cow Ltd and partners embarked on this adventure of implementing a QBMPS, could they imagine what lay ahead?

Considering a QBMPS requires huge and sustained investments, Happy Cow sought the support of SNV's Kenya Market-led Dairy Development Program (KMDP). Improving milk quality in the Kenyan dairy sector was one of the key objectives of KMDP. Through its Innovation Fund, KMDP offered four-year (2016-2019) investment and technical support to pilot a QBMPS for Happy Cow and its partners. The technical support was outsourced to Bles Dairy Advisory from the Netherlands, an international dairy development consultancy firm with much experience in milk supply chain management, having worked for a number of dairy processors world wide.

The bonus payment system focused on 4 quality parameters, which are total bacterial count (TBC/TPC), presence of antibiotic residues, adulteration/freezing and total solids (incl. fat, protein, lactose and ash). Later – in 2018 - the project also tracked somatic cell count an aflatoxin M1.

The investment put in place technical, organizational and managerial systems and incentives needed to improve milk quality. At Happy Cow Ltd, the fund enabled investments to improve the laboratory infrastructure which was KENAS accredited in 2019 for 12 milk quality parameters. It also supported, managerial capacity and information management systems to improve tracking and tracing of the quality of milk and bonus payment.

At the producers' organization level, investments were made and co-financed in mini-laboratories and chilling tanks, aluminum cans, milk testing equipment and collection centers near the farmers in the collection routes, and in training of farmers, staff, milk graders, and transporters. To support the necessary changes, various Kenyan and international experts were involved to advice in the complex process.

Overall, introducing a quality-based milk payment system is about changing practices and mind-sets of all supply chain actors in a way that makes them champions of a quality-driven industry. This proved to be not easy! After four years of implementation, results show some improvement in the milk quality supplied to Happy Cow, but making the full system work had challenges. A number of valuable lessons were learnt:

- Introducing QBMPS in a smallholder-dominant supply chain needs to focus on a few easy-to-trace quality parameters that can quickly offer incentives to all supply chain actors.

- A large number of farmers need to qualify for bonuses in order for the system to 'stick' to avoid losing their loyalty. Additionally, all actors in the supply chain need to benefit from the system to make it sustainable.

- The success of a QBMPS depends on enforcement of regulation and standards and ensuring fair competition in the market- a challenge that persists in the Kenyan context.

- Happy Cow became a champion for milk quality by widely sharing their experiences with QBMPS. This has put the urgency of moving toward a quality-based Kenyan dairy industry firmly on the agenda.

- Quality-based payment is about behavior of individuals as well as organizations. Such changes are easily said than done. Beyond monetary incentives, the ethics of assuring consumers safe food is paramount.

So, is such an innovative business case being scaled and adopted widely in the Kenyan dairy industry today? The lessons from the Happy Cow pilot show that collective effort is needed to fine-tune and upscale the system. This will take the efforts and commitment of private and public sector stakeholders. Meanwhile Happy Cow and its suppliers are upscaling the QBMP system in the post project period, with inclusion of new testing equipment at the cooperative level and an improved software package.

Happy Cow Quality Based Milk Payment System

MILK ANALYZER – ULTRA SCAN SWIFT

DOUBLE SENSOR, MEASURING SPEED 18 SECS

Milk need first the pass the usual platform test like Organoleptic, Alcohol and Peroxide. Milk analyzer uses Ultra Sound to measure e.g. composition, added water and other adulterations (last 2 are major sources of poor milk quality). Analyzers are reasonable prized but cannot detect or count Bacteria, Antibiotics and Aflatoxin residues.

PARAMETER	MEASURING RANGE	ACCURACY	TECH. OVERVIEW	
Fat	0-25%	±0.1%	Sample Volume	20ml
SNF	3-40%	±0.15%	Sample Temp.	5-40^{0}C
Density / CLR	1000-1160Kg/m^3	±0.3Kg/m^3	Humidity	0-80%Rh
Protein	2-15%	±0.15%	Interface 1	RS232 Port
Lactose	0.01-20%	±0.2%	Interface 2	USB
Salts	0.04-0.70^{0}C	±0.05%	AC Power Supply	95-240V
Added Water	0-99%	±3%	DC Power Supply	12V
Freezing Point	0.04-0.70^{0}C	±0.005^{0}C	Dimensions	145x210x220mm
Sample Temp	5-40^{0}C	±1^{0}C	Weight	3.5 Kg

An ISO certified dairy laboratory has advanced equipment to measure results according to quantitative and international standards. For composition it can use a Lacto-Scope (Infra-Red) and for bacteria counting it can use 3M technology (plate reading). For food safety factors (like Anti-Biotic & Aflatoxin residues) specific equipment are used.

A certified ISO laboratory and specialized in dairy matters can measure e.g.:

