
ADIAS

Assessing Dairy Input and Advisory service Systems



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Final policy analysis report

Policy research for enhanced implementation and enforcement of feeds, genetic resources and veterinary services quality standards in the Dairy sector in Kenya

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Summary

The dairy industry in Kenya is one of the largest in Sub-Saharan Africa and plays an important economic and nutritional role in the lives of many citizens. The sector over the years has been undergoing transition towards a more market-driven orientation. The result has been disorganisation of operations within the respective value chains including the input service delivery chain leading to an emergence of a pluralistic market that involves many actors including commercial input suppliers and service providers and related businesses. . The input and advisory service providers are perceived to be critical policy and practice oriented actors supporting relevant activities pertaining to the sector. This implies that they have a role in delivery of efficient and suitable quality assurance mechanisms. One aspect of the dairy input and service delivery that has been affected is that of the quality assurance along the delivery chain. Studies have shown that there is a decreasing quality of dairy farm inputs (animal feeds, genetic resources and veterinary services) which has become a growing concern to all players within the dairy value chain in Kenya. In addition, there is a gap around how the different input and advisory service providers contribute to or are affected by the quality assurance mechanisms more generally. In addition to regulators and government actors, input and advisory service providers as well as dairy farmers are critical stakeholders in the enforcement of requisite quality standards. This notwithstanding, there is lack of an empirical study that focuses on enforcement of quality standards in the Kenya's dairy input supply chain. This policy study attempts to fill up this gap.

The study takes into account the importance of joint learning that may positively shape an optimal dairy input and advisory service configuration towards an efficient quality standards enforcement process. The qualitative study entailed an initial preliminary review of major policies documents including reports, briefs and publications in the dairy farm input and advisory service supply chain. This was undertaken to identify the trends and issues affecting quality standards of three key dairy inputs: feeds, genetic resources, and veterinary services and drugs. This was then followed by interviews with various stakeholders who included farmers' organisations and actors in the private sector, Non-Governmental Organizations (NGOs), and national and county officials. Data from secondary sources, interviews and focus group discussions were analysed using content analysis approach and results were organized into various sub themes. This policy study findings suggest that enforcement of quality standards and related compliance is a major challenge that hampers delivery of quality dairy farm inputs. Overall, the enforcement of quality standards and monitoring mechanisms are generally weak or inadequate at all levels (input manufacturing and supply level, the grassroots level and extension/advisory level). The quality assurance efforts by the stakeholders in the input supply chain seem to be ineffective and are hampered by multiple challenges. The study point to multiple but complex intertwined factors that could explain the challenge of quality standards enforcement and compliance along the dairy input and advisory service supply chain. These include inadequate capacity challenges at different scales and lack of incentives and uncoordinated quality assurance process and call for self-regulation. This study was not able to establish whether the noncompliance issue for quality standards is mainly perpetuated by stakeholders' attitude towards the government reinforced over the years.

The study provides a number of policy and practice recommendations towards an enhanced enforcement and compliance of dairy inputs for quality standards within the dairy sector.

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Acronyms and Abbreviations

ACTS	African Centre for Technology Studies
ADIAS	Assessing Dairy Input and Advisory service Systems
AI	artificial insemination
AKEFEMA	Association of Kenya Feeds Manufacturers
ABSTCM Ltd	African Breeders Services Total Cattle Management, Limited
CP	crude protein
DVS	Department of Veterinary Services
FAO	Food and Agricultural Organization
FGD	focus group discussions
GDP	gross domestic product
ILRI	International Livestock Research Institute
KAGRC	Kenya Animal Genetic Resources Centre
KAHN	Kenya Animal Health Network
KDB	Kenya Dairy Board
KDPA	Kenya Dairy Processors Association
KEBS	Kenya Bureau of Standards
KENDAPO	Kenya Dairy Producers Organization
KEPHIS	Kenya Plant Health Inspectorate Service
KLBO	Kenya Livestock Breeders Organization
KMT	Kenya Market Trust
ME	metabolizable energy
KVB	Kenya Veterinary Board
MF	manufactured feeds
MoA&I	Ministry of Agriculture and Irrigation
MOALF	Ministry of Agriculture Livestock and Fisheries
MOALFI	Ministry of Agriculture, Livestock, Fisheries and Irrigation
MoLD	Ministry of Livestock Development/State Department for Livestock
PCPB	Pest Control and Product Board
RoK	Republic of Kenya

1. INTRODUCTION

The dairy industry in Kenya is one of the largest in Sub-Saharan Africa and plays an important economic and nutritional role in the lives of many citizens (Teresiah et al., 2016). In Kenya, dairy sector is the largest agricultural subsector contributing 4% to the national GDP and 14% to the agricultural GDP. The sector provides primary source of livelihood to many smallholder dairy farmers who contributes approximately 80% of the total milk produced (SNV, 2013).

The sectors over the years has undergone significant transition from semi-subsistence to market oriented dairy farming. This is largely described as intensification and specialization that includes innovative practices aimed at improving the productivity and added value to improve product quality (van der Lee et al. 2018). This process has impacted a number of processes including access to capital, inputs and services (ibid). The Kenyan dairy sector is credited for existence of a wide distribution network that enables good access to commercial input suppliers and service providers and available dairy genetics supporting this sector (Rademaker et al, 2016). These input suppliers are involved among other things in production and provision of animal feeds, genetic resources and veterinary services. The input and advisory service providers are perceived to be critical policy and practice oriented actors supporting relevant activities pertaining to the sector (Kilelu, 2013). This implies that they have a role in delivery of efficient and suitable quality assurance mechanisms.

Though credited for dynamic and higher income and employment creation, the dairy industry's growth and competitiveness are constrained by among other things sub-standard service provision and input supply as well as weak policy and institutional infrastructure for sector governance (Citizen 2017; KMT, 2017). This deters the accelerated sector growth from provision of good quality inputs and services to the dairy farmers and other players within the dairy value chain. Considerable research has been done to inform better quality milk and related enforcement of standards and regulations (see for instance Kilelu et al. 2019; Harcourt-Brown et al. 2018). However, similar studies with regards to feeds, veterinary services and genetic resources including artificial insemination (AI) for quality breeds, and how these affect the sector and value chain have not been explicitly conducted. These are increasingly becoming policy and practice issues with the government and stakeholders showing commitment towards efficient regulation of the dairy input and advisory service supply chain in Kenya's dairy industry (Guguyu, 2015; Citizen 2017; KMT, 2017). The growing concern about the decreasing quality of dairy inputs (feeds, genetics and veterinary services) may be compounded by many factors including lack or inadequate enforcement mechanisms of requisite quality standards stipulated by the government authorities (see for instance Maina, 2019; KMT, 2016, 2017). This calls for empirical investigation about the problem, its magnitude and necessary measures that can be put in place to curb the situation.

The above notwithstanding, there is lack of an empirical study that focuses on enforcement of quality standards in the Kenya's dairy input supply chain. Such a study would contribute to knowledge in terms of how the different stakeholders (regulators and government actors, input and advisory service providers including manufacturers as well as dairy farmers) engage in or are affected by the quality assurance mechanisms more generally. It would also add value to (a) informed decisions pertaining to penalizing those who consciously violate such standards and regulations, and (b) creation of awareness about the hazards that the

standards and regulations intend to prevent. The study reported herein, sought to expose the factors that affect efficient quality standards enforcement and monitoring in the related dairy input and advisory service supply chain. The ultimate aim of the study was to generate evidence that would enhance policy dialogues in the dairy input supply chain actors and policy makers on suitable interventions and incentives to address the quality standards enforcement challenge.

2. MATERIALS AND METHODS

2.1 Study approach

The study was carried out by the African Centre for Technology Studies (ACTS) and Egerton University in partnership with Wageningen University & Research, the Netherlands under the Assessing Dairy Input and Advisory service Systems (ADIAS project). This project aims to generate a better understanding of how new configurations in dairy input and advisory service supply contribute to the innovations, including institutional that embody the transition process to more market-oriented farming. In terms of policy, insights on input-service support may enable creation of more supportive institutional context and contribute to building better capacities of input and advisory service providers to support sustainable dairy farming systems in Kenya. This policy study attempts to explore the broader research question “what is the institutional environment that supports or constrains effective input and service supply to support the commercialization of the dairy farming sector”. It investigates the problem through the lens of dairy animal feeds, genetic resources and veterinary services.

Primary and secondary information in qualitative measurements were collected for the study. Primary data sources included individual interviews and focus group discussions while secondary data sources included media articles, policy documents, published and unpublished reports and related dairy literature that focused on animal feeds, genetic resources and veterinary services in Kenya. In depth review and analysis of these relevant materials helped in identifying issues and trends of importance linked to enforcement and compliance of quality standards in the dairy farm inputs value chain.

2.2 Review of secondary materials

Desk review focussed on policy documents, publicly available reports, media articles and grey materials with attention to the following inputs and services supply chain:

- a. Feeds (dairy meal and minerals) including industrial and agricultural by products that qualify as feeds. Preliminary feed safety issues with respect to handling and administration of feeds and concentrates supply chain.
- b. Genetic resources – includes artificial insemination (AI) or semen and livestock breeding stock.
- c. Veterinary services – veterinary drugs and administration, treatment and licencing. This included agro vets who have to be licenced by Kenya Veterinary Board (KVB) and Pest Control Products Board (PCPB).

The following checklist guided in the review of the secondary documents. Attention was given to what the respective documents say about the following:

- Inputs and service supply chain in the dairy sector,

- Regulation enforcement and compliance requirements of the targeted inputs and services.
- Responsibilities and roles of different stakeholders including participation in the formulation of regulations/policies and enforcement process, monitoring/ regulation and penalties for non-compliances and coordination aspects of different functions.
- Stakeholders in the dairy sector who are pertinent in the targeted inputs and services supply chain. These include regulators, input manufacturers and suppliers, extension service, farmers, and selected projects.
- Incentives for compliance with quality standards and regulations from the government side.
- Incentives for self-regulation from the private sector side.
- Perspectives of different stakeholders on quality of dairy farm inputs and supply services in relation to regulation enforcement and related compliance or non-compliance with set quality standards.
- Any other relevant information pertaining to the subject under investigation.
- Identification of gaps for follow-up during interviews and focus groups discussions (FGDs).

2.3 Field work

This involved a series of activities undertaken with selected stakeholders to understand their perspectives and practice with respect to quality standards implementation and enforcement in the dairy farm inputs and supply services focusing on feeds, genetic resources and veterinary services. This was mainly aimed at collecting primary data from dairy stakeholders and farmers to aid in answering the research questions.

The preliminary review of secondary data provided input in primary data collection via face-to-face interviews with various stakeholders along the dairy sector value chain (Table 1). Initial interviews were conducted using structured questionnaires that were developed to suit different categories of respondents. These were complemented by follow-up interviews targeting key informants drawn from both government (national and county), non-governmental organizations as well as the private sector who are directly involved with dairy inputs.

Seven focus group discussions (FGDs) comprising dairy farmers within three counties were undertaken using a checklist that guided in the discussions. The key informant interviews allowed for further probing on specific aspects, based on different responses provided. Relevant responses were recorded as field notes. Electronic recorders were also used to record the interviews upon receiving consent from the respondents. Table 1 below provides a summary of respondents involved in this policy field study.

Table 1: Summary of respondents

Category	Number of respondents	Description of respondents
Kenya Dairy Board	1	Key informant from government

Veterinary Office, and veterinarians and Veterinary Board	4	Key informant from government & private practice	Key informants spread out across 5 counties
Ministry of Livestock and county officials	8	Key informant from government	
KEBS	3	Key informant from government	
KAGRC	1	Key informant from government	
Non-governmental organizations	3	Key informant	
KLBO	2	Key informant from government	
AKEFEMA and animal feed manufacturers	2	Key informant from industry/private sector	
ABSTCM	1	Key informant from industry/private sector	
Agrovets	4	Key informant from industry/private sector	
Egerton	2	Key informant from Educational institution	
Dairy extension officer	1	Key informant from government	
Focus groups discussion	7	Made up of individual farmers, farmers' associations and non-government key informants	Spread out across 3 counties

2.3.1 Selection of study areas

The Nyandarua, Nandi and Kiambu counties were among the 5 counties earmarked for this study. The three were selected on the basis of being amongst the main milk producing areas in Kenya (Ndambi *et al.*, 2019) and highly intensified in dairy production within the Kenyan Highlands (Bebe *et al.*, 2008; Njarui *et al.*, 2016). The high intensification levels within these counties are also associated with increased use of external dairy inputs and services (van der Lee *et al.* 2018) for continued production levels. Face-to-face interviews involved 45 key informants and 7 focus group discussions (FGDs) from respective counties as presented in Table 2. This provided good data source from the various stakeholders along the dairy value chain including farmers, regulators, government officials and feed manufacturers.

Table 2: Number of interviews and FGDs per county

Counties	Key informants	Focus group(s)
Nyandarua	18	2
Nandi	5	4
Nakuru	9	0
Nairobi	13	0
Kiambu	0	1
Total	45	7

2.4 Data collection

This involved the use of two structured questionnaires (Annexes I & II developed differently) designed to capture responses from the key informants (governmental and non-governmental agencies) and focus group discussions (FGDs). The first set was designed for the various regulators within dairy value chain and mostly involved policy related and implementation questions. The second set was designed for farmers and farmers' organizations through FGDs to elicit perceptions about quality standard issues at farm level. With the interviews lasting between one to two hours, both open and closed ended questions were asked as per the questionnaires and further probing done to collect more information from the interviewees. In addition, triangulation was further done through verifying of information across different categories of respondents.

2.5 Data analysis

Qualitative field and secondary data were analyzed using content analysis approach. Guided by the two sets of questionnaires, collected data was compiled into respective data sheets for subsequent content analysis. A comparative analysis of responses between the two groups of respondents (key informants and farmers in focus groups discussions) was undertaken to identify either similarities or variations in perceptions in relation to the quality standards of animal feeds, genetic resources and veterinary service provision. Analysis was done using two computer based applications. Micro soft Excel for verification, sorting, coding and graphical presentation while Statistical Package for Social Sciences Version 22 for descriptive statistics at 95% confidence level. Output results from selected analyses were displayed using analytical tables and bar graphs, which were complemented by emerging themes obtained from follow-up interviews with selected respondents.

