



“The Role of Extension in Dairy Production and Marketing” under the European Union (EU) funded Transforming Zimbabwe’s Dairy Value Chain (TranZDVC) project (2019-2022)

Policy Research Report

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By

Kingstone Mujeyi and Knowledge Mutodi

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Executive Summary

The European Union (EU) funded Zimbabwe Agricultural Growth Programme (ZAGP) has a Transforming Zimbabwe's Dairy Value Chain (TranZDVC) project that is being implemented by a consortium consisting of the Zimbabwe Farmers Union (ZFU), We Effect, Zimbabwe Dairy Industry Trust (ZIDIT) and Zimbabwe Association of Dairy Farmers (ZADF) in 31 districts. The TranZDVC project is aimed at contributing to the transformation of the dairy sector through addressing the dairy value chain challenges. This policy research study on the role of extension in dairy production and marketing was undertaken on behalf of the ZFU and its partners in the EU-funded TranZDVC Project. It employed a mixed methods approach and reviewed policies, programmes and practices to understand the role that extension and advisory services can play in improving smallholder dairy production and marketing. The study found that agricultural extension and advisory services have generally been changing in response to constraints faced by government extension workers as well as responding to the ever-growing challenges of low productivity faced by smallholder farmers. However, the general consensus from study participants, which was also confirmed in literature, is that there is limited extension support for the dairy value chain, particularly in terms of specialized extension services. The major reason highlighted was that the current agricultural education curriculum lacks specialization courses and programs at lower levels of tertiary learning such as certificate and diploma levels. Despite the growing demand for specialized extension services, the calibre of extension workers available in proximity to the dairy farmers are not specialized in the field and tend to have biases towards general crop and livestock production aspects. The study also found that linkages between research, extension and the smallholder dairy farmers are either very weak or non-existent owing to lack of properly structured mechanisms for fostering the linkages. The study found lack of pronounced structures and approaches for disseminating available research findings from researchers to extension agents and eventually to farmers. As a result, research results and technologies generated from the research institutions are not being effectively disseminated to the farmers to have the desired impact. Most of the extension-related challenges currently being faced in the value chain are predominantly as a result of limited funding. The allocation of agricultural budget to extension leaves a lot to be desired. The proportion of the total agricultural budget allocated to extension continues to decline (from 15% in 2013 to 2% in 2017) despite the GoZ performing well in terms of national budget allocation to agriculture (at least 10%) in line with the Maputo and Malabo Declarations.

The dairy industry is faced with a number of challenges, including low productivity, high cost of production and low producer prices. Extension services, therefore, play a crucial role in resolving some of these constraints through provision of technical advice in production and marketing to help farmers eliminate inefficiencies along the value chain. Nevertheless, agricultural extension services in Zimbabwe face a plethora of challenges such as limited resources to enable them to become more effective and responsive to needs of smallholder dairy farmers. The study's findings show that extension has evolved from dominantly being provided by the government using a transfer of technology (ToT) model, then the training and visit system to participatory pluralistic and integrated extension approaches such as the agricultural innovation systems (AIS).

Information and communication technologies (ICT) based agricultural extension approaches are also being introduced in the country, with the recent launch of a new curriculum for agriculture colleges aimed at supporting 'the development of the country's agriculture sector and its related

industries to be able to produce for profit, including addressing poverty, managing food and nutrition security and natural resources' (MLAFWRR, 2020a). For the dairy value chain, extension is important for capacitating farmers to employ modern technologies, practices and innovations (e.g. fodder production and value addition to cut on feed costs) and linking them to financial service providers and inputs as well as output markets along the dairy value chain in order to meet varying market demands. One of the key findings of this policy research study is that the role extension is still principally production-oriented, with weak/limited linkages to markets. The research study therefore recommends for enhanced capacitation of extension service providers linked to the dairy value chain with skills and equipment in order to strengthen their capacities to effectively discharge their duties. Adequate capacitation will go a long way in enhancing the productive and economic efficiencies along the dairy value chain by fostering critical backward and forward linkages among the various chain actors and functions. Specifically, the study advocates for specialised training programmes and short courses targeted at selected farmers, agriculture students and extension personnel to equip them with in-depth knowledge and information in an evolving industry. There is huge scope for private sector-driven extension service delivery system aimed at ensuring consistent milk supply, whereby private milk processing companies put in place extension programs that help the farmers to overcome the many challenges inherent in smallholder milk production. The ideal situation would be for each milk collection centre (MCC) to have a resident full-time specialized extension officer to provide technical support to the farmers.

Abbreviations

AGRITEX	Department of Agricultural, Technical and Extension Services
AIS	Agricultural Innovation System
DVC	Dairy Value Chain
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FDG	Focus group Discussion
FFS	Farmer Field Schools
FSR	Farming Systems Research
GoZ	Government of Zimbabwe
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ILRI	International Livestock Research Institute
KII	Key Informant Interview
MCCs	Milk Collection Centers
DDP	Dairy Development Programme
DDP	Dairy Development Program
NORAD	Norwegian Agency for Development
DANIDA	Danish International Development Agency
HP	Heifer Project International
PSIP	Public Sector Investment Program
DMB	Dairy Marketing Board
SNV	Netherlands Development Organisation
ESAP	Economic Structural Adjustment Programme
WB	World Bank (WB)
IMF	International Monetary Fund
MLAFWRD	Ministry of Lands, Agriculture, Fisheries, water and Rural Development
NGO	Non-Governmental Organization
R&D	Research and Development
T&V	Training and Visit
TOR	Terms of Reference
TranZDVC	Transforming Zimbabwe's Dairy Value Chain
ZADF	Zimbabwe Association of Dairy Farmers
ZFU	Zimbabwe Farmers Union
ZIDIT	Zimbabwe Dairy Industry Trust

1 Introduction and background

The growing milk market and demand of its related products has been an inducement for smallholder farmers to participate in the dairy value chain. However, milk intake from smallholder farmers is still elusive at 5% of the annual milk intake (TranZDVC, 2019). Washaya and Chifamba (2018) identified several factors that limit optimum milk production in smallholder dairy farming, among which, weak extension support and lack of farmer involvement in production planning are key. The degree to which these challenges affect smallholder dairy farmers is not clear. Notwithstanding that several reasons have been identified to limit optimum milk production among smallholder farmers, weak extension support has been singled out as among the main drivers of the challenges smallholder dairy farmers are facing. University of Greenwich (2012) indicated that agricultural extension economic impact studies have also revealed that specialized extension service is key in improving farm productivity and profits. Farmers and other actors in the dairy value chain need specialized information and advice about production, post-harvest, processing, marketing, management, finances and business strategy. Thus, value chain approach for modern extension is key as it can be used for inclusion of vulnerable farmers who are seeking basic market linkages with a local informal buyer up to sophisticated value chain players seeking penetration into export markets.

It is against this background that a consortium consisting of the Zimbabwe Farmers Union (ZFU), We Effect, Zimbabwe Dairy Industry Trust (ZIDIT) and Zimbabwe Association of Dairy Farmers (ZADF) commissioned a European Union funded project titled Transforming Zimbabwe's Dairy Value Chain (TranZ DVC) in 31 districts. Transforming Zimbabwe's Dairy Value Chain (TranZDVC) project's focus is to transform the dairy sector through addressing the dairy value chain challenges. The project's main objective is to address underperformance root causes in the Dairy Value Chain (DVC) in Zimbabwe through strengthening the linkages between production, processing and financing. The project seeks to increase the DVC's economic, social and environmental performances and to influence policies in the value chain. However, the overall objective of this project is to contribute to the development of a diversified and efficient agriculture sector that promotes inclusive green economic growth which will strengthen understanding and regular measurement of DVC performance and enable core DVC actors, improve their performance through scaling up activities. Many reasons have, however, been identified and among them is weak extension support as aforementioned. Weak extension support has been pointed out to be among root causes of challenges being faced by the dairy farmers. Therefore, this report is a product of policy research on "The Role of Extension in Dairy Production and Marketing" under the EU funded TranZDVC conducted on behalf of the ZFU and its partners to provide a clear road map and guidance for execution of the assignment on exploring and identifying gaps in extension service in smallholder dairy farming in Zimbabwe.

The main purpose of this policy research was therefore to investigate "The role of Extension in Dairy Production and Marketing" for the EU funded Transforming Zimbabwe's Dairy Value Chain (TranZDVC). Specifically, the research objectives were as to:

- a. Map out the public and private extension service providers in the dairy value chain.
- b. Analyse the demand for and supply of specialised dairy extension services in Zimbabwe, focusing on but not limited to extension officer to farmer ratio, number of farm visits by extension officers per given time period and quality of services provided.

- c. Determine the adequacy, relevance, appropriateness and effectiveness of the college and in-service extension training curriculum for specialised dairy production and marketing.
- d. Analyse the research-extension-farmer linkages in smallholder dairy production and marketing.
- e. Analyse adequacy of national budget allocations for and impact on extension services in the smallholder dairy sector.
- f. Identify policy gaps and recommend policy interventions to improve specialised extension service provision in the smallholder dairy sector.
- g. Give recommendations on other key matters arising from the research.

2 The role of extension in agriculture value chain development

Agricultural extension relays information and new technologies to farming households for adoption to enable them to improve their productivity, incomes and livelihoods. It provides a channel through which problems encountered by farming communities are identified for research and the reformation of agricultural policies. The increasing quest for liberalization, commercialisation, intensification and modernisation of agriculture has brought about significant changes in agricultural extension delivery systems across the globe. According to Sulleiman and Davis (2012), there still exists a knowledge with regards to the role that extension and advisory services should play within the agricultural innovation system (AIS). Instead of the public extension delivery systems remaining the sole service provider, the extension landscapes of several African countries have undergone massive reconfiguration, becoming more pluralistic in approach, with increasing role and participation of the private sector (agribusinesses dealing with agro-inputs, mechanisation, financial services, etc.), international and local non-governmental organisations (NGOs); producer cooperatives and associations; and ICT-based services (Ibid).