Composition

- Total solids (fat, protein, lactose)
- Adulteration/ freezing point

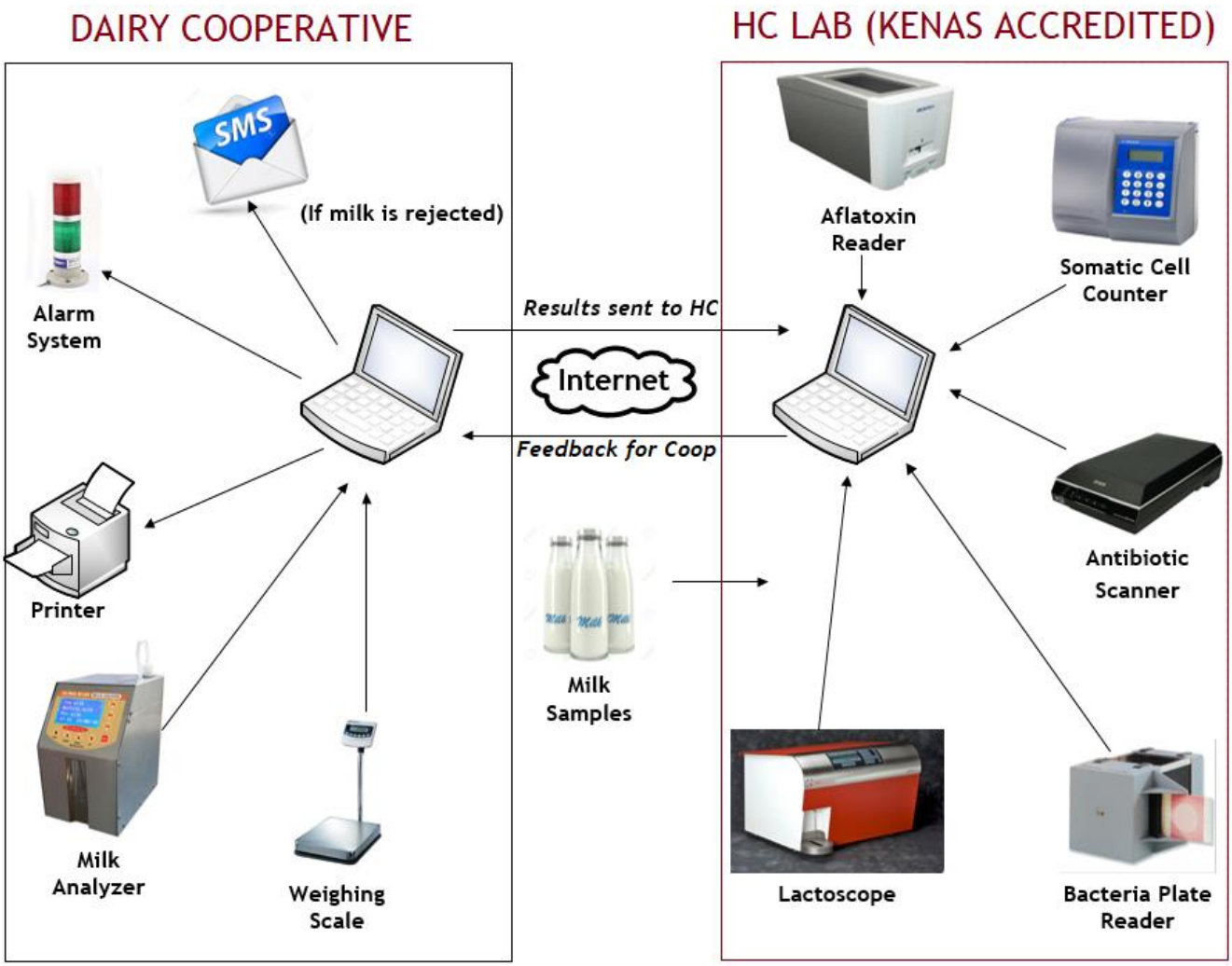
Microbiology

- Total bacterial count; TBC/TPC
- Somatic cell count
- Freezing point depression

Food Safety

- Presence of antibiotic residues
- Aflatoxin M1

Interaction Milk Analyzer at Coop with HC Laboratory



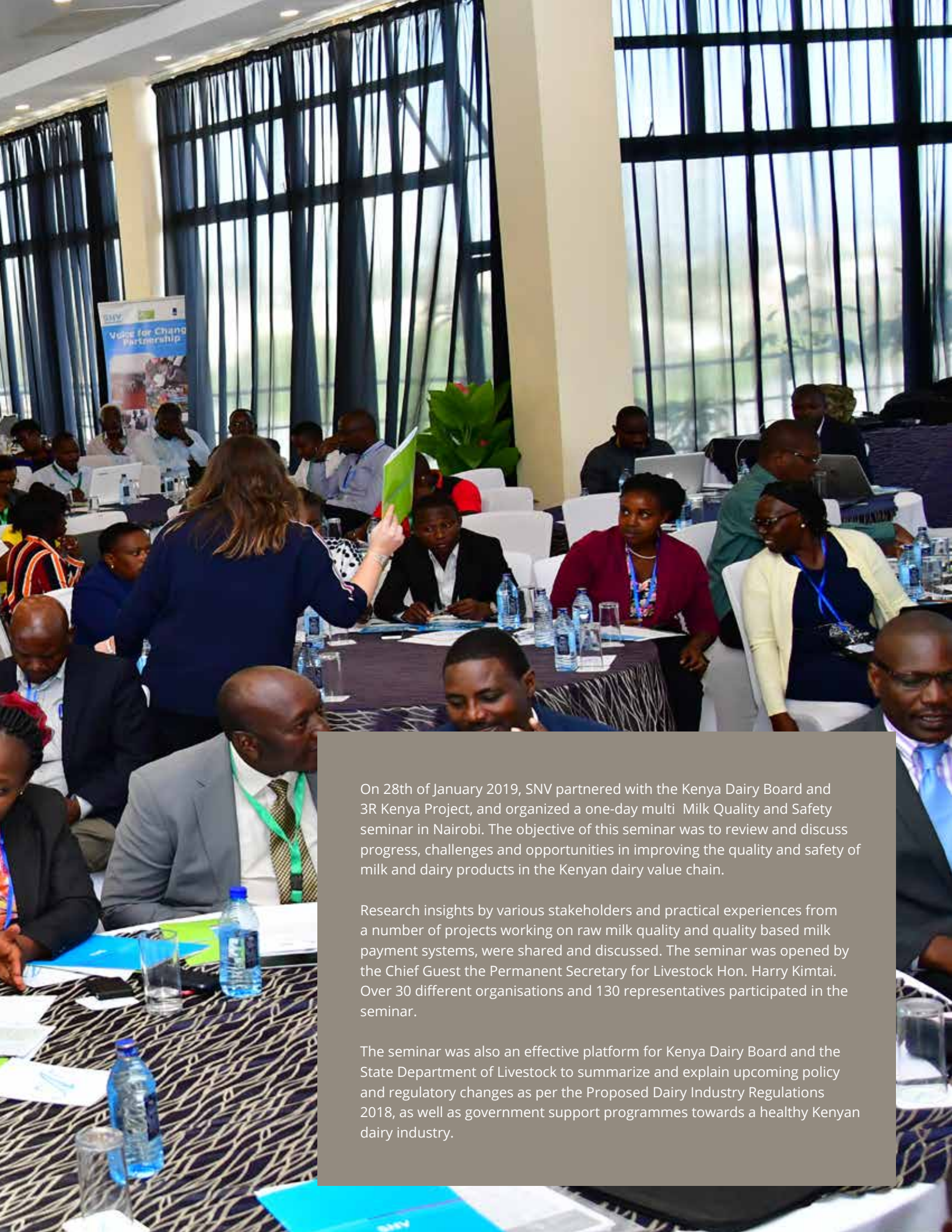
After initial acceptance tests, each can is weighed and analyzed using the Milk Analyzer and results transmitted to the coop's computer. The computer stores the results as an excel file with formulas and ranges. If a value goes "out of range", the system generates an alarm which indicates some non-conformity which could lead to rejection. A farmer gets an SMS when milk is rejected and its reason.

Accepted milk is transferred to the milk cooler. Farmers receive the usual print-out indicating: the date, their names, kgs delivered, etc. On daily basis a summary file is sent to the HC laboratory by internet.

Milk samples from the platform are regularly taken and transported to HC. At HC, tanker milk is also sampled and together with the platform samples analyzed using e.g.: Lacto-Scope for Composition, Plate Reader for Total Bacteria Count and equipment for counting Anti-Biotic residues, Somatic Cells and Aflatoxin levels. The cooperative receives feedback from the HC laboratory.

Results from the HC lab and the Milk Analyzer determine the Quality Pay-out to the farmers.

KENYA DAIRY BOARD



On 28th of January 2019, SNV partnered with the Kenya Dairy Board and 3R Kenya Project, and organized a one-day multi Milk Quality and Safety seminar in Nairobi. The objective of this seminar was to review and discuss progress, challenges and opportunities in improving the quality and safety of milk and dairy products in the Kenyan dairy value chain.

Research insights by various stakeholders and practical experiences from a number of projects working on raw milk quality and quality based milk payment systems, were shared and discussed. The seminar was opened by the Chief Guest the Permanent Secretary for Livestock Hon. Harry Kimtai. Over 30 different organisations and 130 representatives participated in the seminar.

The seminar was also an effective platform for Kenya Dairy Board and the State Department of Livestock to summarize and explain upcoming policy and regulatory changes as per the Proposed Dairy Industry Regulations 2018, as well as government support programmes towards a healthy Kenyan dairy industry.


Jolly
FRESH
yoghurt
LOW FAT
Thick & Creamy
Blueberry
Cheesecake
Thick & Creamy
Passion
Thick & Creamy
Strawberry


EKOMILK
SCAN


DAIRY FARMERS CO-OPERATIVE SOCIETY LIMITED

Theme 4

FUNCTIONAL DAIRY VALUE CHAINS

4: Introduction

KMDP supports within the partnerships it has with processors and dairy societies so-called functional dairy value chains. These are characterized by formal and mutually beneficial relationships between farmers, dairy societies and processors with inclusion of smallholder farmers, women and youth.