3. REVIEW OF POLICY INSTRUMENTS

The delivery of inputs and services in the dairy sector is guided by a range of strategic plans, policies and regulations. These have been consulted, but the study reports only on those policies and regulatory instruments that are relevant to the specific study focus: the implementation and enforcement of quality standards related to feeds, genetic resources and veterinary services. The emerging underlying issues observed during the study are reported in the subsequent sections.

3.1 Description of institutional framework for dairy input standards and quality control

The major relevant policy and regulatory documents that provide guidance to the main agencies concerned with dairy feeds, genetic resources and veterinary services quality standards are outlined in Table (3) below. A few key ones are articulated in detail.

Table 3: Selected policies and regulatory framework governing dairy feeds, genetic resources and veterinary services regulation

Policy/regulation	Implementing institution/agency	Focus
The fertilizers and animal foodstuffs Act (Cap, 345). Amended in 2015 (RoK, 2015a).	Livestock and Veterinary Services departments; government agencies under these departments such as Kenya Veterinary Board (KVB)	Animal feeds
The National Dairy Development Policy (RoK, 2013a); the Kenya Veterinary Policy (RoK, 2015b) National Livestock Policy (RoK, 2008)	Livestock and Veterinary services departments; government agencies under these departments such as KVB and KAGRC	Animal breeding Veterinary services
Draft National Livestock Policy (RoK, 2019) Draft Livestock Breeding Bill (RoK, 2015)	MOALFI, State Department For Livestock. Government agencies under these departments such as KVB and KAGRC	Animal breeding Veterinary services
The standards Act (Cap. 496) Example of relevant standards: KS 1647:2001 Kenya Standard – Code of practice for animal feed production, processing, storage and distribution.	KEBS	Animal feeds
Veterinary Surgeons’ and Veterinary Para-professionals Act No. 29 of 2011 (RoK, 2011)	Department of Veterinary Services	Veterinary services
Animal Disease Control ACT (Cap 364).	MoALF Livestock and Veterinary services departments	Veterinary services

3.1.1 The standards Act (Cap. 496)

This Acts established the KEBS, a statutory organization of the Government of Kenya in July 1974. KEBS is mandated to provide standardization, metrology and conformity assessment services through promotion of standardization in commerce and industry. KEBS thus sets and controls standards or codes of practice for materials produced or imported into the country. The aim is to promote public health, environmental and economic safety. KEBS inspectors are empowered under the Act to undertake inspectorate services and requisite certification of feed manufacturing factories (ingredients and products in relation to dairy inputs) resulting in issuance of the relevant standardization mark of quality.

3.1.2 The fertilizers and animal foodstuffs Act (Cap, 345). Amended in 2015 (RoK, 2015a)

The Act provides for regulation of the importation, manufacture and sale of animal foodstuffs and substances of animal origin intended for the manufacture of such foodstuffs, and to provide for matters incidental to and connected with the foregoing. The legislation is enforced by the Ministry of Agriculture Livestock, Fisheries & Irrigation (MOALFI). It does not give details about specific dairy feeds although there are provisions under the Standards Act. This notwithstanding, clear guidelines commensurate with respective feed intakes or requirements may enhance the compliance of regulations by value chain actors as well as enforcement by KEBS. Some respondents confirmed the inadequacy of this policy instrument for quality assurance of inputs and service delivery during field-work (for example NAI09, 2019). Some of the key informants cited conflicts in the enforcement of respective clauses under this Act amongst DVS, KEBS and public health government arms. This again calls for collaboration.

3.1.3 The National Dairy Development Policy (RoK, 2013a)

As roadmap for improvement of dairy industry, this policy commits to put in place requisite policy and legal environment for dairy feeds and institute the necessary measures to establish an inspection and compliance system specific for animal health and production inputs, in compliance with the internationally set standards. The policy provides for infrastructural, institutional and human capacity building efforts that will enhance the enforcement and/or compliance with the relevant genetic resources protocols and quality standards for improved genetic pool (pages 9-11).

3.1.4 The Kenya Veterinary Policy (RoK, 2015b)

As a roadmap for improvement of veterinary services and breeding, the policy mandates DVS to enforce control measures pertaining to livestock diseases in line with the Animal Diseases Act of the Laws of Kenya, Chapter, 364. The government through DVS assumes the supervisory and regulatory roles in provision of breeding services (including AI services), veterinary drugs and administration, treatment and licensing.

3.1.5 National Livestock Policy (RoK, 2008) and the Draft National Livestock Policy (RoK, 2019)

The RoK (2019) seeks to repeal the RoK (2008). The draft Policy which is developed under MOALFI provides guidance to national and county governments in the development of the livestock industry. The Policy, unlike the previous one, aims at transforming livestock production from subsistence to commercial undertaking by applying modern technologies acquired through continuous research and innovation. With regards to regulation, it makes reference to dairy feeds, genetic resources and veterinary services in a number of ways as outlined below.

Animal feeds: Kenya produces only 60% of the total national feed production capacity of 1,000,000 tons. 60% of the feeds manufactured in the country are produced by licensed feed manufactures, while the rest are supplied by small scale unlicensed manufacturers and importers. The inadequate availability and quality of raw materials is a major contributor for this under production followed by preference of farmers to formulate their own farm-made feeds. Raw materials for livestock feeds are either sourced from other industries, e.g. breweries, food and oil industries. However, the materials from these industries cannot

sustain the feed industry thus majority of the materials are imported from other countries, e.g. Tanzania, Uganda, India, Turkey, Israel and Western Europe. The poor quality of livestock feeds produced in Kenya is a major concern to stakeholders in the livestock sector. The feeds produced are either of low nutritional value and/or are contaminated with aflatoxins or other substances. The main contributing factors to the production of poor quality feeds are; inefficient standardization, weak institutional and legal framework, inadequate testing facilities and poorly trained/ qualified manufacturers. In regards to regulation of feed quality, the national government is mandated to establish an institutional framework to ensure production of good quality feeds, establish a mechanism for enforcement of the code of practice for feed manufacturers, establish an inspectorate agency, and develop a monitoring system to ensure compliance of quality standards. The national government is further responsible for development of standard for feeds, raw materials and other ingredients in consultation with key stakeholders. Enforcement of quality standards and creation of awareness on standardization should be core responsibilities of the county government in partnership with relevant stakeholders.

Animal genetics resources: The policy refers to a number of quality assurance endeavours more generally. It outlines that the county government is responsible for record keeping on livestock identification and performance as well as ensuring the sustainable use of the genetic resources. The national government is further mandated to undertake capacity building, establishment of gene banks and development of legal framework. There are however challenges related to infrastructure and inadequate human capacity and resources that may hamper quality assurance. For instance, local breeding programs are poorly structured and require support for their sustainability. In addition, they have insufficient records on performance and genetic evaluation.

Veterinary services: The KVB is responsible for regulation of activities of veterinary officers/surgeons, para-professionals, veterinary laboratories, artificial inseminators, animal welfare officers and training institutions. Their main aim is to guarantee delivery of quality veterinary services. However, their capacity to carry out this duty has been crippled due to their low number of staff and inadequate resources. The county government in collaboration with the national government is mandated to establish a system to ensure improved service delivery through partnership with institutions and stakeholders in the livestock sector. In addition, the government is in charge of strengthening weak institutions and establishment of new ones.

Extension services: The policy informs about the important role of extension/advisory services in enhancing quality assurance pertaining to feed quality, genetic resources and veterinary services. It outlines that the provision of extension services is the mandate of the county government supplemented by feed manufacturers, milk processors, NGOs and other private stakeholders. It is noted that the county government is understaffed and has inadequate resources, thus does not have the capacity to effectively provide extension services. However, collaboration between the county government extension officers and others advisory service providers is minimal, leading to poor quality services. Partnerships between the county government and the other service providers are paramount for efficient provision of extension service which should arguably promote quality assurance of dairy farm inputs production and supply.

3.1.5 Veterinary Surgeons' and Veterinary Para-professionals Act No. 29 of 2011 (RoK, 2011)

Effective disease control strategies are essential for provision of efficient and reliable animal health services which may enhance a vibrant and improved dairy industry (MoALF, 2013/RoK, 2013a). Towards this end, the RoK (2011) core functions include: to register, license, control and regulate veterinary practices; to formulate and publish a code of ethics and to ensure the maintenance and improvement of the standards of practice for all registered persons. In this context, a veterinary surgeon is one who possesses a degree in veterinary medicine and surgery while a veterinary para-professional is one who possesses either a diploma or certificate in animal health and is registered with the KVB. The veterinary services have long been dependent on qualified licensed veterinary personnel (public and private) whose services were trusted and reliable. Due to the limited number of qualified veterinarians, the RoK (2011) gave provision for animal health technicians to be involved in treatment of sick animals under the supervision/direction of a registered veterinary surgeon in accordance with the Second Schedule of the Act.

3.2 Challenges affecting a dairy sector input and service quality assurance system

According to the above review and analysis of policy materials and secondary reports, the dairy sector input and service quality assurance system is currently constrained by various challenges. The analysis exposes a number of thematic issues that are critical for efficient functioning of the dairy sector. These include policy and regulatory gaps, capacity issues and lack of and inadequate incentives for a) self-regulation and compliance b) implementation and enforcement. To enrich the presentation and validation of the findings, the interview data is used in this section whenever it is feasible.

3.2.2 Policy and regulatory compliance gaps in the dairy feed input supply chain

Production of dairy animal feeds is an attractive business for manufacturers. However, the declining productivity in the dairy sector may be linked to poor quality feeds among other factors. The issue of dairy feeds quality (dairy meal, supplements and concentrates for energy, protein, minerals and vitamins etc) is a concern to many dairy value chain actors because low quality feeds and forages heavily affect productivity per animal and price of milk (Haan, 2014: 9). Despite emerging research that focuses on regulatory compliance in relation to dairy milk (for instance Harcourt-Brown et al. 2018), there is limited empirical research that directly addresses the quality of feeds and related regulatory enforcement and/or compliance challenge.

Kenya is supporting economic robustness of the dairy sector with several policy and regulatory instruments as outlined above. Analysis on the enforcement and compliance level of key policies and respective Acts of parliament associated with dairy feeds indicates lapses in implementation and general weaknesses of respective regulatory agencies. The government in some of the policy documents commits to enhance an integrated public-private partnership approach to addressing some of the quality standards compliance and enforcement related challenges. The Animal feedstuff bill (2016), which has been mentioned in some secondary documents, is hoped will have provisions that would address some of the challenges relating to regulation of the dairy feeds industry (KMT, 2016, 2017; Guguyu, 2015). As provided for under the Standards Act, Cap 496 of the Laws of Kenya, KEBS sets standards that ensure quality of processed products (animal feeds) from manufacturers meet the required specifications before being certified. In relation to concentrates especially dairy

meals, the KEBS specification includes: 10.5 ME/Kg, Crude Protein 14-16%, Calcium 0.7% and Phosphorous of 0.5%. Based on the set standards, all animal feed manufacturers are supposed to adhere to the specifications in all animal feed products they produce for sale. This is not always the case.

Analysis of several documents bring to light some of the factors that may be attributed to the regulatory non-compliance and non-enforcement challenge. The main challenge attributed to non-compliance to set standards is the rising number of poor quality commercial feeds that do not meet KEBS quality and quantity standards (Tegemeo, 2016; KMT, 2017; Citizen, 2017, Sewe, 2016; interview data, 2019). Makoni et al. (2014) cite inadequate or lack of credible input suppliers and service providers, ineffective sector regulation, availability of policies that are not enforced at the grassroots level. Van der Lee et al. (2016) and Rademaker et al. (2016) acknowledge the challenge associated with ensuring safety and quality due to risk of contamination with heavy metals, parasitic and microbial residues, and toxins. They further add that the concentrate feed supply chain in Kenya faces a number of key bottlenecks, including low and variable quality of concentrates; reliance on imported feed ingredients of uncertain quality; and rampant trade malpractices in the feed industry. Other factors include inadequate regulations and enforcement, feed-ingredient supply chain constraints, efficacy and quality of animal feeds and ingredients, feed and food safety, effect of partial liberalization of the feed sector on sector governance and regulation; high costs of feed analyses among others (SNV, 2013; RoK, 2013a,b; Guguyu, 2015; KMT report, 2017). In addition, standards for quality of raw materials imported from abroad are inadequate which makes enforcement problematic (SNV, 2013). The unavailability of local sources of feed supplements and minerals has also escalated the quality challenges (RoK, 2013:12-13; RoK, 2019; NAI06, 2019). Consequently, the entry of many unregulated actors has led to poor quality animal feed (KMT, 2017:6). In addition, high population of agents without oversight of regulators, has led to production of low quality feeds. This demonstrates a lapse in regulatory compliance and enforcement mechanisms after licensing of manufacturers. The industry players acknowledge this challenge and link the same to lack of an integrated approach to Kenya's feed industry operations, policy and regulatory issues including effective legislation and enforcement (KMT, 2016, 2017). They additionally attribute this to a fragmented regulatory framework combined with limited human capacity and financial resources in both public (for instance MoLD and KEBS) and private sector.

The government acknowledges that the low quality and inadequate quantity of dairy feeds is a major constraint to the industry's growth. The KEBS, MoALFI and county governments have a huge responsibility pertaining to regulation of the dairy industry feed input and advisory services supply chain. Following liberalization of the sector, non-state actors within the dairy input supply chain have been proactive in advocating for efficiency in the quality standards compliance (KMT, 2017). These include the industry organizations at the input, service and market level like AKEFEMA and KLBO although it is not clear whether they represent the interests of majority smallholder dairy farmers (Makoni et al. 2014).

3.2.3 Policy and regulatory compliance lapses in the supply of genetic resources and veterinary services in the dairy sector

Animal breeding supports livestock production through provision of genetic resources. The use of technology for purposes of animal breeding involves amongst others the use of AI and

embryo transfer with the main aim being to improve the genetic potential in a given herd. Despite the anticipated production oriented benefit, use of these technologies (especially AI) particularly in smallholder production systems has declined. This may be attributed to different factors which include the policy and regulatory compliance and enforcement related aspects. The latter is the focus of this policy study and is explored next.