2.1 Agricultural extension service models in African countries.

Most extension models exhibit common characteristics such as relying on mass communication methods, addressing farmers without restrictions, facilitating extension agent-farmer linkage, fostering farmers-to-farmer extension, etc. There are six basic extension models in various stages of development and implementation in the developing world. Instead of trying to identify the “best fit” extension model for a particular country, the reality is that pluralism of models is being used in most countries in Africa (Eicher, 2007). These are the national public extension model; the commodity extension and research model; the Training and Visit (T&V) extension model; the NGO extension model; the private extension model and the Farmer Field School (FFS) approach. In cases where more than one agency or institution is involved in extension service delivery, the system is said to be *pluralistic* in approach (Davis and Terblanche, 2016). A schematic presentation of the pluralistic agricultural extension delivery approach is presented in Fig 1. Taye (2013) contends that “agricultural extension has undergone a paradigm shift, from the transfer of technology (ToT) approaches to innovation systems approaches, which perceive the agricultural development process as complex and dynamic and with institutional pluralism against the conventional linear and unidirectional approaches”. As noted by Davis and Terblanche (2016),

there is a need for the development of location-specific extension delivery approaches since a ‘one-size-fits-all’ approach will not work in all situations and for all purposes. Thus, a ‘best-fit approach is one that embraces both the pluralism of contemporary extension delivery approaches and the diversity inherent within agricultural innovation systems of a country, region, sector or value chain.



Figure 1: Extension approaches: Source: Adapted from Nkonya (2009)

2.1.1 The pluralistic agricultural extension policy

According to Eicher (2007), virtually all developing countries now have a mixture of public, NGO and private sector (seed, fertilizer, agrochemical and mechanisation dealers) players delivering agricultural extension support to smallholders. Countries that are more dependent on donor aid like Malawi have a more pronounced role for NGO-led extension delivery systems than less donor-dependent countries like South Africa. However, in terms of coverage, government departments and parastatals continue to be the dominant extension service delivery institutions in many African countries. These are often vertically oriented and hierarchically organised in the way they operate. The increasing role of other non-state actors in agricultural extension delivery has progressively become important and largely been prompted by the failure of many African countries to sustain public extension service due to resource and budget constraints. Agricultural extension service delivery encompasses a wide range of supportive activities and programs that are made available to a farmer, including trainings, technology transfer, and market linkage. These programs constitute the most effective way to strengthen the entrepreneurial, social, and ecological capacities of the farmers to enable them to successfully engage in productive and livelihood activities (Magoro and Hlungwane, 2014). In most African countries, such programs have historically been government-led and mostly underfunded, resulting in them not being as effective

throughout much of the sub-continent as they have been in other regions like Asia and Latin America. Eicher (2007) noted that while massive reforms in agricultural extension delivery systems were taking place in Asia and Latin America during the early 2000s, the same cannot be said for Africa, where reforms have been slow and less pronounced. However, Davis and Terblanche (2016) argue that although numerous extension-specific policies have been formulated in many African countries, the problem has been in developing good extension policies which remain only on paper and are not implemented due to lack of political will or lack of resources and capacity to do so (Taye, 2013).

2.1.2 Public agricultural extension approaches

Not many decades ago, the design and implementation of the agricultural extension delivery system in most African countries was very much public sector-driven and narrow in scope. This model focused on disseminating research findings and information on best practices to the masses in supporting the transfer of technology. Within the public extension service delivery system, the role played by the central government is pivotal in shaping extension delivery processes in line with national development goals such as poverty reduction, sustainable agriculture, and natural resource management (Mbo'o-Tchouawou and Colverson, 2014). Overall, exclusively relying on the public sector approach to providing agricultural extension services remains highly debatable, particularly for many developing countries, including Zimbabwe, that are characterized by limited public spending on agricultural support services and persistent weaknesses in sector governance mechanisms as well as ineffective agricultural management information systems (Eicher, 2007). The government-led extension service delivery system has continued to suffer due to a number of shortcomings caused mainly by the bureaucratic tendencies and inefficiencies endemic in most government systems. Magoro and Hlungwane (2013) noted that instead of consulting and involving farmers about their problems and needs, public extension agents tend to decide for the farmers based on what they think is best for them. The extension agents end up acting as 'advisors, policemen, and arbiters about whether or not farmers should receive subsidies or other assistance'. This may lead to conflicts between extension agents and farmers and a lack of trust in the public extension system. Although these government-driven extension systems are still popular, they are increasingly changing in so many ways in terms of their approach, particularly with regards to embracing new forms of technology and emerging practices like climate-smart agriculture.

2.1.2.1 Training and Visit Model

Most public agricultural extension approaches used by many African countries have mainly built on the T&V model developed and promoted by the World Bank many years ago. The model, which mainly applies a top-down extension delivery approach, became particularly valuable during the Green Revolution era for disseminating improved varieties (Nyambi, 2012). It was designed for capacitating extension agents with technical skills deemed ideal for passing on to farmers using such methods as on-farm demonstrations, field days and hands-on practical exercises (Eicher, 2007). Although the T&V approach was hailed for having achieved some positive results in a relatively short period of time, it can be argued that in the long run, it has not proven to be effective and sustainable due to its rigidity, top-down orientation, high operational costs and limited funding. Taye (2013) reports that while the T&V extension model was evaluated by Purcell and Anderson (1997) to have registered satisfactory results (high and significant rate of returns to extension support) in Kenya, the same could not be established for Rwanda, where the results were

generally unsatisfactory. While the T&V model has been more successful in Asia, its main criticism in Africa emanates from its expensive and bureaucratic nature and failure to integrate farmers in identifying problems and developing solutions (Nyambi, 2012). This passive role allocated to the farmers, coupled with the failure to factor in farmer- and country-specific socio-economic and institutional contexts contributed to its failure (Birner et al., 2009).

2.1.3 Private sector-driven extension

The prevalence of contract farming as a preferred avenue for the promotion of increased participation of private-sector in primary agriculture has led to the prominence of commodity-specific extension service delivery concept. This is a model of an agricultural extension where service delivery takes a very narrow focus to provide specialised services to producers of a particular commodity. While methods of service delivery may take any form, the focus remains narrow to the commodity in question.

2.1.3.1 The commodity-specific extension model

The emerging concept of ‘strategic’ or ‘priority’ value chains has resulted in several specialised extension initiatives being developed, which are aimed at increasing farmer productivity. The commodity-based extension approach has become common with the advent of contract farming and out-grower production models, where there have been increasing levels of private sector participation in agricultural production. A good example is that of the Kenyan dairy giant Brookside, a private manufacturing firm that has put emphasis on extension services. Olawale (2017) reports that the company has a 44 percent dairy market share in Kenya and growing export markets in East Africa and beyond. It has managed to contract over 160,000 dairy farmers for consistent milk supply by putting in place extension programs that help the farmers to overcome the many challenges inherent in smallholder milk production. One such program entails conducting regular field days, where the farmers are trained on good husbandry practices and updated on new developments in the industry. The farmers are regularly updated on new production technologies like artificial insemination services, high-quality drugs, and feeds and optimal feeding practices. The company provides a team of specialised dairy personnel to train, motivate and work with the contracted farmers. This extension system has been sustainable because the farmers are charged a small levy on credit, which gets deducted upon delivery of their milk to the company. This thriving specialised extension delivery system has witnessed dairy production in Kenya growing more significantly over the years.

2.1.4 Participatory Approaches

The failure of the top-down agricultural extension approaches like the T&V and Master Farmer Training often resulted in low rates of technology adoption and unsatisfactory extension service delivery across many African countries (Taye, 2013). The low utility derived from these approaches necessitated a paradigm shift towards participatory approaches to agricultural extension services delivery during the 1980s. Participatory approaches emphasize more on farmers’ ownership of the learning process than the teaching and passive transfer of technology approach emphasized under the top-down approaches. Essentially, elements of the participatory model include gender-sensitive extension, participatory farmer group extension, and client-oriented extension approaches as well as research-extension-farmer linkages that employ participatory tools such as the participatory rural appraisal (PRA). The essence of participatory approaches is to encourage interactive participation and involvement of the targeted beneficiaries

in decision-making at all stages of the project or program to ensure project or program effectiveness and sustainability. Participatory approaches enable the farmers to actively participate in the identification and analysis of their problems and contextual settings. Sharing their knowledge and experiences enhances their understanding of local phenomena and conditions, thereby enabling them to devise solutions, plan and act against adverse conditions. Participatory interaction between research and extension agents as technocrats on one side, and farmers as beneficiaries on the other, narrow the gap between the two professions and leads to enhanced consensus on the direction for change, making development more sustainable (Worth, 2006). The most common participatory approaches that have predominantly been used in extension service delivery are the farming systems research (FSR) and the farmer field schools (FFS). These participatory methods entail group formation by farmers for efficient delivery of extension services through enhanced extension outreach and enablement of farmer-to-farmer extension. In groups and through participatory approaches, the farmers can easily develop action plans for collaborative implementation and close monitoring with assistance from the government, development, NGO, and CBO agents. These participatory approaches have been found to be successful in enhancing access to and adoption of technology by farmers (Nyambi, 2012).