Important drivers for such relationships are trust and loyalty, timely payment, fair and stable prices with a notion of the importance of "shared-value" by all value chain actors, and provision of quality services from the processor to the dairy society to the farmer.

KMDP felt that these services should be geared towards enhancing productivity and income at the farm level, and efficiency and quality in raw milk collection and marketing. As this will contribute to enhanced profitability and sustainability of the dairy enterprises and the industry as a whole, so as to make these value chains economically functional.

Functional dairy value chains are also characterized by a stable and conducive relationship of dairy value chain actors and input suppliers and service providers (value chain facilitators) and – also - with policy makers and regulators (value chain enablers). Value chain actors, facilitators and enablers should have or develop a common vision, on how to address systemic bottlenecks for sector growth and competitiveness. In this regard KMDP supported the Kenya Dairy Board (KDB) and the Kenya Dairy Processors Association (KDPA), the latter with strategic plan development. KMDP also participates in national forums for feed and fodder, milk quality and Technical and Vocational Education and Training (TVET).

Shared value or income and a common vision on the direction of the sector, are important drivers for willingness by stakeholders to invest in attaining higher productivity and quality – and thus the sector being competitive. Next to being economically functional (competitive), functionality must also be sought in environmentally sustainable livestock or dairy value chains.

KMDP's approach to this is to promote quality feeds and forages and good agricultural practices as regards to soil and water management, fodder production and preservation, well balanced feed rations, reduction of unproductive animals, and manure management. This works to mitigate carbon footprint and to reduce emission intensity (emission per liter of milk), and also to make the sector more resilient towards the impact of climate change.

4.1 Inclusive dairy value chains

KMDP has been working in the smallholder dairy value chain for the past 8 years supporting 35 smallholder dairy farmer cooperatives through inclusive business models in North Rift, Central and Eastern. Inclusiveness was defined by the project as development of efficient and functional markets, with inclusion of smallholder farmers, women and youth through their cooperative societies.

In KMDP-II the project chose to support these dairy cooperative societies, within a processor-led approach, through continued collaboration with Meru Dairy Farmers Cooperative Union (Meru Union) and Happy Cow Ltd. Happy Cow is a private processor that buys milk from the two dairy cooperatives supported by KMDP, and invests with the cooperatives in the quality based milk payment project. KMDP co-financed directly the two dairy cooperatives in farmer training and capacity building of their Training & Extensions departments, rolling out of the PDTC concept and training of SPE groups.

The intervention in Meru was through the Meru Union, the apex organisation of 44 dairy cooperatives who form the Union's Board through representation. The Union has increased daily milk intake from a mere 30,000 litres in 2012 to an average of 230,000 litres in 2018-19. It collects and markets milk on behalf of its member dairy societies and pays a fair and stable price for the milk received (in 2018: KES 35-38/litre plus an end-of-year bonus of KES 2.00/litre). Since the collaboration with KMDP, the Union hired 20 T&E staff who work together with the KMDP team on farmer training. It also runs an AI services department.

In KMDP-I the project assisted 5 of Meru Union's affiliated smallholder dairy cooperatives. The approach developed and the lessons learned were scaled up to 15 dairy cooperatives in KMDP-II, which were identified for support by Meru Union. Main interventions have been on dairy society governance and management, farmer training through a lead farmer approach, on-farm training and farmer exchange visits, fodder establishment and silage making service model, and training of milk transporters and graders. Dairy cooperative boards and management have also been trained.

Milk intake in the 15 cooperatives increased by 68% from 12.5 million litres in 2017 to 21.1 million litres in 2018. This represents a growth in milk sales of 57% from KES 494 million in 2017 to KES 776 million.

The package for these 15 dairy cooperatives and Meru Union had several components:

- Training and coaching of Training & Extension staff Meru Union and dairy cooperatives;
- Lead farmer training in partnership with G.A.D. Foundation/ProDairy EA Ltd at Sikiru PDCT;
- Lead farmer on-farm advisory (1 x per month for 20 lead farmer groups);
- Farmer group trainings in the milk collection routes at a lead farmer's dairy farm;
- Farmer group exchange visits between groups of different cooperatives;
- Training of T&E staff and farmer groups in collaboration with a Dutch senior expert (PUM);
- Promoting high energy and protein rich forages and forage preservation (including the brachiaria and panicum pilot in partnership with CIAT);
- Training and equipping Service Provider Enterprises for silage making and business development;
- Farmer training on clean milking and handling;
- Training of milk collectors and graders;
- Developing policies and Standard Operating Procedures (SOPs) for clean milk handling and storage;
- Improved leadership, governance and service provision at dairy cooperative level through training of Board and Management;
- Financial management training of cooperatives finance departments;
- Meru Union Breeding Strategy and Milk Marketing Strategy;
- Linkages with both local and international input providers.


MOUNT KENYA
WHOLE MILK

4.2 Social inclusion

Addressing social inclusion in dairy development goes hand-in-hand with recognizing social differentiation and positioning at varying scales. Next to wealth status, educational and cultural background, experience in the dairy, and even religious affiliation, it is well noted that also gender and age groups occupy different social positions that influence their capacities to uptake new technologies, get employment and income, claim ownership and are able to influence decision-making processes, and hence to affect positive change in their families and communities.

KMDP has mainstreamed the role of women and youth with confirmative action. KMDP has had a strong youth-into-dairy focus through its internship and dairy advisory programme, targeting young graduates and professionals. This is also exemplified through the youth service providers' enterprises (SPE) and promotion of young farmers. In total 200 youths were trained as service providers and many more were recruited afterwards by the groups that offer their silage making services to the farmers.

KMDP has translated social inclusion into activities to enhance sustainability of smallholder dairy farming and improve knowledge, skills and incomes of men, women and youth participating in the dairy value chain. In Meru for example the collaboration with Meru Union and 15 dairy cooperatives resulted in an increase of annual milk intake by 68% (2018 versus 2017 data), increased milk production and productivity for lead farmers and other members, increased income and market for youth service provider groups active in silage making (SPEN) with 53% its members being youth, and female membership in cooperatives of 52.8% of active members.

KMDP-I also conducted a gender scan of the dairy value chain in Meru. The main objective of the study was to understand gender equity in the dairy cooperative societies in Meru. This was done by applying an adapted version of the Women Empowerment in Agriculture Index. Lessons learned were integrated in KMDP-II, and the model was used as a checklist for gender sensitivity in the design of planned interventions, acknowledging the crucial role women play in the industry. The findings from the study were as follows:

- Participation of women in dairy farm operations and decision making is significant and does not show a strong male bias.
- The main resource for agriculture production – land, is still largely a preserve for the male in the households.
- Female have access to dairy incomes, and are able to make decisions jointly with their partner/spouse on the use of the proceeds from dairy and investments in the dairy enterprise.
- Women are generally underrepresented in formal organisations and representative bodies, which is mainly related to socio-cultural factors.

4.3 Environmentally sustainable dairy farming

KMDP took lead in preparing the Kenya Forage Quick Scan Working Paper, a report compiled under the Netherlands East African Dairy Partnership (NEADAP), in collaboration with Wageningen University Livestock Research (July, 2019). This report and the Policy Brief that will be extracted from it, pay due attention to the importance of intensified environmentally sustainable forage production for the dairy sector to remain functional from a natural resource base point of view.

