



Baseline Evaluation Report
on
the FY 2017 Food for Progress “Feed Enhancement for Development of Ethiopia [FEED-III]”

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e-mail: [REDACTED]

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Executive summary

FEED-III is a three-year project funded by the United States Department of Agriculture (USDA). This project will address USDA's food for progress strategic objectives of increased agricultural productivity (SO1) and the expansion of trade in agricultural products (SO2), as well as the Government of Ethiopia's (GOE) Agricultural Growth Plan (AGP), Livestock Master Plans (LMP), USAID's country development and coordination, and Feed the Future strategies. Specifically, the project endeavors to deepen the capacity of agricultural enterprises to participate effectively at scale in the livestock value chain and strengthen their sustainability through greater integration with the commercial private sector.

The baseline study was initiated to set benchmarks for project performance indicators as one of the key steps towards establishing a robust monitoring, evaluation and learning system for the project. The baseline provides quantitative and qualitative data on the performance measures. Specifically, the baseline study intends to:

1. Collect household socioeconomic data pertaining to livestock farmers in the project zone of influence;
2. Determine the baseline values for contextual, outcome, and impact level performance indicators as outlined in the project performance monitoring plan;
3. Identify gaps and weaknesses in feed manufacturing supply chains in each of the 4 project areas including, feed regulatory framework;
4. Identify and document innovative feed and forage production systems that promote smallholder and market resilience;
5. Identify feed and forage production capacity gaps, sector policy constraints and organizational weaknesses related to feed manufacturing and feed distribution supply chains;
6. Identify activities that can act as catalysts in developing sustainable forage production systems that can facilitate on-farm feeding practices;
7. Identify opportunities for collaborative learning and action along the feed value chain that can foster livestock production systems change;
8. Identify constraints in maximizing beneficial use of available feed resources among livestock and poultry smallholder farmers.

The study was conducted in four regions of the country including Oromia, Tigray, Amhara and SNNP and a sample of 16 representative districts where FEED III project is making its focus. The study has adopted blends of approaches and techniques including desk reviews, qualitative approaches and quantitative survey techniques. At qualitative stage, the required data was collected by interviewing 40 key-informant interviews (KIs), 62 in-depth interviews and 20 focus group discussions (FGDs). Quantitative data was collected using a structured questionnaire by interviewing 1648 randomly selected households. Data collection was made electronically, and enumerators and supervisors were trained intensively on data collection approaches along with field level pre-testing.

Major findings

Dairy production and value chain

In the FEED III project regions, households mainly depend on mixed crop-livestock farming systems both as source of food and on-farm incomes. Out of the major household income sources, 55% of the income was generated from dairy, fattening and poultry production, while the other 45% was generated from crop production. In the livestock sector, engagement in dairy production is becoming a common business in rural areas accounting for 6% of the total household income. Among the rural households in FEED III project regions, 45% of them were engaged in dairy production despite only 10% of the households owned crossbred lactating cows. Not only is the supply of crossbred cows very scarce but also their purchase price is consequently very high (in the range of 30,000 – 45,000 ETB¹ per pregnant heifer/cow), the value which is often reported to be unaffordable for smallholder farmers.

Even though the average milk productivity potential of crossbred cows is more than 10 liters per day per cow under good management conditions, it was lower (5.25 liters per day per cow) in FEED III project regions. Apart from poor management conditions, poor quality and inadequate quantity feed provided to crossbred cows were other reasons why crossbred cows performed below potential in rural areas of FEED III project regions. On the other hand, the average milk productivity of indigenous milking cows was 1.95 liters per day per cow (ranging from 1.37 – 2.53 liters per day per cow), which is expected in light of their low yielding potential.

Feed is one of the major inputs in dairy production which accounts for 70% of the cost. Even though households depend on various types of feed sources, 81% of the them (96% in Tigray region, 85% in Amhara, 67% in Oromia and 79% in SNNP region) have indicated crop residue as the most common feed source for dairy cows in rural areas of FEED III project regions. Consequent to human population pressure over time, farmlands have started to expand encroaching up on grazing and pasture lands. This has contributed to expansion of crop production and, as a result, availability of more crop residues. Moreover, crop residue is relatively the cheapest feed source compared to hay, forages and concentrates. Because of this, farmers conserve residues of various types of crops in all agro-ecologies and regions of FEED III project.

In an attempt to add values to feeds, households have adopted various types of feed management practices. The most common method practiced by 67% of the overall sample households was crop residue treatment (53% in Tigray, 66% in Amhara, 70% in Oromia and 75% in SNNP regions). One of the techniques adopted for value addition in crop residue is urea treatment through application of ammonia to increase feed intake of dairy cows. It also minimizes wastage of crop residues by enhancing consumption by animals. The second essential source of feed was green feed in all the FEED III project regions. It was indicated that a large proportion of rural households (71%) adopted cut and carry system of supplying green feed to their dairy cows. Since dairy cows are mostly kept around homesteads, cut and carry practice of feed supply is most preferable mechanism for farmers.

Since small-holder farming households are not strongly business oriented in their feature, the practice of selling milk and milk products is still limited. For instance, only 17% of the households have had experiences of selling milk (26% for Oromia, 27% for SNNP, 5% each for Amhara and Tigray regions). The major reason was reported to be distant location of households from towns where there is demand for

¹ One USD=27.24 ETB as of May 2018.

milk. Because of this, households depend on processing milk and selling milk products, mainly butter. For instance, the study shows that 27% of rural households were engaged in selling butter (36% for Tigray, 33% for SNNP, 32% for Oromia and 9% for Amhara regions). The practice of selling cheese was, however, recognized to be limited in FEED III project regions (only 4% on average).

In FEED III project regions, there are challenges that need to be addressed to make the dairy sub-sector more efficient and productive. One of the challenges identified by 59% of the households was feed shortage followed by land shortage (56%) for grazing, hay making and growing forage crops. This problem was exacerbated by human population pressure which forced farmers to plow grazing lands and provide priority for the growth of food crops. Scarcity of feed supply has also contributed to the rise of feed costs, such as concentrates and industrially processed feeds. Inadequate knowledge and skills of improved dairy management practices was also identified to be the other major problem by 40% of the households.

Feed production and value chain

Out of the essential sources of feed for dairy cows, forage production was a newly introduced technology in the feed sector. Various improved forage crops have been introduced to FEED III project regions by various institutions. These include Sesbaniasesban, Vetivargrass, Setariaverticellata, Elephantgrass (*Pennisetum purpureum*), Rhodes, Dashograss, Oats, Lablab, Cowpea, Alfalfa, Vetch, and Pigeon pea through the government extension system and through NGO interventions. However, the extent of adoption of these forage crops was still very limited. For instance, improved forages were grown by very few households (only 0.2% in Tigray, 7.5% in Amhara, 1.7% in Oromia and 25.7% in SNNP regions). Not only that, but the area allocated to improved forage production was also meager (only 0.02 ha per household). Because of this, the fodder produced remained to be inadequate to meet nutritional demands of dairy cows.

Apart from forage crops, dairy farmers are dependent on commercial feeds which are traded in FEED III project regions. These include hay, green fodder, cereal crop residues, pulse crop residues, mill residues, vegetable and fruit residues, cereal bran, pulse bran, oil seed cakes, and formulated rations. In spite of all these efforts made and options of interventions to develop the feed sector, feed scarcity has still perpetuated to be the major problem in the dairy sector.

Animal fattening and value chain

Fattening is also another option of income source for 27% of rural households in FEED III project regions accounting for 45% of their on-farm income (ETB 37,377), by far higher than income generated from dairy and poultry production. Cattle (mainly ox and bull) are commonly used animals for fattening purposes followed by goats and sheep. Industrially processed concentrate feed, oilseed cake and wheat bran are commercial feeds dominantly used for fattening of animals while dry feed and greens are mainly sourced from own farms. These feeds are supplied by feed processors and wholesalers which are major actors across the feed value chain. Other actors include wholesalers who purchase fattened animals. Since farming households do not have well developed marketing networks, they sale their fattened animals at local markets for lower prices, a condition which is discouraging engagement of farmers in fattening business.

Even though fattening rewards substantial income benefits to the farming households, it was not without challenges. The priority challenge in all the FEED III project regions was associated with feed shortage similar to the dairy sector. Feed shortage is often exacerbated by frequent drought occurrence and land

shortage. Involvement of intermediary brokers makes marketing systems inefficient creating price distortions and keeping farmers and traders at a disadvantage. Cases are common where farmers received the lowest price while traders bear the highest costs. This process disproportionately benefits brokers who add little or no values to the transaction.

Poultry production and value chain

Apart from fattening and dairy production, farming households are also engaged in poultry production. Poultry production is becoming popular among smallholders because it does not compete for limited household resources such as land, labor or capital. In FEED III project regions, 60% of the households in Amhara region, 43% in Tigray, 42% in Oromia and 40% in SNNP regions were engaged in poultry production at the time of the baseline study. However, the traditional poultry production system was largely characterized by small flock sizes, low levels of inputs and outputs, and periodic devastation of flocks by disease.

Even though poultry production is mainly of a small-holder business, there are also commercial poultry farms and feed operators across the value chain operating in bigger towns. Some of the major ones included ELFORA, Genesis Farms Ethiopia, Ethiochickens and Alema Farms. These actors along the poultry value chain dominate the market and make it difficult for smaller millers to obtain feed ingredients. Apart from high prices, the supply of inadequate quantity and poor quality of poultry feed is a worrisome issue that merits due consideration in the poultry sector imposing negative consequences on productivity and household income.

Gender perspectives in the feed management practices and household dietary diversity

In the context of Ethiopia, household members including men, women and youth have roles to play in livestock sector depending on their sex, age and physical conditions. The survey findings show that 70% of dairy management activities (such as feeding cows, milking and milk processing, calf feeding and management) were mainly carried out by women while men contributed to 30% of the task (such as feed collection, purchasing high value feeds and selling cows). The implication is that targeting interventions should be aligned either to women or men depending on the nature of roles they play. Assessment of gender perspectives also helps to identify whom to work with and to make the right targeting (either women or men) in research, extension and development interventions.

Forage production and management was also another activity in the dairy sector where gender disparity was tracked. According to the findings, 70% of the forage production and management activities were implemented by men (such as land preparation and planting of forage crops, harvesting and fertilizer application). On the other hand, watering of forage crops was the major task of women in 75% of the households. The implication is that any of the interventions related to enhancement of forage production should target more men than women.

The findings of this study have also confirmed that all the poultry management related activities are mainly managed by women. For instance, vaccination and treatment of chicken was the major task of women in 84% of the households. Chicken feeding is also their major task in 86% of the households. This implies that any of the technology and development related interventions on poultry production and management should provide priority focus for women. Agricultural extension systems and any of interventions intending to empower women would be more successful if the focus is made on poultry, in which women have better management experiences.

In the context of Ethiopia, gender disparity in decision making and other perspectives is still an issue in male headed households with a husband and a wife. However, it is not an issue in female headed households where the woman is the dominant decision maker except in some cases where adult sons or daughters are involved in decision making. Even though the gender roles vary among the family members (husband, wife and youths), decision making now days is becoming a joint role of both the husband and wife. This was largely the consequence of massive awareness and promotion activities that have been in place for the last two decades. For instance, in FEED III project regions, decision making in 53% of the households for selling dairy products was jointly made by the husband and wife. Joint decision making is dominant not only in dairy sector but also in poultry and forage production and marketing.

Even though all household members participate in the management of dairy, a gender gap was noticed in access to training opportunities for women and men. Even though women are making substantial contributions in dairy management, 83% of the households reported that men received better opportunities to participate in improved dairy management trainings while women had such access in only 16% of the households. Moreover, gender disparity was still evident in the poultry sector as well where men received better opportunities of participation in trainings than women. In both cases, the reason is mainly associated with attitudinal problems, i.e. the perception that the man is heading the household and that he shall get priority for such public services. There was also an assumption that the man will share the knowledge and skills he gained from the training with his spouse and other family members, which in most cases doesn't hold true.

Another focal issue for the baseline survey was assessing access of households to nutrition. Farming households usually feature economic scarcity directly association with access to dietary diversity. Not only are diversified food items not easily accessible at all times, there is also an attitudinal problem which fails to recognize the importance of keeping nutritional balance on the food menu. It was reported that protein source food stuff, such as beef, lamb, goat and egg were not commonly accessible to 52% of the households. On the other hand, food items processed from beans, peas and lentils are almost staple foods of rural households in FEED III project regions.

Conclusion and recommendations

Engagement in livestock production has appeared to be the dominant source of on-farm incomes (55%) for the farming households in FEED III project regions. Fattening, especially, was figured out to be relatively lucrative business accounting for the largest proportion of income (45%) despite the proportion of households engaged in fattening is still low, only 27%. Dairying is also the next essential business to stallholders which contributed to 6% of on-farm incomes. Even though the proportion of households engaged in dairy business in FEED III project regions was considerable (45%), milk selling has not yet become a good option mainly due to distant location of rural villages from towns and inadequate technologies to preserve fresh milk. Because of this, households depend on processing milk and selling butter. They did not have access to improved and efficient milk churning machines either. Because of this, they could not maximize the substantial benefits to be had from dairying. The other option from which rural households generated 4% of on-farm incomes is poultry production. Households in the range of 40 to 60% depend on this business. The study also reveals the substantial contribution of women in dairy and poultry production. Men are dominantly involved in fattening and forage production. For instance, 70% of the tasks in dairy management are played by women.

Despite the substantial contribution of livestock sector to on-farm incomes and household food nutrition, it was not without challenges. Dairy production, fattening and poultry production has been critically challenged by feed related problems. Because of this, feed related issue has appeared to be a priority

agenda for rural households especially in target areas of FEED III project regions, zones and districts. It is not only limited availability and supply but also poor quality that are critical issues which deserve due consideration in the upcoming interventions. The intention of FEED III project to address issues related to feed is of high priority, timely and invaluable. Limited knowledge and skills is also another challenge which restricted the growth of dairy and poultry production, and fattening businesses in FEED III project regions. Interventions which attempted to empower farmers so far have also suffered from wrong targeting (for instance targeting men even though major roles of dairy management are played by women).

The study also confirms that FEED III project has made the right targeting by intending to address the feed issue which is critical not only in the targeted regions but also in the whole country. As a way forward, the study recommends that FEED III project shall focus on interventions that enhance feed supply through various options such as establishing, empowering and strengthening market linkages between feed processing enterprises and beneficiaries (such as dairy producers, fattening enterprises and poultry farms). Institutional strengthening of feed processing enterprises either financially or technically shall also be given due attention during FEED III project phase. Improved forage production and expansion should also receive emphasis to help enhance sustainable feed supply. Increasing feed availability should also be accompanied by introducing and promoting knowledge and skills on improved feed management practices for rural households through making appropriate targeting as per the gender roles. Maintaining feed quality should also be the other issue which FEED III project should pay due consideration. Feed processing enterprises should be compliant to feed quality standards as provided by Ethiopian Quality Standards Authority. Apart from this, FEED III project has to facilitate revision of policy and regulations of feed quality standards established by Ethiopian Quality Standards Authority and Veterinary Drugs and Feeds Administration and Control Authority (VDFACA). These feed quality standards shall be made compulsory and failure to comply should entail legal consequences. This is because, 'today's feed is tomorrow's food' impacting human health. Introduction and promotion of these compulsory feed quality standards shall also be launched intensively for feed processing enterprises and wholesalers through various mediums such as mass-media, fliers and posters, conferences and workshops, consultative meetings, and other platforms. FEED III project shall also strengthen monitoring and evaluation of progresses and take timely corrective measures for pragmatic impacts and enhance resilience of rural households.

1. Introduction

1.1. Background and context of the baseline survey

This report presents the findings of the FEED-III baseline evaluation study. The report is organized into five sections. Section 1 provides background information about the project and the baseline evaluation. Section 2 describes the baseline evaluation methodology while a brief household structure and socio-demographic profile of the sampled households is presented in section 3. Section 4 presents the major findings for the specific objectives of the baseline survey. The last section, section 5, offers conclusions and recommendations for future program development or monitoring and evaluation of the project over its period of implementation in the project sites, in general, and the studied *Woredas*, in particular.

Ethiopia's livestock population (with an estimated 80 million cattle, sheep, goats, and camels, and 32 million poultry) is the largest in the African continent. Its contribution for the total GDP is between 12 and 16 percent while the agricultural GDP accounts for 30 to 35 percent². Moreover, it serves as a draft power for about 90 percent of crop production purpose while contributing to the livelihoods of 60–70 percent of Ethiopia's population, most being smallholder farmers and almost 100 percent to pastoral peoples living in the arid and semi-arid areas of the country. Even in the highlands, where crop-livestock systems dominate and the majority of Ethiopians live, production of staple food crops is dependent upon draught oxen. On the other hand, the dairy products are important both for subsistence and as saleable commodities, in which the income earned from the sales of small ruminant buffer shocks to household economies³.

Livestock and poultry feed is fundamental to growth and sustainability of the meat, milk and egg value chains and the well-being of those whose livelihoods depend on them. Feed plays a fundamental role in livestock rearing and makes up 60 percent or more of production costs. Traditionally, animal and poultry diets consist of crop residues, such as straw, stover, and native-forage from communal pastures and rangelands. Such diets are, however, low in energy and protein that results in negative effects on animal productivity and health. Even worse, traditional grazing resources continue to decline from lack of proper management and conversion to crop production. Droughts are also growing more frequent and severe negatively affecting the supply of feeds. Hence, even though Ethiopia boasts the largest livestock population and livestock being the major livelihood activity for the majority of the population, per capita production in the livestock sector has been declining for many years. Inadequate and poor quality feed resources exacerbated by poor marketing systems are major challenges facing the livestock and poultry sector (MoLF Report, 2017)⁴.

Understanding that the quantity and quality of feeds are major constraints to the development of the livestock sector; the Ethiopian Government and its development partners are investing heavily to address these challenges as part of the holistic, comprehensive, and integrated policy and strategy efforts to improve the feed value chain node. The project aims to increase the income of Ethiopian smallholder livestock producers by improving access to and use of consistent, affordable and high quality animal feed. This is expected to contribute to enhanced livestock productivity and efficiency. In view of this, a project called "Feed Enhancement for Ethiopian Development (FEED III, as an extension to FEED II targeting new *Woredas* and beneficiaries in 10 miles' radius of FEED II targeted unions)" is going to be implemented in

²USDA, Global Agricultural Information Network, 2016.

³USDA, Global Agricultural Information Network, 2016.

⁴ (MoLF Report, 2017).

four regional states—Amhara, Oromia, SNNPR and Tigray. The project will be implemented by an NGO called “ACDI/VOCA”, based in Washington D.C. ACDI/VOCA is an INGO that delivers technical and management assistance in agribusiness, financial services, enterprise development, community development, and food security in order to promote broad-based economic growth and vibrant civil society. ACDI/VOCA initiated the FEED project activities across the country as United States Department of Agriculture’s implementing partner in October, 2009 (FEED I). The project activities continued in a second phase (FEED II) which began in late 2013 and ended in September, 2016. The FEED-III project is to be implemented based on the successes documented and lessons learned from FEED-I and FEED-II. FEED is one of the few development project in Ethiopia that focus on the development of livestock feed resources aimed at contributing to the feed sector development.