Kenya underwent a period of policy reforms in the livestock sector in early 1990's. This included privatization of clinical veterinary services including AI, which led to reduction in public/government support for this sector. This consequently favoured establishment of different livestock health service delivery systems and led to proliferation of multiple private service providers (Otieno et al. 2000). Private provision of AI services by individuals or farmer groups may have accelerated the provision of superior germplasm to smallholder dairy farms (SNV, 2013; Wafula and Creemers, 2018).

Despite the aforementioned policy reforms, there has been a decline in overall performance of the dairy herd within smallholder dairy farms (MoA&I, 2018; the current policy study interview data). According to a number of studies, there are several factors that may be attributed to this trend. For instance, several factors may influence smallholder farmer's choices of breeding service options (AI or selected bulls). These include farmer's experience in dairy farming management as well as cost of AI service and access to AI and veterinary services, including the distance covered by the service providers (Murage & Ilatsia, 2011; Mwangi et al. 2018). In addition, malpractices by unreliable inseminators involving low quality semen have been reported. It is important to note that for one to practice as an inseminator in Kenya, he/she has to be a practicing licensed veterinarian or possess a minimum of a certificate in AI (MoA&I, 2018). Arguably, having qualified professionals may aid in maintaining quality veterinary services offered to dairy farmers. However, delivery of quality service in a given context is problematic as demonstrated by the Uganda case study which shows that increased noncompliance with regulations for veterinary services is primarily attributed to the reform policies as well as other veterinary institution internal and external/shock factors (Wesonga, Madasi and Nambo, 2018).

Empirical studies about the nature of services pertaining to acquisition and provision of genetic resources and veterinary services to small-scale dairy farmers in Kenya are scarce (K'Oloo and Ilatsia, 2015). In addition, the network of actors providing these services is quite complex whereby animal health services and livestock production and extension services are intertwined (*Ibid*). Further, the devolved nature of some of these services has confounded the dairy input and service delivery chain. For instance, before the county devolutions, both the government and private inseminators reported all their activities involving successes and failures to their corresponding District Veterinary Officers (DVOs). This is useful with respect to requisite centralized monitoring and evaluation of quality related aspects. However, with devolution, there are regulatory lapses observed during field work. Some county governments do offer subsidized AI semen to dairy farmers with the intention of offering high quality genetic resources at affordable costs. This is aimed at improving the dairy herd for increased productivity and income. The limiting challenge with this provision, as observed during the field study, was the quality of the semen declining overtime, as well as poor availability of the semen and services in some areas within the study counties. This, coupled with inadequate monitoring for quality of the subsidized semen and insemination services

may not ensure sustainability of efficient regulation of veterinary services by county governments. This problem is made worse by the overall unfavorable policies and legal frameworks to sustainable genetic resources (MoA&I, 2018).

3.2.4 Lack of or inadequate motivation for self-regulation and compliance

Despite the regulatory mandate falling under the government and relevant agencies, compliance with quality standards is a responsibility of dairy input service providers (Sewe, 2016). In the absence of effective government regulation and enforcement mechanisms, there is scope for self-regulation through investing in efficient quality-driven dairy input supply chains especially animal feeds (KMT, 2016) but applicable to genetic resources and veterinary services as well. Despite this, why stakeholders (milk producers, feeds manufacturers and suppliers, regulators etc) are not motivated to pursue a holistic quality control system is not well understood.

The private sector is alleged, can take more initiative to address systemic issues that affect the sector as a whole especially in the area of self-regulation. In the case of genetic resources (for instance AI services), if importers and distributors of semen would employ, train, certify and supervise “own” inseminators, this would reduce reliance on uncertified private technicians. The establishment of AKEFEMA may be seen as an opportunity for private sector to engage in self-regulation for enhanced quality standards in the livestock feed subsector. Such a system would enhance tracking of quality along the dairy input supply value chain, including sampling and testing of feeds, which then informs the quality of the respective dairy products. However, the sector is poorly regulated and seems not able to provide a holistic quality assurance guidance because not all feed manufacturers are registered members of the association. Arguably, members are reluctant to register citing economic and political reasons (KMT report, 2016, 2017). Further, only about half of the animal-feed suppliers are registered with KEBS, while about half do not pursue certification of their products (Citizen, 2017). These factors may complicate self-regulation efforts across the industry and among feed service providers and ingredients suppliers.

As one of the incentives for compliance with quality standards and regulations, the government’s KEBS laboratories are open to feeds manufacturers for feed analyses services. However, these facilities are not utilised optimally because of high costs, unreliable results and lack of engagement with stakeholders (KMT report, 2016, 2017; Andae, 2017; Citizen, 2017; interview data, 2019).

3.2.5 Inadequate capacities in compliance and enforcement of quality standards

Apart from policy and regulatory gaps alluded to above, some of the secondary documents sampled for analysis pointed to inadequate or lack of institutional capacities (infrastructural and human resource) to deliver and monitor dairy inputs and services supply. These include lack of a credible process for tracking and recording quality, nutritive value and cost price of all feed ingredients before manufacturing (KMT, 2017; SNV, 2013). Arguably, this process should be supported by regulators and manufacturers knowledgeable about respective quality standards. There are insufficient accredited laboratory services to undertake testing, analysis and requisite advisory service to smallholder farmers (SNV, 2013). The local capacity to provide proper advice to farmers and the dairy sector based on the outcome of feed

analysis is also a challenge (Ibid). Further, the research and analytics service providers lack testing protocols for animal feeds and ingredients (BLGG Research, 2013; ABS TCM Ltd, 2013).

The government acknowledges that the infrastructural and human capacity issues affect regulation of dairy feeds and commits to capacity building measures to address the challenge (RoK 2013a,b). Development of capabilities for delivery and monitoring of quality standards is debatably a policy issue that requires a collaborative effort between the government and the private sector in the dairy feed supply chain, including animal feed manufacturers and suppliers (KMT, 2016). This is corroborated by field work. Interviewees from KEBS noted that standards development process is a consultative process involving a wide range of stakeholders. Other respondents appreciated the role of KEBS, but cited cases where stakeholders, like farmers, may not have been sensitized and consequently consulted in formulation of certain standards.

Inadequate capacities/competences in delivery of veterinary services has also been cited in other studies. Kiara et al. (2017:7) assert that one of the challenges in delivery of animal health services in Kenya is lack of exposure to standard operating procedures and clear guidelines on professional practices particularly in the devolved system of government framework.

4 PERCEPTIONS FROM STAKEHOLDERS ON QUALITY STANDARDS IMPLEMENTATION AND COMPLIANCE GAPS

To complement the secondary data analysis, field work was undertaken in selected counties. The field data elicited respondents' views about quality standards, enforcement and compliance with regards to animal feeds, genetic resources and veterinary service provision. The respondents comprised of key informants and focus groups discussion (Table 1 & Appendix 1).

4.1 General observations

4.1.1 Understanding dairy input quality standards is helpful in the acquisition of right inputs by farmers

Field interview data suggest availability of a relatively adequate regulatory framework (quality standards and policies) to regulate the dairy input sector along the input supply value chain (includes manufacturing, delivery and use at the farm level). There was a clear distinction between the perception relating to regulation development process and the implementation/enforcement process. This distinction has been factored in the analysis and presentation of results.

Respondents were asked about their understanding of the dairy inputs quality standards and their usefulness. The majority of respondents (90% of key informants and consensus from all seven FDGs) perceived quality standards as relevant in terms of helping farmers acquire the right inputs for dairy farming. In contrast, 5% of the key informants and none of the farmer groups perceived quality standards as restricting access to quality inputs (Figure 1). A small number of key informants (5%) held both views.

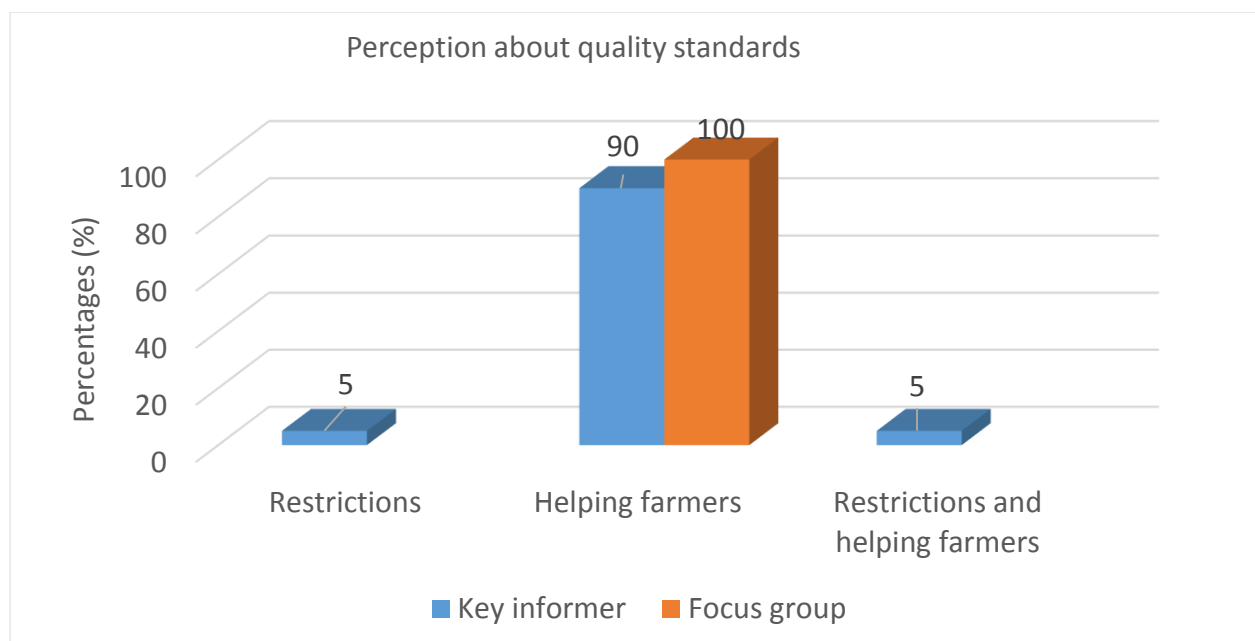


Figure 1: Perception about understanding of quality standards and usefulness

Overall the results may imply that at farm level, farmers and key informants appreciate quality standards as key towards acquisition of quality farm inputs. This has implications in terms of

constrained or enhanced enforcement of the same quality standards/regulations which is the focus of the subsequent sections.

4.1.2 Lack of or inadequate mechanisms to ensure accountability for compliance with dairy input quality standards

The respondents received background information about what a law enforcement mechanism for quality standard entails. They were informed that this involves among other things, continuous monitoring and undertaking legal actions against non-compliance. This may include arrests, fines or penalty in cases of individuals who contravene the set standards. They were asked about whether such mechanisms exist for enforcing compliance with quality standards either at national or county level.

In general, mechanisms for quality standards enforcement are perceived by majority of the respondents to be adequate with regards enhancing farmers' access to quality dairy inputs for maximum productivity. In contrast, majority of respondents (68% of the key informants and consensus of six out of the seven FGDs or 86%) perceived that mechanisms to ensure accountability for compliance with quality standards for dairy inputs are lacking or inadequate (shown as "No" in Figure 2). It is however important to note that a relatively sizeable number of key informants (32%) had a different opinion which indicates some level of disagreement on this matter across this cluster of respondents. This was pursued further in subsequent follow-up interviews.

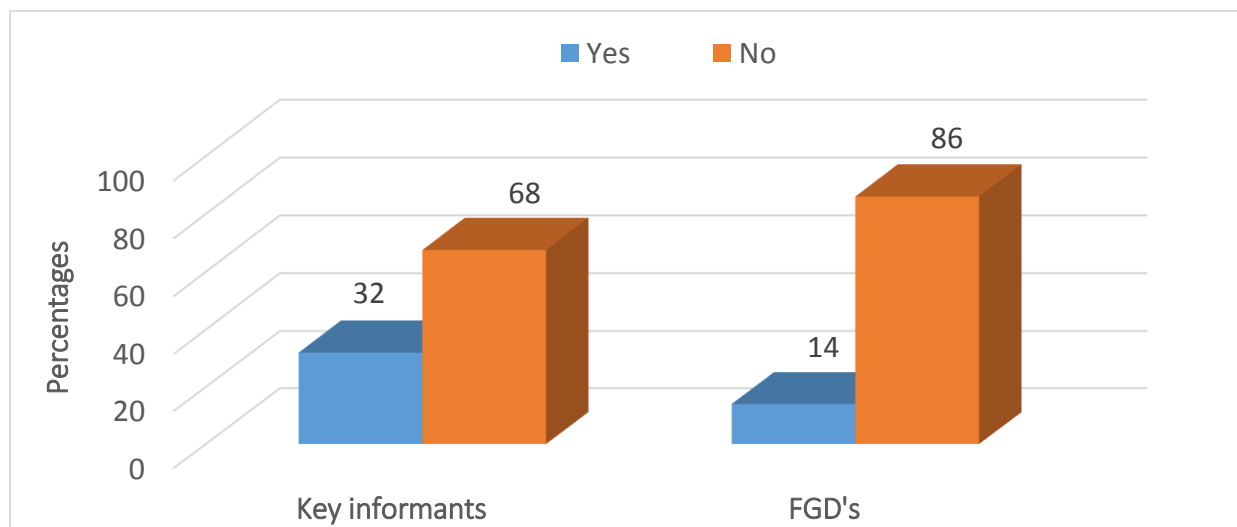


Figure 2: Perception on mechanisms for quality standards compliance accountability

4.1.3 Inadequate and incompetent number of staff; and lack of incentives for enhanced compliance with dairy input quality standards

Follow-up interviews with selected key informants exposed some underlying issues that confound the regulations enforcement and compliance challenge. These include low number of regulators and service providers who are incompetent and lack of incentives and requisite resources to ensure compliance accountability. The respondents further noted that the quality assurance system currently pursued in the Kenyan context encourages self-monitoring whereby consumers are expected to report cases of low quality products in the market. Despite this provision, the study noted inadequate technical capacity to monitor, test and prosecute as well as non-technical issues like corruption.

Although the above observations apply to all animal feeds, genetic resources and veterinary service provision, the subsequent sections highlight varying perceptions that were specific to either of the three dairy input segments.