The report highlights that forages are essential for the successful operation of ruminant animal production systems and the link between quality of forages – productivity – cost price of raw milk – food security and food safety - sector competitiveness – and the industry's economic and environmental sustainability.
Ruminants are heavily dependent on forages for their health and production in a cost-effective and sustainable manner. While forages are an economical source of nutrients for animal production, they also help conserve the soil integrity, water supply and air quality (Chaudry, 2008).

In 2010, Kenya's national GHG emissions equated about 73 MT (million tons) of CO2 equivalents (GoK, 2015). About 40% of agricultural emissions in Kenya come from manure left on pasture (37.2%), application of synthetic fertilizer (1.8%), and manure applied to soils (1.2%). Enteric fermentation takes up about 55% of the agriculture sector's emissions (FAOSTAT, 2019). The dairy cattle sector in Kenya is responsible for about 12.3 MT CO2 equivalents. The GHG profile of milk in Kenya is dominated by methane 95.8%, while the nitrous oxide (N2O) and carbon dioxide (CO2) contribute 3.4% and 1% of the total emissions, respectively. Approximately 88% of the emissions arise from methane produced by the rumination of cows and 11% from the management of stored manure. Emissions arising from other sources make a negligible contribution to overall emissions (FAO and NZAGRC, 2017).

KMDP promotes climate-smart agriculture through improved agricultural practices from "seed to feed": i.e. land preparation, fertilisation, forage crop production and rotation, forage preservation, cow nutrition, ration balancing and manure management To increase availability and accessibility improved forage species and varieties, also agronomic practices need to improve and adopted to intensify sustainable production per hectare like e.g. Conservation Agriculture

Conservation Agriculture (CA) systems can be used to intensify maize grain and forage maize production as well as production of other forage crops. These (CA) systems utilize soils for the production of crops with the aim of reducing excessive mixing of the soil and maintaining crop residues on the soil surface, in order to minimize damage to the environment. The 3 principles of conservation agriculture are: minimum tillage and soil disturbance, permanent soil cover with crop residues and live mulches, crop rotation and intercropping. Conservation agriculture is 20 to 50 percent less labour intensive and thus contributes to reducing greenhouse gas emissions through lower energy inputs and improved nutrient use efficiency. At the same time, it stabilizes and protects soils from breaking down and releasing carbon to the atmosphere (FAO 2018c.).

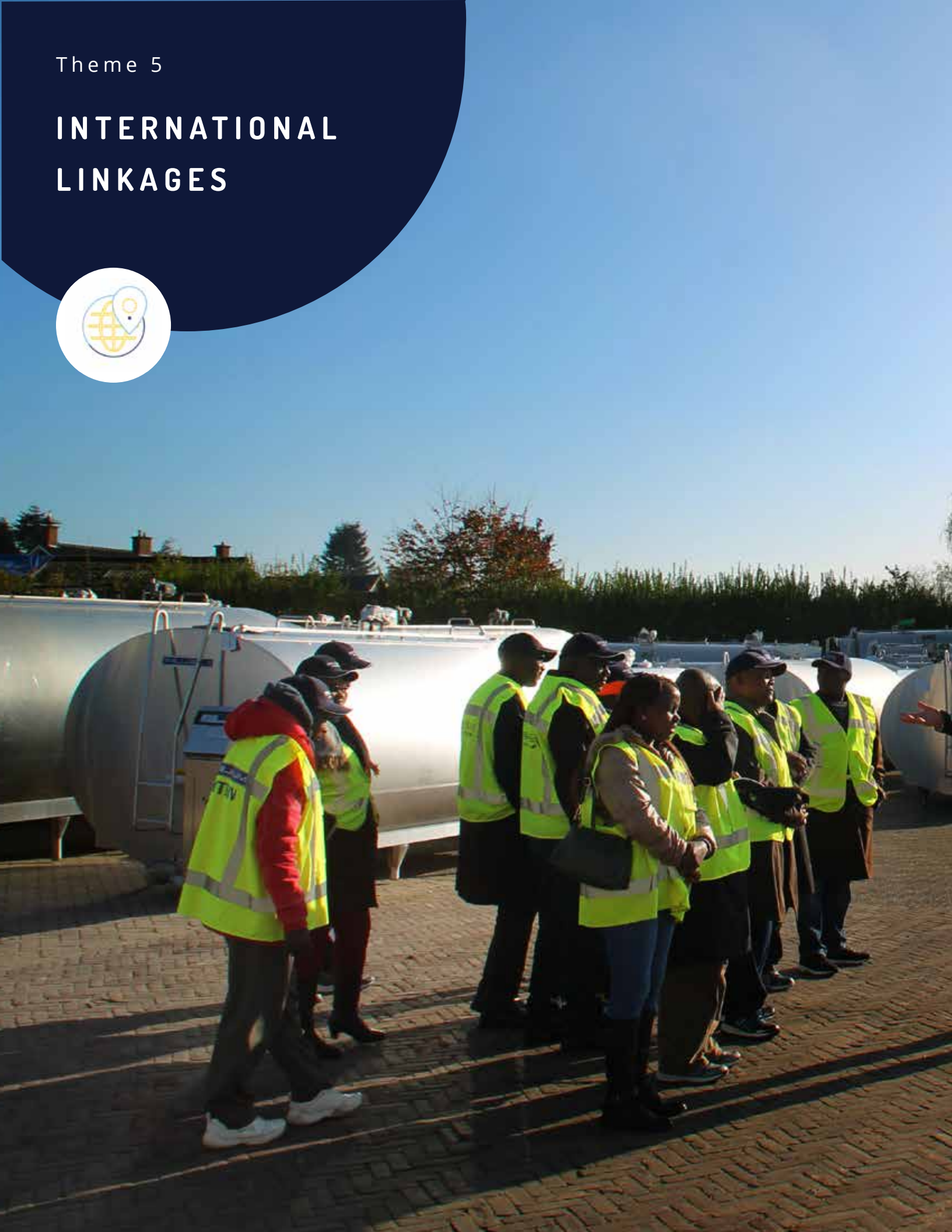
The use of high quality fresh and preserved forages in well balanced diets of dairy cows is not only climate smart in terms of making the sector more resilient for coping with prolonged draughts and erratic weather patterns. More important, improving forage quality to increase milk production contributes to reduction in enteric methane emission per litre of milk. Forage with reduced NDF (Nutrient Detergent Fibre) in well-balanced rations (Rumen8), increases voluntary Dry Matter Intake are can thus boost milk yield and consequently lowers the intensity of methane emission. Besides improved soil management practices through conservation agriculture, soil analysis and optimum fertilization advice (incl. correction of soil pH and manure management), give higher yields/acre of land alongside sustainable use of land and water resources.

KMDP stimulated dairy extension workers to train farmers to use balanced diets. In 2018 this became more visible and pertinent through the Rumen8 pilot project, the brachiaria demos and the report on KMDP's forage interventions in North Rift.

NEADAP
NETHERLANDS EAST AFRICAN DAIRY PARTNERSHIP

Theme 5

INTERNATIONAL LINKAGES



5: Introduction

KMDP promotes and facilitates international knowledge exchange, business linkages and other partnerships for learning and sharing of information. The project realized that this is an important condition for fast-tracking adoption of good agricultural practices and innovations that are necessary to enhance the competitiveness of the sector, its long-term sustainability and its attractiveness for investors.