Areas of interventions under FEED-I and FEED-II included developing sustainable forage production systems on smallholder farms and communal pastures, setting up cooperative based commercial feed manufacturing enterprises and strengthening the feed supply chain. The project also supported the establishment of new fattening, dairy, and poultry enterprises, and expanding existing ones to create economic opportunities and provide models of improved food animal management for others to replicate. The project implemented these interventions through a *combination of training* (feed manufacturing as a business), *technical* (e.g. formulation, quality control, equipment operation, and maintenance) and *in-kind support*⁵ (leveraged contributions to equipment and facility procurement and construction). Through the establishment of cooperative union based feed manufacturing enterprises, the *FEED* project expanded opportunities for growth of livestock and poultry production in the intervention Woredas, in particular, and created new business opportunities and returns for union members and their communities in general.

As stipulated in the ToR, FEED-III is a three-year project funded by the United States Department of Agriculture (USDA). The project will address USDA’s food for progress strategic objectives of increased agricultural productivity (SO1) and the expansion of trade in agricultural products (SO2) as well as the Government of Ethiopia’s (GOE) Agricultural Growth Plan (AGP), Livestock Master Plans (LMP), USAID’s country development and coordination and Feed the Future strategies. With the two specific objectives (SOs), FEED-III’s intended outcome areas include, a) improved feed management practices adopted; b) increased supply of feed and forage inputs; c) improved business and financial management of feed enterprises; and d) improved feed policies, regulations and ancillary service providers. In doing so, the focus will be on productivity, efficiency, and economic outcomes, and their contribution to resilience and food security. With greater access to affordable and consistent supplies of feed, farmers and pastoralists can maintain their breeding animals when challenged by drought and avoid selling them off at depressed market prices. Specifically, the project endeavors to:

- 1) deepen the capacity of agricultural enterprises to participate effectively at scale in the livestock value chain and strengthen their sustainability through greater integration with the commercial private sector;
- 2) expand trade of agricultural products in the livestock and poultry sector by enabling growth of feed, forage, fattening, poultry and dairy enterprises, and expanding market opportunities for their products, building on investments in human and physical infrastructure; and
- 3) contribute to increased resilience of livestock owning households.

⁵www.acdivoca.org.

1.2. Purpose and scope of the baseline survey

The purpose of this baseline survey is to set benchmarks for project performance indicators as one of the key steps towards establishing a robust monitoring, evaluation and learning system for the project. The baseline will seek to verify assumptions and pre-conditions made during project design as well as provide quantitative and qualitative data on performance measures. In compliance with ACDI/VOCA gender framework, the study will apply a gender and youth lens in the design, data collection, analysis, and reporting ensuring that attention is paid to gender and age differences in roles and responsibilities in the feed manufacturing value chain.

Specifically, the study intends to:

1. Collect household socioeconomic data pertaining to livestock farmers in the project zone of influence;
2. Determine the baseline values for contextual, outcome and impact level performance indicators as outlined in the project performance monitoring plan;
3. Identify gaps and weaknesses in feed manufacturing supply chains in each of the 4 project areas including feed regulatory framework;
4. Identify and document innovative feed and forage production systems that promote smallholder and market resilience;
5. Identify feed and forage production capacity gaps, sector policy constraints and organizational weaknesses related to feed manufacturing and feed distribution supply chains;
6. Identify activities that can act as catalysts in developing sustainable forage production systems that can facilitate on-farm feeding practices;
7. Identify opportunities for collaborative learning and action along the feed value chain that can foster livestock production systems change; and
8. Identify constraints in maximizing beneficial use of available feed resources among livestock and poultry smallholder farmers.

In terms of scope, the FEED-III baseline evaluation was conducted in four regions of Ethiopia including, Tigray, Amhara, Oromia, and SNNPR. The baseline study only covered the eight baseline specific objectives stipulated in the ToR. It also generated both qualitative and quantitative data along the specific objectives from selected Woredas of the FEED-III implementation regions.

2. Baseline evaluation methodology

2.1. Baseline evaluation approach

As suggested in the ToR, the baseline survey was conducted using diverse range of methodologies with a triangulation between in-depth relevant document review and field visits to project regions thereby generating detailed qualitative and quantitative data. On this account, DAB-DRT employed a utilization-focused approach that enabled it to generate adequate data from direct and indirect beneficiaries in the project zone of influence and focal persons from project implementing partners. This is because a utilization-focused approach was expected to generate actionable insights and incorporates the contextual knowledge (including indigenous knowledge on the objectives of the study) and insightful perspectives among the key stakeholders and/or target groups of FEED-III baseline survey. In other words, the FEED-III baseline survey employed both quantitative and qualitative methodologies (e.g., mixed approach). The survey was conducted in a consultative and collaborative manner with key target groups of FEED-III project at all levels of data collection. Accordingly, the use of mixed survey approach ensured the generation of quantitative data (from poultry, dairy, livestock and forage producing smallholder farmers, and the extraction of secondary data from relevant project documents including FEED-I and II evaluation reports). Qualitative data was also collected with the help of key informant interviews, focus group discussions, indepth persons interview, and field observation. To guide the baseline survey and help to understand the gender aspect of the FEED-III project, DAB-DRT applied the ACDI-VOCA's Gender First framework as per the suggestion in the ToR.

2.2. Baseline evaluation design

As per the ToR, the baseline evaluation followed a cross-sectional survey with the objective of collecting both quantitative and qualitative data on the various outcomes and impact level measures in strict compliance with USDA and ACDI/VOCA Monitoring and Evaluation Policy as well as the FEED-III-Project evaluation plan. The survey also employed the ACDI/VOCA's Gender First Framework to ensure that the collected data will be able to generate knowledge and inform the learning approach and operations in order to achieve the best results for men, women, boys and girls. Since this is a baseline survey, most of the project outcome indicators are addressed through the survey questions, i.e. quantitative dominant qualitative approach was applied for the baseline survey. The survey was designed in a manner that helps the project team and stakeholders understand conditions as they are at the beginning of the project so that the project can monitor, measure, document and share changes as the project progresses. Furthermore, the baseline results will inform management to take the necessary modifications to project activities and implementation approaches to ensure the greatest project success. Up on the completion of the baseline survey, the methodology can be replicated during the final evaluation of the project to assess changes in performance measures.

2.3. Sources and type of data for the baseline survey

Data for the baseline survey was generated both from primary and secondary sources with the purpose of triangulation to arrive at valid conclusions. This will serve as the basis for the effective implementation of the FEED-III project's specific objectives. The primary data for this baseline evaluation was generated using household survey (HH), key informant interviews (KIIs), focus group discussion (FGDs), in-depth personal interview (IDPI) and field observation (FO) from feed service providers, livestock producers, government personnel, agricultural extension workers, feed processors and enterprises in selected Woredas and Kebeles of the baseline survey. The use of multiple sources of data was one way of ensuring triangulation, i.e. to look at the problem [generating benchmark project performance indicators] from diverse perspectives as a way to cross-check accuracy of information.

On the other hand, for a better understanding of the FEED-III project, relevant secondary data was collected in relation to the project including FEED-I and FEED-II baseline reports, mid-term and final evaluation reports, FEED-III work plan, FEED-III result framework and all other relevant sources. Besides secondary data on overall feed management practices at national, regional and local levels, demand and supply of feed and forage, business and financial management of feed enterprises including relevant policies, strategies and reports related to the project activities and outcome areas have been reviewed. In the reviewing process, due attention was given to checking the validity, completeness and accuracy of the data generated from various sources.

2.4. Sampling techniques, sample size, and study site selection

As indicated in FEED-III project documents, the project's target populations ("the will be" beneficiaries) are estimated to 48,000 *smallholder farmers* in four regions⁶— Tigray, Amhara, Oromia, and SNNPR. In compliance with the ToR, the sample size for the survey was required to be large enough to permit statistical analyses and comparisons beyond the indicator numbers. Hence, DAB-DRT designed a sample size that confirmed to this requirement. In drawing the required sample size, factors such as target population size, required disaggregates (targeting groups *dairy, poultry, forage, and fattening*), confidence level, margin of error and sample selection approach were considered. The sampling design for the household survey followed a multi-stage sampling strategy that cascaded down from targeted regions to individual households (the ultimate unit of analysis) using stratified random sampling techniques.

Stage 1: Region Selection: Four Regions-Tigray, Amhara, Oromia and SNNPR-were selected purposively as project implementation regions stipulated in the project document.

Stage 2: Woreda selection: In order to select the sample woredas from each region, DAB-DRT in consultation with the FEED-III project team stratified the targeted project Woredas based on the agro-ecological settings⁷. Accordingly, the woredas were stratified into dairy, poultry, and fattening dominant mode of production.

A sample Woreda from each stratum in each region was then selected using simple random sampling technique (lottery method). As a result, four woredas namely, Toke Kutaye (Moist highland/fattening stratum), Shirka (Wet highland/dairy stratum), Mulo (Wet highland/dairy stratum), and Bosset (Dry mid highland/fattening stratum) were selected from Oromia region (Figure 1A); Aleta Wendo (Moist highland/dairy stratum), Misrak Badawacho (Moist highland/dairy stratum), Boloso Sore (Moist mid

⁶ At the time when the baseline survey was conducted, "the will be" project beneficiaries (direct or indirect) were not identified. Target respondents of the baseline survey are representative samples of the direct and indirect beneficiaries.

⁷ Hurni, H. (1998). Agro-ecological Belts of Ethiopia: Explanatory notes on three maps at a scale of 1:1,000,000. Soil Conservation Research Programme Ethiopia.

highland/fattening stratum), and Bonke (Moist mid highland/fattening stratum) were selected from SNNPR (Figure 1B); Adiet (Wet mid highland/fattening stratum), Lay Gayent (Wet highland/fattening stratum), Guangua (Wet mid highland/dairy stratum), and Awabel (Wet mid highland/fattening stratum) were selected from Amhara region (Figure 1C); and Tsegede (Moist lowland/fattening stratum), Alamata (Dry mid highland/fattening stratum), Tahitay–maychew (Dry highland/dairy stratum), and Hintalo Wajirat (Dry highland/fattening stratum) were selected from Tigray region (Figure 1D) (see also Annex 1 for agro-ecological settings and the mode of production for all the selected stratum of each Woreda in each region). Once the Woredas were selected from each stratum, the number of respondents in the sample woredas were determined using population proportion to size (PPS) method, the size being the total number of population in the Woreda (Table 1) which was based on the recent population projection (Central Statistic Authority, 2013)⁸.

Stage 3: Kebele selection: Sample kebeles were selected from each sample Woreda using simple random sampling technique (lottery method). Considering time and cost, three kebeles were selected from each sample Woreda totaling 48 sample Kebeles in the four regions. While selecting the Kebeles, two major points were taken into consideration. First, urban Kebeles were purposively excluded since they do not fit the study purpose. Second, rural Kebeles with similar project interventions have been excluded from the list of random selection. The number of sample respondents in each Kebele was determined using PPS method, size being the total number of population in the Kebele.

Stage 4: Household selection: In order to select sample households from each selected Kebele, fresh list of “the will be” beneficiary households from the Kebele city administration was used. Once the final list of households was obtained from each kebele, sample households was selected using systematic random sampling technique using random table, i.e. once the population size of each Kebele and the planned number of sample respondents were determined, the total number of population in the Kebele was divided by the number of sample respondents to get the sample interval. Then, every i^{th} household between one and the first sampling interval was randomly selected.

Sample size determination: Considering the 48,000 agriculture-dependent households within 10 miles or less of union-made feed as target population, the sample size determination formula, assuming smallholder farmer households in the potential project areas were slightly heterogeneous, was



Where, N = Total target population (48,000)

n = sample size needed (1650)

$DE = 2.5$ = Design effect; to accommodate possible heterogeneity in target population, resulted from

-
- Two stage sampling,
 - Difference in livestock and poultry stocks,
 - Difference in distances from union-made feed stock/processing sites,
 - Difference in benefiting from other project interventions,
 - Difference in agro-ecological zones.
-

⁸ Central Statistical Agency (CSA). (2013). Federal Democratic Republic of Ethiopia (FDRE). Population projection of Ethiopia for all regions: At Wereda level from 2014 – 2017. Addis Ababa, Ethiopia.

ME = acceptable error (the precision) 4% (0.04); [ranges from 1% to 5% in majority of the applied researches]

Z = Z score for specified confidence level $(1-\alpha) * 100\%$. = 1.96 confidence level (@ 95 %)

P = population proportion = 0.5 (an estimate for the likelihood of participation in FEED-III)

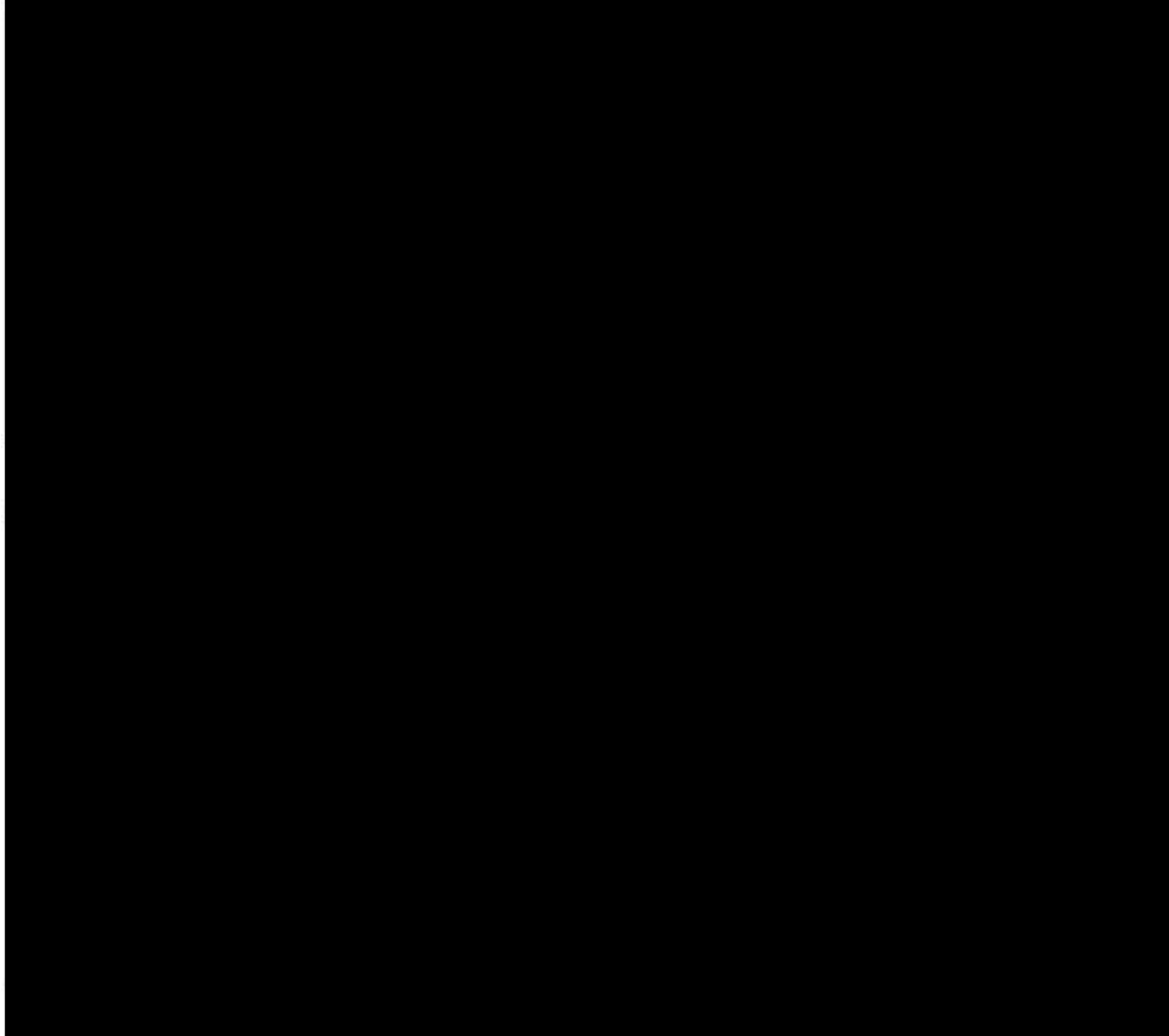


Table 1 Sample proportion by region

Region	Woreda	Sample Size	Proportion (%)
Tigray	Tsegede	96	23.36
	Alamata	79	19.22
	Tahitay Machew	94	22.63
	Hintalo Wajirat	143	34.79
sub total		412	24.97
Amhara	Lay Gayint	113	27.36
	Guangua	120	29.06
	Yilmana Densa	115	27.85
	Awabel	65	15.74
sub total		413	25.03
Oromia	Toke Kutaye	106	25.73
	Shirka	145	35.19
	Mulo	32	7.52
	Boset	130	31.55
Sub total		413	25.03
SNNP	Aleta Wondo	125	30.34
	Misrak Badawacho	52	12.62
	Boloso Sore	134	32.52
	Bonke	101	24.51
Sub total		412	24.97
Grand Total		1650	100.00

2.4. Methods of data collection

2.4.1. Household survey

Household survey data was collected by electronic data collection template designed by Census and Survey Processing System (CSPro). Once the template was designed and tested on windows, it was then uploaded into tablets to collect the household data electronically. DAB-DRT'S Statistician and data manager was in charge of designing the e-data collection template and data processing (editing, coding and cleaning). The survey primarily focused on generating quantitative data on but not limited to

- household socio-economic data pertaining to livestock farmers in the project zone of influence;
- baseline values for contextual, outcome and impact level performance indicators;
- gaps and weaknesses in feed manufacturing supply chains in each of the 4 project areas including feed regulatory framework;
- innovative feed and forage production systems that promote smallholder and market resilience;
- feed and forage production capacity gaps, sector policy constraints and organizational weaknesses related to feed manufacturing and feed distribution supply chains;
- activities that can act as catalysts in developing sustainable forage production systems that can facilitate on-farm feeding practices;
- opportunities for collaborative learning and action along the feed value chain that can foster livestock production systems change; and

- constraints in maximizing beneficial use of available feed resources among livestock and poultry smallholder farmers (see Annex 2).

2.4.2. Key Informant Interviews (KIs)

DAB-DRT employed key informant interviews to generate relevant qualitative information regarding the baseline evaluation with selected key individuals with information and knowledge about the topic of the survey. The interviewed key informants or experts were from MoAL, FCA, EMDIDI, AFIA (Table 2). In view of this, the choice of key informants was based on their position, experience or responsibilities to provide information about facts, attitudes, beliefs and experiences regarding FEED-III project objectives. A total of 40 KIs (Table 2) were interviewed in selected Woredas (See Annex 3A to Annex 3D).

Table 2 List of key informants for the baseline survey

Type of KIs	Level of KIs	Number of KIs
Federal Ministry of Agriculture and Livestock (MoAL)	National	1
	Regional	4
	Zonal	16
	Woreda	16
Federal Cooperative Agency (FCA)	National	1
Animal Feed Industry Association (AFIA)	National	1
Ethiopia Meat and Dairy Industry Development Institute (EMDIDI)	National	1
Total		40

2.4.3. In-depth Personal Interviews (IDIs)

In-depth personal interviews were employed to add details to the qualitative project benchmark indicators which were not perceived or revealed by the participants in the FGD and household surveys. In close collaboration with the FEED-III project team representatives and local officials, our supervisors and qualitative data collectors selected informants for IDIs which included Feed manufacturing unions/cooperatives, Feed Ingredient Suppliers, Agro-dealers, Forage Nursery Enterprises and Livestock Development Agents (see Table 3). However, it was difficult to reach forage nursery enterprises and feed ingredients suppliers mainly due to the absence of these actors in the Woredas. As a result, a total of 62 IDIs were interviewed for the baseline survey (see Annex 4a to annex 4F).