2.1.4.1 Farmer Field Schools

Farmer field schools were introduced into sub-Saharan Africa in the mid-1990s. The FFS model is a community learning model that has been adopted in several countries over the past four decades. Although many positive reports exist on the benefits of the FFS approach, some studies have questioned their overall impact and financial sustainability (Davis, 2008). For instance, Davis et al. (2010) found the FFS extension programme implemented in the East African region to produce mixed results. Although it generated significant change in Kenya and Tanzania in terms of farm productivity and income, its impact evaluation using similar variables in Uganda revealed that there was no significant change brought about by the programme. The rapid spread of the FFS extension model has encouraged donors and NGOs to put agricultural extension back on the agricultural development agenda. However, critics argue that the model will not be financially sustainable in Africa after foreign aid and external funding is withdrawn (Eicher, 2007).

2.1.5 The agricultural innovation systems perspective

There has gradually been a paradigm shift in the agricultural development discourse, where the extension delivery system is moving away from the conventional linear models of technology transfer to a more complex innovation systems perspective. Thus, the agricultural innovation systems (AIS) framework has taken root and gained prominence as a conceptual model in both scholarly literature and development work. It is important to note that the innovation systems perspective of agricultural extension assumes a delivery system where the new cadre of extension professionals or agents being moulded assumes responsibilities that transcend beyond providing technical information to farmers. According to Davis and Terblance (2016), the extension agents need to have 'soft functional skills that enable them to generate and promote innovations, improve the management of farmer organisations and agribusinesses, and build alliances and networks of different groups and individuals along the value chain'. Within this model of extension services delivery embedded in the agricultural innovation system, capacity will be required at three levels - individual, organisational, and system (Sulaiman and Davis, 2012). The AIS framework entails interaction among all actors in the system working together to bring about agricultural innovation under a set of enabling policy and institutional frameworks governing their interactions. Thus,

trying to embark on this approach while at the same time having to deal with the growing challenges of agricultural and rural development implies the need for new capacities and roles for the extension delivery system (Sulaiman and Davis, 2014). That would mean intensive in-service training and education programmes to enable extension personnel to perform new duties and responsibilities related to the new AIS perspective.

2.2 Selected African Country experiences on agricultural extension policies and practices

2.2.1 Agricultural extension in Kenya

The agricultural extension system of Kenya was anchored on the T&V approach for almost two decades lasting until 1998, which had been introduced and supported by the World Bank since 1982 (World Bank, 1999). However, efforts have been made over the years to reform the extension system in Kenya. The country now has a comprehensive stand-alone national agricultural sector extension policy that recognises extension service delivery as one of the key change agents needed for the transformation of subsistence farming into modern and commercial agriculture to ensure attainment of food security, improvement in incomes and reduction of poverty (GoK, 2012). However, Chimoita (2014) notes that the country's agricultural extension delivery system is characterized by a multiplicity of players, with each of the extension service providers having its own peculiar challenges. The major service providers include the public service under the Ministry of Agriculture, the private sector under various cash crop programmes, NGOs and farm inputs supply companies. Coordination among these various actors is poor with each actor driven by its own interests and motives, which may sometimes be conflicting. A study by Muyanga and Jayne (2006) found private extension provision to be generally skewed towards high potential regions and high-value crops (such as coffee, tea, pyrethrum and sisal) and livestock (especially dairy) value chains. They recommend for the resource-constrained public extension to desist from duplicating efforts in areas that are already being efficiently and sustainably served by private and non-profit agents.

Mbo'o-Tchouawou and Colverson (2014) observe that although a wide range of traditional and reformed agricultural extension and advisory service delivery systems have been tried in Kenya, very little has been achieved in terms of systematic consideration of the gender perspective. Very few strategies have been designed and implemented, while policy discourses on agricultural extension delivery have not fully concentrated on addressing the needs of the country's rural population from a gender perspective. They advocate for innovative extension models that focus on best-fit gender approaches to provide opportunities to groups with specific needs and priorities.

2.2.2 Malawi agricultural extension system

Rural populations in Malawi often lack reliable and accessible information sources that can help increase their agricultural productivity (Steinfeld et al., 2015). The country has a well-written agricultural extension policy whose objective is to assist farmers in achieving and maintaining self-sufficiency in food production and income generation through the promotion of technologies proven to improve productivity (GoM, 2016; 2000). The key features of the Malawian agricultural

extension policy are: pluralistic in approach; demand-driven extension services, accountability, users pay principle (service at cost), and equalization (inclusion of marginalized and vulnerable groups). The department of agricultural extension services under the Ministry of Agriculture, Irrigation and Water Development is the one mandated with the provision of holistic and demand-driven agricultural extension services (GoM, 2016). Other extension service providers include civil society organizations, non-governmental organizations, private sector and farmer organizations. It is generally acknowledged that extension service delivery has mainly been conducted in a top-down manner, where major decisions have been made centrally at the top level of government. This has recently been changing towards a more participatory and pluralistic approach to agricultural extension service delivery as nuanced in the national extension policy (GoM, 2000).

Regasa and Chiu (2017) found that agricultural extension development officers in Malawi, who are basically government extension workers, continue to play a big role in the provision of extension advice, implying that the public extension remains the dominant service delivery system relied upon by 66 percent of farmers in the country. Their study reveals that the farmer-to-farmer extension pathway is still the major source of awareness of technologies while community group meetings are the major pathway for disseminating information on agricultural technologies, followed by radio, face-to-face visits, and short-term training done within small groups of farmers. Chapota, Fatch and Mthinda (2014) as well as Steinfield et al. (2015) found the radio to be the most used communication channel for rural Malawians for accessing agricultural extension and advisory services. With more than 30 radio stations run by both government and NGOs, there is a significantly wide range of reach. Both public and private radio stations offer agriculture-related programs commonly sponsored by the government, NGOs or donor agencies (Chapota, Fatch & Mthinda, 2014). Steinfield et al. (2015) found that around 75 percent of radio stations broadcast farming-related programs. Disappointingly, only 42 percent of the surveyed rural farming households had access to radio in 2014.

2.2.3 Rwanda agricultural extension system

The widely accepted notion that agricultural extension services should be delivered through a pluralistic system that includes the public and private sectors, as well as international and local NGOs, fits well into the Government of Rwanda's new agricultural extension strategy. These national stakeholders are actively involved in providing extension advisory services in Rwanda to all categories of farmers across all the farming areas. Besides the dominant public sector-driven agricultural extension delivery system, there are other common approaches used in Rwanda.

The voluntary lead farmer extension approach relies on a system of identified progressive farmers providing voluntary agricultural extension and advisory services to their colleagues. The voluntary service provider is farmers identified to be innovative people, possessing good interpersonal and communication skills and living harmoniously with their neighbours, who agree to work on a voluntary basis. Their motivation for work comes from incentives to participate in trainings, study tours, and token awards handed to them during agricultural events and competitions (GoR, 2009). Each voluntary extension service provider is tasked with the responsibility to assist at least five farming households in their own neighbourhood.

There are also NGO-led extension service provision programmes, which train and supervise farmers through their organisations and/or commodity associations. The farmer groups are trained

in different technical aspects of agriculture as well as various other organisational activities. The training modules, which cover both theoretical and practical aspects of farming, are delivered to groups of 20 to 25 farmers. After completing the training, the trained farmers are expected to become lead farmers who identify more farmers in their respective villages and organise them into new groups to be trained. The snow-ball effect helps with reaching as many farmers as possible with extension education.

Similar to the NGO-led extension approach is the commodity chain development approach, which is normally used by different private sector companies and development partners in promoting specialization on particular commodities (e.g. coffee, tea, pyrethrum and quinquina). Extension services are provided starting from inputs supply through production to the marketing of the final processed product. This approach has the advantage that it tends to organize the producers into groups that have the potential to replicate and replace public extension services for certain tasks within their specific commodity chains.

2.2.4 Agricultural extension in South Africa

South Africa's agricultural sector is characterised by a dualistic structure comprised of white-dominated large-scale commercial farming on one hand and a smallholder sub-sector made up of former reserves and homeland areas on the other. The extension delivery system during the apartheid era offered two parallel services – one to the large scale commercial sub-sector and another to the smallholder sub-sector in the self-governing territories (Liebenberg, 2015). With the attainment of independence in 1994, the South African Government revamped the agricultural extension system, which had previously emphasized the conventional transfer of technology (ToT) approach and was highly skewed in favour of large-scale commercial agriculture. However, there has been a paradigm shift from the ToT model to a holistic model where research, extension and farmers work together in partnership to generate solutions for the farmers' problems. The new integrated extension system promotes a participatory and pluralistic approach to extension delivery, where the extension worker plays a facilitator's role unlike in the conventional top-down ToT model, where a rigid hierarchy is created which discourages feedback from the technology recipients (Williams et al., 2008). It is argued by Koch and Terblanche (2013) that although the extension service delivery system and service conditions in South Africa have changed in many aspects, the basic principle of "helping people to help themselves" has remained unchanged. Furthermore, the system is still largely top-down in its approach and dominated by the state through the ministry of agriculture (Magoro and Hlungwane, 2014).

The shortage of skilled manpower is considered as one of the major reasons for the poor performance of the agricultural extension delivery system in South Africa (Davis and Terblanche, 2016). Skills are therefore increasingly becoming the 'missing link' in the country's quest for rural transformation and development. The National Extension and Advisory Service Policy of South Africa seek to guide agricultural development through the provision of extension and advisory services (Liebenberg, 2015). The new policy thrust has adopted a multidisciplinary approach to capacity development for extension professionals as a way of improving service delivery to farmers.

3 Policy Research Methodology

This policy research study is a product of extensive document review, focus group discussions (FDGs) conducted in Mashonaland East Province in August 2021 and key informant interviews (KIIs). Extensive desk review of relevant literature related to dairy farming in Zimbabwe and international experience, TranZDVC project documents, NGO dairy reports, Farmer Organization dairy reports, Commodity Association reports was conducted. Key informant interview (KII) and FGD interview guides were developed taking into account variables of interest as outlined in the ToRs. Both the KII and the FGD guides comprised of two main sections i.e. administrative data section and a section on collection of information pertaining to the role of extension in dairy production and marketing. The consultant, ZFU and TranZDVC consortia partners validated the research instruments in the inception meeting.