4.2 Animal feeds

4.2.1 Monitoring and enforcement of quality standards as a collective responsibility

The study sought to understand the respondents' knowledge about who is responsible for enforcement and monitoring of animal feed quality standards. Majority of the key informants (28%) perceive the monitoring and enforcement role to be a collective responsibility involving a diverse range of actors and institutions (Figure 3). However, a relatively significant number of key informants (26%) identified KEBS and county government as the major agencies that should be responsible for this task. What exactly each player should be doing to enhance compliance was not pursued in this study. There was inconclusive findings among the focus groups with two groups out of the seven identifying KEBS and the county government as the key agencies responsible for the task.

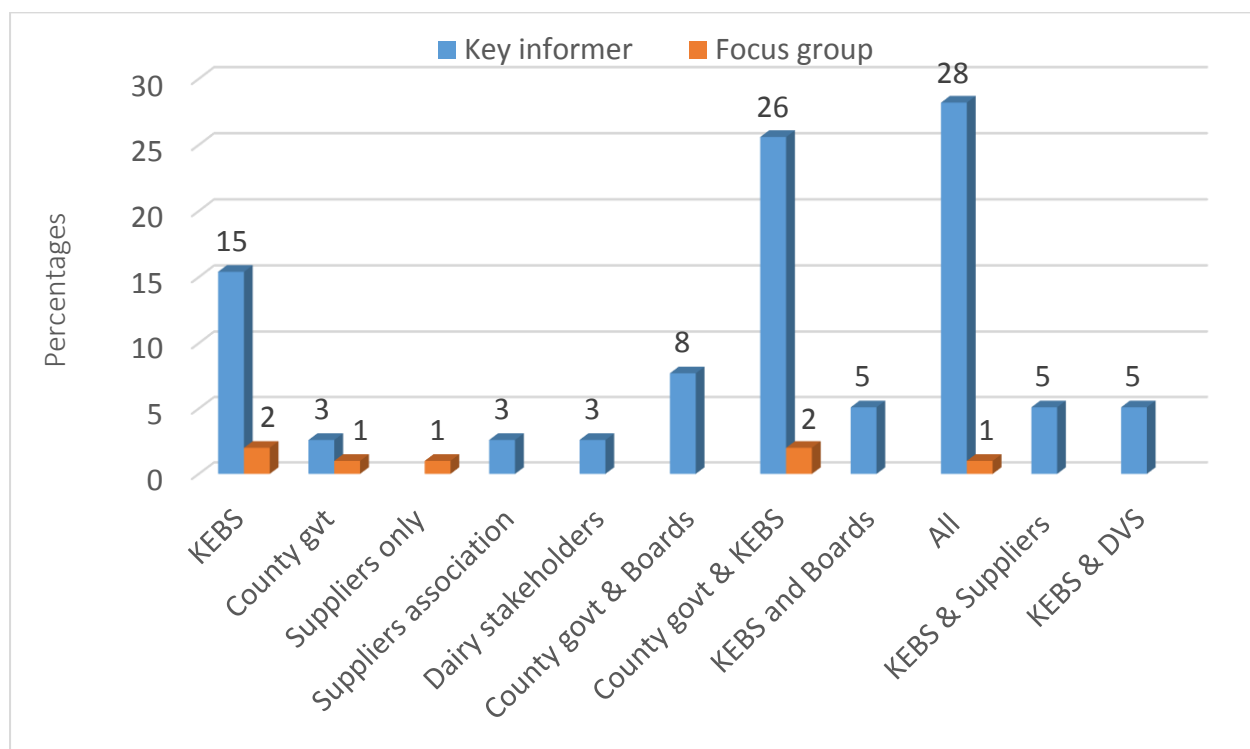


Figure 3: Who is responsible for monitoring quality standards in animal feed?

Through follow-up questions involving selected key informants (Table 1), there were varying explanations behind the selected enforcement and monitoring agencies. KEBS was perceived to have technical and infrastructural capacity to enforce animal feed quality standards. Some interviewees noted that grassroots level implementation of feed quality standards is the responsibility of MOALFI, with KEBS participating only in quality verification. Interviews with KEBS representatives seem to confirm the stakeholders' preference of collective regulatory enforcement. This perhaps is the reason why KEBS encourages associations like AKEFEMA, anti-counterfeit agency, county governments and other government agencies to join hands in regulation enforcement oversight (NAI08, 2019). Considering the devolved infrastructure

and related operations, the national government through the MOALFI could support other stakeholders' efforts in this regard as a policy issue which is revisited in the conclusion. That support could come in form of coordination and collaboration involving manufacturers as they pursue relevant certification or even deal with counterfeit products as the majority of the respondents seemed to suggest. This is arguably a positive step towards self-regulation by the industry.

4.2.2 Inadequate regulations and structures for dairy feed quality standards enforcement and compliance

Respondents were asked about their perception pertaining the existing regulations and structures to enhance dairy feed quality standards enforcement and compliance. There was a general consensus amongst all the 7 FGDs (100%) and 85% of the key informants that regulations including enforcement and compliance structures in the dairy feed input subsector are absent or inefficient ('no' answer) as opposed to 15% of the key informants who felt otherwise ('yes' answer) (Figure 4). Follow up questions sought to elicit respondents' understanding about the different factors contributing to this. These are explored next.

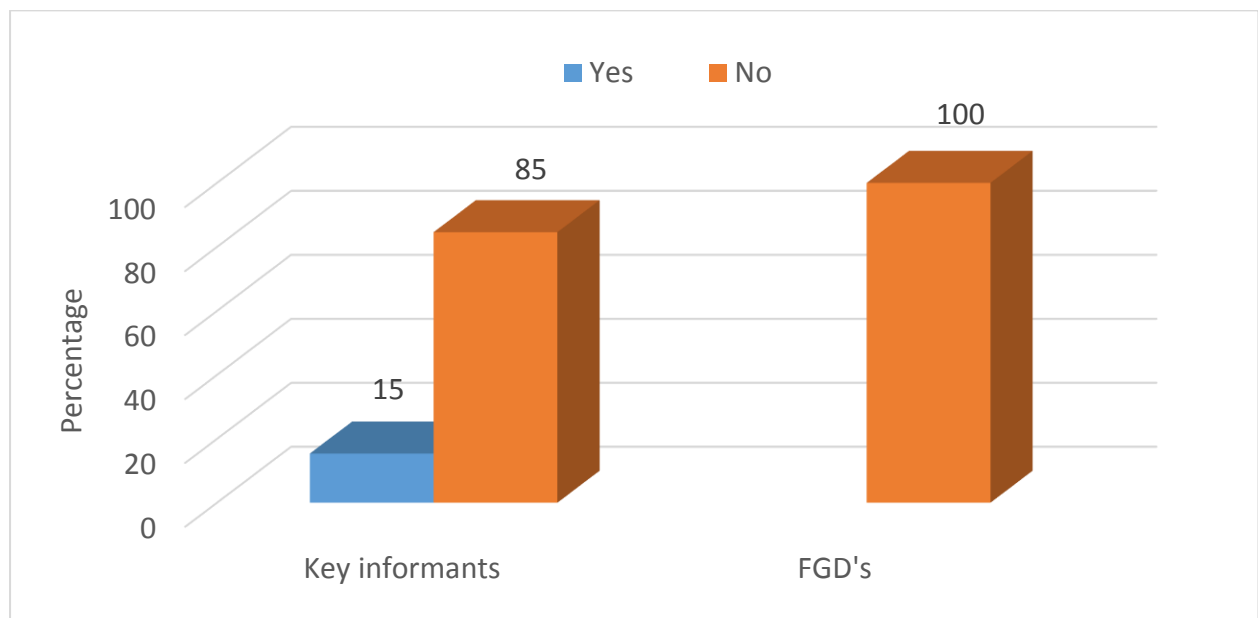


Figure 4: Perception about regulations and enforcement/compliance structures of dairy feed quality standards

4.2.3 Factors associated with lapse in compliance and enforcement of dairy feed standards

Majority of respondents identified a lapse in enforcement of feed quality standards and a number of factors were attributed to this.

4.2.3.1 Poor coordination amongst government agencies in monitoring for compliance with quality standards

Better coordination of quality standards would entail consistent monitoring along the dairy feed production, supply and post handling value chain. This includes consistent provision by government and consequent access of relevant information by stakeholders (farmers, regulators, manufacturers etc) pertaining to quality of commercial dairy feeds. Interviews with key informants pointed towards poor coordination amongst the government agencies

charged with monitoring. A key government official noted “every government institution operates as a single entity” (NAI07, 2019).

Some respondents argued that poor coordination may be attributed to a weak legal framework that does not provide clear guidelines on roles of agencies and consequently lack of coordination in dealing with cases of non-compliance. A key informant argued, “the anti-counterfeit agency and not KEBS is the most competent agency to handle issues of counterfeit products” (NAI08, 2019).

4.2.3.2 Lapse in monitoring of feed manufacturing process for compliance with quality standards

The majority of the respondents identified inadequate or poor monitoring of raw materials for feed manufacturing, which is primarily the role of the regulators and responsible government agencies. The lapse in monitoring include failure to undertake frequent spot checks and consistent testing of the feeds throughout the year. This consequently subjects the manufacturing process to abuse and unethical practice, mainly by unscrupulous traders. Some farmers in the focus groups discussion identified corruption as one of the main hindrances to effective implementation of regulations. From the accounts of the respondents, the study further establishes that manufacturers have a critical role to play in the dairy feed quality assurance process since majority of the feed manufacturers in Kenya are in the private sector. If they have to take up this role, they also have challenges to grapple with. A key informant (NAI08, 2019) from the regulatory side added that one of the major concerns faced by feed manufacturers is insufficiency of raw materials at the local market since most feed raw materials (e.g. cotton seed cake, sunflower seed, bran and germ) are imported from outside mainly Tanzania, Rwanda and Uganda. He noted that this contributes to among other things high cost of inputs and unethical practices, like adulteration of feeds, use of contaminated raw materials and reduced protein content in feeds by unscrupulous feed millers. The respondent urged the government to incentivize local manufacturers to enhance production of these raw materials locally in Kenya. Notably, a weak legal and institutional framework for enforcing quality assurance may perpetuate exploitation of the farmers by various feed manufacturers. It also partly explains the high number of animal feed manufacturers producing sub-standard products as reported by some respondents. One of the key informants noted “there are approximately 50 manufacturers of animal feeds, especially in Nakuru, but many exploit farmers by using non-quality feed ingredients like saw dust” (NAK 003, 2017). This may imply poor monitoring of registered animal feeds companies for adherence to relevant quality standards, which would ensure consistency in delivery of quality feeds to farmers. This study did not establish the involvement of technically unqualified players in the animal feed processing chain, which may interfere with the ultimate quality standards of feeds.

The above results suggest that poor quality feeds are blamed on lapse in enforcement of dairy input quality standards; which has implications. For instance, farmers are forced to look for alternative sources of feeds or embrace innovation. A farmer from Nandi county noted “sometimes we grind the maize and then mix instead of buying the commercial products which, most of the times, the quality is not the best”. There was a clarification by some farmers that this practice may not be sustainable with regards to proven quality and cost of the home-made rations. In a focus group discussion in Nyandarua County, some respondents

raised concerns on commercial animal feed quality. This has made the cooperative societies in this County to formulate their own animal feeds for distribution to their members through a check-off system. We can argue that this is an institutional re-organization that is prompted by a lapse in quality standards enforcement.

4.2.3.3 Lack of clarity on the role of extension in monitoring for quality standards compliance

There was lack of clarity about who should undertake enforcement or monitoring for regulatory compliance. An interviewee from the government (NAI11, 2019) argued that MOALFI is not responsible for enforcement or monitoring of dairy feeds standards but for extension service and knowledge provision. There was some agreement that this task may be embedded in the extension service delivery. This may perhaps explain why the lapse in enforcement of quality standards was attributed partly to poor extension service. Enhanced extension is important because farmers lack knowledge with regards to distinguishing between high and low quality feeds. A key informant from the manufacturing side expressed concern that “extension services have decreased since devolution. The county government lacks commitment in the provision of extension services to farmers since priorities are politically driven” (NAI09, 2019). A farmer in Nandi county reported that “quality feeding depends on a farmer who mainly relies on the extension officer to provide relevant information about quality feeding”. Arguably, within this context, the farmer expects to receive appropriate information on quality standards and alternative sources of animal feeds through extension services. This includes information on making home-made rations by either buying or producing animal feed ingredients and mixing them as supplements (Technoserve, 2008). It was noted that the government rate of employing extension workers has reduced and the ones in employment are not motivated in terms of training and resources to undertake extension and related quality monitoring work. A government official interviewed in the study (NAI11, 2019) informed that the government through MOALFI had proposed establishment of the “fertilizer and animal feed stuffs board”. If in place, the Board would be in charge of regulation of the quality of animal feeds and fertilizer through deployment of “livestock feed officers” to the field to ensure enforcement of quality standards alongside extension service.

4.2.3.4 Inadequate regulatory capacities, competences and laxity

The study further shows that regulatory and enforcement capacity related to dairy feed quality standards currently is weak or inadequate amongst the regulators especially KEBS, government extensionists and manufacturers.

Responses from the key informants on one hand suggested that absence or inadequate regulation enforcement and compliance is attributed to negligence and laxity of regulators. The farmers on the other hand, attributed this to inadequate personnel (capacity) as the main hindrances to effective implementation of regulations. A key informant from the private sector noted, “the government lacks knowledge and expertise, capacity and resources to control all the products produced in the market...and is not proactive in quality control.” (NAI13, 2019). The feed manufacturers and farmers lack knowledge and capacity to identify low quality raw materials, which was corroborated by a large number of interviewees including the private sector. One respondent from the private sector lamented “you cannot regulate or manage what you do not understand” (NAI14, 2019).

Some respondents in both FGDs and key informants mentioned the uncertainty around the right nutrient composition of ingredients used for feed rationing. This was directly linked to inadequate technical knowhow and related capacity around quality standards by different actors in the input value chain (farmers, extension and manufacturers). This includes inadequate technical skills to ensure proper procedures in the formulation process at the manufacturing level (private sector and homemade feeds).

Some respondents noted that the inadequate staff and testing tools at KEBS is a major challenge that limits the regulator's ability to keep track of feed quality standards' non-compliance. Enforcement of dairy farm inputs quality standards must be facilitated through provision of efficient testing equipment, which was identified as a major challenge affecting quality assurance of dairy inputs. A key informant noted, "quality standards cannot be effectively enforced if there are no well-equipped labs to test the feeds. Standards are useless if this can't be done" (NAI13, 2019).