Table 3 List of IDIs for the baseline survey

Type of IDIs	Level of IDIs	Number of IDIs
Union Feed Manufacturing Unit Manager	Zone/Wereda	16
Private actors (Agri-Input Dealers)	Zone/Wereda	16
Forage Nursery Enterprises	Wereda	3
Feed Ingredients Suppliers	Wereda	3
Woreda Cooperative Promotion Agency	Woreda	8
Development Agents	Wereda/Kebele	16
Total		62

2.4.4. Focus Group Discussion (FGDs)

With the help of this method, DAB-DRT obtained households insights, attitude, perceptions, beliefs, feelings and experiences of participants (different group clusters) about livestock and poultry feeding systems, practices and their ramifications (availability, marketing and business development, technology adopted, indigenous innovative feeding practices, marketing system etc.). The FGDs were conducted in groups of 8 to 15 FEED-III project potential [direct and indirect] beneficiaries focusing on the baseline objectives including feed management practices, supply and demand side of feed and forage inputs, business and financial management of feed enterprises, opportunities and challenge of feed management, access to and use of feed and forage inputs, and alternative sources of feed for livestock. In consultation with local level government offices, the FGD participants were selected purposively to represent adult men, women, and youth feed growers and dairy and poultry producers thereby ensuring representation of all modes of production. In undertaking the FGDs, each FGD session was guided by experienced facilitators and research assistants in selected Woredas and Kebeles assisted by note takers who were able to simultaneously speak the local languages and comprehend the socio-culture contexts of the selected regions/Zones/Woredas (see Annex 5). A total of 20 FGDs (five in each Woreda/Kebele) was conducted with the listed groups of FGD participants (Annex A1).

2.4.5. Direct/field observation

In order to triangulate data from other sources, direct/field observation was carried out in the selected Woredas/Kebeles to document observable facts before the implementation of FEED-III project in the project sites. In collaboration with project staff, government offices, development agents and other relevant individuals, each Kebele was observed using a checklist (see Annex 6). The observation results focused on the documentation of feed production, marketing, transportation, management, availability and accessibility of infrastructural facilities that can be opportunities or constraints for the implementation of the FEED-III project over the coming three years. In other words, the field observation focused on *[forage production, communal grazing areas, animal fattening, dairy processors, feed market places, feed processors, poultry sites, on-farm innovative feeding practices, multi-purpose unions/cooperative based-enterprises, indigenous and adoptive forage management practices...etc.]*, which offered valuable insights for the collection of additional facts for benchmark performance indicators. Therefore, the observed cases were documented in the form of photographs and used to underpin data from other sources of the baseline survey.

2.5. Ethical considerations (survey ethics, confidentiality, and ethical approval)

In order to undertake the baseline survey, FEED-III-project-technical team facilitated DAB-DRT survey permit from Regional Bureaus and Woredas for collaboration letter to conduct the data collection in selected 16 FEED-III project Woredas. The country being under state of emergency, it was vital that before conducting the field data collection, all field supervisors, research assistants and enumerators undertook discussions with the concerned bodies to ensure that the later were made aware of the project and data collection can proceed with minimal interference. In conducting the baseline survey, DAB-DRT has established clear intentions and procedures to assure the privacy of respondents and the confidentiality of the information they provide. As a result, verbal informed consent was obtained from each respondent. The respondents were given the right to refuse or to take part in the survey as well as to withdraw at any time during the interview. Moreover, culturally sensitive and unacceptable questions were avoided. The questions were verified during the pre-testing of tools and privacy and confidentiality was maintained throughout the study. In general, the baseline survey in all sample Kebeles/offices was conducted with due

consideration of the basic ethical principles of respect for humans, beneficence and justice. DAB-DRT also ensured that the enumerators selected to work in each specific project Kebele were fluent in the local language of the target area or district and had experience in household data collection. Interviewers, supervisors and the entire survey team were responsible for assuring that the survey reports, questionnaires and guiding questions/checklists were kept confidential.

2.6. Data processing

Prior to the data analysis, all the collected data from primary and secondary sources were checked for quality and consistency. The team supervisors were in charge of checking the quality of the data collected from the field. Finally, at the office level, all the collected data was cross-checked with different sources and only refined and reliable information were used for the baseline evaluation analysis. Once the data quality was assured, the data was made ready for analysis by the team leader and experts using different methods. The collected data was edited both on the field and at the head office which was further cleaned using CSPPro and SPSS/STATA to verify the validity of assigned values as well as logical consistency. Cross-tabulations and frequencies were generated to check for inaccurate (outliers or other errors), and incomplete data (missing values) and to see if the data was consistent and logical. The data cleaning process enabled DAB-DRT to determine inaccurate, incomplete or unreasonable data which improved the quality of the data through correction of detected errors and omissions. Two types of data cleaning techniques were used: basic and advanced. Basic data cleaning involved running simple frequency counts for each variable to check for mislabeled, out-of-range or system-missing data with corrections being made when necessary. Advanced data cleaning involved using cross-tabulations to check for internal consistency on the linked questions. Finally, the cleaned data set was saved as a "READ ONLY" format for documentation. This READ ONLY version was shared with the client and the analysis was carried out on a copy of the document (i.e., another copy was used to prepare the report). The qualitative data was also coded and organized and saved as a "READ ONLY" format for further analysis.

2.7. Methods of data analysis interpretation and report write-up

Once the data management, transcription and verification processes were completed and the data was saved as a "READ ONLY" format, DAB-DRT study team commenced the data analysis assisted by data analysis software packages such as SPSS® Version 23, Stata® 14, and XLSTAT®16 interchangeably. DAB-DRT also used Arc-GIS®10.2 for mapping the study sites. Results from the baseline survey were analyzed, summarized and presented in multiple statistical forms including *descriptive statistics*, (mean, mode, median, standard deviation, minimum, maximum, range) and detailed tabulation of results along the eight baseline objectives in the form of percent, number, ratio, indices value, and amount. The statistical outputs were presented in the form of figures, frequency tables and radar diagrams. On the other hand, the qualitative information was thematically analysed with a focus on description of information, classification and making connections, i.e. three key qualitative analysis strategies. The qualitative information was meant to support findings from the household survey which cannot be explained quantitatively. In this case, key points were coded and organized into categories and subcategories that represented further analysis based on observed information which was used to strengthen the interpretation of the quantitative findings.

2.8 Limitations and challenges

Even though the FEED-III project's baseline evaluation was strong enough in terms of methodology used, sources of data generation, field data coordination and data management, data analysis and reporting the results, it was not without challenges. One of the critical challenges that hampered the evaluation study relates to the unwillingness of sector offices (unions and cooperatives) and lack of cooperation at field level. The other challenge was the physical distance between the study Woredas and the unions as well as cooperatives, mainly in Tigray and Oromia, which needed additional time to visit both the Unions and cooperatives. The country being under state of emergency, the need for internet connections and communication was partly a challenge. The volume of data and the time allocated to submit the draft report was quite unbalanced. In spite of all these challenges, however, the baseline evaluation team exerted maximum efforts, with unreserved support from FEED-III project team, the staff of DAB-DRT have helped to address the problems and to offset the potential limitations by employing alternatives mechanisms with a clear purpose of achieving the study objectives.

3. Results and discussion

3.1. Chapter overview

This section of the report describes the key findings from the FEED-III baseline evaluation study. In doing so, the first part focuses on the description of the socio-economic and demographic profiles of respondents by region. It also highlights the surveyed households' major livelihood activities and income sources. The second section will discuss the key findings regarding dairy production and the dairy value chain. The third section will present the results from animal fattening and the animal fattening value chain. The fourth section will discuss results from the poultry production and the poultry value chain. The last section will present the results of forage production and the forage value chain. Cross-cutting issues including gender, household nutrition and environment will be part of this section. In the course of the discussion, emphasis is placed on presenting the key findings from the household survey as seen from the mode of production and value chain perspectives and complementing these findings with qualitative information generated from the selected actors and institutions for the FEED-III baseline evaluation study.

3.2. Socio-economic and demographic profiles of respondents

The baseline survey planned to interview 1650 households in four regions of Ethiopia. Thus, a total of 1648 households were surveyed with a non-response rate of 2 (0.12 %). In this case, both Amhara and SNNPR had 100 % response rate whereas only two respondents (one in Tigray and one in Oromia) did not respond to the survey questionnaire. Except in Oromia, representation of male-head households was over 90 %. Female-headed households for Oromia was 46 (11.2%) (Table 4). Even though the sample was taken randomly in 48 Kebeles, female-headed households were reported to be low. This could be partly due to the nature of the livelihood activities which require access to and control over the productive resources which in the survey areas were mostly owned by male head of households.

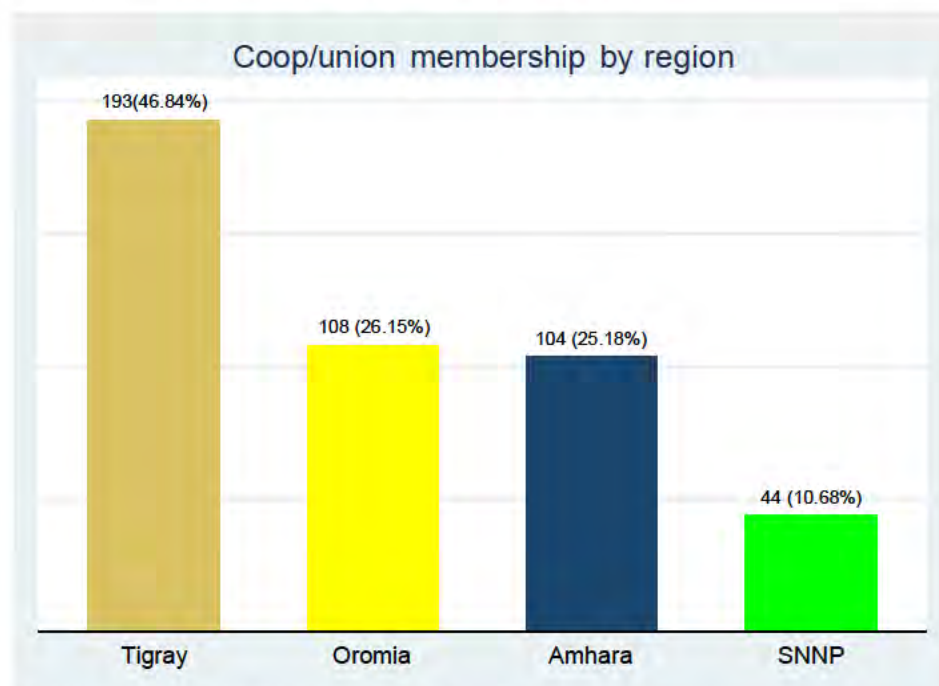
Table 4 Respondent composition by region and sex (N=1648)

Region	Sex	Frequency	Percent
Tigray	Male	372	90.5
	Female	39	9.5
Amhara	Male	391	94.7
	Female	22	5.3
Oromia	Male	366	88.8
	Female	46	11.2
SNNP	Male	382	92.7
	Female	30	7.3
Total	Male	1511	91.7
	Female	137	8.3

Source: FEED III baseline survey (2018)

Cooperative or union membership by region

As shown in Figure 2, 193 (46.84 %) in Tigray, 108 (26.15%) in Amhara, 104 (25.18%) in Oromia and 44 (10.68%) in SNNPR are members in primary cooperatives. The figure shows a relatively larger number of households in Tigray region are involved in cooperative/unions while the figure is small for SNNPR. Thus, FEED-III can take this as entry point to work with cooperatives/union to help address the access to and use of feed resources for livestock production in the project sites.



Source: FEED III baseline survey (2018)

Figure 2 Households membership into unions/cooperatives by AEZ

Demographic profiles of respondents

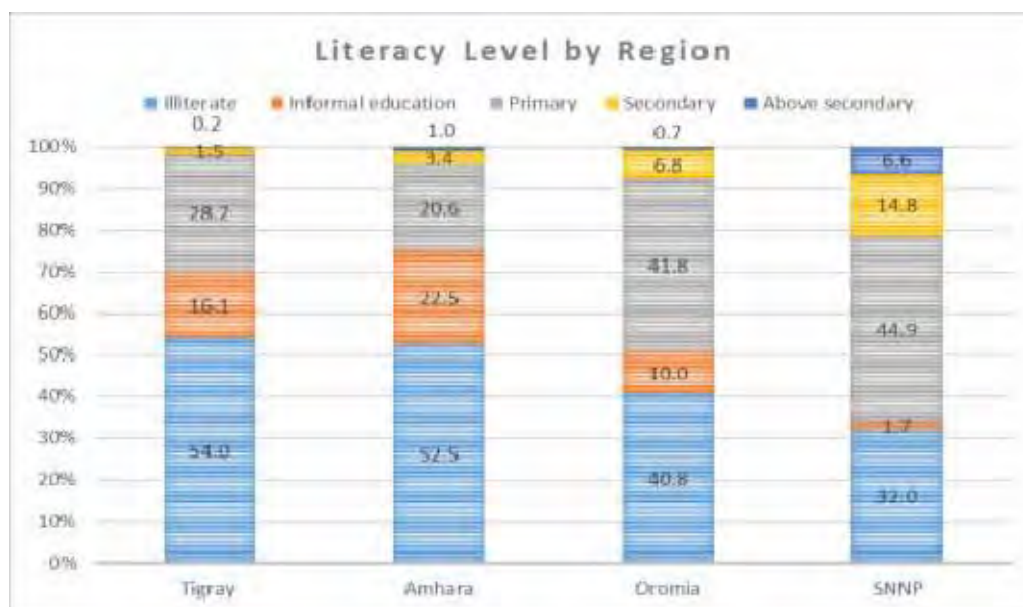
The distribution of household heads by gender is presented in Table 5 below. A total of 1511 (91.7%) are male-headed households and only 137 (8.3%) are female headed-households. This is because in many parts of the country, households are led by males signifying the patriarchal (male-dominated) nature of Ethiopian society. In terms of the marital status, the largest portion-1505 (91.32%)-are married and only 20 (1.2%) are unmarried households (Table 5). Education is one of the crucial factors for skills development and enhancing decision-making capacities enabling individuals to take part in viable livelihood activities. However, the data suggest that most of the respondents did not attend formal education. A total of 739 (44.84%) participants are illiterate (Table 5). Only 558 (33.86%) participants completed primary level education (grade 1-8) and even a smaller number-109 (6.61%) - have completed secondary school (Table 5). The number for those who have been educated above the secondary level is a meager 35 (2.12%) (Table 5).

The literacy level for surveyed households by region is presented in Figure 3. As evidenced there, 54 %, 52.5 %, 40.8 %, and 32 % of the sample household in Tigray, Amhara, Oromia, and SNNPR respectively are illiterate. The proportion of informal education accounts for 22.5% in Amhara, 16.1% in Tigray, 10% in Oromia and an insignificant number in SNNPR. The disparity in the figures may be due to the prevalent role of church education in both Amhara and Tigray regions. On the other hand, 45%, 42%, 28.2%, and 20.6% of households have completed primary schooling in Oromia, SNNPR, Tigray, and Amhara, respectively (Figure 3).

Table 5 Demographic profiles of respondents (N=1648)

House head demographic characteristics	Category	Frequency	Percent
Sex	Male	1,511	91.69
	Female	137	8.31
Marital status	Single	20	1.21
	Married	1,505	91.32
	Widowed	68	4.13
	Divorced	31	1.88
	Separated	24	1.46
Level of Education	Illiterate	739	44.84
	Informal education	207	12.56
	Primary	558	33.86
	Secondary	109	6.61
	Above secondary	35	2.12

Source: FEED III baseline survey (2018)



Source: FEED III baseline survey (2018)

Figure 3 Household survey response rate in %

Descriptive statistics of demographic profile of the respondents

From the descriptive statistics, the mean average age of the surveyed respondents is 45 years (n=1648). In terms of region, both Amhara and Tigray regions have the same average age as the mean average age for the whole sample (45 years). The case in Oromia is nearly the same as those in other regions (Table 6). The household head age distribution is summarized in Figure 4. About 33.3%, 31.4 %, 28.3 %, and 7 % fall between 30 to 40 years, 41 to 50 years, over 50 years and less than 30 years, respectively. Those household heads in the age category of 30 to 40 years' range from 37.1 % in Oromia to 30.7 % in Tigray (Figure 4). The average family size was 6 in all regions (n=1648), which was slightly greater in SNNPR than those in other regions (Table 6). The regional disparity in family size may be due to samples drawn from the most densely populated Zones of SNNPR including Wolaita, Hadiya, Sidama and Gamo Gofa (see CSA, 2007)⁹.

Following the CSA (2007) classification of household members as under age (0-17 age), economically active (18-64 age) and old age (above 65 age), DAB-DRT generated data from all regions. As a result, 53.8 %, 43.7 %, and 2.5% of the sample population are economically active and the rest are inactive or dependent (Table 6). Among regions, a similar pattern can be observed for the economically active age groups except in Tigray region for which the figure stands at 49.4 %. In general, the figures suggest that over half of household members of sampled households fall within the working/economically active age group (16-64) (CSA, 2013¹⁰) which can reasonably be expected to contribute towards the active involvement of the beneficiary households in project activities.

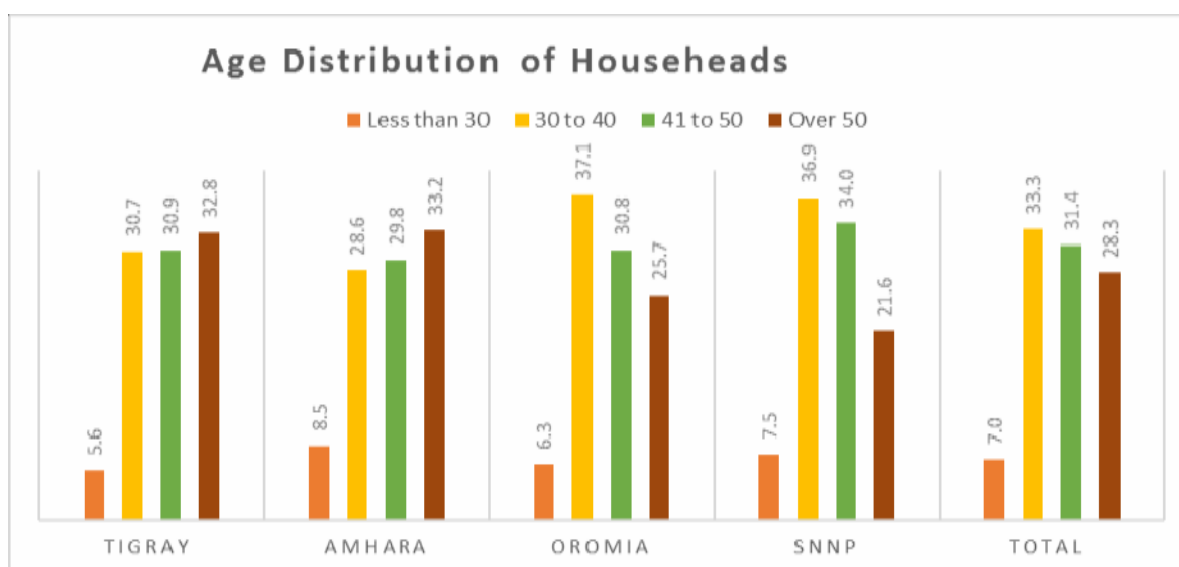
9 CSA. (2007). Summary and statistical report of population and housing census: Population size by age and sex. Addis Ababa, Ethiopia.