In addition to – and to eventually replace - aid partnerships, business to business (B2B) linkages are considered by KMDP as a (more) sustainable way of promoting change, innovations and best practices, as they are market-led and will prevail as long as there is demand for the products and services. Provided the products, services and practices so introduced, are adjusted to local needs and context, affordable and practical.

Throughout project implementation, KMDP therefore supported investors' forums, dairy trade fairs and exhibitions, market studies/scans, international study or exposure tours and trainings. The project has been successful in forging B2B linkages between Dutch input suppliers and service providers on one hand and Kenya stakeholders on the other. It assisted some with setting up base in Kenya and investing in the sector. This was partly facilitated through KMDP's Innovation Fund where private investors received co-funding for innovative business cases, demos and pilots to address sector systemic issues.

A recent evaluation of the KMDP project concluded that in spite of increasing interest of international players to invest in the Kenya dairy sector, the market is still immature. This is partly connected to market size and structure (smallholder dominated, large raw milk market), to fiscal and sector policies and regulatory environment (e.g. registration and marketing of forage seeds, land ownership), and – more generally - the "ease of doing business" in Kenya.

The Kenyan dairy sector is largely relying on a domestic market and is protected by 60% import duty on dairy products imported from outside the East Africa Community. This exposes the sector less to international competition and hence a lower drive to innovate and develop more efficient dairy value chains.

5.1 KMDP as business facilitator to drive innovations and knowledge sharing

Adapted from: Evaluation of the Kenya Market-led Dairy Programme II (KMDP II), Aidenvironment, June 2019.

In KMDP international linkages and partnerships have been important tools or vehicles for transfer of knowledge, technology, skills and investments – and driving innovations – to the Kenyan dairy sector. Facilitating linkages and engagement with the Dutch private sector, is also considered important in a transition "from aid to trade". The following activities took place (adapted to include KMDP-I):

- Linking expertise: study tours and exposure visits to the Netherlands, inventories, feasibility studies, strategy papers, and policy briefs on key issues in the Kenya dairy sector, numerous PUM missions and PUM business links, case study reports for learning, development or introduction of tools (Rumen8, Dairynomics, PDTC training manual), and creating an online platform for sharing KMDP publications and reports.
- Facilitation of B2B linkages: investor forums, dairy exhibitions and trade fairs (Dutch Pavilion), trade missions to the Netherlands, market studies for North Rift & Central/Eastern, networking and brokering.
- Partnerships: 3R Kenya Project/WUR, SoilCares FDOV, DSM/AIM FDOV, NUFFIC, CIAT, NEADAP, GAD Foundation, others.
- Innovation Fund: 7 grants for private companies driving innovations through a business case proposal, 2 feasibility studies and 5 demonstration projects.

Thanks to the willingness of Dutch actors to collaborate with KMDP, innovations have been introduced in Kenya in fodder, breeding, milk processing, cooling and testing, and dairy advisory, amongst other areas. It also facilitated significant capacity building. KMDP has linked-up with Dutch dairy advisory companies and organisations like PUM to build capacity of local dairy advisors as well as other actors. The study tours to the Netherlands were highly valued. The PUM experts were valued, although to various degree, generally related to the ability of the expert to translate its knowledge to the local context. Also, much knowledge and good practice is being transferred by the Dutch input suppliers and service providers in the market, including those co-funded by the Innovation Fund.

KMDP has helped to grow the customer base for some businesses and all of the above-mentioned activities have contributed to this. For example, the market intelligence offered by KMDP II, via their market studies, and field days, have been very helpful for agricultural contractors looking to scale up. Several other companies stated that KMDP II's market studies helped them to identify clients and ultimately grow their business. Such intelligence is otherwise structurally lacking in Kenya. The field days also contributed to a growing client base for several service providers and input suppliers.

The Innovation Fund played an important role in reducing risk associated with investing in Kenya. Some investors (Dutch owned, or with Dutch linkages) see Kenya has potential for business, but there are also higher risks involved in investing in Kenya than, for example, in the Netherlands. The Innovation Fund allowed these companies to make investments they would otherwise not have done or in a different, much smaller way. Not all projects were successful as some products and services offered did not find sufficient response by the market. Again, most beneficiaries highly valued the networking and advice which came with the grant.

KMDP's Innovation Fund invested EUR 1,055,000 and leveraged EUR 1,514,000 from the private sector in own investments within the lifespan of the project. A good number of these projects are already scaling up or are replicated by others, resulting in a significant multiplier effect and sector impact. Through KMDP's Innovation Fund demonstration projects were co-financed in farm recording (Uniform Agri), improved forage production and commercialisation (Endakano Farm Kitale, Gogar Farm Nakuru), E-Learning (DTC Oenkerk) and cow barn design (Heber Farm and Risa Farm, cow barn design handbooks). The Fund further facilitated 6 business cases to take off: Nundoroto Farm Company and Agri Harvesting Ltd (agricultural contracting/maize train), Forage Innovation Team (FIT) Ltd (baling of maize silage, Roodbont Publishers (Cow Signals EA publications), Bles Dairies EA Ltd (dairy advisory service), and 2 proof of concepts: Happy Cow Ltd (Quality Based Milk Payment project) and Global Agricultural Development Foundation/ ProDairy EA Ltd (practical dairy training).

AG Harvesting KMDP-II Innovation & Investment Fund

Project title: “Commercializing Agricultural Contracting Services for the Kenyan Dairy Sector”.
Sub-title: Upscaling of the maize train concept with innovations on logistics and expansion of service model for dairy farmers and commercial silage producers
Duration: 11 months, starting from 1-7-2018
Hardware budget: EUR 141,000 (EUR 59,700 grant = 42%)
Technical assistance/operations budget: EUR 70,000 (EUR 13,000 grant = 18%)
Total budget: EUR 211,000 (EUR 72,700 grant = 34%)

Innovations: The project innovates, expands and professionalizes the Maize Train concept earlier introduced under KMDP-I. It addresses one of the most pressing needs in the Kenya dairy sector, the need for quality silage. The technology and the business concept are partly innovative and partly enhancing other innovations in agricultural contracting services and commercial fodder production. The project will allow harvesting of maize for silage in all-weather conditions in poorly drained fields. This extends the window of maize harvesting considerably and will reduce losses in the farms where maize is grown. The project will also operate a workshop for repair and maintenance services for forage harvesters, and it will provide advisory to clients on maize and grass production (GAP).

Development impact: The project will enhance supply of quality forages (silages) and impact on the sector of quality fodder is large, as it is key to enhanced productivity of fodder production per acre and per livestock unit. It contributes to efficient milk production (currently 65% of the cost of one litre of raw milk is feed). Increased quality and availability of forages also contributes to a lower environmental footprint of the dairy sector. The potential for scaling up is big. The project also supports and complements other, earlier and ongoing, investments in agricultural contracting services and commercial fodder production promoted by KMDP, such as Nundoroto, FIT Ltd and other investors in baled silages to be marketed for to smallholders. The combined efforts of these projects and their investors brings this concept to robustness and matureness, reducing the risk of dependency on a single service provider. The project will contribute to lower dairy sector environmental footprint as its services and products enhance productivity per acre and per animal

Progress to date (31 December 2018): AG Harvesting was established in 2018 as a partnership between Dejirene and the Dutch investor Hans Thijssen, is a new entrant into the silage making business with a late model John Deere 6-row-harvester. AG Harvesting’s brief is operating an agricultural contracting service to support dairy farmers in maize production, harvesting and ensiling, but with a number of innovations on logistics. This entails modified loaders and wagons that can work under all weather conditions. The machinery can both chop maize and cut grass for making silage. In the short period remaining in 2018 after arrival of the machinery (Oct-Dec 2018) AG Harvesting was able to serve 12 customers and did a total of 435 acres. In spite of late arrival of the machinery these farmers still enjoyed the service and were happy due to the quality of work done.