A follow-up question to establish what KEBS is doing to address the non-compliance issue revealed that periodic workshops are organized to sensitize feed manufacturers on the importance of compliance to set quality standards. Other aspects of training include importance of using the right raw materials in formulation of animal feeds. For instance, reduced protein content in feeds is tantamount to unfair business practices.

4.3 Genetic resources

During the study, respondents were engaged through focus group discussions and interviews to elicit their views about enforcements of quality standards associated with genetic resources/semen in the Kenyan context. Genetic material in this section largely refers to the semen used by AI inseminators. AI has proven to be an effective technique of breeding in the dairy sector with the main aim to improve dairy productivity & fertility, decrease sexually-transmitted diseases and increase calving rates, among other factors (Karanja, 2003; Murage and Ilatsia, 2011; Mwangi et al., 2018; Wafula and Creemers, 2018).

4.3.1 Perception on enforcement of quality standards associated with genetic resources

The majority of the respondents (53% of key informants versus all 7 FGDs) were dissatisfied with quality of AI services in general while a relatively large number of key informants (41%) expressed satisfaction with the quality of AI services (Figure 5). Those who were dissatisfied based their assessment on the observed increased repeat inseminations per cow and low conception rates following use of AI.

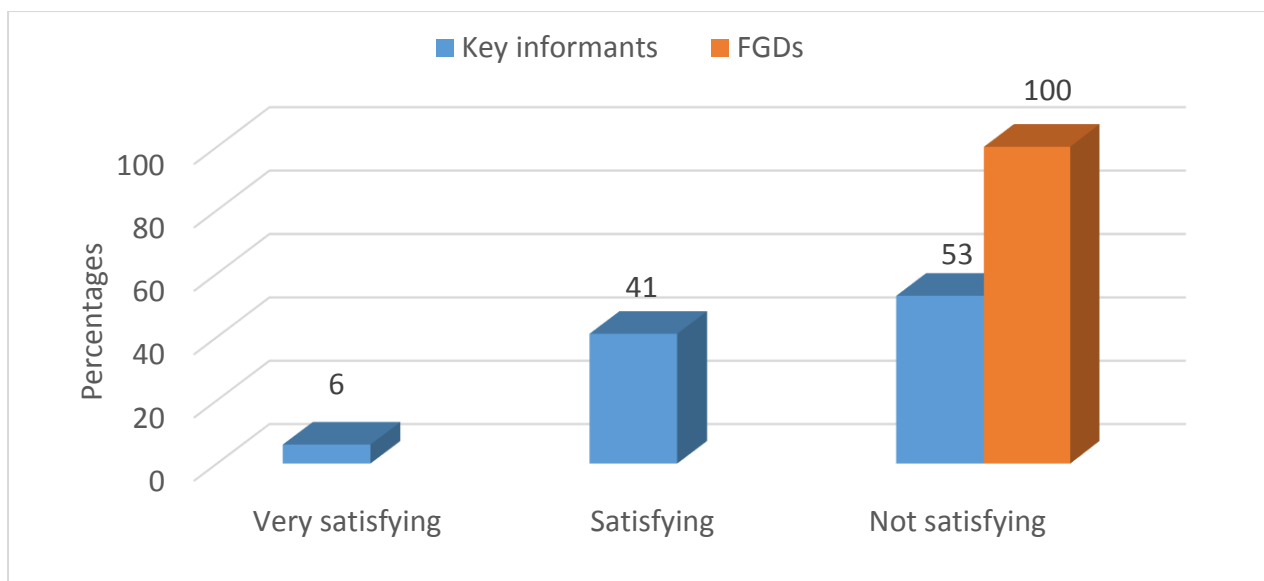


Figure 5: Level of satisfaction with quality of AI services

While interrogating further the level of respondents' satisfaction with the services offered by responsible officers and how this relates to quality standards, there were varied perceptions.

4.3.1.1 A disconnect between decreasing quality of AI and enforcement of quality standards

Increasingly, farmers are experiencing decreased quality of the services provided by AI service providers irrespective of cost or availability of service. In Nandi County for example, despite the high number of AI officers offering insemination services, there are still complaints about the quality of genetic resources. The high number of inseminators within a region may imply an increased and improved service delivery to farmers. However, quality standards of the services may not be guaranteed. This further compromises the quality of genetic resources accessible to the dairy farmers at farm level. During follow-up interviews, some farmers reported that AI inseminators are concerned primarily with administering semen and are less concerned with enforcement of quality standards.

4.3.1.2 Uncoordinated regulatory efforts by government agencies

The draft Livestock policy (RoK, 2019) clarifies the mandates of different agencies enforcing the policy. Enforcement of standards is a responsibility of mainly the county government. The other critical government agency is the Directorate of Veterinary Service (DVS). A government respondent noted that enforcement of requisite standards pertaining to AI is a mandate of the county government which is responsible for licensing and monitoring animal health assistants. DVS on the other hand is responsible for "production of bulk amounts of certified semen which is allocated to various distributors who may then sell to AI technicians" (NAI12, 2019). This responsibility issue notwithstanding, the importance of quality standards and related collaborative efforts in enhancing quality of genetic resources is a policy and practice issue and is therefore revisited in the conclusion section. Section 4.3.2 further sheds more light on the complexity of the problem around access to quality genetic resources by smallholder farmers.

4.3.2 The high cost of genetic resources may be attributing non-compliance with quality standards

The respondents had varying perceptions about cost implications associated with use of genetic resources at perceived varying levels of quality.

The findings are inconclusive about the relationship between cost and genetic resources quality standards compliance. For instance, the majority of FGDs (6 groups out of 7 or 86%) perceived that farmers may be accessing low quality genetic materials at high costs. This is compared to 49% of the key informants who perceive that farmers may be accessing high quality genetic materials at high cost and 37% who perceive that farmers may be accessing low quality genetic materials at high costs (Figure 6). These results suggest that there is a direct relationship between cost and declining use of AI services versus increased use of bulls as source of genetic resource. The impact of cost on accessibility of quality genetic resources has also been reported elsewhere. For instance, due to expensive genetic resources, small scale farmers may be unable to access right quality genetic resources for production and reproduction (ILRI, 2015; SNV, 2013). It is difficult to relate these findings to the perceived inadequate enforcement of quality standards related to genetic resources, which thus warrants further investigations.

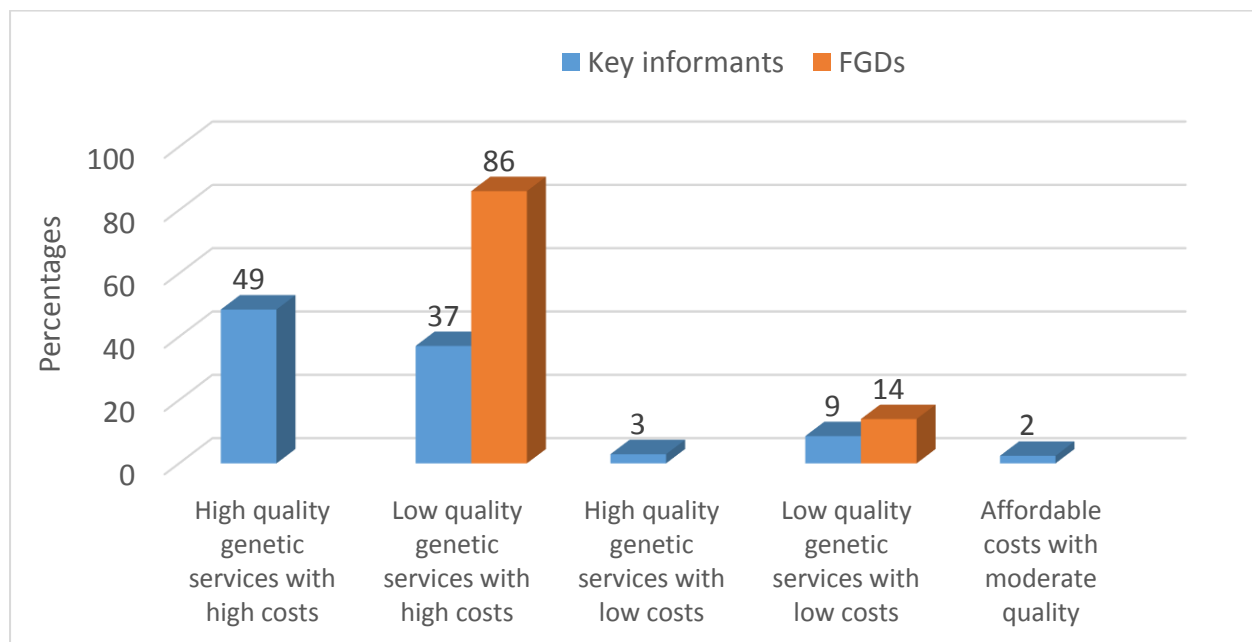


Figure 6: Perception levels on the quality of genetic resources versus cost

Some secondary materials have alluded to other possible factors, besides cost, that constrain supply of quality genetic resources. For instance, SNV (2013) reported high incidences of poor quality semen linked to poor handling along the supply chain. The study findings expose the complexity of challenges associated with access and supply of quality genetic resources among small scale farmers.

4.3.3 Ineffective monitoring for genetic resources quality standards

The respondents were asked about their perception relating to factors that affect effective monitoring for the purpose of ensuring quality genetic resources. The majority of key informants (67%) were of the opinion that the respective standards and regulations for

genetic resources are not being implemented as they should. All the farmers in the FGDs were in agreement that monitoring is not being undertaken. Overall, the respondents identified a number of reasons that could lead to this scenario. These include inadequate policies, inadequate personnel, and corruption (Figure 7). The combination of inadequate personnel and corruption ranked the highest among both the FGDs and key informants (46% of the key informants and 5 out of the 7 FGD). This study’s findings echo the findings of a report that identified low monitoring and enforcement, unfavorable policies and legal framework as factors that affect effective guidance for sustainable utilization of genetic resources (MA&I, 2018).

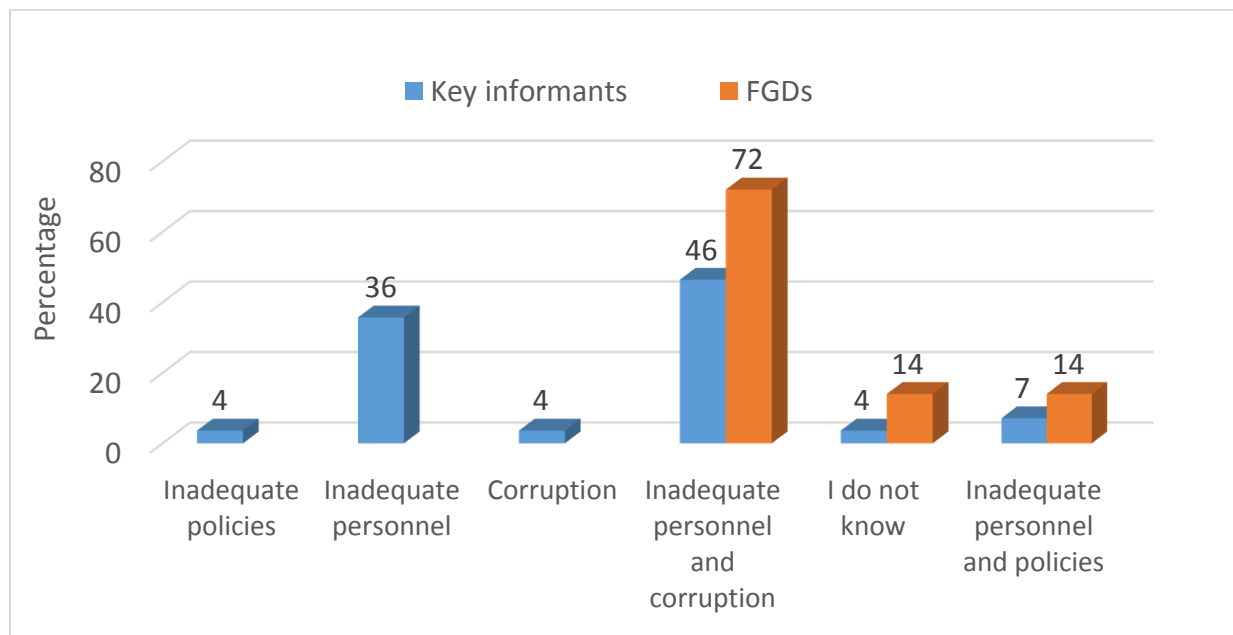


Figure 7: Perceptions about factors that hinder effective monitoring of genetic resources

4.3.3.1 Inadequate personal and competence

The findings show that lack of capacity and related knowledge by regulators is a major issue in the AI service provision. Inadequate personnel in terms of reduced number or lack of officers required to undertake monitoring roles along the value chain from point of semen production and supply, to the subsequent process of distribution and handling by chain distributors and inseminators. Follow-up interviews with key stakeholders help to put the challenge into perspective. It was clarified that the problem of inadequate staff is complicated by low technical knowhow and competence of veterinary officers and animal health assistants licensed to practice AI service. A respondent noted that some animal health assistants lack the technical know-how associated with proper storage of semen using liquid nitrogen (NAI03, 2019). Further, another key informant from the private sector stressed “the people involved in the importation of semen lack sufficient knowledge in the area. Proper expertise is required to bring in genetic material from breeds adapted to the tropics” (NAI13, 2019). Another one noted that from the supply side, the semen importers are not in control of the supply chain activities e.g. margins, storage techniques, and selection of compatible breeds (NAI04, 2017). Interviewees from the government agencies added that the county government officers, KEBS and the Anti-Counterfeit Authority (ACA) are not well equipped to

execute their mandated duties. County government officials in particular lack knowledge on proper licensing, supervising, reporting and regulation of AI service providers.

4.3.4 Implications of ineffective enforcement of standards

Follow-up interviews with farmers revealed that inadequate enforcement of quality standards has implications for quality of genetic stock used for breeding purposes.

4.3.4.1 Potential unethical practice

Some respondents noted that inadequate monitoring and corruption may compromise the quality of genetic materials either through poor handling techniques and/or adulterations.