10 Central Statistical Agency (CSA). (2013). Federal Democratic Republic of Ethiopia (FDRE). Population projection of Ethiopia for all regions: At Wereda level from 2014 – 2017. Addis Ababa, Ethiopia.

Table 6 Age, family size, household members role, land owned, and cultivated by region (N=1648)

Variable	Region				
	Tigray	Amhara	Oromia	SNNP	Total
Average age (years)	46	46	45	44	45
Average HH size	6	5	6	7	6
Proportion of members by productive ability					
Under Age	47.9	42.8	43.5	41.0	43.7
Econ. Active	49.4	54.4	54.6	56.5	53.8
Old age	2.7	2.8	1.9	2.4	2.5
Land owned (ha)	1.2	1.6	1.8	1	1.4
Land cultivated (ha)	1.2	1.6	1.6	0.8	1.3

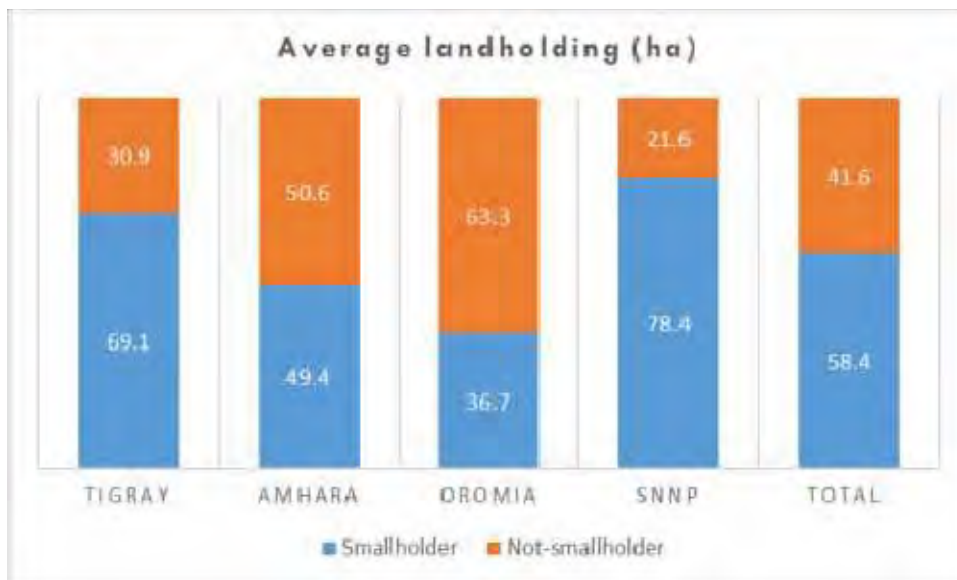
Source: FEED III baseline survey (2018)



Source: FEED III baseline survey (2018)

Figure 4 Household head age distribution by region

With regards to landownership, the average reported owned land was 1.4 hectares for all regions (n=1648). The average owned land ranges from 1.8 hectares in Oromia to 1 hectare in SNNPR (Table 6). On aggregate, 962 (58.73 %) of households are smallholder (less than 1 ha of land) while 686 (41. 62%) are not smallholders (above 1 ha of land) (Figure 5). The cultivated land size is 1.3 hectares across all regions. The average cultivated land ranges from 1.6 hectares both in Amhara and Oromia to 0.8 hectare in SNNPR (Table 6).



Source: FEED III baseline survey (2018)

Figure 5 Proportion of smallholder by region

3.3. Household livelihood activities and income sources

Participation in livestock production

Surveyed households' participation in crop, dairy, animal fattening and poultry production is presented in Table 7. Most of the surveyed households participated in crop production with an estimated 37,643.50 annual incomes across all regions. With regard to dairy production, 253 (61.4%), 219 (53.5%), 215 (52.1%), 139 (33.7%) farmers are involved in dairy production in SNNP, Oromia, Amhara, and Tigray, respectively. On average farmers reported to have earned 4,878.60 birr from dairy production. On animal fattening, 34.1% of households are engaged in fattening. The smallest number for participation in animal fattening was in Tigray region (14.35%). On average, farmers earned 37,377.50 birr from animal fattening. Over 60 % of sampled households engaged in poultry production in Amhara region and only 43.8 % in Oromia. The annual estimated income from the poultry production is birr 3,292.60 (Table 7).

Table 7 Smallholders participation in production and estimated annual income earned by region

Occupation	Participation	Region				Income (Birr)
		Tigray	Amhara	Oromia	SNNP	
Crop production	Frequency	405	399	407	402	37,643.50
	Percent	98.3	96.6	98.5	97.6	
Dairy production	Frequency	139	215	219	253	4,878.60
	Percent	33.7	52.1	53.0	61.4	
Animal fattening	Frequency	59	141	119	126	37,377.50
	Percent	14.3	34.1	28.8	30.6	
Poultry production	Frequency	196	253	181	194	3,292.60
	Percent	47.6	61.3	43.8	47.1	

Source: FEED III baseline survey (2018)

Livestock ownership

With regards to livestock ownership, 2.4 was the average male indigenous cattle in all regions. The ownership of male indigenous cattle was the same in all regions except in SNNPR. There, the number fell slightly to 2 male indigenous cattle (Table 8). In relation to male crossbreed cattle ownership, nearly the same pattern was observed in all regions. On female indigenous cattle ownership, 2.13 was the average value for all regions. Female indigenous cattle ownership ranges from 2.6 in Amhara to 1.8 in SNNPR. 4.74 was the average sheep and goat owned across all regions with the maximum of 7 in Tigray region and a minimum of 2.4 in SNNPR. An average of 4.17 indigenous chickens is owned in all regions. Indigenous chicken ownership ranges from 7.2 in Amhara to 1.2 in Tigray (Table 8). Farmers in all regions owned on average 1.63 equines (n=1648). Equines ownership ranges from 1.9 in Oromia to 1.2 in SNNPR (Table 8). Regarding the average number of total livestock owned, 10.79 was the mean ownership with estimated sales value of 32,798.52 for all regions. The highest number for livestock ownership was 13.04 livestock in Tigray with estimated sales value of 36,667.12 and the lowest was 6.7 livestock in SNNPR with the sales value of 18,435.29.

Table 8 HH Average livestock ownership by breed

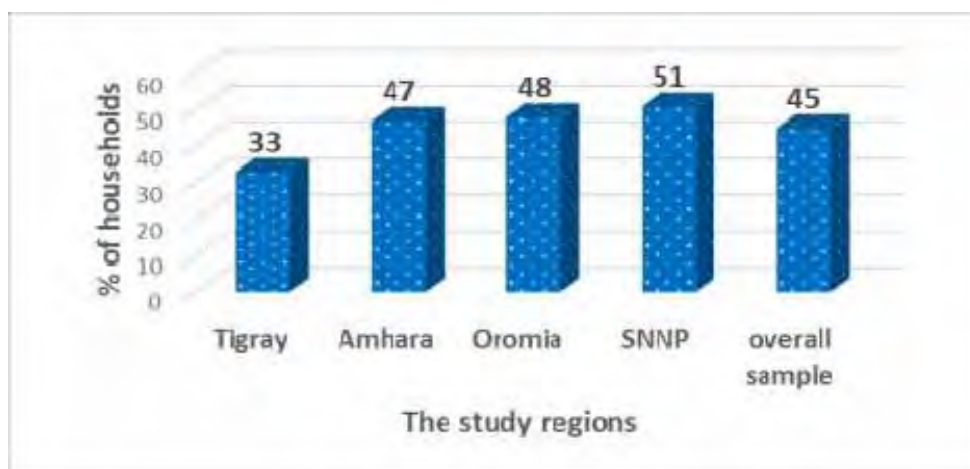
Livestock Type	Breed	Region				Total
		Tigray	Amhara	Oromia	SNNP	
Cattle Male	Indigenous	2.6	2.6	2.6	2	2.46
	Crossbreed	0.15	0.26	0.4	0.1	0.23
Cattle Female	Indigenous	2.44	2.6	2.3	1.8	2.13
	Crossbreed	0.14	0.3	0.6	0.5	0.40
Sheep & Goats	Indigenous	7.0	3.7	5.2	2.4	4.74
	Crossbreed	0.03	0.01	0.2	0.09	0.08
Chicken	Indigenous	2.12	5.5	7.2	2.74	4.17
	Crossbreed	4.96	2.2	1.4	1.8	2.73
Equines		1.53	1.5	1.9	1.2	1.63
Total	No	13.04	12.2	11.7	6.7	10.79
	Value	36,667.12	34,122.952	41,974.883	18,435.29	32,798.52

Source: FEED III baseline survey (2018)

3.4. Dairy production and value chain

Dairy production

Dairy production is becoming a common enterprise in rural areas. Milk is sold in peri-urban centers and other milk products are sold in urban centers. In FEED-III project regions, 45% of the households practiced dairy production (Figure 6). Among the project regions, the highest proportion of households engaged in dairy production were found in SNNPR (51%) and the lowest proportion was in Tigray (33%). In SNNPR, higher proportion of rural households engaged in dairy production were located in Sidama (78%) and Hadya Zones (71%). This is mainly because of high consumer demand for milk in bigger towns such as Hawasa in Sidama Zone and Hosana in Hadya zone. In Oromia region, higher proportion of households engaged in dairy production were located in Finfine Zuria Zone (64%) followed by Arsi Zone (50%). Finfine Zuria Zone is a rural area located in close proximity to the capital city, Addis Ababa (a maximum of 40km radius) and supplies large quantities of milk to the city. There are more than 10 intermediaries who collect more than 10,000 liters of milk every day from these rural areas found within a radius of 100km from Addis Ababa city including Finfine Zuria Zone. East Gojam (66%) and South Gonder (49%) were the two Zones with the highest proportion of households engaged in dairy production in Amhara region. Southern Tigray (62%) and Western Tigray (36%) Zones are also known for their dairy production practices. This is because irrigation based farming is common in these zones and feed availability better supports dairy production.



Source: FEED III baseline survey (2018)

Figure 6 Household engaged in dairy production in the FEED-III project regions, 2018

Surveyed households keep both indigenous and crossbred dairy cows. In the FEED III project regions, 36% of the households owned indigenous lactating cows in the last 12 months. Out of these, 24% owned only one lactating cow while 9% owned two and 3% owned more than two. On the other hand, the proportion of households which owned crossbred lactating cows was only 10%, out of which 8% owned only one lactating crossbred cow while 1.5% owned two and 0.5% owned more than two. These low figures can be explained by the scarcity in the supply of crossbred cows and their high purchasing price. It was estimated that the price of a pregnant heifer/cow costs anywhere between 30,000 and 45,000 Birr making it unaffordable for smallholder farmers.

Milk productivity and lactation length

As provided in Table 9, the average milk productivity of indigenous milking cows is 1.95 liters per day per cow (ranging from 1.37 – 2.53 liters per day per cow) while it is 5.25 liters per day for crossbred cows (ranging from 3.99 – 6.52 liters per day). There is variability among the regions in terms of milk productivity for both indigenous and crossbred cows. The average productivity of crossbred cows was highest in SNNP region (7.46 liters per day) and lowest in Tigray region (3.67 liters per day). In urban centers where there is controlled breeding, better feed and overall better management practices, crossbred cows often provide more than 10 liters of milk per day. However, in rural areas, the productivity of crossbred cows is lower due to inadequate management practices and less attention provided for maintaining exotic breed quality. In addition to high costs, farmers in rural areas are not able to obtain the required quality and quantity of concentrate feeds. Moreover, less efficient AI services and inadequate availability of purebred bulls have long been constraints to improving genetic potentials of local cows in rural areas.

Table 9 Average quantity of milk produced from indigenous and crossbred cows in FEED III project regions, 2018

Region	Indigenous cows		Crossbred cows	
	n	Average milk (liters/day/cow)	n	Average (liters/day/cow)
Tigray	125	1.80	15	3.67
Amhara	177	1.76	32	4.36
Oromia	147	2.00	64	4.24
SNNP	152	2.25	53	7.46

Source: FEED III baseline survey (2018)

Lactation length, which is the number of months on which dairy cows are in milk, varies from one agro-ecology to another. As revealed in Table 10, indigenous cows seem to have longer lactation length in mid-altitudes (7.5 months) and lowlands (7.2 months) than highlands (6.0 months). On the contrary, crossbred cows seem to be comfortable in the highlands (7.3 months) than in other agro-ecologies. This might be associated with feed availability. Relatively, there is better feed availability in the highlands which can support high feed requirements of crossbred cows. On the other hand, indigenous cows can still keep on performing under stressed feed and management conditions in the later lactation months.

Table 10 Lactation length of dairy cows in various agro-ecologies FEED III project regions, 2018

Agro-ecology	Indigenous cows		Crossbred cows	
	n	Average lactation period (number of months)	n	Average lactation period (number of months)
Highland	196	6.0	196	7.3
Midland	455	7.5	446	6.2
Lowland	92	7.2	92	5.9
Overall	743	7.1	734	6.4

Source: FEED III baseline survey (2018)

Dairy cows feeding and management practices

Feed type and availability depends on the nature of the agro-ecology which dictates vegetation cover and the nature of resources. In all agro-ecologies, crop residue has become the most common source of feed for dairy cows followed by green feeds which include forages, grasses, hay and silage. For instance, as revealed in Table 11, 80% of the households in the highlands have prioritized crop residue as the most common source of feed followed by green feeds (64%). The same trend holds true in the midlands where 78% of the households rated crop residue as a major source followed by green feeds (68%). Even in the lowlands, crop residue is the most important source of feed for 96% of the households followed by green feeds (24%). When overall sample is considered, 81% of the households have indicated crop residue as the most common feed source for dairy cows followed by green feeds (62%).

As a consequence of human population pressure over long periods, farmlands have started to expand encroaching upon grazing lands and rising to steep hilltops. This has contributed to the expansion of crop production and consequently availability of more crop residues. Moreover, crop residue is relatively the cheapest feed source compared to hay, forages and concentrates. Decline in grazing and hay lands has exacerbated feed scarcity in the country, in general, and in FEED III project regions in particular. Because of this, farmers conserve residues of various types of crops in all agro-ecologies to use as major source of

livestock feed, including dairy cows. The second essential source of dairy cow feed was reported to be green feeds, which is commonly available during wet seasons. Cut-and-carry is the common practice of supply practiced by harvesting greens from borders of farmlands, weeds, tinning of maize/sorghum, forage plants and leaves from pruning. Apart from this, moisture availability in the highlands and mid-altitudes has contributed to easy accessibility of green feed and hay resources. Industrial by-products are often raw materials for blending concentrate feeds which include oilseeds cake, molasses, wheat middling, maize and soya bean flour and others.

Similar to the trend across all agro-ecologies, crop residue has been identified as major feed source in all the FEED III project regions. The findings show that 96% of the households in Tigray region, 85% in Amhara, 67% in Oromia and 79% in SNNP have prioritized crop residues as a major feed source for dairy cows (Table 12). However, green feed was reported to be the major source of feed for almost all (98%) of the households in SNNP region. SNNP region is endowed with ample perennial plant resources which are also a source of green feed for dairy cows often stall-fed around homesteads. Greens from pruning and thinning of perennials and annual plants are major sources of feed in a cut-and-carry system of supply.

Table 11 Feed sources of dairy cows in various agro-ecologies of FEED III project, 2018

Feed sources	Highland		Midland		Lowland		Total	
	n	%	n	%	n	%	N	%
Concentrate feed	15	8	62	14	4	4	81	11
Agro-industrial by-products (Wheat bran, Nug Cake etc.)	58	30	125	28	4	4	187	25
Other high quality feed (Atela, grains)	59	30	123	27	19	21	201	27
Green forage, grass, hay, silage	126	64	311	68	22	24	459	62
Crop Residue (Teff straw, wheat straw, maize Stover, and others)	157	80	354	78	88	96	599	81
Other	2	1	26	6	9	10	37	5

Source: FEED III baseline survey (2018)

Table 12 Feed sources of dairy cows in the FEED III project regions, 2018

Feed sources	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	N	%
Concentrate feed	11	8	19	10	9	5	42	20	81	11
Agro-industrial by-products (Wheat bran, Nug Cake etc.)	6	4	38	19	69	35	74	35	187	25
Other high quality feed (Atela, grains)	28	20	59	30	55	28	59	28	201	27
Green forage, grass, hay, silage	19	14	150	77	86	43	204	98	459	62
Crop Residue (Teff straw, wheat straw, maize Stover, and others)	133	96	166	85	134	67	166	79	599	81

Source: FEED III baseline survey (2018)

Feed preservation and storage practices

Farmers preserve feed resources in various ways. According to 85% of the overall sample households, the most common feed preservation technique was reported to be hay making (Table 13). Households in all agro-ecologies practice hay making. For instance, 83% of households practice hay making in the highlands and mid-altitudes. On the other hand, hay making has become the common practice of almost all the farming households (99%) in the lowlands. Green grass which is grown during the wet season is harvested and dried for hay making, to be fed in the dry season when there is feed scarcity. Hay can be stored either as heaps or in the form of bale. It has also become a source of income for some of the farmers who are located near vehicle roads. As perceived by farmers, hay income generated from a hectare of land could even be higher than the one obtained from sales of most of the cereals. Hay making is also the most common practice across FEED III project regions with a large proportion of farmers in Tigray (91%), Amhara (90%), Oromia (75%) and SNNP (85%) regions practicing hay making (Table 14).

Table 13 Type of animal feed preservation and storage practices in various agro-ecologies of the FEED III project sites, 2018

Preservation techniques	Highland		Midland		Lowland		Total	
	n	%	n	%	n	%	n	%
Hay making	162	83	377	83	91	99	630	85
Baling	29	15	58	13	4	4	91	12
Silage	15	8	75	17	0	0	90	12
Other	31	16	44	10	4	4	79	11

Source: FEED III baseline survey (2018)

Table 14 Type of animal feed preservation and storage practices in the FEED III project regions, 2018

Preservation techniques	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	N	%	n	%	N	%
Hay making	126	91	176	90	151	75	177	85	630	85
Baling	1	1	39	20	19	10	32	15	91	12
Silage	7	5	17	9	11	5	55	26	90	12
Other	13	9	13	7	48	24	5	2	79	11

Source: FEED III baseline survey (2018)

Equipment used for drinking and feeding

Dairy farmers use various types of equipment for drinking and feeding of cows. In all agro-ecologies of FEED III project, feeding trough is commonly used by 65% of the overall sample households followed by water trough (48%). Households in the highlands (75%) and midlands (66%) also use feeding trough for feeding their dairy cows. Apart from feeding and water troughs, 57% of the households in Tigray region have adopted the practice of using other apparatus such as plastic sheets and plates for feeding cows (Table 15). Apart from using water troughs, taking cows to rivers and water sources is also reported to be a common practice of farming households. In Amhara region, 55% of the households commonly used water troughs to provide water for dairy cows. In Oromia and SNNP regions, use of feeding trough is common for 83% of households. Using of troughs helps to minimize quality deterioration of feed and water at the time of service provision. What matters is the quality, design and hygiene of troughs to maintain supply of hygienic feed and water for dairy cows.