5.2 Collaboration with PUM: preparing the market for B2B

PUM Netherlands Senior Experts supports small and medium-size enterprises in developing countries and emerging markets. It operates in 30 countries and has a pool of 2,000 senior experts in a wide number of economic sectors, including agriculture and dairy. It is a volunteer organisation financed by the Dutch Minister for Development Cooperation (https://www.pum.nl/).

In 2013 KMDP and PUM signed a partnership agreement for operational and strategic support to the project that lasted up to the closure of the project. The PUM support was in three areas of expertise:

- Technical advice on total farm management, forage production and feeding to KMDP clients;
- Training, coaching and business development support for KMDP's dairy advisors;
- Facilitating KMDP's B2B (business to business) agenda.

In KMDP-I 32 PUM Missions took place by 3 experts: Halbe Klijnstra, Jaap de Vrij and Frans Ettema. In KMDP-II 21 PUM missions took place by 4 experts: Halbe Klijnstra, Frans Ettema, Hink Perdok and Tseard van der Kooi.

These (2-weeks) missions were executed by PUM experts to train and support KMDP clients and KMDP's local dairy consultants on forage crop planning and management, soil preparation, silage making, total farm management (TFM), ration balancing, calf rearing, record keeping, fertility, breeding, animal health, cow housing, clean milking and so on and so forth.

Training and knowledge transfer by PUM experts has raised awareness of farmers, dairy consultants and forage producers to a critical level, where Kenyan farmers and investors see the value of purchasing and paying on commercial terms machinery, technology, inputs and services, and management advice by professional input and service providers.

As for the KMDP forage interventions in North Rift, PUM experts played an import role in conceptualizing the business cases of maize train and baled silages. They offered important technical advice to the investors and linked them to suppliers in the Netherlands. The recommendations made by PUM experts were to bring more focus to the programme, to deepen the support as regards demonstrating good practice and farm economics, and to invest even more in developing a sustainable local delivery mechanism.

Jaap de Vrij (KMDP-I) focused strongly on soil preparation and conservation agriculture, with much attention to ploughing, machine operation and crop management.

Halbe Klijnstra (KMDP-I & II) was mainly working in the North Rift area on total farm management including feed management, calf rearing, record keeping, maize silage and grassland/pasture management.

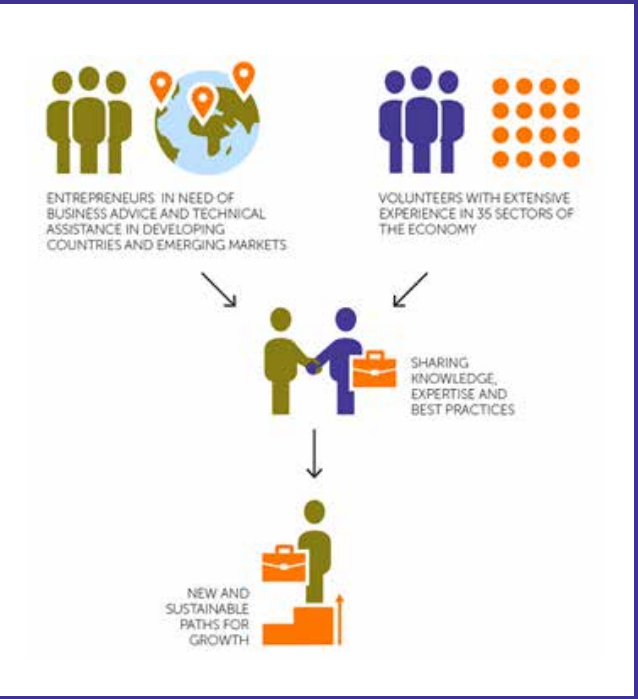
The missions of Tseard van de Kooi (KMDP-II) were all in Meru County. His training focused on farm management, feeding, calf rearing and fertility/genetics. Tseard was also involved as an advisor in the development of the Meru Union Breeding Strategy and he played an important role in facilitating linkages between Meru Union and CRV. With Frans Ettema, he also much facilitated a trade mission of Meru Union to the Netherlands and an exchange visit of the Kenya Dairy Board. Tseard also supported the piloting of brachiaria varieties in Meru.

Frans Ettema (KMDP-I & II) supported Perfometer Agri Business Consultants and KMDP to implement the KMDP project in Central Kenya. He developed with Perfometer the Dairy Farm Benchmarking tool and training courses for Farm Managers. Frans was also instrumental in supporting more strategic issues in KMDP – both for KMDP clients (Eldoret Dairy Farmers Association - EDFA) and KMDP management. He was co-author of the feasibility study for a Commercial Forage Production and Service Centre, 2014, and the author of the report assessment of KMDP forage interventions in North Rift (2019).

Since 2018 Hink Perdok joined the KMDP project being an expert on animal/dairy nutrition and ration formulation. He introduced Rumen8 to the KMDP team in Kenya and is the linking-pin between the Rumen8 Team and the software developers in Australia. He also networks for KMDP/Rumen8 in Kenya (CIAT, ILRI, Department of Livestock, KALRO) and in the Netherlands with several parties to facilitate B2B linkages in feed testing.

All trainings, farm visits, demonstrations and field days by PUM experts had a dual purpose. Focus was not just on farmers, but equally on the dairy service infrastructure and capacity building of local consultants/extension workers and organisations (cooperatives, processors, input suppliers and service providers). Development of diagnostic tools, training and instructional materials, SOPs, power point presentations and other reference documents were also part of PUM experts' deliverables.

The PUM experts also initiated and facilitated 4 PUM Business Links (BL) in 2014, 2015, 2016 and 2018, where KMDP dairy consultants were given the opportunity for one week induction, training and networking in the Netherlands dairy sector. The objective of the Business Links was to link the participants to Dutch business companies and to have practical training on farm management in the context of the KMDP project. A Farmers Exchange Programme was executed in 2017 for a group of Kenyan dairy farmers.