4.3.4.2 Increased access of poor quality genetic resources

A farmer from Nandi remarked “the AI being used is not of the best standard since the calf ends up producing less milk”. Consequently, the perceived uncertainty about quality of semen and AI services resulted in use of bull services by farmers. Another farmer reported “I decided to go back to use of bulls because I got undesirable calves and a different breed after using AI”. Another farmer from Nyandarua had this to say “when you use AI, you will be forced to serve twice or thrice for the cow to conceive which is expensive”. Another farmer from the same county further noted that “quality of breeds has reduced over the years and you find that the bulls do not give quality breeds”. This practice by farmers may imply that despite their knowledge about disadvantages of bull use, they still use them. Majority attributed this to unsatisfactory levels of AI services and inaccessibility of semen and AI services within their regions. The continuous use of bulls as source of genetic resource has implications too. According to some secondary sources, accessing quality semen is a major problem affecting most dairy farmers in Kenya. This may lead to low genetic quality of dairy cows and consequently a poor genetic resource among Kenyan smallholder dairy farmers (Technoserve, 2008; Wafula and Creemers, 2018). A key private sector informant pointed out that, “most farmers prefer imported semen as opposed to locally available semen regardless of the productivity/ adaptability of the animal” (NAI13, 2019). Despite this perception, it is crucial to note that options are available for farmers to choose between semen produced locally by KAGRC and that imported by private companies such as Coopers. The latter may be costly but the study cannot establish whether the local semen is better in terms of quality than the imported one because this was not explored in this study. This is an important research area considering the potential role of the counties in provision of subsidized AI services and supporting regulatory compliance at the grassroots as established from this study’s field work.

4.4 Veterinary services

This policy study sought to elicit perspectives of the respondents about veterinary services that ensure treatment, prevention and control of animal diseases as stipulated in the Veterinary Surgeons’ and Veterinary Para-professionals Act No. 29 (RoK, 2011). Veterinary regulatory services aid to protect the public and animals against zoonotic diseases, provides level and fair playing field for livestock related trade and regulates the veterinary profession (Wesonga *et al.*, 2018). The Kenya Veterinary Board (KVB) is mandated to ensure quality veterinary services are maintained for either prevention or treatment of dairy animals at farm level. Before the current devolved government, veterinarians and veterinary para-professionals (either public/private) reported all their activities to the District Veterinary Officer within their area of jurisdiction. This aided in assessing and monitoring the code of

conducts and/ethics as well as the follow up of the dairy cows after treatment. With the devolution of the counties, there is inadequate clarity on where/who the veterinary para-professionals can report to for efficient monitoring mechanisms on their service delivery.

4.4.1 Perception on the level of satisfaction with quality veterinary services

Respondents were asked about their level of satisfaction with the quality of veterinary services currently offered by veterinary officers including veterinary para-professionals. The majority of key informants (73%) were highly dissatisfied as compared with 25% who were satisfied. On the other hand, farmers in the FGDs expressed a different opinion. Four out of the seven FGDs (57%) expressed satisfaction with the quality of veterinary services they are able to access while three groups (43%) were dissatisfied (Figure 8). Further probing revealed that the higher satisfaction recorded among the farmers could be attributed to their experience related to rate of recovery of their dairy animals after undergoing treatment following a particular disease attack. They attributed the recovery to appropriate drugs (as opposed to substandard drugs) and acceptable veterinary service provision by the health technicians more generally.

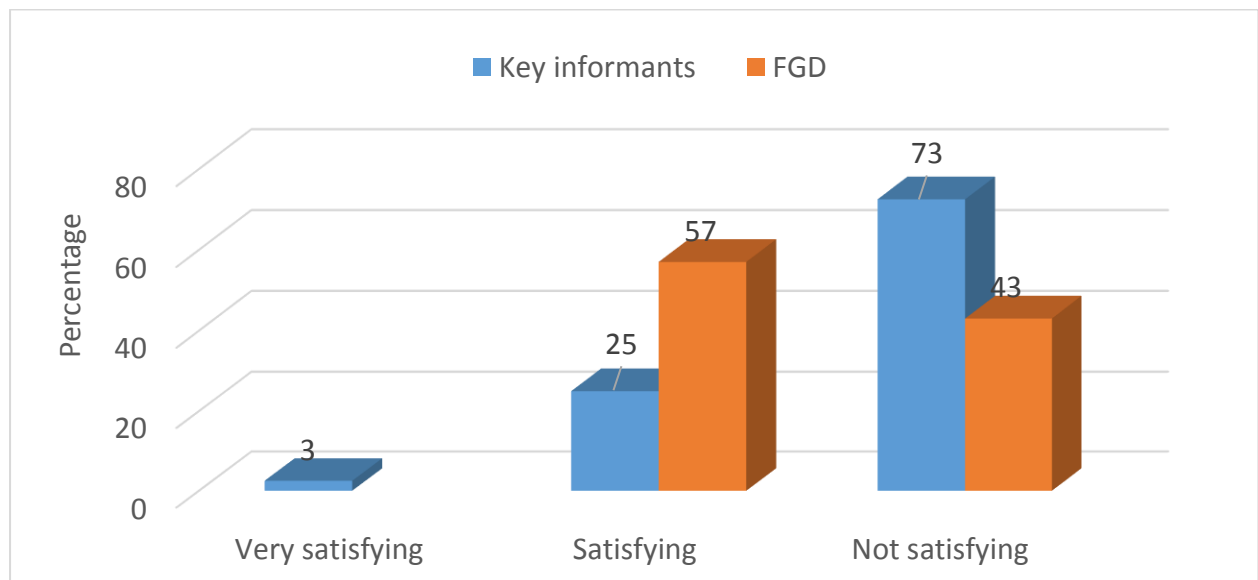


Figure 8: Level of satisfaction with quality of veterinary services

4.4.1.1 Monitoring as a concerted responsibility for regulatory compliance of veterinary services

Respondents were asked about the monitoring responsibility for enhanced quality of veterinary services. The majority of respondents (72% of key informants and 4 out of 7 FGDs or 57%) were on the opinion that the boards, mainly the KVB and Kenya Dairy Board (KDB) are better placed compared to KEBS and county government in ensuring quality standards of veterinary services (Figure 9). This was attributed to the direct contact and monitoring undertaken by respective boards in the study counties. A few respondents identified the county government and the KEBS, which points towards the role of multiple actors in ensuring quality delivery of veterinary service at the grassroots level.

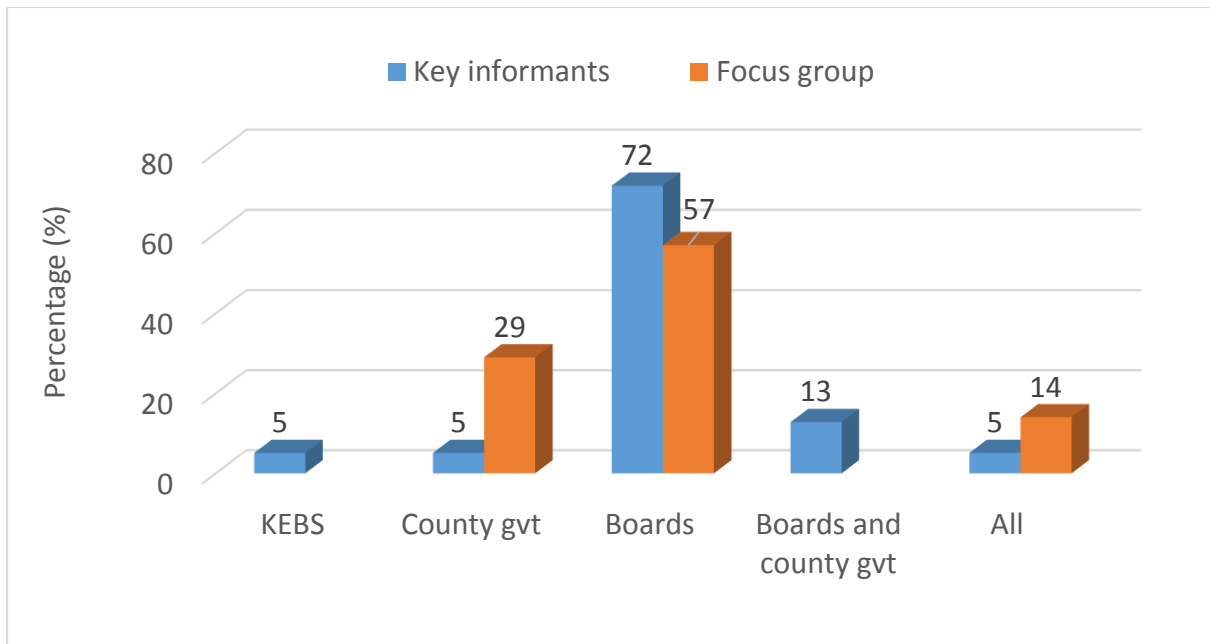


Figure 9: Responsibility for monitoring veterinary services

4.4.1.2 Inadequate and incompetent veterinary service providers

One of the major challenges identified in delivery of quality veterinary services relates to inadequate number of staff (for instance few animal health workers). A farmer from Nandi county remarked, “we only have one veterinarian in this area who is private, what can we do about it? Does he need to improve?” The other challenge relates to capacity of workers. A number of respondents noted that the devolved county system has aggravated the challenge associated with quality veterinary service access. One reason attributed to this is that the veterinary para-professionals (whether private or public) in counties have minimal capacity or lack requisite reporting structures. In addition, some respondents noted the rise of unlicensed and less qualified animal health technicians who pose a threat to the quality of veterinary service delivered to the farmers.

4.4.2 Cost and capacity issues constrain provision of quality veterinary services and drugs

The perception of the respondents suggests that the quality of veterinary service is commensurate with costs. There were varied perceptions about cost within the FGDs. Three FGDs out of seven linked high quality veterinary services to high cost. On the other hand, four FGDs out of seven argued that high cost of services does not guarantee quality service. A follow-up enquiry revealed that the varying perceptions could be attributed to low number of qualified veterinarians who operate mostly as private entities. One respondent (NAK 02, 13/12/2017) further added that these private practitioners charge high costs for their services and tend to take advantage of the inadequate number of veterinarians. A number of key informants from the government and private sector pointed out that veterinary officers in the private sector are business oriented and thus charge farmers very high fees for services. Arguably, farmers who cannot afford to pay for services offered by private veterinary officers opt for the para-vets within the communities. The majority of the key informants (63%) expressed fear that farmers may be accessing low quality veterinary services mostly from the para-vets at high cost (Figure 10). A number attributed this to the low number of qualified veterinarians, but went further to explain that this opens up room for unscrupulous veterinary para-professionals. Some cases of unethical practice were cited which include use of expired

veterinary drugs and misuse of drugs for preventive and treatment purposes, which ultimately contributes to low quality veterinary services.

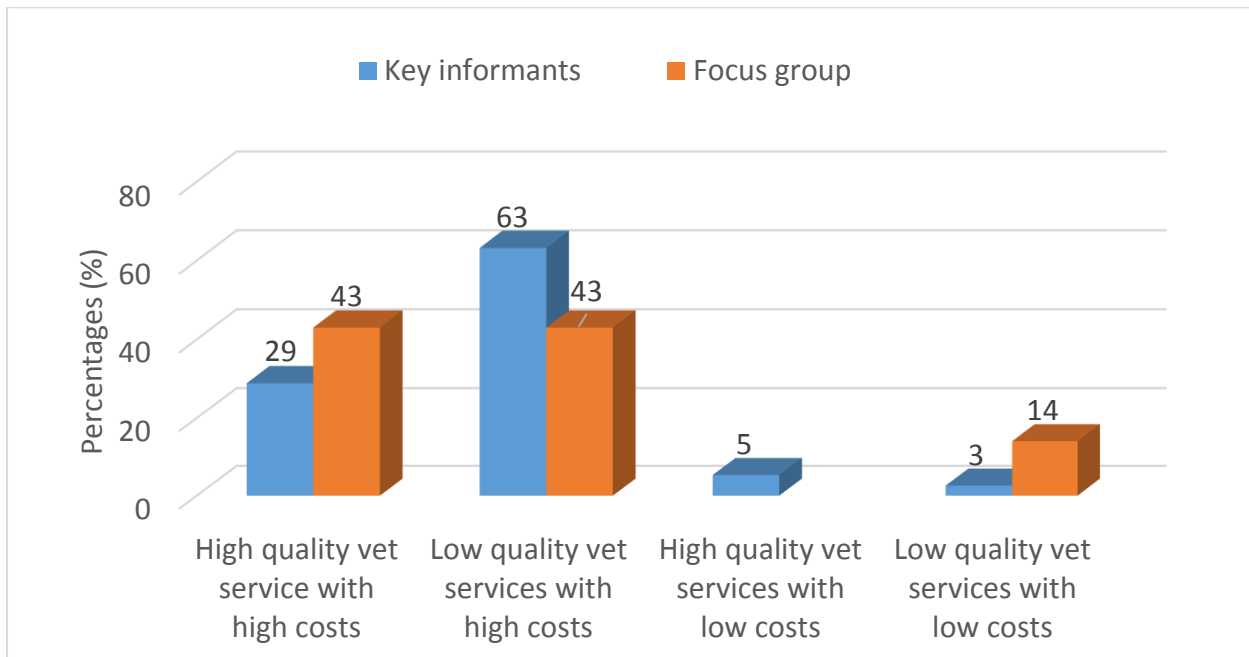


Figure 10: Perception levels on the quality of veterinary services versus costs

A government interviewee explained the reason behind the low number of qualified veterinarians (NAI12, 2019). He noted that most government veterinary officers have reached retirement age and there are few new officers employed to replace them. He added that, the few who secure employment lack mentorship from veteran officers, which constrains them from effectively providing professional service.

The quality of veterinary services and veterinary drugs being used for either treatment or prevention purposes needs to be assessed through continuous inspection. Some key informants from the government mentioned that government veterinary officers are not empowered/ well facilitated to contribute towards compliance with quality standards (NAI12, 2019; NAI04, 2017). This may explain the observed inadequate monitoring of service providers' service codes and surveillance of veterinary drugs for sustained quality.