Table 15 Equipment used for drinking and feeding activities in various agro-ecologies, 2018

Equipment	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Feeding trough	46	33	94	48	166	83	173	83	479	65
Water trough	35	25	108	55	106	53	107	51	356	48
Others specify	78	57	58	30	41	21	38	18	215	29

Source: FEED III baseline survey (2018)

Physical and chemical treatment practices of feed

Various types of feed management practices are in operation in FEED III project sites. The most common method practiced by 67% of the overall sample households is crop residue treatment followed by cut and carry systems (65%) (Table 16). In the highlands, 66% of the households practiced crop residue treatment while 55% of the households adopted the same practice in the lowlands. In the midlands, cut and carry system is the most common practice for 70% of the households. In the regions, 53% of households in Tigray and 70% in Oromia practiced crop residue treatment (Table 17). On the other hand, cut and carry practice of feed supply is common in Amhara (71%) and SNNP (94%) regions.

One technique for adding value in crop residue is urea treatment which increases feed intake of dairy cows due to application of ammonia. It also minimizes wastage of crop residues by enhancing consumption by animals. Cut and carry system is common for collecting green feed from farm lands and carrying it home, a practice which is often practiced during the wet season. Because of limited availability, cut and carry method of feed supply is mostly provided to selected animals such as milking cows and oxen.

Table 16 Type of physical and chemical treatment of feed used for dairy cows in FEED III project agro-ecologies, 2018

Type of treatment	Highland		Midland		Lowland		Total	
	n	%	N	%	n	%	n	%
Cut and carry	110	56	331	73	45	49	486	65
Crop residue treatment	129	66	318	70	51	55	498	67
Nothing	7	4	5	1	9	10	21	3

Source: FEED III baseline survey (2018)

Table 17 Type of physical and chemical treatment of feed used for dairy cows in the FEED III project regions, 2018

Type of treatment	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Cut and carry	56	41	140	71	94	47	196	94	486	65
Crop residue treatment	73	53	130	66	139	70	156	75	498	67
Nothing	16	12	0	0	3	2	2	1	21	3

Source: FEED III baseline survey (2018)

Feeding practices of dairy cows

Households adopted various feeding practices for dairy cows. As illustrated in Table 18, 71% of the households practiced cut and carry system of supplying feed for dairy cows followed by rotational grazing (44%), a practice which is common in all types of agro-ecologies. Highlander households (61%),

mid landers (77%) and low landers (62%) practiced cut-and-carry system of feed supply to dairy cows. This system is also found across all regions where households in the FEED III project regions dominantly practiced cut and carry system. For instance, 61% of the households in Tigray, 83% in Amhara, 42% in Oromia and 94% in SNNP regions practiced cut and carry system of feed supply (Table 19). Since dairy cows are mostly managed around homesteads, cut and carry practice of feed supply is most preferable for farmers. Given the intensive management required for crossbred dairy cows, herding on grazing lands together with local cows is not advisable as it compromises milk productivity.

Table 18 Type of feeding practices in various agro-ecologies of FEED III project, 2018

Feeding practice	Highland		Midland		Lowland		Total	
	n	%	n	%	n	%	n	%
Cut and carry	119	61	351	77	57	62	527	71
Rotational grazing	86	44	208	46	30	33	324	44
Feeding of factory produced formulated feed	25	13	98	21	3	3	126	17
Mixed or balanced ration feeding	36	18	66	14	1	1	103	14
Other	1	0.5	34	7	16	17	51	7

Source: FEED III baseline survey (2018)

Table 19 Type of feeding practices across FEED III project regions, 2018

	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Cut and carry	84	61	162	83	84	42	197	94	527	71
Rotational grazing	24	17	122	62	57	29	121	58	324	44
Feeding of factory produced formulated feed	1	1	9	5	43	22	73	35	126	17
Mixed or balanced ration feeding	7	5	22	11	38	19	36	17	103	14
Other	32	23	1	0.5	18	9	0	0	51	7

Source: FEED III baseline survey (2018)

Access to trainings in dairy animal nutrition and management

To enhance production and productivity of dairy sector, farmers received trainings on improved dairy management practices. The trainings were, however, not accessible to most of the farmers. As provided in Table 20, only 14% from the overall sample households have had access to trainings. It was also recognized that men (15%) had better access to trainings than women (8%). In 83% of male headed households, the husband had more access to trainings on dairy management than wives (17%) (Table 21). Among the regions, the proportion of households who had access to trainings on dairy management was highest for SNNP (18%) and lowest for Tigray region (8%). In male headed households, 30% of wives in SNNP region had better access to trainings on improved dairy management than wives in other regions. Dairy cows in rural areas are mainly managed around homesteads where the involvement of women in management practices such as watering, feeding, cleaning and milking is considerable. Despite this salient fact, trainings and other capacity building opportunities are skewed towards providing more access to men than women. This may be due the fact that majority of women in the study area who dominate dairy production decisions including dairy training are found illiterate (44%) with cultural barriers to participate in off home activities like getting training. Women are busier with in-house activities than men. Women are

traditionally entitled to prepare daily family food, taking care of children and elders, shopping of family needs, manage livestock and milking cows, fetch fire wood and water. Moreover, traditionally there is a saying "women are for kitchen and men are for public appearance" and such a taboo could discourage them for attendance to training and public gatherings.

Table 20 Access of men and women to trainings on dairy management, 2018

Region	Men		Women		Total	
	n	%	n	%	n	%
Tigray	8	7	3	10	11	8
Amhara	26	15	3	12	29	14
Oromia	24	15	2	4	26	13
SNNP	32	21	5	9	37	18
Overall	90	15	13	8	103	14

Source: FEED III baseline survey (2018)

Table 21 Household members who received trainings on improved dairy management in the regions, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Husband	10	91	26	90	23	89	26	70	85	83
Wife	1	9	2	7	3	12	11	30	17	17
Another household member	0	0	1	3	0	0	0	0	1	1

Source: FEED III baseline survey (2018)

Even though different development organizations are involved in facilitating and providing trainings to farmers on improved dairy management practices, Office of Agriculture and Natural Resources at various levels plays the leading role in all regions. According to the findings of this study, 81% of the households attested that they received trainings through Office of Agriculture and Natural Resources (Table 22). NGOs and private enterprises are also involved in facilitating and providing trainings to the farmers in the dairy sector. Regarding regional variability, the involvement of Coops/unions in providing trainings to farmers on improved dairy management practices was higher in Tigray (27%) than in the other regions.

Table 22 Organizations who provided trainings to farmers on improved dairy management, 2018

Organizations	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Coop/Union	3	27	0	0	2	8	0	0	5	5
Private Enterprise	0	0	1	3	0	0	11	30	12	12
Office of Agriculture and Natural Resources	9	82	24	83	23	88	27	73	83	81
NGO	3	27	3	10	1	4	4	11	11	11
Other	0	0	3	10	0	0	0	0	3	3

Source: FEED III baseline survey (2018)

Milk selling practices in FEED III project regions

Since small-holder farming households are not strongly business oriented, they have limited experience in selling milk and milk products. Introduction of crossbred dairy cows is aimed at increasing the sale of milk especially by farmers located in close proximity to towns where there is high milk demand. The findings of the study, however, indicate that milk selling experience is still limited among smallholder farming households. As illustrated in Table 23, only 17% of the households had experiences of selling milk.

Assessment of regional variability indicates that the proportion of households which sale milk was highest for Oromia (26%) and SNNP (27%) regions and lowest for Amhara and Tigray regions (5% each).

The perishable nature of milk is one major reason why households' experience of milk selling is limited especially for those located outside a radius of five kilometers from towns. Instead, small-holder households prefer to process milk and sale butter which has relatively longer shelf life. Because of this, 27% of the overall sample households have experienced selling butter. Except for Amhara region with only 9% of households which sold butter, the experience of other regions was better with more than 30% of households selling butter. Since cheese is an easily perishable product, the proportion of households engaged in selling this product was very limited (4%). While Oromia seems to have relatively better experience of selling cheese (9%), it is not yet a common practice in Tigray region.

On the other hand, assessment of experiences across agro-ecologies (Table 24) indicates that 24% of highlander households had better practices of selling milk followed by midland households (17%). Shelf life of milk is very short in the lowlands because of high temperature making milk selling an uncommon practice (only 3% of the households claimed to have sold milk in the lowlands). Instead, butter selling is a common practice in all agro-ecologies where more than 25% of the households in all regions experienced butter selling. Cheese making is also a limited practice in the highlands and midlands where only 4% of the households were engaged in the practice.

Table 23 Selling practices of milk and milk products in the FEED III project regions, 2018

Region	Milk		Butter		Cheese	
	n	%	n	%	n	%
Tigray	7	5	49	36	0	0
Amhara	10	5	18	9	4	2
Oromia	52	26	64	32	17	9
SNNP	57	27	69	33	8	4
Total	126	17	200	27	29	4

Source: FEED III baseline survey (2018)

Table 24 Selling practices of milk and milk products in the FEED III project agro-ecologies, 2018

Agro-ecology	Milk		Butter		Cheese	
	n	%	n	%	N	%
Highland	46	24	51	26	7	4
Midland	77	17	126	28	22	5
Lowland	3	3	23	25	0	0
Total	126	17	200	27	29	4

Source: FEED III baseline survey (2018)

Due to the infancy of the dairy sector, there is no well-organized market for dairy products. Local markets serve as the common place to sale milk, butter and cheese (Table 25). For instance, among those households which sale milk, all in Tigray region and more than 90% in Oromia and SNNP regions have sold milk through local markets. This could be through farmers delivering milk along road-sides where milk collectors make aggregation and supply to bigger towns or Addis Ababa city. The same is true for butter where more than 80% of the households in all regions sale in local markets. The second essential market is farm gate sale where traders or village collectors go to farmer villages and collect dairy products, aggregate them and sale to wholesalers in the towns.

Table 25 Place of sale of dairy products in the FEED III project regions, 2018

Dairy product	Place of sale	Frequency (%)				
		Tigray	Amhara	Oromia	SNNP	Total
Milk	Farm gate	6 (86)	0	2 (4)	7 (12)	15 (12)
	Local market	7 (100)	7 (70)	47 (90)	52 (91)	113 (90)
	Local market Coop/Union	0	2 (20)	0	0	2 (2)
	Coop/Union Milk collection business	0	0	1 (2)	5 (9)	6 (5)
	Milk collection business Milk processors	0	0	1 (2)	1 (2)	2 (2)
	Milk collection business Milk processors	2 (27)	1 (10)	4 (8)	1 (2)	8 (6)
	Milk processors Other	10 (20)	4 (22)	0	5 (7)	19 (10)
	Other Farm gate	49 (100)	15 (83)	63 (98)	68 (99)	195 (98)
Butter	Farm gate	0	1 (5.6)	0	0	1 (0.5)
	Local market	0	2 (11)	0	1 (1.4)	3 (1.5)
	Local market Coop/Union	0	0	0	1 (1.4)	2 (1)
	Coop/Union Milk collection business	0	0	1 (2)	1 (1.4)	2 (1)
	Milk collection business Milk processors	0	1 (6)	1 (2)	0	2 (1)
	Other Farm gate	0	3 (71)	16 (94)	8 (100)	27 (93)
Cheese	Farm gate	0	1 (25)	0	0	1 (3)
	Local market	0	1 (25)	0	0	1 (3)
	Local market Coop/Union	0	0	0	0	0
	Coop/Union Milk collection business	0	0	1 (5.9)	0	1 (3)

Source: FEED III baseline survey (2018)

Quantity of dairy products sold by small-holder farmers

Not only is small-holder farmers' experience of selling dairy products not well developed, the quantity sold is also limited. For instance, the average quantity of milk sold by the overall sample of households within one-month time (March 2018) was 90.7 liters which amounts to 3 liters per day (Table 26). Assessment of regional variability indicates that households of SNNP region have sold relatively large quantities of milk (114.5 liters) in a month-about 4 liters of milk per day. By contrast, households in Oromia region have sold smaller quantities of milk (67.8 liters) on average in a month-nearly 2 liters per day.

On the other hand, households in Oromia region have sold a relatively large quantity of butter (6.1 kg) and cheese (25.8 kg) in a month than other regions. Instead of milk, they depend on selling processed dairy products and sold on average 860 grams of cheese and 200 grams of butter per day. Households located far away from towns (about 5 kms in radius) depend on selling processed milk products because of high perishability of milk. Assessment across agro-ecologies indicates that the quantity of milk produced

in the midlands (109.5 liters) was higher than in other agro-ecologies while it was the least in the lowlands (35 liters) (Table 27). The quantity of butter and cheese produced was observed to be similar across all agro-ecologies.

Table 26 Quantity of dairy products sold in the FEED III project regions in the month of March 2018

Dairy product	Region	n	Mean	Minimum	Maximum
Milk	Tigray	7	70.7	20	360
	Amhara	10	88.0	10	180
	Oromia	52	67.8	3	300
	SNNP	57	114.5	5	720
Butter	Tigray	49	2.3	0.5	8
	Amhara	18	4.0	1	20
	Oromia	64	6.1	1	50
	SNNP	69	2.9	1	24
Cheese	Tigray	-	-	-	-
	Amhara	4	3.7	2	7
	Oromia	17	25.8	2	200
	SNNP	8	3.1	1	8

Source: FEED III baseline survey (2018)

Table 27 Quantity of dairy products sold across agro-ecologies of FEED III project in a month, 2018

Agro-ecology	Dairy product	n	Mean	Min	Max
Milk	Highland	46	63.1	5	300
	Midland	77	109.5	3	720
	Lowland	3	35.0	5	90
Butter	Highland	51	4.8	1	50
	Midland	126	3.9	0.5	24
	Lowland	23	2.0	0.5	5
Cheese	Highland	7	32.0	2	200
	Midland	22	11.6	1	90
	Lowland	-	-	-	-

Source: FEED III baseline survey (2018)

Income earnings from sales of dairy products

Small-holder farmers generate on-farm incomes from diversified sources such as sales of crops, forest products, live animals and livestock products even though the amount varies from one source to another. As presented in Table 28, households on average generated Ethiopian Birr (ETB) 951.87¹¹ from sale of milk while they obtained ETB 692.13 from butter and ETB 900.79 from cheese. Regions have also generated closely similar amount of income from sale of milk and cheese. On the other hand, the income generated from households in Oromia region (ETB 1186.28) was higher than other regions while income generated from Tigray region was the least (ETB 297.04). Even though the proportion of households which generated income is limited, the annual income that could be generated from dairy products alone is considered to be high. For instance, if we assume that farmers would get a stable income of ETB 692 per month from sale of butter alone, annual income would approximately be ETB 8,304 which is adequate to purchase one ton of wheat. As presented in Table 29, the monthly income generated across agro-ecologies is similar for milk

¹¹ One USD = 27.24 ETB.

and cheese. On the other hand, the highest income was generated in the highlands (ETB 919) followed by the midlands (ETB 670) and it was lowest in the lowlands (ETB 305).

Since most of the farming households depend on family labor for feeding, barn cleaning, milking and other operations, and supplement feed resources from their own farms (such as green feed and hay, grain and grain by-products and local beverage by-products), there is room to minimize costs. Therefore, many of the dairy farmers perceived that engagement in dairying would be a worthy enterprise if they receive some support in getting access to crossbred dairy cows and industrially processed high value concentrate feeds.

Table 28 Income generated from sales of dairy products in the regions, 2018

Dairy product	Region	n	Mean	Minimum	Maximum
Milk	Tigray	7	1118	200	6480
	Amhara	10	845	80	1800
	Oromia	52	1075	45	6000
	SNNP	57	837	30	4000
Butter	Tigray	49	297.04	60	900
	Amhara	18	738.88	100	4000
	Oromia	64	1186.28	5	4500
	SNNP	69	502.17	50	6300
Cheese	Tigray	-	-	-	-
	Amhara	4	86	20	175
	Oromia	17	1439	50	5400
	SNNP	8	163	40	400
Overall sample	Milk	126	951.87	30	6480
	Butter	200	692.13	5	6300
	Cheese	29	900.79	20	5400

Source: FEED III baseline survey (2018)

Table 29 Income earnings from dairy products across agro-ecologies of FEED III project in a month, 2018

Dairy product	Agro-ecology	n	Mean	Min	Max
Milk	Highland	46	891	30	6000
	Midland	77	1006	120	6480
	Lowland	3	492	45	1350
Butter	Highland	51	919	5	4200
	Midland	126	671	50	6300
	Lowland	23	305	60	800
Cheese	Highland	7	1568	20	5400
	Midland	22	688	40	4500
	Lowland	-	-	-	-

Source: FEED III baseline survey (2018)

Challenges of small-holder farmers in dairy production

Even though the dairy sub-sector is a worthy business to engage in both as a source of income and nutrition for households, there are still challenges that need to be addressed to make the sub-sector more efficient and productive. As illustrated in Table 30, the major challenge reported by 59% of the households was feed shortage followed by limitations of farm size (56%) for grazing, hay making and growing forage crops. Land shortage was exacerbated by human population pressure which forced farmers to plow

grazing lands and provide priority for the growth of food crops. Scarcity of feed supply has also contributed to the rise of costs for concentrates and industrially processed feeds. Inadequate knowledge and skills of improved dairy management practices was also identified to be the other major problem by 40% of the households.

Even though dairy products have appeared to be essential sources of on-farm incomes, dairy farmers could not maximize the benefits due to inability to obtain crossbred and productive cows (33%). Especially, there is demand for crossbred Holstein Friesian cows in the outskirts of towns and Jersey cows in locations far away from towns. Even if they are available, their purchasing price is unaffordable to small-holder farmers who also lack information regarding the productivity traits of crossbred cows such as exotic blood levels, parity, age, milk productivity and others. This lack of knowledge was the result of limited experience of record keeping for dairy cows. In light of limited availability of veterinary clinics in rural areas, disease prevalence has also been identified as one of the critical challenges facing the dairy sector (30%).

According to analysis of challenges across agro-ecologies, 71% of the highlander households reported shortage of concentrate feed as their major challenge while land shortage is prominent a challenge in the midlands as mentioned by 61% of the households. The lowlands are evidently more challenged due to prevalence of disease exacerbated by limited veterinary clinic facilities and moisture stress. The challenges are also the same across FEED III project regions except for variations from one region to another. For instance, while households in Tigray region (51%) and Oromia (61%) complain about limited supply of concentrate feeds, the major challenge in Amhara region (62%) and SNNPR (83%) was land shortage to manage the dairy sector (Table 31).