SELECTION OF CLIENTS SUPPORTED BY KMDP

1. DAIRY FARMER COOPERATIVES

CBE Name	County
Muthiru DFCS	Meru
Nkuene DFCS	Meru
Mbwinjeru DFCS	Meru
Kithirune DFCS	Meru
Githongo DFCS	Meru
Uruku DFCS	Meru
Naari DFCS	Meru
Tulaga DFCS	Nyandarua
New Ngorika Ltd	Nakuru
Kitiri DFCS	Nyandarua
Muki DFCS	Nyandarua
Slopes DFCS	Nyeri
Olenguruone DFCS	Nakuru
Ndumberi DFCS	Kiambu
Kiambaa DFCS	Kiambu
Ainabkoi DFCS	Uasin Gishu
Kiplombe DFCS	Baringo

CBE Name	County
Mumberes DFCS	Baringo
Cheptiret DFCS	Uasin Gishu
Abogeta DFSC	Meru
Buuri DFCS	Meru
Chure DFCS	Meru
Kinoro DFCS	Meru
Kithoka DFCS	Meru
Mitigo DFCS	Meru
Ngwataniro DFCS	Meru
Nyaki DFCS	Meru
Mukami DFCS	Meru
Kiirua DFCS	Meru
Arithi DFCS	Meru
Igoki DFCS	Meru
Mujwa Digital DFCS	Meru
Ruiga Rurii DFCS	Meru
Ndamene DFCS	Meru

2. PROCESSORS

Happy Cow Ltd	Nakuru
Meru Dairy Farmers Cooperative Union	Meru

Kinangop Dairies Ltd	Nyandarua
Bio Foods Ltd	Nairobi

3. PILOT FARMS FOR RUMEN 8 RATION BALANCING SOFTWARE

Farms	County
Hill	Nyeri
Kentmere Garden	Kiambu
Risa	Kiambu
Meved	Kirinyaga
Mwiboini	Kirinyaga
PrimeB	Nyandarua
Pejima	Meru
Sikiru	Meru
Maitai	Meru
Briaton	Meru
Rarama	Meru
Gogar	Nakuru
Itigo Tophill	Nandi
Gitonga	Meru
Joy	Nakuru

Farms	County
Karimi	Nyeri
Kuzuri	Murang'a
Naiposha	Nakuru
Peaceline	Machakos
RK	Meru
Kalia	Machakos
Rehoboth	Machakos
Olosian	Kajiado
Chemusian	Nakuru
Westwood	Baringo
Chepseon	Kericho
Lacata	Uasin Gishu
Illula	Uasin Gishu
Small Dairies	Transzoia
Sprout	Transzoia

4. PILOT FARMS FOR KEY PERFORMANCE INDICATORS (KPIs)

Farms	County
Hill	Nyeri
Joy	Nakuru
Kalia	Machakos
Karimi	Nyeri
Kuzuri	Murang'a
Meved	Kirinyaga
Mwiboini	Kirinyaga
Naiposha	Nakuru
Oloisan	Kajiado
Peaceline	Machakos

Farms	County
PrimeB	Nyandarua
Rehoboth	Machakos
Risa	Kiambu
Mayanka	Nyeri
Sunvalley	Tharaka-Nithi
Muhinga	Laikipia
Olmaroloi	Makueni
Family Choice	Kiambu
Double M	Embu

SELECTION OF CLIENTS SUPPORTED BY KMDP

5. OTHER MEDIUM SCALE FARMS

Farm Name	County
Olger	Uasin Gishu
DL	Uasin Gishu
Kiplombe	Uasin Gishu
Chumo	Uasin Gishu
Rimo	Transnzoia
Oitos	Uasin Gishu
Plateau Dairies	Uasin Gishu
Komool	Uasin Gishu
Lesmat A	Transnzoia
Tarus	Uasin Gishu
Fide	Kirinyaga
Herber	Kirinyaga
Danns	Kirinyaga
Olumara	Kirinyaga
Kairu	Nyeri
Good Wood	Nyeri
Agronix	Nyeri
Kefa	Muranga
Kiambati	Meru
Mwirigi	Meru

Farm Name	County
Tarus	Uasin Gishu
Lesmat B	Transnzoia
Kalua	Transnzoia
Bidii	Uasin Gishu
Fanikiwa	Uasin Gishu
Leketeton	Uasin Gishu
Simam	Uasin Gishu
Setway	Uasin Gishu
Maraba	Uasin Gishu
Imani	Nyeri
Kinuthia	Nyeri
Manyatta	Nyandarua
MIPE	Kiambu
Murugi	Kiambu
Mwireri	Kiambu
Tanostone	Machakos
WILDA	Nakuru
Elatia	Narok
Nanasol	Narok
Muindi	Makueni

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KMDP IN NUMBERS

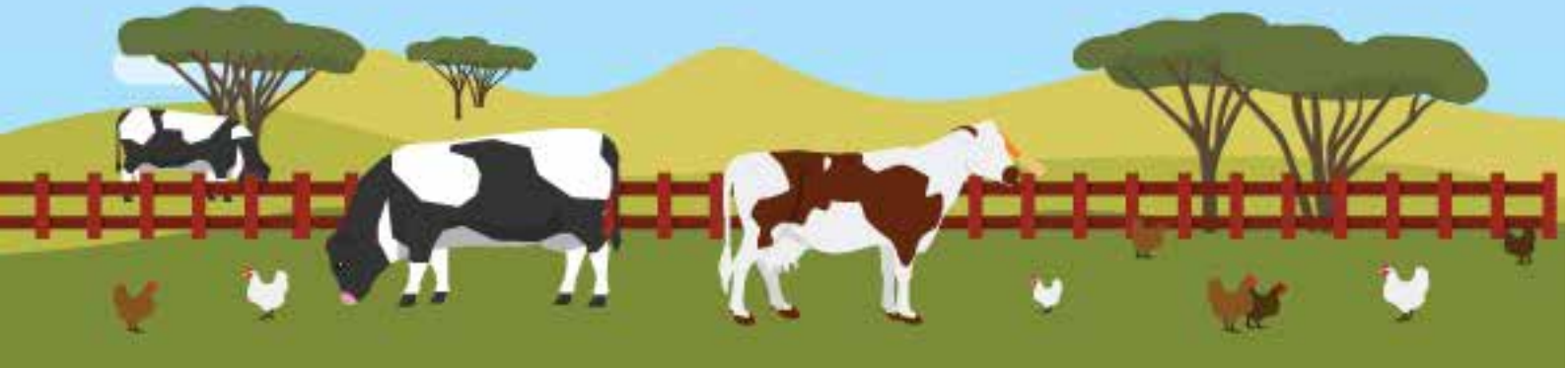
KMDP I and II			
Number of dairy cooperatives	35		
Number of processors	4		
KMDP II – 2018 key figures			
Total membership 17 Coops in 2018	39,695	53% Female	
Active membership 17 Coops in 2018	9,457	57% Female	
Board members 17 Coops in 2018	162	26% Female	

	2017	2018	% +
Total milk collection 2017/18 (in litres for 17 Coops)	15.9 mln	24.3 mln	53%
Average selling price per litre to processors by 17 Coops (KES), 2017/18	KES 39	KES 36	
Total revenue from milk collection by 17 Coops, 2017/18 (KES 100 = US$ 1.0)	KES 620 mln US$ 6.20 mln	KES 875 mln US$ 8.75 mln	41%
Average price/liter paid to farmers by Coop, 2017/18	KES 35	KES 32	
Total revenue from milk deliveries at farm level, 2017/18 (KES 100 = US$ 1.0)	KES 556 mln US$ 5.56 mln	KES 777 mln US$ 7.77 mln	

Approximate total annual milk intake Happy Cow and Meru Union in 2018 (litres)		84 mln	
Value in the market @ KES 85 per litre, 2018 (KES 100 = US$ 1.0)		KES 7.14 billion US$ 71.4 mln	

KMDP II (Jan 2017 – July 2019)	No. of Trainings	Attendees	% Female
Farmer training, 2017-19 (cumulative 17 Coops)	4,832	44,821	51%
Coop Board member trainings, 2017-19	30	392	27%
Coop on the job training/support, 2017-19	249		