A total of 4 Focus Group Discussions (FGDs) were conducted with smallholder dairy farmers around four selected Milk Collection Centres (MCCs) in the Mashonaland East Province (Nharira MCC (Chikomba), Marirangwe MCC (Seke), Watershed MCC (Wedza), and Agroprosperity MCC (Marondera)). Each FGD was facilitated using the local language. During FGDs, note-taking and voice recording was done. FGD participants were purposively selected from each MCC. Each FGD had not more than 20 participants to ensure compliance with Covid-19 regulations regarding social gatherings.



Fig 1: FGD in session and group photo at Nharira MCC

In addition, a total of 25 key informants were interviewed (see Appendix 3). Key informants were drawn from research (DR&SS, Henderson, Matopos Research Stations), agricultural education (Blackforby, Chibero, Gwebi and Kushinga Phekelela Agriculture Colleges, and University of Zimbabwe), extension (AGRITEX), NGOs (FINTRAC, ILRI, ICRISAT), private sector milk processors, farmer associations (ZFU, ZADF) and MCC leaderships. The purpose of the key informant interviews (KIIs) was to collect information on the role of extension in dairy production and marketing in Zimbabwe using a KII guides discussed and approved by ZFU. The purpose of the consultations was to document extension service experiences, issues, lessons learned and challenges in smallholder dairy production and marketing, particularly as they relate to extension service delivery. The insights helped to craft extension policies specifically for smallholder dairy farmers. The interview guide responses were recorded and hand written (verbatim) and then typed into word documents. All transcripts were thoroughly checked to ensure quality. The consultant conducted a final review where main themes and patterns were drawn. The transcripts were

examined using content analysis method. Summary of the main findings under each heading is presented in the results section of the report.

4 Results and key findings from the study

Key findings from the study are presented according to the study objectives as outlined in the terms of reference.

4.1 Extension service providers in the Zimbabwe dairy value chain.

According to information obtained from key informants, dairy farmers have traditionally relied on agricultural advice, support and information from specialized resident project officers at MCCs provided by the Dairy Development Programme (DDP) of the Agricultural and Rural Development Authority. However, due to diminishing of funding over the years, the DDP has failed to sustain the model resulting in most dairy farmers having to rely on short-term NGO project support for specialized dairy extension support services. This was confirmed by the dairy farmers during FGDs, where the issue of lack of specialized dairy extension officers came out prominently. The farmers now rely on ward based government extension officers through various departments such as AGRITEX, Department of Veterinary Services (DVS) and at one time the Division of Livestock Production and Development (LPD). Predominantly, it is the AGRITEX, which provides general extension services and train farmers in the use of new sustainable productivity enhancing technologies. The farmers complained that the AGRITEX and DVS officers lack specialized knowledge and skills in dairy production since they were trained in broader crop and livestock production without specialization. At one MCC, the farmers even claimed that majority of them were more knowledgeable and skilled in dairy issues than the ward extension worker whom they have to rely on for support. Allegations are that the extension officers have bias towards crop production to the extent that they dedicate more than 70% of their time on crop related matters, particularly the Pfumvudza Conservation Agriculture Program. The department uses a variety of extension approaches to serve farmers, including the Master Farmer training approach, commodity specific groups, demonstrations, field days, competitions, study tours and individual farm visits.

The current extension to farmer ratio for government extension is estimated at anything between 200 and 1,000 farmers depending on the commodity of interest, geographic area and farming sector. The most pronounced source of extension services to the farmers is through government extension agents from the AGRITEX for crops, LPD and DVS for livestock. Some key informants indicated that some of the extension staff are a product of the fast track training program of the early 2000s, who were not properly trained. As a result of this high Extension Agent (EA) to farmer ratio and poor mobility, some key informants contend that the current situation of the agricultural extension system in the country has suffered with most smallholder farmers in remote areas lacking adequate coverage. It was reported that there are an average of 2-3 extension agents in every rural ward while every one out in four EAs is female.

Although some EAs have extensive experience in local cropping and livestock systems, they are often insufficiently resourced to meet the demands of all farmers. As a result, many farmers often struggle to receive visits from government extension agents. The decline in donor and public funding may as well have affected government departments and parastatals such as DDP and LPD that used to play a critical role in the dairy sector (Matekenya, 2016).

The rapid transformation of the agrarian structure during the FTLRP era affected both the core actors and the support service providers in the dairy value chain. The service providers that were affected include the stock feed companies, the oil expressing companies, specialist companies, veterinary and pharmaceutical supply companies, dairy chemical supply companies, breeding companies, auctioneering companies, private veterinaries, and livestock consultants. The public extension service providers critical for the proper functioning of the dairy value chain were also not spared.

To remedy the public extension constraints, Zimbabwe has increasingly turned to pluralistic advisory service approaches, which integrate government extension officers with other forms of service providers, including NGO field based officers, private sector staff and lead farmers and expertise across the country. The new players integrate government extension service, through offering specialized information and advice about production, post-harvest, processing, marketing, management, finances, and business strategy. These non-public organizations play a role in influencing policy on research, pricing, extension, marketing, and financing. The impact to the dairy sector of these new other players in extension service is still not known and is subject to debate. However, the government still dominates the extension delivery service country-wide (ARC, 2002).

Both the public and private extension service providers play a critical role in the dairy value chain as they play a complementary role. The main public extension providers include Dairy Development Programme (DDP), Department of Agricultural, Technical and Extension Services (AGRITEX), Department of Research and Specialist Services (DR&SS), Department of Veterinary Services, Rural district councils, University of Zimbabwe, Zimbabwe Dairy Services Agency (ZDSA). The inadequate resources to reach out to farmers in these government departments and institutions have led to a decline in extension service provision by the public sector. Private extension service is now being used by producers and other value chain actors (Matekenya, 2016).

The main non-public extension service providers in the dairy value chain are the Commercial Farmers' Union (CFU), ZFU, ZADF, Zimbabwe Fertilizer Company Private Limited (ZFC), Zimbabwe Livestock Development program-USAID, and Heifer Project International. These organizations cooperate with other stakeholders in the dairy value chain and have a role in influencing policy on research, pricing, extension, marketing and financing.

Public and private extension service providers provide a direct link between the research community and farmers. Tables 1 and 2 present public and non-public organizations and their motive for providing extension services to farmers.

Table 1: Main public extension services providers in the dairy value chain.

Public extension service providers	Description of work
Dairy Development Programme (DDP)	Enhancing the development of a viable smallholder dairy sector
Department of Agricultural, Technical and Extension Services (AGRITEX)	Increasing agricultural productivity, while maintaining the sustainability of the agricultural production base.

Department of Research and Specialist Services (DR&SS) (Henderson Research Institute)	Improving the adoption of generated technologies. Mandate-driven
Department of Veterinary Services	Ensuring a disease-free livestock sector.
University of Zimbabwe	Training and research designed to increase the productivity, efficiency, viability and sustainability of agricultural enterprises. Outreach activities are part of community development initiatives and a strategic marketing technique.
Zimbabwe Dairy Service Agency (ZDSA)	Conducting dairy research and training of dairy stakeholders

Table 2: Main private extension services providers in the dairy value chain.

Private extension service providers	Motive for extension work
Commercial Farmers' Union	Boosting agricultural production and increasing productivity and efficiency in the large-scale commercial farming sector
Zimbabwe Farmers' Union	Providing technical and market information as a means of improving the welfare of smallholder farmers.
Zimbabwe Fertilizer Company Private Limited	Extension programmes are run for business motives: "investing in the extension programme in anticipation of a return".
USAID Zimbabwe Livestock Development Program	Supplies inputs efficiently and provide extension and training to growers as well.
Heifer Project International	Training and connecting farmers so they can pool knowledge and resources to become self-reliant environmental stewards
Zimbabwe Association of Dairy Farmers (ZADF)	Promote, advance and develop the production of milk and dairy products in Zimbabwe

4.2 Demand for and supply of specialised dairy extension services in Zimbabwe

Farmers indicated during FGDs that the current extension officers are mainly from AGRITEX and these offer them advise and capacity building trainings in crop production mainly. Indication were that market issues covered were emphasis on quality achievement with linkages to markets directed to very few suppliers i.e. through MCCs in the districts. There was no value addition/processing at the farmers household level particularly the small scale farmers and processing at the MCC was limited to only one product i.e. sour milk. Farmers felt they lack specialized dairy extension as the current AGRITEX (formerly LPD officers) were mainly knowledgeable in general aspects of crop and livestock production. They highlighted that what is needed are additional trainings on the part of the extension officers in terms of strengthening their marketing and business development skills to assist farmers with capacities for improved productivity and viability of dairy farming.

Some key informants indicated that there might be growing demand for specialized dairy production and marketing given the continued low milk productivity from farmers and in particular

the small scale farmers (old resettlement communal, A1) but there is however inadequate provision of dairy specialized extension both from government and private sector. Some farmers indicated during FGDs that they are now relying on researching on internet about dairy production and marketing from world renowned countries such as New Zealand and Canada. The problem is that the farmers then fail to customize and contextualize the knowledge to their local circumstances. This revelation points to the huge potential and scope for ICT-based extension.

Very few tertiary institutions like Blackforby and Kushinga Phekelela are offering short course trainings on dairy production and marketing to farmers. It would be very beneficial if all agriculture colleges given their even distribution offer dairy short courses to farmers at an affordable cost. Farmers indicated that they desired capacitation of lead farmers to become paravets through being offered specialized dairy short courses.