Table 30 Challenges of small-holder farmers across various agro-ecologies of FEED III project, 2018

Challenges	Highland (%)	Midland (%)	Lowland (%)	Total (%)
Shortage of concentrate feed	71	56	47	59
Land problem/limited land size	55	61	37	56
Disease prevalence	22	28	57	30
Lack of crossbred cows	35	34	25	33
Lack of cooling and storage facilities at milk	22	18	3	17
Water availability problem	15	30	39	27
Low milk price	24	25	10	23
High feed price	43	60	27	51
Lack of knowledge for modern dairy cow	47	39	34	40
Limited access to credit	18	34	12	27
Others (specify)	1	5	5	4

Source: FEED III baseline survey (2018)

Table 31 Challenges of small-holder farmers in the FEED III project regions, 2018

Challenges across regions	Tigray (%)	Amhara (%)	Oromia (%)	SNNP (%)	Total (%)
Shortage of concentrate feed	51	56	61	65	59
Land problem/limited land size	39	62	34	83	56
Disease prevalence	37	24	26	35	30

Lack of crossbred cows	17	42	27	42	33
Lack of cooling and storage facilities at milk vending sites	4	16	14	30	17
Water availability problem	40	32	6	34	27
Low milk price	13	21	10	43	23
High feed price	30	39	39	88	51
Lack of knowledge for modern dairy cow management	35	42	47	35	40
Limited access to credit	7	24	23	48	27
Others (specify)	5	1	3	6	4

Source: FEED III baseline survey (2018)

Dairy value chain

Various actors playing different roles ranging from input supply to final consumption and disposal are involved across the dairy value chain. Identification of key actors in the value chain helps to make joint planning, implementation and evaluation of various development activities in the dairy sector. Unless all these actors accomplish their roles across the value chain, it would not be possible to run dairy businesses effectively and efficiently. Farmers have identified the most common actors which are presented in Table 32. For instance, 27% of the overall sample households have identified actors in the marketing segment of the value chain such as wholesalers and retailers of concentrate feeds, feed ingredients and veterinary drugs. According to 25% of the households, dairy farmers (milk producers), forage growers and feed producers, and service providers (extensionists, researchers, etc) are also key actors in the value chain.

Table 32 Actors involved across dairy production value chain in FEED III project regions, 2018

Actor	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Suppliers of inputs, such as forage seed, vet drugs, AI services, vaccines, crossbred cows, etc	3	13	3	8	7	21	20	22	33	18
Feed processors and milk collectors	3	13	9	24	14	42	5	6	31	17
Forage and feed producers and service providers (extension agents, researchers, etc)	2	9	14	38	5	15	25	28	46	25
Wholesalers, retailers and consumers	9	39	10	27	9	27	22	25	50	27
Other actors	3	13	3	8	1	3	0	.0	7	4
I don't know	5	22	4	11	0	.0	36	40	45	25

Source: FEED III baseline survey (2018)

One of the major inputs for small-holder farmers in the dairy value chain is feed resource which can either be produced from own farms or purchased. While green and dry grasses, crop residues and grain can be sourced from own farms, industrially processed concentrate feeds must be purchased. According to the findings, 25% of the overall sample households had experiences of purchasing concentrate feeds for their dairy cows (Table 33). Assessment across the regions indicates that the proportion of households who had experiences of purchasing concentrate feeds was higher in SNNP (42%) than in the other regions. Consideration across agro-ecologies also indicates that 31% of the households in the midlands had experiences of purchasing concentrate feeds followed by the highlands (16%).

Inability to purchase concentrate feeds in 75% of the households means milk productivity is compromising due to inadequate quantity and poor quality of concentrate feeds as feed type is key in determining productivity of dairy cows. Limited supply and associated high purchase cost are the two major factors responsible for restricting farmers' purchasing power. These farmers make all possible efforts to replace industrially processed concentrate feeds with by-products of grain and local beverages. Out of those households which have experiences of purchasing concentrate feeds, 56% of them did so in the last 12

months (a large proportion of them were from Oromia region (85%) followed by Tigray (78%), SNNP (50%) and Amhara (30%)). Households purchased 333 kg of concentrate in a year which amounts to nearly one kg per day (Table 34). However, households in Tigray region seem to have purchased the largest quantity of concentrate feed (500 kg) those in SNNP purchased the lowest quantity (192 kg). Households on average spent ETB 2791 for purchase of concentrate feeds spending about ETB 8.38 per kg of concentrate. Oromia seems to have spent the highest cost (ETB 4050) followed by SNNP (ETB 2507), Amhara (ETB 2062) and Tigray (ETB 1984).

Table 33 Experiences of purchasing concentrate feed for dairy cows, 2018

Region	Highlands		Midlands		Low lands		Total	
	n	%	n	%	n	%	n	%
Tigray	6	27	13	27	4	6	23	17
Amhara	13	19	22	20	2	12	37	19
Oromia	5	6	26	24	2	29	33	17
SNNP	8	40	81	43	0	0	89	42
Overall	32	16	142	31	8	9	182	25

Source: FEED III baseline survey (2018)

Table 34 Quantity of concentrate (kg) purchased by dairy farmers in FEED III project regions, 2018

Regions	n	Mean	Min	Max
Tigray	18	500	2	3000
Amhara	11	480	1	2000
Oromia	28	392	2	1500
SNNP	45	192	2	1000
Overall	102	333	1	3000

Source: FEED III baseline survey (2018)

Farmers sourced concentrate feeds from the available option of dealers. As reported by 50% of households, the most common source was identified to be private enterprises, which include wholesalers, processors and retailers (Table 35). Processors often act as wholesalers when a well-developed feed market is absent. Farmers' cooperatives/unions have also appeared to be essential sources of concentrate feeds for 19% of the farmers. Apart from engagements in various income generating activities, cooperatives are also involved in processing and distribution of concentrate feeds to meet the demands of their members and neighbors.

Even though there are options for sourcing, 85% of the dairy farmers (90% in SNNP, 79% in Oromia, 81% in Amhara and 83% in Tigray) believed that the number of distribution channels for concentrate feeds is inadequate to fulfill their demands. One of the major reasons reported by 69% of the dairy farmers was the inaccessibility of available distribution channels due to their location (Table 36). Unbalanced supply and demand for concentrate feeds is another reason as indicated by 68% of dairy farmers.

Table 35 Sources from where farmers purchased concentrate feeds in FEED III project regions, 2018

Sources	Tigray		Amhara		Oromia		SNNP		Overall	
	n	%	n	%	n	%	n	%	n	%
Coops/unions	0	0	2	18	1	4	16	35	19	19
Private enterprises	6	33	3	27	20	71	22	49	51	50
Government	4	22	1	9	0	0	0	0	5	5
Other farmers	1	6	4	36	3	11	4	9	12	12
NGOs	1	6	0	0	0	0	0	0	1	1
Other sources	6	33	1	9	4	14	3	7	14	14
Total	18	100	11	100	28	100	45	100	102	100

Source: FEED III baseline survey (2018)

Table 36 Reasons why distribution channels are inadequate for concentrate feeds, 2018

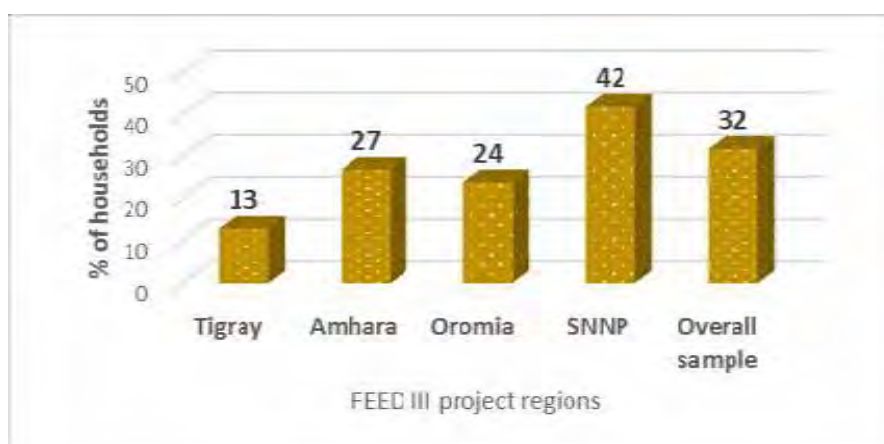
Reasons	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
It serves too many farmers	6	32	9	30	12	46	44	55	71	46
The service is too far/not accessible	14	74	18	60	19	73	56	70	107	69
Unbalanced supply and demand	9	47	22	73	10	38	64	80	105	68

Source: FEED III baseline survey (2018)

Access of households to feed market information

Market information is instrumental to enhance efficiency of feed transaction and strengthen bargaining power. According to the findings, 32% of the households claimed that they had access to feed market information especially concerning prices and supply conditions. Among the regions, 42% of dairy farmers in SNNP region claimed to have better access to feed market information while the least proportion of farmers with access to feed market information was in Tigray region (13%) (Figure 7). Even though there are options (Table 37), development agents have appeared to be key sources of information for 41% of dairy farmers followed by fellow farmers (38%) and local feed traders (33%). Information exchange during community meetings was also identified to be the most important source of information in Tigray, Oromia and Amhara regions while communication with fellow farmers is an essential information source in SNNP region.

The findings also show that a large proportion of dairy farmers (58%) still did not have access to market information such as where to get quality feed and location of traders, quantity of supply and prices, types of feeds available and others. Lack of information may expose dairy farmers to high prices, poor quality products and inability to purchase concentrate feeds. Dairy farmers communicate with a range of information sources through mobile phones, physical visits and person-to-person communication. However, the quality and timeliness of information is still in question.



Source: FEED III baseline survey (2018)

Figure 7 Access of dairy farmers to feed market information, 2018

Table 37 Sources of feed market information in the FEED III project regions, 2018

Information	Tigray	Amhara	Oromia	SNNP	Total
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sources	n	%	n	%	n	%	n	%	n	%
Local feed traders	1	33	2	20	3	37	13	35	19	33
Feed suppliers	1	33	0	0	3	37	9	24	13	22
Development Agents	2	67	4	40	2	25	16	43	24	41
Fellow farmers	1	33	4	40	0	0	17	46	22	38
Community meeting	2	67	5	50	4	50	6	16	17	29
Radio	0	0	1	10	0	0	0	0	1	2

Source: FEED III baseline survey (2018)

Even though dairy farmers make all the necessary efforts to purchase and feed their cows, 20% of the overall sample households on average emphasized that they are not able to obtain adequate quantity of concentrate feeds to feed their dairy cows. Especially the proportion of dairy farmers who are not able to supply adequate quantity of concentrate feeds to their dairy cows was higher for Tigray region (48%) followed by Oromia (21%), SNNP (16%) and Amhara (11%).

As illustrated in Table 38, the two major reasons for the limited supply of concentrate feeds were high prices, as identified by 77% of dairy farmers, and limited supply (71%). High price of raw materials and ingredients for processing concentrates was one of the factors that have led to high prices for concentrate feed. Not is the supply of raw materials limited in the local markets, but also their quality is often perceived to be below acceptable standards. In addition, there are only limited incentives to motivate enterprises to engage in feed processing such as allocation of adequate land to establish a processing plant, credit and others. In the face of the limited number of feed processors and inadequate supply, the demand for concentrate feeds is very high resulting in high selling prices unaffordable to many of small-holder farmers. Out of the total sample households, 85% of dairy farmers reported that the price of concentrate feeds was unaffordable. The proportion of dairy farmers who indicated that the price of concentrate feeds was not affordable to them was higher for SNNP dairy farmers (92%) followed by dairy farmers from Amhara (89%), Oromia (76%) and Tigray (65%) regions.

Price of concentrated feed is also unstable and fluctuates from time to time. It was reported by 81% of the dairy farmers that price fluctuation is another problem they are facing in the concentrate feed market. Price fluctuation was especially acute in Oromia region (as reported by 88% of dairy farmers) followed by SNNP (81%), Amhara (78%) and Tigray (74%) regions.

Quality of concentrate feed is another issue that was raised by the dairy farmers. Among the sample households, only 43% of the dairy farmers (39% for Oromia, 45% for SNNP, 46% for Amhara and 35% for Tigray) made physical quality inspection of quality before purchase while others (57%) purchased concentrate feed without such inspection.

Table 38 Reasons why dairy farmers are unable to supply adequate quantity of concentrate feeds to their cows, 2018

Reasons	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
High price	11	92	19	58	21	81	61	81	112	77
Low quality	0	0	4	12	5	19	17	23	26	18
Limited supply	8	67	21	64	11	42	64	85	104	71
Other	0	0	0	0	1	4	0	0	1	1

Source: FEED III baseline survey (2018)

In times of limited access to industrially processed concentrate feeds due to high price and other reasons, dairy farmers have adopted their own strategies to fill the gap. For instance, 64% of the dairy farmers

have replaced concentrate feed with locally available feeds such as by-products of local beverages, grain and others (Table 39). Moreover, 57% of the dairy farmers have made efforts to purchase the raw materials from local markets and blend them with approximate formulations. Even though they use various options to meet their concentrate demands, dairy farmers still recognized that they are not feeding adequate quantity and quality of concentrate feed to their cows compromising milk productivity. For instance, 90% of dairy farmers reported that milk productivity has been reduced as a result of limited supply of feed (Table 40). Decreases in milk production mean declining incomes from the sector (75%). Most of the dairy farmers complained that engagement in dairy production is becoming almost non-feasible in the face of an underdeveloped feed market. Unless measures are taken to motivate the private sector including coops and unions to engage in the feed processing sector extensively shortage of milk will be exacerbated especially during times of high feed prices.

Table 39 Strategies adopted by farmers at times of inadequate supply of concentrate feeds, 2018

Strategies	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Reduce the quantity of feed given to cattle	2	17	9	27	12	46	21	28	44	30
Shift to own production	4	33	19	58	15	58	45	60	83	57
Use some other feed materials	6	50	13	39	13	50	62	83	94	64
Other (Specify)	1	8	0	0	0	0	0	0	1	1

Source: FEED III baseline survey (2018)

Table 40 Consequences of limited access to feed for dairy production, 2018

Consequences	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Reduced in the quality of production	6	50	11	33	10	39	40	53	67	46
Reduced in the quantity of production	9	75	28	85	22	85	72	96	131	90
Decreased income from dairy products	6	50	21	64	14	54	68	91	109	75
Dairy health effects	1	8	6	18	2	8	49	65	58	40

Source: FEED III baseline survey (2018)

3.5. Animal fattening and value chain

Animal fattening

The household survey data shows that 1211 (73.48 %) of the farm households across all regions did not participate in the animal fattening livelihood activities. Only 437 (26.52 %) of the farm households were involved in animal fattening. In terms of regions, the numbers are 142 (34.38%), 125 (30.34%), 121 (29.37%), and 49 (11.92%) in Amhara, Oromia, SNNP, and Tigray respectively (Table 41).

Table 41 HH participation in fattening by region

Region	Participation in fattening	Frequency	Percentage
Tigray	Yes	49	11.92
	No	362	88.08
Amhara	Yes	142	34.38
	No	271	65.62
Oromia	Yes	125	30.34
	No	287	69.66

SNNP	Yes	121	29.37
	No	291	70.63
Total	Yes	437	26.52
	No	1211	73.48

Source: FEED III baseline survey (2018)

Animal fattening practice in FEED III project regions

On average, farmers owned 2.07 cattle in Oromia, 1.81 in Amhara, 1.76 cattle in Tigray, and 1.41 in SNNPR. For sheep, the head count was 1.12 in Tigray, 2.47 in Amhara, 0.72 in Oromia, and 0.88 in SNNPR. The largest average number of goats was owned in Tigray (2.10) and the smallest was 0.02 in SNNPR. The maximum fattening period for cattle was 173.36 days in Tigray and the minimum was 83.28 days in Oromia. For sheep, it takes a maximum of 150.28 days in Amhara and a minimum of 73.93 days in Oromia. With regard to goat fattening, 209.83 days are required in Amhara and 50.40 days in Oromia regions (Table 42). The maximum cattle purchase cost was birr 13,180.87 in Tigray and the minimum was birr 6,537.50 in SNNPR. The figure was birr 912.78 in Amhara region and the average purchase cost for a goat was 233.33 birr (Table 42).

Table 42 Animal fattening practice by region by animal type

Region	Animal Type	Average		
		Head Count	Fattening Period (Days)	Animal Purchase Cost (Birr)
Tigray	Cattle	1.76	110.54	13,180.87
	Sheep	1.12	135.38	539.13
	Goat	2.10	101.33	417.39
Amhara	Cattle	1.81	173.36	9,926.11
	Sheep	2.47	150.28	912.78
	Goat	0.29	209.83	233.33
Oromia	Cattle	2.07	83.28	10,424.45
	Sheep	0.72	73.93	630.28
	Goat	0.95	50.40	174.66
SNNP	Cattle	1.41	94.79	6,537.50
	Sheep	0.88	87.27	57.03
	Goat	0.02	52.50	22.00

Source: FEED III baseline survey (2018)

Animal fattened and sales income in FEED III project regions

In Tigray region, on average 9.33 fattened animals were owned with the average sales value of birr 24, 406.5 (Table 43). In terms of share of sales income, the highest was fattened ox/bull and the least was sheep. In Amhara region, 15.13 was the mean fattened animals' ownership with the average sales value of birr 15, 363.9 (Table 43). On the other hand, in Oromia region 4 was the mean fattened animals' ownership with the sales value of birr 20814.3 (Table 43). The case in SNNPR was 4.40 fattened animals and the mean sale value was birr 11,922.10. The largest number of fattened ox/bull was owned by farmers in Amhara region while the least-2.84-was in Oromia.

Table 43 Animal fattened and sales income by region by animal type

Region	Animal Type	Average Fattened	
		No	Sales
Tigray	Fattened ox/bull	5.4	34,955.56
	Fattened cow	1.5	7,500.00
	Sheep	1.2	4,783.30
	Goats	1.25	8,192.31
Sub Total		9.33	24,406.50
Amhara	Fattened ox/bull	10.6	15,912.97
	Fattened cow	0.77	8,535.00
	Sheep	3.4	4,351.50
	Goats	0.35	4,750.00
Sub Total		15.13	15,363.90
Oromia	Fattened ox/bull	2.84	19,842.08
	Fattened cow	0.14	13,000.00
	Sheep	0.432	5,036.73
	Goats	0.472	14,560.40
Sub Total		3.90	20,814.30
SNNP	Fattened ox/bull	4	11,580.56
	Fattened cow	0.11	7,450.00
	Sheep	0.23	2,143.80
	Goats	0.1	1,500.00
Sub Total		4.40	11,922.10

Source: FEED III baseline survey (2018)

Value chain actors in FEED III project regions

Relatively the largest proportion of actors involved in the animal fattening were producers-40 (65%) in SNNPR, 17 (31.48%) in Oromia, 4 (9.52%) in Amhara, and 7 (41.18%) in Tigray. For small private and cooperative fatteners, the figures are 14 (25.93%) in Oromia and 2 (11.76 %) in Tigray (Table 45). 15 (27.78%) individual traders and exporters in Oromia and the lowest registered numbers for individual traders and exporters were in Tigray and SNNPR. Livestock trading cooperatives were almost nonfunctional in all regions (Table 44).