According to MoLD/RoK, (2008), there are limitations associated with enforcement of veterinary drugs quality standards by veterinary personnel. Currently, legal provision under the Pharmacy and Poisons Act (Cap 244) places veterinary drugs inspectors under the Ministry of Health. This has implications because it can lead to sale of veterinary drugs in the wrongly designated points. This may consequently result into possible wrong prescription, abuse, misuse and ultimate risk to the users.

5. CONCLUSIONS

This policy study was aimed at exploring the factors that affect efficient quality standards enforcement and monitoring in the related dairy input and advisory service supply chain. The ultimate aim of the study was to generate evidence that would enhance policy dialogues in the dairy input supply chain actors and policy makers on suitable interventions and incentives to address the quality standards enforcement challenge. It focused on dairy feeds, genetic resources and veterinary services. Although there were general observations that cut across the three subsectors, specific aspects were identified within each of the subsectors.

5.1 Specific observations pertaining to feed quality standards enforcement

A number of factors affect a credible and efficient quality assurance process in dairy feed input supply. These include inadequate capacity, weak legal framework for effective coordination and dealing with non-compliances, weak monitoring structures including weak extension service and unethical practices. These results are in agreement with previous studies or reports. Previously, MoLD (2008) and Technoserve, (2008) reported about a) a weak legal and institutional framework for enforcing quality assurance as among the many factors contributing to poor quality commercial animal feeds and b) farmers dissatisfaction about the decreasing and inconsistent quality of the animal feeds.

Results from a previous study by Snipes (2014), noted that regulatory and monitoring challenge encourage the introduction of low quality dairy feeds and adulteration, thereby compromising quality standards. This is because scrupulous traders tamper with original quality brands or produce substandard brands due to inadequate monitoring services by regulators and reduced number of field officers (Van der Lee et al. 2016). Generally, the animal feed industry is faced with challenges like unregistered and unregulated smaller feed formulators. This perpetuates the challenge of regulatory oversight by KEBS.

5.2 Specific observations pertaining to genetic resources

The study notes that farmers are reverting to bull services due to poor quality semen and services. It also exposes factors affecting effective genetic resource quality assurance which include unethical practices, inadequate policies and inadequate monitoring practices. Based on these results, there is need to build requisite capacities at the national and county levels to ensure quality of semen and AI services are maintained. This includes capacity building that pertains proper access and handling of genetic resources. This policy study points at an institutional failure pertaining to deliberate and relevant government structures in dealing with the capacity challenge. This may be at the educational system level or at the employment level. The Kenyan education system may have failed to train adequate personnel with requisite skills to undertake monitoring for compliance with quality standards. A regulatory official advised “the government should include training aspects like certification in the training of students in animal sciences to ensure that that they are well equipped when they are employed” (NAI08, 2019). This may suggest that the training undertaken may not be holistic in nature to provide inseminators with basic skills on quality standards and advisory services. There is need to build requisite capacities at the national and county levels especially with regards to proper access and handling procedures to ensure quality of semen and services are maintained. In addition, and as noted by other scholars, there is need to increase

awareness on the importance of breeds that are adaptable to the climate in the tropics and are highly productive (NAI13, 2019; Wafula and Creemers, 2018). This would complement enhanced AI services.

5.3 Specific observations pertaining to provision of Veterinary services

The study exposed a number of dynamics in the provision of veterinary services. The issue of quality service is directly or indirectly linked to cost of the service as well as technical capacity (for instance the number of qualified veterinarians versus veterinary para-professionals) available. The issue of inadequate capacity to provide quality service cannot be overemphasized. The withdrawal of a substantial number of qualified veterinarians from veterinary service provision following the liberalized and fragmented nature of the industry was noted from the secondary data. In addition, the rise of unqualified animal health technicians who pose a threat to the quality of veterinary service delivered to the farmers has implications. Debatably, possible compromise in delivery of animal health services for either diseases treatment and/or preventive strategies has adverse effects not only on the animals but also on the ultimate consumers of the animal products including milk and meat.

A government respondent (NAI04) cited policy and practice reforms aimed at enhancing regulation and monitoring of quality veterinary service delivery. He alluded to the different platforms; the Kenya Animal Health Network and National Agricultural Value chain forum where issues of quality veterinary services and requisite regulations enforcement are discussed. Another private sector respondent informed about the Livestock Genetic Society of East Africa (LGSEA) where matters pertaining to regulation including self-regulation could be deliberated on (NAI14, 2019).

5.4 The multiple factors contributing to the dairy input and services quality standards challenge

This policy study findings suggest that enforcement of quality standards and related compliance is a major challenge that hampers delivery of quality dairy farm inputs. Overall, the enforcement of quality standards and monitoring mechanisms are generally weak or inadequate at all levels (input manufacturing and supply level, the grassroots level and extension/advisory level). The quality assurance efforts by the stakeholders in the input supply chain seem to be ineffective and are hampered by multiple challenges. The study point to multiple but complex intertwined factors that could explain the challenge of quality standards enforcement and compliance along the dairy input and advisory service supply chain. These are briefly recapitulated below, with a view to providing policy and practice recommendations in the subsequent section.

5.4.1 Inadequate capacity challenges at different scales and lack of incentives

The relevant government agencies mandated to provide regulatory oversight in the input and advisory service supply chain appear to lack adequate human and infrastructural capacity to do this. For instance, KEBS and other government agencies do not have capacity to undertake effective enforcement of quality standards due to insufficient number of personnel and lack of resources including incentives for monitoring of compliance with quality standards.

Farmers and manufacturers on the other hand are constrained by inadequate extension services especially at the county level to address the issue of information on relevant regulations and respective quality standards pertaining to compliance.

5.4.2 Uncoordinated quality assurance process and call for self-regulation

The issue of coordination relates partly to collective responsibility with respect to addressing the quality standards challenge and in designing of strategies for enhancing the quality of dairy farm inputs. The study reports about lack of coordination of quality assurance related activities, including regulatory compliance and enforcement services by dairy farm input value chain actors. The respondents, in particular the key informants, repeatedly appealed for better coordination amongst government agencies (KEBS, DVS and county governments) for efficient monitoring and implementation of quality standards and regulation pertaining to dairy inputs supply. The study alludes to the fact that main value chain actors, such as manufacturers, distributors, traders and/or inseminators, are profit driven. This has implication in terms of delivery of quality standards compliant service. Self-regulation by the private sector was repeatedly pointed out as a possible solution to the quality assurance problem. This is arguably a policy issue that requires support from the government and coordination amongst respective value chain actors.

5.5 Policy and practice recommendations

This study attracts a number of recommendations which are briefly outlined below.

5.5.1 Review of regulatory policies and harmonised regulatory process among stakeholders for enhanced accountability in the dairy farm input supply chain

There is a disconnect between regulatory policies and the requisite implementation by the different agencies which hampers enforcement of quality standards in the dairy farm input and advisory service supply chain. For instance, the regulatory documents do not provide for reporting mechanisms of non-compliant cases of quality standards of dairy inputs by different stakeholders and this needs to be addressed. For an effective quality assurance system, a strong and effective legal framework coupled with adequate information dissemination about quality aspects of all dairy inputs and necessary advisory service is necessary. In addition, efficient accountability mechanisms are needed to ensure continuous arrests and prosecution on non-compliance with quality standards.

It is noted that a lot is happening in the milk safety and quality assurance (see for instance Kilelu et al. 2019; Harcourt-Brown et al. 2018). This study recommends a holistic, and harmonized approach to delivery of service in the sector including enforcement of quality standards.

5.5.2 Improved and inclusive facilities for testing of dairy inputs

This should include proper and fairly equipped laboratories that are available and accessible to users at both supply and demand side. These may be strategically located at counties level for ease of testing of feed ingredients and/or finished products, genetic resources and veterinary products. The service should be subsidized to enhance access by the majority of the stakeholders especially small scale dairy farmers and input traders. These facilities should be accessible to government officials and regulators for the purpose of ascertaining quality standards for informed decision-making and ultimate intervention measures.

5.5.3 Encouraging a coordinated system approach to enforcement of quality standards

There is an appeal for a concerted approach to implementation of quality standards in the dairy inputs supply chain. This implies a need for a coordinated system approach amongst all the stakeholders within the dairy value chain to ensure an effective inputs quality assurance system. This requires rethinking the roles of the different value chain actors. This requires the

National government, county governments, farmers groups and other dairy related groups to fully take responsibility through proper communication and monitoring mechanisms.

5.5.4 Empowering both public and private sector actors for a participatory quality standards enforcement

Capacity and competence issues have repeatedly been cited as perpetuating the regulatory compliance challenge. It is therefore important to pay attention to capacity building efforts across the different layers of stakeholders. For instance, increasing stakeholders' awareness of regulations, and offering them practical training on how to comply, are crucial starting points for improving compliance.

While regulations affecting the production and sale of dairy inputs are national, counties have an important role to play, manufacturers and farmers should be educated on the importance of quality standards through mass media campaigns and outreach by relevant service providers including community health workers. Farmers' awareness about standards and capacity to participate in monitoring can be improved through agricultural extension. In addition, county officers in charge of genetic resources and veterinary services can train manufacturers, stockists and farmers on the regulations and how to comply.

Since KEBS and other government agencies do not have capacity to undertake effective enforcement of quality standards due to insufficient personnel and resources, the government should provide incentives for self-regulation by the private sector. Notably, if well-functioning, a quality assurance system can support various private sector led governance mechanisms including industry inspired quality and safety standards. As an example, AKEFEMA has a code of conduct to guide members in adherence of KEBS quality standards especially animal feeds and implementation of the same may be enhanced through requisite government support. Other support should be collective personnel recruitment and/ or facilitating activities related to enforcement of standards.

5.5.5 Improved access to reliable AI and veterinary services

A pro-poor and inclusive system that ensures accessibility of high quality genetic resources at affordable costs by the semen and veterinary input suppliers and distributors is essential. This would minimize the persistent use of low quality genetic resources including bulls and semen. This requires a concerted effort amongst stakeholders. This may entail:

- Continuous awareness creation and capacity building mechanisms along the entire value chain from processing and distribution all through to insemination for quality genetic resources.
- Farmers also need capacity building on bull selection and follow up mechanisms before and after inseminations for enhanced upgrading processes.
- Inseminators should also be trained to improve the quality standards of genetic resources besides service delivery. This will further reduce the dependency on bulls by some farmers.
- Effective and coordinated regulatory implementation mechanisms

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APPENDICES

Appendix I: Code list of interviewees

NAKURU	WHAT	WHERE	DATE
NAK01	Menengai Agro vet shop (Main semen distributor)	Nakuru	11 th December 2017
NAK02	Veterinary Centre	Nakuru	15 th December 2017
NAK03	Lens Feed Manufacturer	Nakuru	14 th December 2017
NAK04	Dean/Kenya Veterinary Board	Egerton	11 th December 2017
NAK05	Animal Production Technician	Nakuru	14 th December 2017
NAK06	Kenya Livestock Breeders Organization	Nakuru	13 th December 2017
NAK07	Egerton, Kenya	Waterbuck hotel, Nakuru	10 th April 2019

NAIROBI	WHAT	WHERE	DATE
NAI01	USAID-Kaves	USAID-KAVES offices, Karen park offices	20 th November 2017
NAI02	SNV-Kenya	SNV offices, Ngong lane	20 th November 2017
NAI03	Director Veterinary Services	DVS, Lower Kabete Offices	29 th November 2017
NAI04	Kenya Animal Genetic Resources Centre	KAGRC, Lower Kabete Offices	27 th November 2017
NAI05	Kenya Dairy Board	KDB, Nairobi office	22 nd November 2017
NAI06	Kenya Bureau of Standards (KEBS)	KEBS, South C office	20 th March 2019
NAI07	Kenya Bureau of Standards (KEBS)	KEBS, South C office	20 th March 2019
NAI08	Kenya Bureau of Standards (KEBS)	KEBS, South C office	1 st April 2019
NAI09	Association of Kenya Feeds Manufacturers (AKEFEMA)	ACTS office, ICIPE, Duduville campus	3 rd April 2019
NAI11	Directorate of Livestock Production (DLP)	DLP office, Hill plaza, Upper hill	29 th April 2019
NAI12	Directorate of Veterinary Services (DVS)	DVS office, Kabete	30 th April 2019
NAI13	SNV, Kenya	SNV offices, Ngong lane	19 th April 2019
NAI14	ABSTCM	Kabarnet Road	6 th September 2019

NANDI	WHAT	WHERE	DATE
NAND01	Livestock Officer	County Offices	14 th November 2017
NAND02	Livestock Officers	Kaptumo, County Vet Offices	13 th November 2017
NAND03	Agricultural Officer	Chiefs offices	15 th November 2017

NYANDARUA	WHAT	WHERE	DATE
NYAND01	Tulagaa Dairies	Tulagaa Dairies Office	8 th November 2017
NYAND02	County Vet Officer	Nyandarua County Offices	6 th November 2017
NYAND03	Nyandarua	Olkalou dairies Extension office	7 th November 2017
NYAND04	Olkalou dairies	Agrovet attendant	7 th November 2017
NYAND05	Stockist	Olkalou Agrovet	7 th November 2017
NYAND08	Sub count Vet Officer	Nyandarua County Offices	10 th November 2017
NYAND09	Stockist	Agrovet	10 th November 2017
NYAND10	Livestock Officers	Nyandarua County Offices	7 th November 2017

Focus group discussions

Code	County	Sub-county	Place	Attendance		Dates
				Male	Female	
NYAND06	Nyandarua	Kinangop	Kinangop	8	6	8 th November 2017
NYAND07	Nyandarua	Kinangop	Nyala, Dairies	8	3	9 th November 2017
NANDI04	Nandi	Chemusei	Chemuswa	16	3	16 th November 2017
NANDI05	Nandi	Chemusei	Mosoriot	0	9	14 th November 2017
NANDI06	Nandi	Chemusei	Kaiboi	6	4	17 th November 2017
NANDI07	Nandi	Chemusei	Kaimaiywo	12	8	15 th November 2017
KIAMB01	Kiambu	Kiambaa	Kiambaa	9	11	15 th December 2017

Appendix II: Questionnaire for regulators

Questionnaire for Regulators/Policy Makers

General Information:

Date of interview:

Place of interview:

Interviewer.....Reporter.....