4.2.1 The study circle extension and learning approach

Key informants interviewed and FGDs conducted indicated that the challenge of lack of adequate resources to have extension agents and their advisory services accessible to the dairy farmers, the TranZDVC project has emphasized on the study circle extension and learning approach. The method, as a community-based farmer-to-farmer extension approach is being used by ZFU and its partners under the project. Farmers are grouped into small groups of up to seven members to focus on a particular subject at any given moment. Within the study circle, the farmers share, discuss and learn relevant information and experiences pertaining to dairy farming lessons learnt. The study circles entail sharing of extension and advisory services among farmers through creation of a community-based structure, where properly designed training materials are distributed for use by the farmers. Each group has a leader who help in interpreting the study material to the group participants and guiding the discussion. Whenever they visit, the extension agents then monitor progress in those groups and help tackle aspects considered difficult to understand by the group on its own. A group that proves to have grasped the study material is conferred with a certificate. However, indications during the FGDs were that the approach is less effective because the theory is not put into practice due to limited understanding and lack of confidence on the part of the farmers to work on their own without supervision from extension agents, particularly on the practical aspects. They suggested that the approach can be more effective if they are assisted to put the theory into practice through practical demonstrations.

The approach is criticized by some key informants for requiring dedicated members of the farming community to drive dissemination of information and technologies. Their argument is that the moment a study circle group fails to have a motivated member to drive the peer-learning process, the approach fails to yield the desired results. Since such individuals do not usually belong to a defined demographic group, it is critical for facilitators of the approach to identify and mobilize volunteer lead farmers to enhance the flow of technology and information. For other group members to commit themselves to effectively participate in the study circles, there is need for the volunteer lead farmer to have some basic training on how to manage a common interest group. The general view and belief is that farmers tend to respect and dedicate themselves to a cause when the training facilitator has some form of certificate. Thus, ZFU and its partners should consider identifying local facilitators for short trainings and certification. In terms of motivation, they can be provided with tokens of appreciation like bicycles, branded regalia, etc.

4.3 Appropriateness of extension training curriculum

In terms of adequacy, relevance, appropriateness and effectiveness of the college and in-service extension training curriculum for specialised dairy production and marketing, key informants at institutions of higher learning such as agriculture colleges have indicated that they have teaching and learning modules that cover dairy production and marketing issues. However, they concur that there is general lack of specialized dairy extension training programmes in these tertiary institutions of higher learning. Some level of specialization begin at postgraduate level. For example, at the University of Zimbabwe, full degree programme specialization are only offered at Masters level (i.e. MSc in Dairy Production and Technology) and has some component on dairy production and marketing. However, this kind of specialization was criticized by some key informants for being “too elitist” since qualified postgraduate degree holders may not be willing to work at MCCs in communal areas, where viability is a huge challenge. At the Bachelors’ degree programme level, a course in dairy Production and Technology is also offered at UZ but this is merely a one semester course, which might not be enough to comprehensively cover all pertinent aspect of dairy production and marketing. Due to the fact that specially trained officers might not be willing to go and be resident in the rural areas to support communal area smallholder farmers, key informants consulted contend that such kind of specialization should have been ideally introduced at certificate and at diploma levels, whose graduates might be amenable to working with rural-based MCCs. It was overwhelmingly agreed and emphasized across all the four FGDs that current government agricultural extension officers resident in around the MCCs have a bias towards crops while livestock and veterinary officers are more knowledgeable in other types of livestock more than dairy animals. Some key informants actually indicated that this has led to a situation where some dairy farmers are actually more knowledgeable than the extension officers who should be supporting them with extension and advisory services. One key informant referred to his recent research study which found access to extension services to have positive and significant influence on milk sales volume supplied to MCCs by smallholder dairy farmers. He opined that having access to satisfactory extension services by the smallholder dairy producers tend to increase milk quantity supplied by about 6.1 litres, an indication that milk sales volume is more responsive to access to extension services.

Another key informant advocated for both scaling out and scaling up the use of innovation platforms as a way of enhancing adoption of the concept of AIS and improving productivity and viability of smallholder dairy production. However, the informant cautioned that for the innovation platform concept to be effective, there is need to address key institutional barriers that currently hamper access to information.

Also noted during the study is that the GoZ, through support from the EU funded Zimbabwe Agriculture Knowledge and Information Services (ZAKIS) project, has undertaken a comprehensive curriculum review for agriculture colleges to make it more appropriate in responding to the needs of the evolving agricultural sector. To date the GoZ has improved the curriculum to have detailed modules that respond to the needs of the dairy sector. A Dairy Science and Technology module will be piloted at Gwebi Agricultural College (MLAFWRR, 2021a). The main thrust of this specialisation is to provide students with practical knowledge and skills on dairy value chain management practices. The specialisation will cover topics on the whole dairy value chain from the production of inputs such as silage and pasture grasses, milk production and ultimately, value addition. The specialisation will also cover various dairy breeds of different livestock species, health, breeding, dairy products processing and marketing. The specialisation

will consist of three taught modules (one in the first and the other two in the final year) in addition to a minor project which will start in the first year. Esigodini College of Agriculture has been identified and selected to offer specialised in-depth training useful for dairy in terms of fodder production and reproduction technologies. The specialization course on Forage and Fodder Production introduces students to the production of forage and fodder crops (grass and legume crops). The broad objective is to enable students to acquire knowledge and skills to enable them to immediately practice forage and fodder grass and legume crops production for sustainable and profitable livestock production. The first two modules will cover the theory and practical aspects of forage and fodder grass and legume crops production as well as the role of forage crops in Zimbabwe and principles of successful planted fodder and forage crop establishment. The third module will introduce students to the basic skills in various fodder and feed preservation methods. The module will also expose students to the main technologies of conserving forage and fodder crops and will cover topics ranging from benefits of conserving forage and fodder crops, methods of utilization, conserved fodder types, hay and silage making. A specialization course on Artificial Insemination and Embryo Transfer for Animal Reproduction comprising of three taught modules: Selective Breeding and Gene Technologies, Artificial Insemination and Embryo Transfer will be introduced at Esigodini College of Agriculture. These modules provide foundation concepts, principles and applications of assisted reproductive technologies in livestock. The Selective Breeding and Gene Technologies module is an introductory module offered in the first year that introduces the students to conventional breeding and molecular genetic techniques that could be used for genetic selection of animals and/or management of animal genetic resources. In the Artificial Insemination module students will learn about basic principles and applications of harvesting and preserving sperms and embryos, estrous synchronization, palpating the cervix, and negotiating the AI gun through the cervix. In the Embryo Transfer module, students will be taught the most economical methods to perform embryo transfer in animals, thereby maximizing profitability. Students will learn how to select and prepare donors and recipients; and how to collect, recognize, manipulate, classify, freeze, thaw and transfer embryos. The students will be equipped with business skills in assisted reproductive technology (ART) in livestock, including dairy cows.

Any organisations or companies willing to offer support to the dairy sub-sector are encouraged to channel investments for education through these two colleges. This curriculum review initiative was lauded by some key informants as a welcome move that will go a long way on ensuring availability of appropriate skills and technologies for the dairy value chain. A key informant, however, highlighted that governance issues around the MCCs are also contributing to reduced productivity by these farmers. Majority of the farmers are now older and need new blood (youth) injected to retain the original competitiveness that they had. Quality of milk has gone down and prices have been low leading to dotted side marketing from formal channels to informal market (marketing to fellow farmers within the wards). Some key informants are of the opinion that a reintroduction of the DDP model would go a long way in boosting productivity and competitiveness of smallholder dairy production and marketing.

4.4 Research-extension-farmer linkages in smallholder dairy value chain

Adoption of scale-appropriate dairy technologies has remained low due to limited involvement of the smallholder dairy farmers in research prioritization, implementation and evaluation. According

to key informants, there are no well pronounced research-extension-farmer linkages in support of the dairy value chain. For instance, it was highlighted that while the DR&SS does good research in pastures and farm feeds through its dairy section, there is very little initiatives aimed at dissemination and replication of the research demonstrations at the MCC and farmer levels mainly due to limited funding and weak research-extension linkages. Livestock-oriented public agricultural research stations such as Henderson, Grasslanss and Matopos have dairy units, where they conduct some experiments and demonstrations but efforts aimed at replicating the same in smallholder dairy farming areas through tailor-made outreach programmes are either limited or non-existent. Farmers consulted during the FGDs could not confirm knowledge of existence of any of these institutions' outreach programmes on the ground. Key information obtained also confirmed that there are no pronounced research-extension-farmer linkages except for a few initiatives on fodder demonstration plots and feed formulation trials that are being championed by donor-funded projects like the ZAGP TranZDV project. The recommendation by these key informants is for the dairy farmers to make concerted efforts through their farmer representative organizations and extension agents to reach out to research DRSS institutions for vital knowledge and technologies, particularly on low cost feed formulation and processing options as well as accessing improved dairy genetics.

In terms of low-cost on-farm feed formulation and processing, some key informants noted that smallholder dairy farmers generally tend to eagerly welcome and embrace participatory trainings offered under NGO programmes/projects like TranZDVC but have a tendency of disadopting or failing to continue putting into practice the new knowledge and skills and quickly reverting back to their old/traditional practices. Even though learning materials such as manuals, fact sheets and brochures are provided to accompany the trainings, it was revealed that there is general lack of commitment and responsibility on the part of the farmers to continue practicing after getting trained. The major reason cited by key informants is that of entrenched donor dependency syndrome.