Table 44 Value chain actors involved in animal fattening in FEED III project regions

Actor type	Response	Region			
		Tigray	Amhara	Oromia	SNNP
Producers	Frequency	7	4	17	40
	Percent	41.18	9.52	31.48	65.57

Collectors	Frequency	1	10	7	5
	Percent	5.88	23.81	12.96	8.2
Small private and cooperative fatteners	Frequency	2	8	14	5
	Percent	11.76	19.05	25.93	8.2
Livestock trading cooperatives	Frequency	0	1	0	0
	Percent	0	2.38	0	0
Individual traders and exporters	Frequency	3	8	15	3
	Percent	17.65	19.05	27.78	4.92
Other actors not listed	Frequency	4	11	1	8
	Percent	23.53	26.19	1.85	13.11

Source: FEED III baseline survey (2018)

Access to trainings in animal fattening

Regarding whether farmers have received any training in relation to animal fattening over the last 12 months, the results show that the government had provided training for farmers in all regions except in SNNPR where most of the respondents indicated that the training was given by private enterprises (Annex A2a). Although few in number, unions or cooperatives have also provided trainings for animal fatteners mainly in SNNPR and Tigray region while locally deployed NGOs offered training in all regions complementing the capacity gaps on animals fattening livelihood activities across all regions. Concerning the market outlet for the sale of the fattened animals, it was revealed that across all regions farmers sold their fattened animals in the local market and an insignificant number was reported for other market outlets (Annex A2b). Limited access to markets along with other factors may discourage farmers from involvement in animal fattening.

Animal feed usage, feed preservation and storage practices and feed equipment

In Tigray region, most of the farmers depend primarily on crop residuals supplemented by other high quality feeds (Atela, grains) and other feed typologies as sources of feed for the fattened animals, with the last of these resorted to the least (Annex A3a). By the same token, farmers in Amhara region chiefly depend on crop residual supplemented by green forage, grass, hay, and silage as alternative feed sources for their fattened animals. From the survey, it was evident that farmers did not frequently use the concentrate animal feed for their fattened animals in Amhara region which could be attributed to lack of supply on one hand and lack of awareness on the importance and use of concentrate animal feed on the other. Similarly, in Oromia region farmers use crop residual as primary source of feed followed by green forage, grass, hay, and silage, agro-industrial by-products (wheat bran, nug cake etc.) and lastly other feed typologies (Annex A3a). Farmers in the SNNPR mostly use green forage, grass, hay, and silage and complement the feed through crop residuals and the least used feed option was concentrate animal feed. The limited role of concentrate feed in animal fattening in the region is probably down to the same reasons mentioned above.

When it comes to animal feed preservation and storage practices, it is hay making that was largely used across all regions. The highest number for this activity was from Amhara region and the lowest figure came from Tigray region (Annex A3b) revealing both commonalities and discrepancies with regard to animal feed preservation and storage practices among regions. This indicated the need for region specific intervention to address challenges to animal feed preservation and storage practices. An insignificant number of farmers also practice bailing and silage as complementary animal feed preservation and storage practices. Concerning animal feeding equipment (drinking and feeding activities), the data shows

that feed trough has been consistently used across all regions followed by water trough. The data suggests the existence of similar patterns and practices of animal feeding equipment which demand similar support across all regions through context focused packages to enable farmers improve on the use of animal feeding equipment which can be constructed from locally available materials. In all regions, farmers used rotational grazing as part of feeding practices for fattened animals, the numbers being nearly the same for farmers in SNNP and Amhara regions. This was followed by the use of factory produced feed and the mixed ration which was practiced the least (Annex A3d).

Households' members' participation in animal fattening

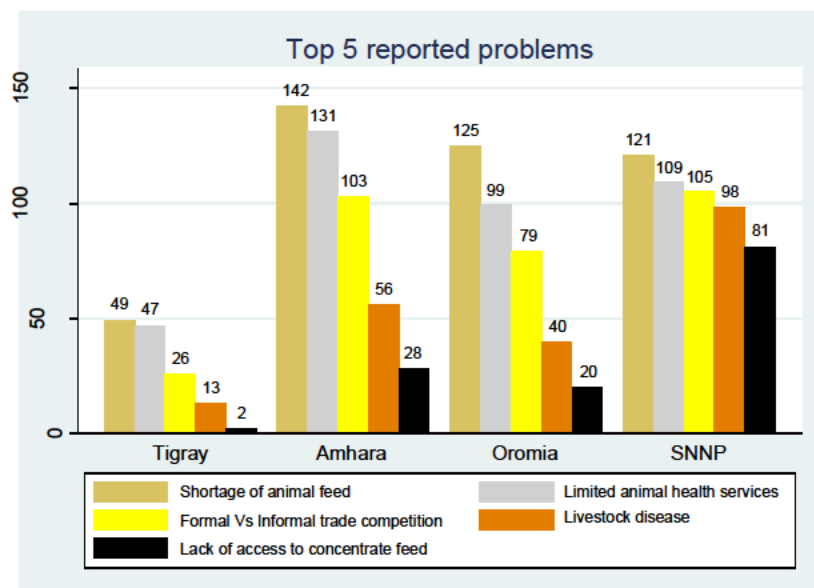
Concerning household members' involvement in the animal fattening activities, the survey data revealed that cleaning the animal house was consistently undertaken by the adult male across all regions while the adult female complementing the cleaning activities in all regions the largest of which was in Amhara region (Annex A4a). From the same data, feeding the animal was mostly carried out by the adult male-the largest figure was reported from Amhara region and the lowest was from Tigray region (Annex A4b). The labor intensive nature of fattening activities ensures that children play a marginal role. As the data shows, the role of children under 18 years was reported to be very minimal suggesting that most of the animal feeding activities are carried out by adult males. As for forage collection for fattened animals, the adult female plays a dominant role across all regions with the largest figure coming from Amhara region and the smallest was from Tigray region (Annex A4c). Similar to feeding and cleaning of animal house, the role of children under 18 years in the forage collection was minimal. By the same token, the participation of the adult female in the purchase of concentrate feed for fattened animals was reported to be large. The most adult females were reported for participating in the purchase of animal concentrate feed in SNNPR and the lowest adult female participation figures were reported from Tigray region (Annex A4d).

On the purchase of factory ingredients, the survey data suggested that the largest share was occupied by the adult females from Oromia region. This could be partly because of the larger number of factory ingredient suppliers in the region in comparison to the other regions. On the other hand, insignificant number of both adult males and females was reported in Tigray region and purchased by both adult female and male on the purchase of the factory ingredients (Annex A4e). The adult male also supported the adult female in the purchase of factory ingredients for the fattened animals signifying shared tasks between male and female household members. On watering the fattened animals, nearly the same patterns have been observed across all regions and between adult household members of both genders (Annex A4f). On cattle cleaning, large participation of male adults was reported in all regions and nearly comparable figures were reported in Oromia and Amhara regions (Annex A4g). The adult female complemented the cattle cleaning activities in all regions with children under 18 years having limited roles due to the nature of the activity. In general, it was reported that most of the activities vis-à-vis animal fattening have been undertaken by adult male accompanied by the adult female with small disparities between and among regions.

Major challenges of smallholder farmers in animal fattening

As shown in Figure 8, shortage of animal feed resulting from droughts and land use changes was reported as the major problem that animal fatteners have been facing across the studied regions. The largest reported figure was in Amhara (142) followed by Oromia (125), SNNPR (121), and Tigray region (49). The second most reported problem with regard to animal fattening was the issue of limited animal health services. Limited animal health services were reported by 131 households in Amhara, 109 in SNNPR, 99 in Oromia, and 47 in Tigray region. The third largest reported problem was competition between formal and informal animal traders. In terms of region, problem was most prevalent among fatteners in SNNPR while

relatively smaller competition was observed in Tigray region (Figure 9). The fourth largest reported problem was the livestock disease which is relatively higher both in SNNPR and Amhara and smaller in Tigray region. Lack of access to concentrate feed for fattened animals was the other major reported problem. The combined effect of these obstacles could discourage smallholder farmers' engagement in fattening as a viable livelihood option.



Source: FEED III baseline survey (2018)

Figure 8 Major problems in animal fattening activities

Walking physical distance, access to market, and source of information

The survey data reveals that on average farmers travel 67.28 minutes to reach a distribution channel. In other words, it suggests the inadequacy of the distribution channels to purchase concentrate feed for the fattened animals (146, 84 %). Farmers in Oromia walk the longest distance (78.10 minutes) from their farm to the concentrate feed distribution channel followed by 73.60 average walking minutes in SNNPR while farmers in Tigray region walk the shortest distance to reach a distribution channel (Table 45). The reasons for the high figures are, in order of severity, inaccessibility (116), supply-demand gap (89) and distribution channel serves too many farmers (47).

Access to market information is crucial for farmers to involve in various livelihood options including animal fattening. The data shows that sampled fatteners have had market information provided by local feed traders (51), fellow farmers (43) and feed suppliers (30) (Table 46). The regional figures for sources of information indicate that fatteners from SNNPR have better sources compared to the other regions signifying the actors' involvement in the supply of feed for fattening which offers an opportunity for FEED-III to augment existing working modalities for improved supply of animal concentrate feed over the project implementation period. In this regard, both farmer to farmer communication (79) and community meeting (30) serve as major avenues through which fatteners can gain access to market information which can also serve as entry points for the FEED-III project to work with the market actors.

Table 45 Feed market access and information (174 farmers who purchase feed out of 437 farmers involved in fattening)

Region	Average distance to distribution channel (Minutes)	Channel adequacy					Feed market information						
		Adequacy		Reasons for inadequacy			Accessed information		Information source (Top 3)			Ways of accessing information (Top 2)	
		Yes	No	Serves too many farmers	Inaccessibility	Supply - demand gap	Yes	No	Local feed traders	Feed suppliers	Fellow farmers	Farmer to farmer communication	Community meeting
Tigray	41.35	6	11	1	9	5	2	15	1			1	2
Amhara	54.71	12	30	8	19	13	17	25	5	2	4	16	11
Oromia	78.10	10	44	8	36	14	18	36	10	3	1	14	7
SNNP	73.60	0	61	30	52	57	51	10	35	25	38	48	10
Total	67.27	28	146	47	116	89	88	86	51	30	43	79	30

Source: FEED III baseline survey (2018)

Concentrate feed inadequacy and its effects

In terms of concentrate feed supply adequacy, 138 (79.31%) farmers reported that the supply of animal concentrate feed was not adequate. This is due to the limited supply (69), high feed price (62) and low feed quality (6). Owing to the feed supply problem, farmers reported applying various strategies to offset the gap including using other feed materials (78), shifting basis on own production (43) and reducing feed quantity (16). Consequences of inadequate concentrate feed supply were reported to be, in order of severity, decreased income from fattening (118), reduced number of fattened animals (81) and reduced meat quality (71) (Table 46).

Table 46 Concentrate feed inadequacy and its effects (174 farmers who purchase feed out of 437 farmers involved in fattening)

Region	Concentrate feed adequacy					Strategy way out in case of inadequacy			Consequences of feed inadequacy (Top 3)		
	Adequacy		Reasons for inadequacy			Reduce feed quantity	Shift to own production	Use some other feed materials	Reduces meat quality	Reduces no. of cattle fattening	Decreases income fattening
	Yes	No	High price	Low quality	Limited supply						
Tigray	9	8	4	1	3	1	2	4	4	8	5
Amhara	12	30	10	1	19	4	15	11	9	19	28
Oromia	13	41	27	3	10	8	15	18	16	26	27
SNNP	2	59	21	1	37	3	11	45	42	28	58
Total	36	138	62	6	69	16	43	78	71	81	118

Source: FEED III baseline survey (2018)

Purchased concentrate feed price and quality

On purchased feed price and corresponding quality, the survey data shows that 150 (86.20%) reported prices as unaffordable and 23 (13.21%) as unstable. On the other hand, only 24 (13.795) farmers indicated that the concentrate feed price was affordable and stable overtime. The data also suggested that the purchased concentrate feed was checked for quality as evidenced by 107 (61.49%) (Table 48). Nearly all of the quality check was carried out by employing indigenous knowledge of physical detection. On account of this, it would be good for the FEED-III project to critically take into account the major gaps identified in relation to access to market, distance to distribution channels, major feed information sources, feed price affordability, price stability, farmers' strategies in time of crisis and modalities of accessing the feed information which will contribute to improvement of conditions for fatteners over the project period.

Table 47 Purchased concentrate feed price and quality (174 farmers who purchase feed out of 437 farmers involved in fattening)

Region	Concentrate feed price affordability and stability				Concentrate feed quality				
	Affordable		Stable		Purchased feed quality checked		Ways of quality checks		
	Yes	No	Yes	No	Yes	No	Laboratory	Physical detection - indigenous knowledge	Physical detection - livestock experts
Tigray	6	11	10	7	6	11	0	6	0
Amhara	4	38	35	7	23	19	0	23	0
Oromia	14	40	48	6	25	29	0	22	2
SNNP	0	61	58	3	53	8	0	53	0
Total	24	150	151	23	107	67	0	104	2

Source: FEED III baseline survey (2018)

3.6. Feed production and feed value chain

This section of the report covers the roughage and concentrate feed components. The fodder production subsection includes grazing pasture, improved forage, crop residue and non-conventional feeds. The concentrate feeds components reported under the feed value chain subsection deals with feed ingredients production and supply, private feed dealers, millers and concentrated feed manufacturing enterprises.

Fodder production

a) Grazing pasture

Due to a rapid increase in human population and increasing demand for food, grazing lands are steadily shrinking due to the conversion of prime grazing lands in to crop lands. As a result, grazing is restricted to marginal areas with low farming potential such as hill tops, swampy areas and roadsides. However, there are reports (ILRI 2017) which stress the importance of grazing lands as the major basal feed for livestock in the highlands of Ethiopia. For instance, in Yilmana Densa district of West Gojjam of

Amhara region and North Shoa, West Shoa and Arsi Zones of Oromia region, the main source of animal feeds is natural pasture on communal grazing lands. According to the key informant interview, in Maychew district of Tigray cut and carry system are applied and serve as feed source About 178 hectare of land has been preserved in the Woreda for the cut and carry system. In Sidama Zone of SNNPR, planted Dasho grass and elephant grass are used as grazing pastures.

b) Cultivated Fodder

Various improved forage crops have been introduced by various institutes including the Ministry of Agriculture, regional Livestock Development Agencies, research centers, universities and non-governmental development partners since 1970s. Out of the total respondents only 145 (8.79%) have participated in forage production. Among the project regions, one-fourth of the farmers in SNNPR engaged in forage production followed by 31 (7.5%1) in Amhara region, 7 (1.7%) in Oromia and only one farmer (0.24%) in Tigray region (Table 49). In Tigray, Oromia and Amhara, improved forages were grown by very few households on very small plots of land, on soil conservation structures and on farm boundaries. Thus, it would be imperative for FEED-III project to draw lessons from the existing practices, mainly from farmers in SNNPR, which could be materialized in the form of experience sharing between and among the farmers and promote the need for forage development and management in other regions.

Table 48 Households participation in forage production by region

Region	Participation	
	Frequency	Percent
Tigray	1	0.24
Amhara	31	7.51
Oromia	7	1.7
SNNP	106	25.73
Total	145	8.79

Source: FEED III baseline Survey (2018)

SNNP and Oromia regions reported higher percentage of households involved in improved forage production training (40 percent and 29 percent respectively) than in Amhara and Tigray regions. Only 3 percent of the total interviewed households use improved forage planting materials. The highest figure for use of improved forage planting materials was 10 percent in SNNP and the lowest was in Tigray where no beneficiary was reported. SNNP region is followed by Amhara (5%) and Oromia (3%). The government is the main source of improved forage planting materials (86.4%) followed by NGOs (7.6%) and the private sector (4.5%) (Table 50). Forage planting materials source from the private sector and farmer to farmer exchanges are the sort of practices that need to be encouraged for sustainable forage development. On the other hand, access to forage market is nil. These findings are summarized in Table 50 below.

Table 49 Percentage of household provided training and use and source of planting material in past 12 months

Variable	Beneficiary households (%)				
	Tigray	Amhara	Oromia	SNNP	Total
Training on improved forage	0	23.0	29.0	40.0	36.0

Use of improved forage planting material	0	5.0	3.0	10.0	3.0
Source of planting material					
Government	0	50.0	0	91.4	86.4
NGO	0	12.5	0	6.9	7.6
Private	0	37.5	0	0	4.5
Farmer to Farmer	0	0	0	1.7	1.5
Access to forage market	0	0	0	0.1	0

Source: FEED III baseline Survey (2018)

The total area covered by improved forage among interviewed households in the past 12 months was very low- in Tigray 0.25 ha, in Amhara 16.00 ha, in Oromia 4.30 ha and in SNNP 15.56 ha (Table 51). Accordingly, the average area of land that produced improved forage was limited to 0.02 ha per household. Most improved forage producers (96 percent of the respondents) applied cut and carry feeding practice and 39 percent applied rotational grazing (Table 51). Training was mainly provided by the government extension system (100 percent of the respondents), NGOs (23 percent) and the private sector (31 percent) focusing on training topics such as pasture management, improved technologies for forage production and forage nursery establishment. The contribution of private sector on forage training is highest in SNNP (37 percent) while the contribution of NGOs is highest in Amhara (57.1 percent). In Tigray no training was reported by NGOs and private sector in the past 12 months. Table 51 and figure 9 reveal the insignificant role of other actors in building farmers' capacity on forage production and development across all regions. The survey data indicates that on average farmers travel 44 minutes to reach a forage seed distribution shop. Farmers in Oromia walk the longest distance (58 minutes) and those in SNNP walk the shortest distance (34 minutes).