Questionnaire No.	Name of respondent	Sex	Organization	Position of respondent	Respondents level
		<input type="checkbox"/> Male <input type="checkbox"/> Female			<input type="checkbox"/> National <input type="checkbox"/> County
1. Which of the following documents/ policy drafts are you aware of? Tick all that apply					
<input type="checkbox"/> Animal feed policy		<input type="checkbox"/> Kenya Dairy standards act		<input type="checkbox"/> National Dairy Development Policy	
<input type="checkbox"/> Veterinary surgeon Act		<input type="checkbox"/> Feed quality policy		<input type="checkbox"/> Dairy Master Plan	
<input type="checkbox"/> Public health Act		<input type="checkbox"/> Substandard feed policy		<input type="checkbox"/> Not aware of any	
<input type="checkbox"/> EAC dairy standards act		<input type="checkbox"/> Others (specify)			
2. Do you think these feed/drugs/AI regulations are being implemented and enforced? <input type="checkbox"/> Yes <input type="checkbox"/> No					
If no, what is currently hindering effective implementation?					
3. Do you think there is inadequate access of animal feed ingredients that can be used as alternative sources to those not meeting the standards? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I do not know					
If Yes, why is there the inadequacy?					
4. Do you think there is inadequate monitoring of feed quality standards in the final feed product? <input type="checkbox"/> Yes <input type="checkbox"/> No					
If Yes, why the inadequacy?					
5. How do you perceive the quality of available animal feed resources versus the cost implications?					
<input type="checkbox"/> High costs with high quality services			<input type="checkbox"/> Low costs with low quality services		
<input type="checkbox"/> High costs with low quality services					
<input type="checkbox"/> Low costs with high quality services			<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify					
Why?					
6. How do you perceive the quality of available semen/stock (local/imported) versus the cost implications?					
<input type="checkbox"/> High costs with high quality services			<input type="checkbox"/> Low costs with low quality services		
<input type="checkbox"/> High costs with low quality services					
<input type="checkbox"/> Low costs with high quality services			<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify					
Why?					
7. How do you perceive the quality of veterinary services versus the cost implications?					
<input type="checkbox"/> High costs with high quality services			<input type="checkbox"/> Low costs with low quality services		
<input type="checkbox"/> High costs with low quality services					
<input type="checkbox"/> Low costs with high quality services			<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify					

Why?		
. Are there policy provisions on management of animal diseases in terms of prevention (dipping/spraying, vaccination), treatment, culling etc? [] Yes [] No Please state some.		
. Do you think that the fact whether the regulations are being implemented and/ enforced or not has an impact on the dairy sector in terms of support or constraint to effective input service supply for enhanced commercialization? [] Yes [] No		
If yes, how?		[] I do not know
If no, how?		[] I do not know
0. Do you think people are accountable or are being held accountable for compliance or noncompliance with the set (feed/drugs/AI) standards? [] Yes [] No		
If yes, how?		
If no, how?		
1. Who do you think should be involved in ensuring compliance? the following		Please tick from
[] National government	[] Regulatory bodies	[] County governments
[] Suppliers themselves	[] Farmers associations/groups	
[] Suppliers associations	[] I do not know	
[] Others, specify		
2. How do you rate the reforms to enhance regulation in the dairy input and service delivery chain?		
[] Excellent	[] Very good	[] Good
[] Average	[] Fair	[] Poor
3. Do you think there is inadequate access of animal feed ingredients that can be used as alternative sources to those not meeting the standards? [] Yes [] No [] I do not know		
If Yes, why is there the inadequacy?		
[] Poor production of local ingredients (Low supply chain)	[] I do not know	
[] Low costs attached to local ingredient production		
[] High operating costs in acquiring local ingredient		
[] Insufficient incentives to produce quality ingredients		
[] Others, specify		
4. Are you motivated to improving/ensuring the quality of dairy inputs are maintained? [] Yes [] No []		
If Yes, How/what incentives are you using?		
If No, Why are you not motivated?		
5. Are farmers/other dairy stakeholders motivated to improving/ensuring the quality of dairy inputs are maintained? [] Yes [] No []		
If Yes, How/what incentives are you using?		
If No, Why are you not motivated?		

Other general comments

Thank you for your time.

Appendix III: Questionnaire for other dairy stakeholders

General information:

Date of interview:

Place of interview:

Interviewer:.....

Reporter:.....

Questionnaire No.	Sex <input type="checkbox"/> Male <input type="checkbox"/> Female	Contact	County
Name of respondent			<input type="checkbox"/> Nyandarua <input type="checkbox"/> Nandi
Name organization/Company		Position	
Stakeholders Position <input type="checkbox"/> Farmer <input type="checkbox"/> Farmers associations <input type="checkbox"/> Input suppliers <input type="checkbox"/> <input type="checkbox"/> NGO's/CBO's <input type="checkbox"/> County official <input type="checkbox"/> Others, specify			

1. Which of the following documents/ policy drafts are you aware of? Tick all that apply		
<input type="checkbox"/> Animal feed policy	<input type="checkbox"/> Kenya Dairy standards act	<input type="checkbox"/> National Dairy Development Policy
<input type="checkbox"/> Veterinary surgeon Act	<input type="checkbox"/> Feed quality policy	<input type="checkbox"/> Dairy Master Plan
<input type="checkbox"/> Public health Act	<input type="checkbox"/> Substandard feed policy	<input type="checkbox"/> Not aware of any
<input type="checkbox"/> EAC dairy standards act	<input type="checkbox"/> Others (specify)	
2. What do quality standards and regulations mean to you, in your position?		
<input type="checkbox"/> Restrictions	<input type="checkbox"/> Helping farmers	
<input type="checkbox"/> Others, specify	<input type="checkbox"/> I do not know	

3. Who do you think is responsible for monitoring and/ enforcement of regulations on quality standards in animal feeds resources?		
<input type="checkbox"/> Government bodies (KEBS)	<input type="checkbox"/> County government	<input type="checkbox"/> Dairy stakeholders
<input type="checkbox"/> Boards (Dairy, Veterinary)	<input type="checkbox"/> Suppliers themselves	<input type="checkbox"/> Suppliers associations
<input type="checkbox"/> Others, specify	<input type="checkbox"/> I do not know	

4. Who do you think is responsible for monitoring and/ enforcement of regulations and quality standards in genetic resources (semen, AI, stock)?		
<input type="checkbox"/> Government bodies (KEBS)	<input type="checkbox"/> County government	<input type="checkbox"/> Dairy stakeholders
<input type="checkbox"/> Boards (Dairy, Veterinary)	<input type="checkbox"/> Suppliers themselves	<input type="checkbox"/> Suppliers associations
<input type="checkbox"/> Others, specify	<input type="checkbox"/> I do not know	

5. Who do you think is responsible for monitoring and/ enforcement of regulations and quality standards in veterinary service provision?		
<input type="checkbox"/> Government bodies (KEBS)	<input type="checkbox"/> County government	<input type="checkbox"/> Dairy stakeholders
<input type="checkbox"/> Boards (Dairy, Veterinary)	<input type="checkbox"/> Suppliers themselves	<input type="checkbox"/> Suppliers associations
<input type="checkbox"/> Others, specify	<input type="checkbox"/> I do not know	

6. Does the respective standards and regulations address the dairy feed quality and enforcement? <input type="checkbox"/> Yes <input type="checkbox"/> No

If Yes, what could be the other areas for improvement/gaps?		
<input type="checkbox"/> Governance	<input type="checkbox"/> Institutional	<input type="checkbox"/> I do not know
<input type="checkbox"/> Others, specify		
If No, what are the gaps/area(s) of improvement?		
<input type="checkbox"/> Governance	<input type="checkbox"/> Institutional	<input type="checkbox"/> I do not know
<input type="checkbox"/> Others, specify		
7. Do you think the respective standards and regulations to ensure quality animal feeds are being implemented and enforced? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, how?		
If no, what is currently hindering effective monitoring?		
<input type="checkbox"/> Inadequate policies	<input type="checkbox"/> Inadequate personnel	<input type="checkbox"/> Corruption
<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify		
8. Do you think the respective standards and regulations to ensure quality animal genetic resource provision are being implemented and enforced? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, how?		
If no, what is currently hindering effective monitoring?		
<input type="checkbox"/> Inadequate policies	<input type="checkbox"/> Inadequate personnel	<input type="checkbox"/> Corruption
<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify		
9. Do you think the respective standards and regulations that ensures quality veterinary service provision are being implemented and enforced? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, how/ If no, what is currently hindering effective monitoring?		
<input type="checkbox"/> Inadequate policies	<input type="checkbox"/> Inadequate personnel	<input type="checkbox"/> Corruption
<input type="checkbox"/> I do not know		
<input type="checkbox"/> Others, specify		
10. Are people being held accountable for noncompliance with standards? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, how/ what do you see as actual repercussions being practised/metted out?		
<input type="checkbox"/> Charges in court	<input type="checkbox"/> Imprisonment	<input type="checkbox"/> I do not know
<input type="checkbox"/> Paying fines	<input type="checkbox"/> Others, specify	
If no, what is currently hindering effective implementation and monitoring?		
<input type="checkbox"/> Inadequate policies	<input type="checkbox"/> Inadequate personnel	<input type="checkbox"/> Corruption
<input type="checkbox"/> I do not know	<input type="checkbox"/> Others, specify	
11. Do you think the regulators and technicians are supporting or inhibiting the mplementation of existing regulations and standards? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If supporting, how are they doing this?	<input type="checkbox"/> Continuous monitoring <input type="checkbox"/> Making arrests	<input type="checkbox"/> I do not know
<input type="checkbox"/> Others, specify		
If inhibiting, how are they doing this?	<input type="checkbox"/> Inadequate monitoring <input type="checkbox"/> Corruption	<input type="checkbox"/> I do not know

<input type="checkbox"/> Others, specify

12. Do you think the roles of regulators/technicians have an impact in terms of support or constraint to effective inputs and services supply within the Kenyan dairy sector? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, how			
If no, how			
13. What is the role of private and public stakeholders at the national and county levels in enhancing compliance with standards along the input and service supply chain?			
<input type="checkbox"/> Continuous monitoring for compliance		<input type="checkbox"/> Making arrests and charges in court	
<input type="checkbox"/> Making policies and laws		<input type="checkbox"/> I do not know	
<input type="checkbox"/> Other, specify			
14. What do you think can be done to enhance coordination of the dairy input and services supply chain in a way that promotes/maintains quality standards?			
<input type="checkbox"/> Development of farmers dairy hub		<input type="checkbox"/> Improved monitoring skills & techniques	
<input type="checkbox"/> Chain-wide quality assurance system			
<input type="checkbox"/> Continuous and frequent monitoring		<input type="checkbox"/> I do not know	
Others, specify			
15. What is your level of satisfaction on the current situation concerning enforcement for quality animal feeds within the dairy sector? WHY			
<input type="checkbox"/> Very satisfying	<input type="checkbox"/> Satisfying	<input type="checkbox"/> Not satisfying	<input type="checkbox"/> Highly Dissatisfied
<input type="checkbox"/> I do not know	<input type="checkbox"/> No response	<input type="checkbox"/> Others, specify	
16. How do you perceive the quality of animal feed resource provision versus the cost implications?			
<input type="checkbox"/> High costs with high quality feed		<input type="checkbox"/> Low costs with low quality feed	
<input type="checkbox"/> High costs with low quality feed			
<input type="checkbox"/> Low costs with high quality feed		<input type="checkbox"/> I do not know	
<input type="checkbox"/> Others, specify			
Why?			
17. What is your level of satisfaction on the current situation concerning enforcement for quality genetic resources within the dairy sector?			
<input type="checkbox"/> Very satisfying	<input type="checkbox"/> Satisfying	<input type="checkbox"/> Not satisfying	<input type="checkbox"/> Highly Dissatisfied
<input type="checkbox"/> I do not know	<input type="checkbox"/> No response	<input type="checkbox"/> Others, specify	
18. How do you perceive the quality of genetic resource provision (semen/stock, local/imported) versus the cost implications?			
<input type="checkbox"/> High costs with high quality services		<input type="checkbox"/> Low costs with low quality services	
<input type="checkbox"/> High costs with low quality services			
<input type="checkbox"/> Low costs with high quality services		<input type="checkbox"/> I do not know	
<input type="checkbox"/> Others, specify			
Why?			

19. What is your level of satisfaction on the current situation concerning enforcement for quality veterinary services?			
<input type="checkbox"/> Very satisfying	<input type="checkbox"/> Satisfying	<input type="checkbox"/> Not satisfying	<input type="checkbox"/> Highly Dissatisfied
<input type="checkbox"/> I do not know	<input type="checkbox"/> No response	<input type="checkbox"/> Others, specify	
20. How do you perceive the quality of veterinary service provision versus the cost implications?			
<input type="checkbox"/> High costs with high quality services		<input type="checkbox"/> Low costs with low quality services	
<input type="checkbox"/> High costs with low quality services		<input type="checkbox"/> I do not know	
<input type="checkbox"/> Low costs with high quality services			
<input type="checkbox"/> Others, specify			
Why?			

Do you think farmers are accessing/getting high quality dairy input products/services?
 If yes, how do they ensure its of high/right quality?
 If no, what is could be hampering this access

21. How can you rate the reforms/changes to enhance regulation in the dairy input and service delivery chain?		
<input type="checkbox"/> Excellent	<input type="checkbox"/> Very good	<input type="checkbox"/> Good
<input type="checkbox"/> Average	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
22. Do you feel motivated in ensuring the quality of dairy inputs are maintained? <input type="checkbox"/>		
] Yes <input type="checkbox"/> No <input type="checkbox"/>		
If Yes, how/why do you feel motivated?		
<input type="checkbox"/>		<input type="checkbox"/> I do not know
<input type="checkbox"/>		
<input type="checkbox"/>		
If No, Why are you not motivated?		
<input type="checkbox"/>		

What do you think would motivate /continue to motivate the other actors in maintaining/improving the quality standards of these inputs?
 (Awareness creation/capacity building/allowances)

Regulators.....

Suppliers.....

Farmers.....

Others

Do you think the dairy value chain is coordinated in ensuring compliance in maintaining the quality of dairy inputs (animal feeds, genetic resources, veterinary services? Yes No

If Yes, how.....

If No, what is hindering effective coordination.....

Other comments.....

Thank you for your time