Another key informant pointed out that dairy research in its current form has mainly focused on and put more emphasis on aspects dairy production thereby limiting emphasis on important aspects of value addition and product development. This kind of situation has left little options for the smallholder dairy farmers to become viable, particularly given their limited bargaining power for viable producer prices. Current linkages between research and extension on one side and farmers on the other are very weak. Both the farmers and some key informants are of the opinion that dairy-focused units within the MLAFWRR should also prioritize dairy marketing, value addition and product development. Thus, the GoZ should also adequately support and fully equip these units like the Dairy Services with relevant laboratory and processing equipment to enable them to generate demanded appropriate technologies.

4.5 Adequacy of national budget allocations for extension services.

The government of Zimbabwe allocated 19% and 12% to the agriculture sector for the 2020 and 2021 respectively (GoZ, 2021). This is commendable given that Zimbabwe is a signatory to the Maputo and Malabo declarations which advocate for at least 10% of the national budget to be allocated to agriculture. However, a closer look at expenditure of the agriculture sector allocated budget shows that the proportion eventually allocated towards extension, advisory services has continued to significantly drop over the years as shown in Table 3. The proportion of budget

allocation towards extension dropped from a peak of 15% in 2013 to 2% in 2017 of the total agriculture budget (World Bank, 2019).

Table 3: Expenditure on Agriculture research, extension, advisory services and education(%).

Component	2011	2012	2013	2014	2015	2016	2017
Policy & Administration	51	60	57	62	56	89	85
Agriculture Education	2	2	2	2	2	<1	<1
Crops & livestock Research & Technology Development	8	6	7	8	6	2	2
Crops & livestock Production, Extension & Advisory Services	15	14	15	12	14	3	2
Agriculture Engineering & Farm Infrastructure Development	7	4	5	4	5	1	7
Animal Production, Health	18	15	15	12	17	4	3
Total	100	100	100	100	100	100	100
Total Expenditure, US \$ millions	153.6	201.7	209.1	244.1	201.3	779.7	1,147.6

Source: World Bank 2019

Despite the dwindling proportion of agriculture spending going to meet the needs for extension and advisory services, the total budget allocation to the agricultural sector has continued to rise. However, it is worrying to note that the greatest chunk of spending in agriculture (51 – 85%) continues to be accounted for by policy and administrative components at the expense of technical and operational components like extension.

4.6 Review of Dairy Value Chain Policies and Programs

The Zimbabwe dairy sector has undergone significant transformation post-independence owing to several macro and microeconomic policy changes. The period 1980 to 1989 was characterised by a single marketing system where the Dairy Marketing Board (DMB) had monopoly in purchase, processing, distribution and trading of dairy products. Prices were determined pan seasonally and pan territorially. The DMB was subsidised as there were price controls in an effort to achieve growth with equity. The Agricultural and Rural Development Authority (ARDA) was mandated to spearhead commercialization of this project. At inception, the program was funded by the Norwegian Agency for Development (NORAD), Africa Now (UK), the Danish International Development Agency (DANIDA), Heifer Project International (HP) and the Government of Zimbabwe through the Public Sector Investment Program (PSIP). The growth with equity objective adopted at independence sought to bring on board these disadvantaged subsectors into the mainstream economy with the view to improve productivity and participation in formal markets. In 1983, the government established Dairy Development Programme (DDP) whose mandate was to set up smallholder dairy schemes with participation from communal, small-scale and resettled farmers (Chamboko, 2019). The DDP started as a branch of the then DMB established to spearhead the development of organized smallholder schemes and milk processing centers. Since its inception to date, the DDP has managed to set up 24 smallholder dairy schemes (17 of which embarked on processing and marketing various milk products) with membership of 1,750 smallholder farmers (SNV, 2012). Though, some schemes later became dysfunctional during the hyperinflationary period that ensued between 2007 and 2008.

The Economic Structural Adjustment Programme (ESAP) a prescribed policy package inspired by World Bank (WB) and the International Monetary Fund (IMF), launched in the 1990s resulted in the market liberalization of agricultural commodities including dairy (Kawewe & Dibie, 2000). DMB, which had a monopoly in domestic and external markets of all dairy products was then at first commercialized in 1993 and then fully privatized in 1996. The liberalization of the dairy sector created the opportunity for smallholders to partake in the emerging dairy value chain dominated previously by large-scale commercial farmers (Jansen & Koech, 2016). The government was to support the smallholder farmers in the liberalized dairy sector with extension services as well. However, the drastic cuts in national budgets and belt-tightening for government agencies during that period has been argued that several government services, including the agricultural extension, were supposed to be commercialized. In line with privatization ethics and efforts to improve efficiency, it was argued further that government can reduce its service provision to allow the NGOs and private companies to provide extension services. Enhancing participation by NGOs and private players were expected to avail alternative extension services to smallholder farmers (Hanyani-Mlambo, 2000). Collaborations in the last two decades, where partner organizations shared skills, technical knowledge, information and resources, experiences, and best practices resulted in saving of resources due to elimination of duplications. This was achieved through participation of several NGOs and donors (e.g. Technoserve, Land O'Lakes, EU-STABEX, USAID-ZimACP and -Fintrac, EU-ZAGP)

Thus, the smallholder dairy sector started to be developed as a poverty alleviation tool and a method to raise farm incomes, improved nutrition and employment in rural areas. Numerous “schemes” were set up in the 1990s often with subsidies to cover running costs, and administered by government departments and parastatals. During this period, a total of 35 sites were set up nationally. Whilst only a few currently remain operational, the majority of them never opened owing to lack of buy in from all stakeholders. The private sector saw such projects as a corporate social responsibility rather than viable business that could supply quality products. Many of the site selection criteria did not take into account markets, or location of dairy farmers leading to substantial subsidies being required to cover transport and running costs of the MCCs. With the hyperinflation of the 2000s, nearly all the MCCs stopped functioning as the subsidies could no longer be provided and markets imploded. The introduction of the multi-currency system in 2009 saw seven DDP centres reopening courtesy of funding from the European Union (EU) under the Stabex Project, which was administered by the National Association of Dairy Farmers (NADF). The project approach has been criticized by some analysts for focusing more on trying to increase production of milk than on aspects of market linkages and financial management and inclusion of the MCCs and farmers.

Recently, the private sector in particular milk processing companies such Nestle Zimbabwe, Dairibord Zimbabwe Holdings, and Dendairy, has embarked on significant development of small, medium, and large-scale farmers across the country through heifer importation and distribution programs to boost milk production. For instance, Dairibord Zimbabwe Holdings reported 8% increase in milk supply in 2015 as a result of implementation of the heifer program.

From June 2015 to October 2020, Fintrac implemented the USAID funded Feed the Future Zimbabwe Livestock Development program in collaboration with local private companies, non-governmental organizations (NGOs), the LPD, AGRITEX, DVS, and other government departments involved in the dairy value chains in agroecological regions (NRs) III, IV, and V. Local NGOs and commercial companies worked with the program as development partners to co-

fund purchases of essential inputs and new technologies for demonstration purposes on a cost-recovery basis. In summary, the Feed the Future Zimbabwe Livestock Development Program was a market-driven program that worked closely with SME and large-scale buyers to stimulate demand and increase competition for smallholder dairy products in Chirumhanzu, Gokwe South, Gweru, Kwekwe, and Umzingwane districts. In terms of extension, the dairy farmers have been receiving extension support through a locally based extension officer who provides technical support to MCCs.

Currently, the Zimbabwean dairy subsector principally consists of large-scale commercial, small-scale commercial and communal smallholder dairy producers. The principal dairy farmers are large-scale commercial farmers who contribute over 95% of the national formally marketed milk while small holder dairy farmers contribute as low as 5% to the formal market (TranZDVC, 2019). Smallholder producers usually deliver their milk through MCCs. Over the recent years, the dairy sub-sector has witnessed massive decline in production, with the country's milk production, which once peaked at about 260 million litres of milk per year in 1998, slumping to 39 million litres in 2009 (SNV, 2012). Production has gradually risen to 54 million liters in 2014 and reaching almost 80 million litres in 2019 and 77 million litres in 2020 against a national target of 150 million litres and a local processing capacity of 300 million litres per annum (MLAFWRR, 2021b). The gap implies that the dairy sub sector has an opportunity for import substitution through improved competitiveness and increased production (Chari and Sibongiseni, 2019). Causes of low productivity in the dairy value chain over all these years have been identified as the harsh economic environment, poor performance of the extension and advisory services, lack of financial support, lack of access to good quality breeding cows and heifers, poor marketing channels, poor disease control methods, inadequate infrastructure, limited technical knowhow, recurrent droughts, which have led to inadequate feed supply and reduced demand due to COVID 19 restrictions (MLAFWRR, 2021a; Chamboko, 2019; Washaya and Chifamba (2018). Nationally, the dairy herd has declined by 83% since 2000 and the current herd stands at 16,000 (GoZ, 2020). An effective extension delivery system can play a very crucial role in addressing most of these constraints through building the capacity of farmers to adequately respond to these challenges and ensure that milk production and marketing needs are adequately met. Thus, adopting a value chain approach to modern extension service provision is key since it can be used for inclusion of vulnerable farmers who are seeking basic market linkages with local buyers up to sophisticated large-scale producers seeking linkages with export markets.