Youth in fodder production (service provider enterprises)	Total	% Female	
Total number of youths trained, 2017-19	203	13%	
Number of SPE groups formed, 2017-19	17		
Number of clients (smallholders), 2017-19	1,361	40%	
Maize silage (2017-19)	**Total**		
Smallholder (tonnes, 2017-19)	13,538		
Large/medium scale farmers (tonnes, 2017-19)	49,668		
Feed & Fodder (FIT) (tonnes, 2017-19)	5,250		
Total tonnes	68,456		
Agri-contractors (maize harvested for quality silage in acres, 2017-19)	4,027		
Extra income and milk from improved silage quality from 4,027 acres (average quality / milk price at KES 35)	US$ 1.07 mln 3.0 mln ltr milk		



KMDP DOCUMENTATION

Theme 1. Practical Skills and Farm Management

PUBLICATION	AUTHOR(S)	YEAR
KMDP-I Project Overview	SNV	2015
KMDP-II Project Overview	SNV	2018
DTI Business Plan	DTC, Friesian, SNV, DTI	2013
DTI Status Report	SNV/PKF	2013
Labour-market Needs Assessment (LNA) Report	PKF/SNV	2013
PDTC Presentation	SNV	2015
Modular Cow House Handbook for medium scale farmers	Vetvice, Friesian	2015
Modular Cow House Handbook Annex 1: Best and Worse Practices	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 2: Herd Numbers and Treatment Schedules	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 3: Technical Drawings	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 4: BoQ Cow House	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 5: BoQ Biogas	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 6: Feed Requirement	Vetvice, The Friesian	2015
Modular Cow House Handbook Annex 7: Government Regulations	Vetvice, The Friesian	2015
Modular Cow Barn Design Handbook for Smallholder Dairy Entrepreneurs	Fieten, Vetvice, Perfometer	2016
Status Report on KMDP Training and Extension Approaches	G. Katothya, J. van der Lee (WUR)	2016
Business Link Report	PUM	2018
Dairynomics ICT Innovation for East African Dairy	3R Kenya Project, (WUR), CTA, SNV	2018
Rumen8 Dairy Cattle Ration Formulation Software: Report of the Kenyan Pilot Project	SNV, ProDairy EA, PUM	2019
Rumen8 Feed Library for Tropical Regions	SNV, ProDairy EA, PUM	2019

Theme 2. Feed and Fodder

PUBLICATION	AUTHOR(S)	YEAR
Kenya Feed and Forage Sub-sector Study Report I : Summary	BLGG Consortium	2013
Report II: Dairy Sector Structure: The Concept of the Dairy Life Cycle	BLGG Consortium	2013
Report III: Feed Sector Policy Issues	BLGG Consortium (N. Makoni)	2013
Report IV: Interviews and HACCP Audits	BLGG Consortium	2013
Report V : Feed Analyses	BLGG Consortium	2013
Report VI: Kenya Fodder Sector Trends	BLGG Consortium (Perfometer)	2013
Report VII: Trends Dutch Fodder Sector	BLGG Consortium	2013
Fodder Production and Service Centre - Feasibility Study	de Haan, Ettema, (Friesian, Landfort)	2014
Fodder Seeds Survey	SNV/Perfometer	2013
Status Report MSFs and Commercial Fodder Producers	Landfort, SNV	2015
Pictures speak – MSFs and Commercial Fodder Producers	Landfort, SNV	2016
Progress Report on Fodder Production and Preservation Demos in the Dairy Value Chain	Perfometer	2016
KMDP Forage Power Point	SNV, ProDairy EA	2018
Case Study of the Service Provider Enterprise (SPE) Model	3R Kenya Project (WUR)	2018
Youth-led Service Provider Enterprises in Kenya (SPEN)	3R Kenya Project (WUR), CTA, SNV	2017
Guidelines for Forage Maize Production and Ensiling (Booklet)	SNV/Pro Dairy EA	2019
Guidelines for Forage Maize Production and Ensiling (Flyer)	SNV/Pro Dairy EA	2019
Assessment of KMDP Forage Interventions in North Rift	SNV, Landfort, ProDairy EA	2019
Quick Scan of Kenya's Forage Sub- Sector - NEADAP	ProDairy EA, WUR LR, SNV	2019

Theme 3. Milk Quality

PUBLICATION	AUTHOR(S)	YEAR
Quality Based Milk Payment Study Report	Irwin Foreman, The Friesian	2013
Quality Based Milk Payment System: A Guideline for Implementation	Irwin Foreman, The Friesian	2013
Quality Based Milk Payment Study Annexes	Irwin Foreman, The Friesian	2013
Analysis of Dairy Partnerships between Business and Civil Society Organisations in Tanzania and Kenya	ECDPM	2016
PUM Training Report on Milking	PUM	2017
Private and Public Costs and Benefits of Implementing a QBMP Milk Payment System in Kenya	3R Kenya Project (WUR)	2018
Power Point Happy Cow QBMP Pilot Project	Happy Cow	2018
Happy Cow Quality Based Milk Payment Project Manual	Happy Cow, SNV, Bles Dairy (EA)	2018
Happy Cow Milk Quality Tracking and Tracing System	Happy Cow, SNV, Bles Dairy (EA)	2019
Lessons from the Happy Cow QMBP Project	3R Kenya Project (WUR)	2019

Theme 5. International Linkages

PUBLICATION	AUTHOR(S)	YEAR
Dutch Dairy Development Partners	NABC	2013
Lessons from Holland Trip	Perfometer, Eldosirikwa	2014
Study Tour Netherlands 2013	SNV	2013
Dairy Highlights - Eldoret Agribusiness Fair 2016	SNV	2016
Mission Report Farmers Exchange and Training Tour to the Netherlands	James Ngatia (Perfometer)	2017
Mission Report of Meru Union Trade Mission to The Netherlands	SNV	2017
SNV Kenya/KMDP Market Study North Rift, Kenya	SNV	2017
Dutch Input Suppliers and Service Providers in Kenya	SNV	2019

Theme 4. Functional Dairy Value Chains

PUBLICATION	AUTHOR(S)	YEAR
BoP Study to Identify Viable Business Opportunities for the Dairy Industry Targeting Lower Income Groups: Synthesis Report	Research Solutions Africa (RSA)	2013
BoP Study Appendix 1: Terms of Reference	SNV Kenya	2013
BoP Study Appendix 2: Policies	Research Solutions Africa	2013
BoP Study Appendix 3: Supply Side	Research Solutions Africa	2013
BoP Study Appendix 4: Retail Outlet Mapping	Research Solutions Africa	2013
BoP Study Appendix 5: Consumer Survey	Research Solutions Africa	2013
BoP Study Appendix 6: Institutions	Research Solutions Africa	2013
BoP Study Appendix 7: Product Scan	Research Solutions Africa	2013
BoP Study Appendix 8: International Illustration	BoP Innovation Center	2013
Dairy Sector Policy Study	PPD Consultants	2013
Presentation for KDB School Milk Conference (2015)	Irwin Foreman	2015
Processor Study	Setpro Consult	2013
Dairy Matters: 18 KMDP Case Studies	SNV, WUR LR	2016
Meru Dairy Value Chain Gender Scan	SNV	2016
KMDP Smallholder Dairy Value Chain Interventions	SNV/WUR	2017
Meru Union Breeding Strategy	C.S. Wafula, J.Creemers	2017
Benchmarking of Dairy Processors Associations	WUR LR	2018
Emerging Innovations in East African Dairy Sectors	3R Kenya (WUR), CTA, SNV	2018

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