5 Conclusion and Recommendations

5.1 Conclusions

The policy research study on the role of extension in dairy production and marketing was undertaken on behalf of the ZFU and its partners in the EU-funded TranZDVC Project. It employed a mixed methods approach and reviewed policies, programmes and practices to understand the role that extension and advisory services can play in improving smallholder dairy production and marketing. It made use of desk research to critically appraise literature around the subject area and combined the analysis with primary research in the form of qualitative FGDs and KIIs techniques. The study has found that agricultural extension and advisory services have generally been changing in response to constraints faced by government extension workers as well as responding to the ever-growing challenges of low productivity faced by smallholder farmers. However, the

general consensus from study participants, which was also confirmed in literature, is that there is limited extension support for the dairy value chain, particularly in terms of specialized extension services. The major reason highlighted was that the current agricultural education curriculum lacks specialization courses and programs at lower levels of tertiary learning such as certificate and diploma levels. Despite the growing demand for specialized extension services, the calibre of extension workers available in proximity to the dairy farmers are not specialized in the field and tend to have biases towards general crop and livestock production aspects. The study also found that linkages between research, extension and the smallholder dairy farmers are either very weak or non-existent owing to lack of properly structured mechanisms for fostering the linkages. The study found lack of pronounced structures and approaches for disseminating available research findings from researchers to extension agents and eventually to farmers. As a result, research results and technologies generated from the research institutions are not being effectively disseminated to the farmers to have the desired impact. Most of the extension-related challenges currently being faced in the value chain are predominantly as a result of limited funding. The allocation of agricultural budget to extension leaves a lot to be desired. The proportion of the total agricultural budget allocated to extension continues to decline (from 15% in 2013 to 2% in 2017) despite the GoZ performing well in terms of national budget allocation to agriculture (at least 10%) in line with the Maputo and Malabo Declarations.

5.2 Key policy lessons for Zimbabwe on agricultural extension policies and practices.

Listed below are key policy lessons that can be drawn from the review of best practices.

- The government should come up with a clear comprehensive stand-alone agricultural extension policy.
- To ensure sustainability, public extension agents that focus on basic production systems have to broaden their extension service to include issues such as financial education, savings and loans, business planning, nutrition and comprehensive farm planning, which includes diversification. These services are usually provided by NGOs for a specific number of years generally not more than five years. However, when NGO external support is withdrawn, farmers will be left without any backing in those critical areas.
- Whereas there are public, NGOs and farm inputs supply companies working on similar programmes, it is important for the cash trapped government extension providers to coordinate and avoid duplicating efforts in areas that are already being efficiently and sustainably served by private and non-profit agents.
- Public, private and nonprofit organizations should design and implement innovative extension models that have gender dimensions to provide opportunities to groups with specific needs and priorities.
- Extension providers should shift from top-down, where major decisions are made centrally at the top. This has to shift towards a more participatory and pluralistic approach to agricultural extension service delivery.
- Value chain approach to extension service is key and should be provided starting from inputs supply through production to the marketing of the final processed product. This approach has the advantage that it tends to organize the producers into groups that have the potential to replicate and replace public extension services for certain tasks within their specific commodity chains.

- There should be a deliberate policy by government to allow both public and private to run radio stations that offer agriculture-related programs.
- To facilitate the strengthening of comprehensive research-extension-farmer linkages, feedback mechanisms should be put in place for receiving recommendations from farmer evaluations of promoted technologies.
- Budgetary allocations to research and extension need to be increased through various fundraising mechanisms.

Thus, massive reforms in agricultural extension delivery systems including the development of a comprehensive stand-alone extension policy that guides extension activities are critical areas needed that address the needs of farmers in the ever-changing agricultural environment. The agricultural extension service delivery should encompass a wide range of supportive activities and programs that include training, technology transfer, and market linkage. These programs constitute the most effective way to strengthen the entrepreneurial, social, and ecological capacities of the farmers to enable them to successfully engage in productive and livelihood activities.

Extension has shifted for the dairy value chain from pluralistic extension to participatory approaches, which go beyond just training farmers in new technologies to facilitation and helping them to be well organised in groups, interact with a broad range of service providers and to deal with marketing bottlenecks. From the findings of this policy research study, an effective dairy extension system is one that is expected to play the following roles in the dairy value chain:

- Dissemination of information about dairy technologies, new research findings, markets, input and financial services, and climate and weather.
- Training and advice to individual dairy farmers, groups of farmers, farmer organisations, cooperatives and other agri-business along value chains.
- Testing and practical application of new dairy technologies and practices on-farm.
- Development of business management skills among smallholder dairy farmers and other local entrepreneurs along the dairy value chain.
- Facilitation of market linkages among the dairy value chain actors.
- Linking smallholder dairy farmers, rural entrepreneurs and other members of the community with institutions offering training, education, financial services, etc. in fields relevant to dairy production and marketing.
- Facilitation of linkages between dairy producers, their organisations and the public sector.
- Increasing awareness of new opportunities for environmentally friendly, fair trade and other production methods, and
- Facilitating access by dairy value chain players to other non-extension government support services.

5.3 Recommendations for the dairy sub-sector

The following specific recommendations can be drawn from the findings:

- The MLAFWRR should consider reviewing upwards the allocation of agricultural spending on extension aimed at capacitating field-based extension personnel with mobility and other capacities for effective delivery of extension and advisory services. Increased expenditure on extension will have spill-over effects on the dairy sub-sector.

- AGRITEX Extension officers who provide advice to dairy farmers should regularly receive specialized refresher trainings and relevant resources so that their capacity is built to strengthen the farmers along the value chain.
- Department of Agricultural Education and Farmer Training need to come up with training programmes and manuals for capacitating dairy farmers with relevant knowledge and skills competitive milk production and marketing
- Department of Agricultural Engineering, Mechanization and Soil Conservation should come up with appropriate designs and prototypes for appropriate-scale mechanization equipment such as hay balers, mobile milking machines, cans, etc. for use in smallholder dairy production and marketing.
- Department of Agricultural Research, Innovation and Development need to design and promote participatory R&D programmes for collaborative implementation with farmers e.g. on-farm demonstration of least-cost feed formulation, product development, value addition, etc.
- Department of Strategic Policy Planning and Business Development should to roll out tailor-made business development programmes aimed at capacitating smallholder dairy farmers' entrepreneurial skills, particularly in business planning, financial literacy for inclusion and market linkages.
- Dairy Services and Aglabs need to increase efforts towards research-extension-farmer linkages in the dairy value chain through conducting research and supporting farmers and extension personnel with information on modern dairy production and marketing technologies.
- Institutions of higher learning in agriculture should design and offer specialized dairy programmes at certificate, diploma and degree levels to ensure availability of well-trained dairy development cadres
- There is huge scope for private sector-driven extension service delivery system aimed at ensuring increased and consistent milk supply in Zimbabwe. Private milk processing companies need to put in place extension programs that help the farmers to overcome the many challenges inherent in smallholder milk production.

ZFU and ZADF need to:

- Consolidate efforts towards effective lobbying and advocacy for favourable milk and inputs (feeds) pricing policies on behalf of farmers. The farmer representative organizations should continue to engage the GoZ through the relevant ministries for more funding to be allocated to the dairy sub-sector, particularly towards capacitation of dairy specialized extension service providers.
- Identify local facilitators for capacitating with specialized short-term trainings and certification as semi-skilled extension personnel. In terms of motivation, they can be provided with tokens of appreciation like bicycles, branded regalia, etc.
- Augment the study circle extension and learning approach with regular training and visits to ensure that farmers continue practicing the various knowledge and skills they would have learnt.
- There is need to ensure that there is resident dairy extension personnel at each MCC for quick response to farmers' extension needs.

- Promote capacitation of selected members of MCCs and dairy associations as paravets to bridge the current gap in extension advisory service delivery
- Further explore the socioeconomic factors that might be influencing disadoption of on-farm feed formulation for dairy production.

For the dairy farmers:

- There is need to explore avenues for minimizing the cost of inputs in dairy by reducing dependency on bought-in and ready-made (factory processed) external inputs through adoption of least-cost feeding regimes that result in higher productivity in dairy farming.
- Establish fodder plots and plantations for feed supplementation with cheaper but nutritious on-farm produced ingredients
- Put in place mechanisms for incentivizing or remunerating local paravets or specialized extension advisory service providers, in the event that they become available.
- Do away with the donor-dependency syndrome and embark on initiatives that are aimed at increasing investments in the entire enterprise for enhanced viability and sustainability.

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7 Annexes

6.1 Annex 1: Key Informant Guide

Policy research on “The Role of Extension in Dairy Production and Marketing” under the EU funded Transforming Zimbabwe’s Dairy Value Chain (TranZDVC) project (2019-2022

A. INTRODUCTIONS

Dear Sir/Madam

My name is Kingstone Mujeyi an independent research consultant with the Transforming Zimbabwe’s Dairy Value Chain (TranZDVC). We are carrying out a research on behalf of ZFU and its partners. You have been purposively selected to participate in this study. I would like to ask you some questions concerning the role of extension in dairy production and marketing. The study aims to unpack the role of extension in dairy production and marketing. The study will assist in the development of clear, practical response to the key findings in the survey and inform policy making process for the country to have a vibrant dairy sector. The specific objectives of the study are to:

- Map out the Public and Private extension service providers in the dairy value chain.
- Analyse the demand for and supply of specialised dairy extension services in Zimbabwe
- Determine the adequacy, relevance, appropriateness and effectiveness of the college and in-service extension training curriculum for specialised dairy production and marketing.
- Analyse the research-extension-farmer linkages in smallholder dairy production and marketing.
- Analyse adequacy of national budget allocations for and impact on extension services in the smallholder dairy sector.
- Identify policy gaps and recommend policy interventions to improve specialised extension service provision in the smallholder dairy sector.
- Give recommendations on other key matters arising from the research.

The names of interviewees/organisation were selected based on people’s professional position /experience and knowledge. Therefore, you were selected for this particular reason. The data from this is solely for study purposes and will be treated confidentially and anonymously. The information obtained from this research will be used solely for policy advisory purposes. Your honest and accurate responses will be greatly appreciated. Anonymity of respondents will be respected. The interview will take some of your time and you will be answering the questions according to your knowledge. I will be grateful if you could answer all questions because your input in this study is very important.

SECTION B: ADMINISTRATIV DATA

- a. Date of Interview: _____ Place: _____
- b. Name of Respondent: _____
- c. Contact Number and Email: _____
- d. Organisation/Company name: _____
- e. Interviewee designation: _____

SECTION C: ROLE OF EXTENSION IN DAIRY PRODUCTION AND MARKETING

The following section seeks to collect information pertaining to the role of extension in dairy production and marketing.

The questions are as follows

1. Who are the key value chain actors/stakeholders in terms of Public and Private Extension service provision in the smallholder dairy value chain?
2. What are their main roles in smallholder dairy?
3. What are the institutional arrangements in terms of the research-extension-farmer linkages in smallholder dairy production and marketing?
4. In your opinion, what is the demand like, for specialised dairy extension services in Zimbabwe?
5. What about the supply side, focusing on but not limited to:
 - a. Extension officer to farmer ratio?
 - b. Number of farm visits by extension officers per given time period?, and
 - c. Quality of services provided?
6. Looking at college and in-service extension training curriculum for specialised dairy production and marketing, what can you say about the following:
 - a. Adequacy?
 - b. Relevance?
 - c. Appropriateness?, and
 - d. Effectiveness?
7. On a scale of 1 to 5 (1=unsatisfactory, 2=somewhat satisfactory, 3=satisfactory, 4=fairly satisfactory, and 5=very satisfactory), how would you rank the curriculum against these attributes?
8. Can you please comment on the adequacy of national budget allocations for:
 - a. Agricultural extension?
 - b. Smallholder dairy sector?
9. On a scale of 1 to 5, (1=inadequate, 2=somewhat adequate, 3=adequate, 4=fairly adequate, and 5=very adequate), how would you rank the adequacy of the national budget for each?
10. What is the impact of this kind of budget allocation on extension services in the smallholder dairy sector?
11. What policy gaps exist in terms of provision of specialised extension service provision in the smallholder dairy sector
12. What policy interventions do you recommend to improve the provision of specialised extension service provision in the smallholder dairy sector
13. Are there any general comments you may have on ways for enhancing the competitiveness of smallholder dairy production and marketing in Zimbabwe?

D. CONCLUSION

Sum up the discussion by highlighting the main points raised. Ask if there is anything else that s/he would like to share. Thank him/her once again for his/her time and information and indicate that the discussion has been very helpful for your study.

6.2 Annex 1: FGD Guide

Policy research on “The Role of Extension in Dairy Production and Marketing” under the EU funded Transforming Zimbabwe’s Dairy Value Chain (TranZDVC) project (2019-2022)
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FGD Protocol

Start with a prayer and move on to salutations and introductions

A. INTRODUCTIONS

My name is Kingstone Mujeyi, an independent research consultant with the Transforming Zimbabwe’s Dairy Value Chain (TranZDVC). We are carrying out a research on behalf of the ZFU and its partners. You have been purposively selected to participate in this study. I would like to ask you some questions concerning the role of extension in dairy production and marketing. The study aims to unpack the role of extension in dairy production and marketing. The study will assist in the development of clear, practical response to the key findings in the survey and inform policy making process for the country to have a vibrant dairy sector. The specific objective of the study are to:

- Map out the Public and Private extension service providers in the dairy value chain.
- Analyse the demand for and supply of specialised dairy extension services in Zimbabwe
- Determine the adequacy, relevance, appropriateness and effectiveness of the college and in-service extension training curriculum for specialised dairy production and marketing.
- Analyse the research-extension-farmer linkages in smallholder dairy production and marketing.
- Analyse adequacy of national budget allocations for and impact on extension services in the smallholder dairy sector.
- Identify policy gaps and recommend policy interventions to improve specialised extension service provision in the smallholder dairy sector.
- Give recommendations on other key matters arising from the research.

:

By conducting this FGD, we hope you can help us have a better understanding about the current situation with regards role of extension in dairy production and marketing. We expect this conversation to last about two hours. Please do not hesitate to interrupt us at any time to ask any question that you may have. We greatly appreciate the time that you are here and we invite you to share your experiences with the group. We also ask that you listen carefully to others and be respectful of their contributions. This is a group discussion, so please feel free to participate and speak freely.

Do you have any questions before we can start? (Wait for questions)

Section B: Administrative data

- a. Date of Interview: _____ Place: _____
- b. Name of Group/MCC: _____
- c. Name and Contact Number for Group Leader: _____
- d. Number of Participants: Total _____ Male _____ Female _____
- e. Name of Province: _____ District: _____
- f. Ward: _____ Venue: _____

SECTION C: THE ROLE OF EXTENSION IN DAIRY PRODUCTION AND MARKETING

The following section seeks to collect information pertaining to the role of extension in dairy production and marketing.

- (a) Kindly tell us about the historical overview of dairy production and marketing in this area/district in brief? (**Brain storming questions**)
- (b) What has been the experience of the group in dairy farming? (**Explore issues of production, productivity, feeding regimes, marketing, viability, financing**)
- (c) What are the key challenges and constraints in dairy production and marketing in the area/district?
- (d) What support services are critical for success in smallholder dairy production and marketing? (**Probe for policy, legal, institutional frameworks, including marketing, extension**)
- (e) Who are the main extension service providers in dairy farming and marketing? (**Probe for the role government /private/NGOs - GoZ MLAFWRR Depts; Private input suppliers, off-takers, etc.; NGO Programs e.g. TransZDVC; UN Agencies e.g. FAO; Tertiary Institutions (Universities and Agric. Colleges); Farmer-Based Organizations e.g. ZFU; Cooperatives e.g. ZADF; Community-Based Organizations; Research Organizations e.g. ILRI**)
- (f) What approaches do they use in extension service provision?
(**Probe for the different extension approaches and service providers that are applicable and rank them in order of importance to the farmers**)

Extension Approach/model	Service Provider Examples	Ranking: 1=unsatisfactory, 2=somewhat satisfactory, 3=satisfactory, 4=fairly satisfactory, and 5=very satisfactory			
		Adequacy	Relevance	Appropriateness	Effectiveness
<i>Supply-driven approaches</i>					
Public extension model					
Training and Visit (T&V) model					
NGO extension model					
<i>Demand-driven approaches</i>					
Farmer Field School (FFS)					
Private extension model					
Lead Farmer approach					
<i>Pluralistic</i>					
Innovation Platform					
Commodity-based: research-extension-farmer					

- (g) How many times do you interact with extension officers on dairy production and marketing issues per month?
- (h) Do you think that the service provided by the extension officers is appropriate considering changes that have taken place in the agricultural sector?
- (i) Are the extension services provided suitable for your dairy farming and marketing needs? **(Probe for sustainable and climate smart production methods; Support farmers in organising themselves, enable farmers to identify and engage with appropriate markets).**
- (j) Are there any general comments you may have on ways for enhancing the competitiveness of smallholder dairy production and marketing in Zimbabwe?

D: Concluding the Focus Group Discussion

Is there anything else that you would like to share with us?

Is there anyone else in your community whom you wish we should talk to for more details?

Thank you once again for your time and contributions. The discussion has been very helpful for our study.

Ask for someone to close with a prayer

6.3 Annex 3: List of Key Informants Interviewed

	Name of Key Informant	Designation	Organization	Contact
1	Mr Farai Zinyama	Senior Lecturer	Blackforby College of Agriculture	0773996323
2	Dr Benjamin Mudiwa	M&E Manager	Formerly with Fintrac FtF Livestock	0775690916
3	Dr Jacob Gusha	Senior Lecturer/Animal Nutritionist	University of Zimbabwe	0772252514
4	Mr Balisi Nleya	Principal	Kushinga-Phikelela College	0772221280
5	Dr Benjamine Hanyani-Mlambo	Senior Lecturer	University of Zimbabwe	0772321760
6	Dr Tafireyi Chamboko	Senior Lecturer	University of Zimbabwe	0772349599
7	Mr Kumbirai Nyamwena	Principal Research Officer	DR&SS	0772827125
8	Ms Shamiso Chikobvu	Chief Agricultural Extension Specialist	AGRITEX	0774818656
9	Mr Charles Chakoma	Dairy Consultant	Formerly ARDA DDP	0772101051
10	Mr Machinga	District level extension officer	AGRITEX	077808282
11	Ms Rosemary Muwani	Senior Lecturer	Gwebi Agricultural College	0773722682 0715849970
12	Mrs Chipo Muswehaurari	Senior Lecturer	Chibero Agricultural College	0772816696
13	Mr Admore Waniwa	Chief Dairy Officer	Zimbabwe Dairy service Agency (ZDSA).	0738620117 0719630129 0772630129
14	Antonnette Chingwe	Chief Economist	Commercial Farmers' Union	0774551911
15	Mr Cleopas Mashozhera	District Coordinator	ZFU	0773491486
16	Mr Piroro	District Extension Officer	ZADF	0718390214
17	Mr Phillimon Buruzi	Milk Supply Development Manager	Dairiboard	0775138121
18	Mr Mukapeni	Accountant	Reddane Farming	0784296329
19	Mr Stanely Mandizha	Farmer & Industry Relations Manager	Dendairy	0776349379
20	Thomposon Nyamtora	Milk Supply logistics Manager	Probrands	0772935543
21	Mrs Portia Makunde	Dairy Value Chain Specialist	We Effect	0772250850
22	Dr Irenie Chakoma	Research Associate	ILRI	0773389265
23	Dr Rose Nyoka	Deputy Chief of Party	FINTRAC	0772148630
24	Mr Milton Makumbe	Head of Station	Henderson Research Station	0772357765
25	Mr Chapangara	Lecturer	Chibero Agriculture College	0774039797
26	Mr Patrick Kasasa	Agricultural Colleges Curriculum Review Coordinator	CTDO	0772863811
27	Mr David Kambeva	Provincial Manager	ZFU	0774179797
28	Mr Tendai Mutambiranwa	Provincial Officer	ZADF	0773533347