Table 50 Area cultivated by improved forage, feeding system and actors involved forage development Training in 2017/18 by region

Variable	Beneficiary households				
	Tigray	Amhara	Oromia	SNNP	Total
Area cultivated by Forage (ha)	0.25	16.00	4.27	15.56	36.08
Distance travel to feed shop (hours)	0	58.00	0	34.00	44.00
Cut and Carry (%)	100	93.5	71.4	98.1	95.9
Rotational grazing (%)	100	25.8	42.9	42.5	39.3
Government training (%)	0	100	100	100	100
NGO Training (%)	0	57.1	0	18.6	23.1
Private sector Training (%)	0	0	0	37.2	30.8

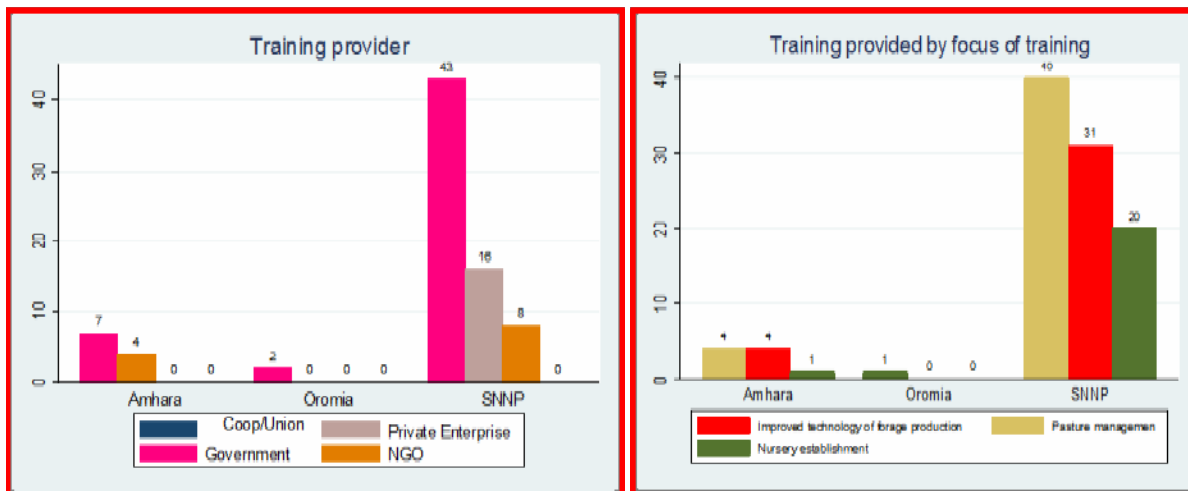


Figure 9 Actors involved in improved forage training and the focus of the training by region

Source: FEED III baseline Survey (2018)

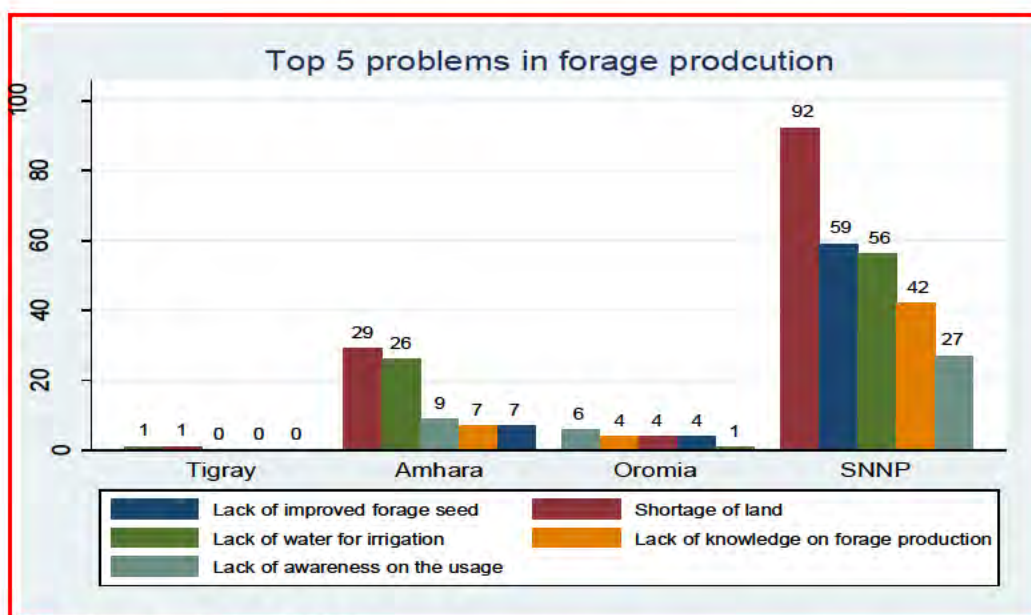
As per Table 52, all surveyed households confirmed that the fodder they had produced (local and improved) were not adequate enough to meet the nutritional demand of their livestock. In response to feed shortages, farmers restrict animal feed intake in 25 percent of the households. 75 percent of the households find other alternatives such as feeding fruit and vegetable leftovers, migrate to locations where feed is available, sugar cane top (Bosete of Oromia) or purchase grass hay and straw. Limited access to forage has a negative impact on quantity of produce particularly of milk (58 percent of the households) and quality of produce such as fat content of milk (17 percent), hence, affects the expected income of the household (25 percent).

Table 51 Forage inadequacy and its effects

Region	Forage adequacy	Strategy way out in case of Inadequacy		Consequences of feed inadequacy		
	Adequate	Reduce quantity given	Start own production	Reduce product quality	Reduce product quantity	Reduce income
Tigray	0	0	0	0	0	0
Amhara	5 (1.2%)	1 (20%)	4 (80%)	1 (20%)	3 (60%)	1 (20%)
Oromia	0	0	0	0	0	0
SNNP	7 (1.6%)	2 (29%)	5 (71%)	1 (14%)	4 (57%)	2 (29%)
Total	12 (0.73%)	3 (25%)	9 (75%)	2 (17%)	7 (58%)	3 (25%)

Source: FEED III baseline Survey (2018)

The major reasons for low adoption of forage development as cited by farmers include shortage of land, unavailability of quality seed, knowledge and skill gap and damage caused by free roaming animals (see Figure 10).



Source: FEED III baseline Survey (2018)

Figure 10 Major forage production problems by region and number of respondents

Farmers in Tigray and Amhara regions benefit from fodder development carried out on soil and water conservation structures. In Oromia region, *Sesbania sesban*, *Vetivar* grass, *Setaria verticellata*, Elephant grass (*Pennisetum perpureum*), Rhodes, Dasho grass, Oats, Lablab, Cowpea, Alfalfa, Vetch, and Pigeon pea have been introduced by the government extension system and through NGO interventions. In Sidama highlands of SNNP region, few fodder species mainly Desho, Elephant grass and *Sesbania*, were established along fences and farm boundaries. The adoption rate is reasonably good in Aleta Wondo due to NGO intervention. In Gamogofa Zone, Desho and Mercho grasses grow around soil conservation structures in some parts of Bonke district.

Table 52 Forage varieties grown and used by survey households in 2017/18 by region

Forage type	Beneficiary households (%)				
	Tigray	Amhara	Oromia	SNNP	Total
Elephant Grass	0	9.7	14.3	50.0	39.3
Sesbania	100	16.1	14.3	0	4.8
Rhodes	0	3.2	0	1.9	2.1
Alfalfa	0	6.5	0	0.9	2.1
Vetch	0	9.7	0	0.9	2.8
Oats	0	16.1	14.3	5.7	8.3
Lablab	0	3.2	0	0.9	1.4
Desho	0	0	0	65.1	47.6
Buffle	0	3.2	14.3	0.9	2.1
Gutemala	0	0	0	24.5	17.9
Others	0	61.3	71.4	17.0	29.0

Source: FEED III baseline Survey (2018)

In Tigray region, based on qualitative information, the cultivated forage crops grown in the survey districts were Sesbania, Leucaena, Napier grass, Alfalfa, Tree lucerne, Vetch, Cowpea, Lablab and Pigeon pea. Sesbania, Leucaena and Napier grass are among the most frequently used forage crops for feeding livestock. From grass species, Napier (*Pennisetum purpureum*) and Rarely Rhodes (*Chloris gayana*) are commonly distributed to forage growers mainly through the government extension system. Nevertheless, from the present household survey in Tigray, Sesbania is reported as the only cultivated forage crop grown in the last 12 months (Table 53).

c) Crop residues

The major crop residues produced in the surveyed districts could be broadly grouped into cereal, pulse, fruit, root crops, vegetables and sugar cane residues. In SNNPR, barley and wheat straw are important cereal straws in Bonke while maize stover is important crop residue in Wolaita Zone districts. The dominant crop residues in the Sidama highlands are enset leaf and stem. Similarly, feed resources derived from fruits such as banana and mango have the largest contribution in Arba Minch Zuria districts. In Central and Eastern Zones of Tigray region, wheat straw is by far the most dominant crop residue in all districts except Adwa and Laelay Maichew where teff straw contributed the largest residue. A less common crop in other parts of Ethiopia but widely farmed in the central and eastern zones of Tigray region is hanfets, a crop which possesses the characteristics of both wheat and barley. Faban bean is the most dominant crop contributing as protein source. In Amhara region, crop residues include maize, barley, teff and finger millet. The highest protein source residue providers were faba bean and grass pea in order of importance. In Oromia, cereals and pulse crops residues were maize, teff and faba bean in West Shoa Zone, maize, teff, wheat, haricot bean and chickpea in Arsi, East and North shoa.

Crop residue quality can be improved through mechanical and chemical treatment. These practices have been demonstrated through the government extension system and by NGOs. Mechanical treatment is carried out by chopping to improve palatability and reducing wastage of coarse feeds. Chemical and biological treatment introduced by the government extension system and NGOs were Effective Micro-organism Treatment of Crop Residues (EM), Urea Molasses Treatment of Crop Residues (UM), Urea Molasses Block and Bag Silage. Chemical treated feed can improve palatability and nutritional availability, increase water intake by dairy cows which helps to raise milk yield and improve body condition of cows, increase egg yield and shorten cattle finishing period. The FEED I and II projects already introducing these crop residue improvement technologies in their intervention districts and FEED III should follow similar promotional activities.

d) Non-conventional feeds

The major non-conventional feeds identified in the surveyed districts in SNNP region were traditional liquor residue (katikala and borde atella), spoiled grains, crop thinning, vegetable and fruit waste and bamboo leaf and kocho residues. The major non-conventional feed resources in Amhara and Oromia regions were by-products of local beverages and liquors, chat geraba (Khat edulis), cabbage and mango fruit rejects, backyard grown cabbage and some shrubs such as Grewia (Verona) and Acacia in West Shoa. In Tigray region, atella (home-made brewery by-product) is more common in the Central Zone districts while cactus cladodes feeding is a traditional feed in the Eastern Zone districts. Cladodes/pods of cactus pear (*Opuntia ficus indica*) are traditionally used as livestock feed during the dry season and drought periods in South Tigray.

3.7. Feed value chain

Concentrate Feed agribusinesses

Feed marketers/suppliers identified and surveyed were feed traders, cereal processors, feed mills and oil extraction plants. In Oromia, feed market is relatively more accessible in East Shoa and Arsi than in West Shoa and North Shoa Zones. For instance, in Shirka Woreda of Arsi Zone, a private agro-dealer give services for over 1000 farmers and another trader in Boset of East Shoa has over 2000 customers. Livestock feed trading is a new and emerging business in West Shoa Zone with only two feed traders. One of the traders in West Shoa is an agent for Ethio-Chicken poultry feed manufacturing company and also sells effective micro-organism, molasses and homemade poultry feed.

In Tigray, oil processors and cereal mills operators are the major livestock feed traders. In SNNPR, there were very few specialized feed traders, but flour mills and concentrate feed processors sell concentrate mixes in Sidama Zone. In Bonke Woreda, there is one trader who sells concentrate feed manufactured by Gamo Gofa Fruit and Vegetable Cooperative Union. Many feed traders in Gamo Gofa supply concentrate feeds coming from Alema Koudjis, Debre Zeit in Oromia. In West Gojjam Zone, the majority of feed businesses are privately owned (83.3%) but few are owned by cooperatives (8.3%) and unions (8.3%). For example, ADMAS cooperative union in Guangua district retails the feed manufactured by Guanga farmers' cooperative union feed enterprise. NGOs like SNV have contributed for the establishment of private agro-input dealers in Amhara, Oromia, Tigray and SNNPR. Most of the agro-input dealers contacted in this survey were those once supported by SNV. The major challenge agro-input dealers face is unfair increase in feed price from suppliers' side, unavailability of feed, lack of credit and high income tax.

Generally, privately owned medium and small millers who mix ingredients and label them as a concentrate feed are characterized by three basic problems: first, majority of them are neither formally licensed nor registered for value-added taxes (VAT) that makes their product cheaper. Their lower cost structure (important given rising feed prices in Ethiopia) means they might be able to lower the selling price of their products making them more attractive to cost-sensitive buyers such as those in the informal sector. Second, they may not have the competence to mix quality feed or formulate the appropriate ration from a given set of raw materials. Third, and most importantly, from the standpoint of disease, the largely ad hoc nature of their production and sourcing practices makes them more susceptible to the spread of poultry diseases through contaminated re-used bags and containers. The major concerns here are the potential rapid spread of aflatoxin, avian flu and other poultry diseases through these feed producers and their distribution channels. Such feed producers are not knowledgeable on how to manage such risks and are difficult to monitor and track. The government regulatory system is inadequate in terms of facilities, man power and structural organization to follow up on them. Like the previous FEED projects, FEED III could contribute much in capacity building of regulatory institutes and upgrading the technical skill of privately owned millers.

Benefit of Locally formulated concentrate feeds

One of the major challenges facing farmers is the increasing price of concentrate feed. Therefore, establishing local feed enterprises that use local raw materials to reduce surging feed price is important. Such enterprises can also contribute in reducing transportation costs. The use of local raw materials can also benefit farmers who supply crops like maize to feed enterprises and support local industries like flour mills and oil extracting plants. From the qualitative information, it is reported that FEED I and II projects provided feed processing equipment and finance to establish farmers' cooperative unions feed enterprises.

The projects also supported technical trainings on synthesis of balanced feed ration. On the input side, FEED I and II projects created linkages between local farmers and enterprises in order to supply local ingredients to feed plants. On the output side, FEED I and II projects created market linkages between feed enterprises and primary cooperatives, individual smallholder farmers and commercial farmers. Based on the focus group discussion in Tigray region, participants of the discussion believed that *“the main hindrance for livestock production is shortage of concentrate feed caused by high costs and lack of availability in local markets”*. For example, participants mentioned that since there is no animal feed supplier nearby farmers are obliged to go to Mekele, a town 30 km away from their residential village. The price is expensive-a quintal of wheat bran and oilseed cake costs about 760 and 620 birr in Mekelle town respectively. This does not include the transportation cost which is about 50 birr for each. Most of livestock keepers are not aware of the difference between concentrate feed and feed ingredients used for concentrate manufacturing. The problem of feed availability, quality and upward surging prices are the obvious setbacks for livestock development in the country. FEED I & II projects have already started the establishment of feed enterprises in order to alleviate this challenge. In view of this, ACDI/VOCA FEED I and II projects supported about 16 Cooperative unions in the survey districts by providing feed processing machinery and stand by generators, technical support and trainings, financial donations, ration formulation manuals and software and continuous monitoring and coaching including business planning and financial management. The findings of the key informants interview on Cooperative unions feed enterprise is summarized as follows.

The daily production capacity of most farmers' cooperative union feed enterprises that were established by FEED I and II are about 80-480 quintals per day. But most are not operating at full capacity and actually produce only 55-100 quintals per day due to shortage of feed ingredients and output market (e.g., Ambo and Biftu Selale). The annual revenue of some of the enterprises is estimated at about Eth. Birr 2.4 million (e.g. Galema union of Arsi, Oromia). The highest estimate was Birr 7.0 million for Biftu Selale union of North Shoa in Oromia region. On average, each enterprise employed 3 to 15 permanent staff and 4 to 10 casual labors. Feed ingredients are obtained from different sources and in some cases from union own flour factory, wheat short and wheat bran (e.g., Ambo Farmers' Cooperative union) and in others from local farmers. Gozamin farmers' cooperative union in Amhara region, for example, buys maize from local farmers who are members of the union. Other enterprises such as Bokra Union in Alamata buy wheat short and bran from Addis Ababa and maize from Gojam. For mineral supplements, there is a limestone factory in different towns like Ambo and Adwa towns.

The main users of the enterprises' products are the union's primary cooperatives which distribute the produce to individual farmers. There are also commercial dairy farms, poultry farms and feedlots who buy directly from the feed enterprises. The project linked the enterprises with end users and provided training on concentrate feeding and livestock management to cooperative members and other customers. Most of the cooperative unions still expect support from the FEED-III as summarized in Figure 11.



Source: FEED III baseline Survey (2018)

Figure 11 Expected support areas for cooperatives/unions by FEED-III project

From the key informant interviews, most of the feed enterprises are confident about their organizational capacity to run the business and ability to expand their services beyond the current distribution domain. They anticipate a big demand for their product but face major challenges with regard to availability and quality of feed ingredients used for concentrate making (e.g., Ambo and Biftu Selale). On the other hand, unions like Enderta face both input and output market challenges as the number of their end product customers were very limited. Through the customers' evaluation survey that was conducted by some of the unions, the feedback on level of customer is very good (e.g., Bokra of Tigray, Ambo in Oromia and Gozamin in Amhara). The highly in demand concentrate feeds are dairy, poultry and fattening feeds depending on the location of farmers' cooperative union enterprise and customers demand.

The feed ingredients supply only a limited volume of production of each enterprise. Premix importers are also unreliable as they do not have enough stock in their stores. Most enterprise management staff believe that their feed prices are affordable to farmers when compared to commercial concentrate producers but price still rises when the cost ingredients increases. The majority of the enterprises have plans to expand their machinery capacity and provide enough quantity of feed to the market. Some enterprises reported shortage of store space to store their inputs and products. Power supply and electricity interruption were bottlenecks for full operation of some of the feed enterprises. Taxation and vat charges at different market segments were raised as contributing factors to the rise feed price. Some of the enterprises purchase ingredients from distant places incurring additional transport costs. This particularly affected those enterprises located in the northern part of Ethiopia which may influence their competitiveness in the market. For example, Megenagna, Enderta and Bokra unions buy major ingredients from Addis Ababa, Nazerte and Gojam. Setithumera union located in Western Tigray purchase maize and wheat brans from Gojam and Gonder.

Feed enterprises are also involved in forage nursery operation (e.g., Guangawa in Amhara, Mirana in Tigray, Ambo and Biftu Selale in Oromia). However, shortage of land, inconsistent demand and high prices made the business unsuccessful. On the other hand, demand for forage seed has been created and is steadily growing due to government and NGOs intervention. In this regard emphasis should be given to capacity building and market linkage of forage seed actors. Promotion of farmers to farmers seed exchange system should also be strengthened.

Commercial feed supply

The feed types traded in the surveyed districts are hay, green fodder, cereal crop residues, pulse crop residues, mill residues, vegetable and fruit residues, cereal bran, pulse bran, oil seed cakes, and formulated rations. Cereal and pulse bran are better available in Oromia and Amhara regions. Limestone is available in Addis Ababa, Adwa, Ambo and other towns. The types of feed ingredients traded varied between regions and districts depending on the type of crops grown and the presence or accessibility of cereal processing mills, oil extracting plants and feed processors.

In Yilmana Densa district of Amhara region, Sigede multipurpose farmers' cooperative supply maize and noug seed cake to feed enterprise by collecting maize from members' farmers and noug seed cake from oil plants. In Setituhumera of Tigray region, a private individual, [REDACTED] supplies sesame oil seed cake to Setituhumera Farmers' cooperative union. In the remaining 14 feed enterprises, feed ingredients are purchased by each respective union. In Amhara and Tigray regions, the major feed types traded are oil seed cakes owing to the fact that the two regions are major growing areas for sesame, noug and other oil crops and the presence of relatively larger number of small-scale oil extraction plants.

In North Shoa, standing grass hay from enclosed private area is sold to hay bailers. In East Shoa, teff and wheat crop residues are sold to bailers and stored in a pyramid shape on the way to Hawassa. Sugar cane top is used as livestock feed in Bosete district of Oromia region. The major marketed feeds in SNNPR are wheat bran and oil cakes. A unique feed marketing is observed in Gamo Gofa zone where standing grass hay collected mainly from bush lands/forest in enclosed area is marketed in Arba Minch town. In addition, green fodders like maize stover, green grass, banana stem and leaf, sugar cane top, and limited volumes of improved forages such as elephant grass are also marketed.

3.10. Poultry production and value chain

Production

The traditional poultry production system is characterized by small flock sizes, low level of inputs and outputs, and periodic devastation of flocks by disease. In Amhara 60 percent and in Tigray 43 percent, in Oromia 42 percent and in SNNPR 40 percent of the households interviewed participate in poultry production (Table 54).

Table 53 Household Poultry production participation

Region	Sex	Frequency	Percent
Tigray	Male	176	42.8
	Female	235	57.2
Amhara	Male	251	60.8
	Female	162	39.2
Oromia	Male	169	41.0
	Female	243	59.0
SNNP	Male	163	40.0
	Female	249	60.0
Total	Male	176	42.8
	Female	235	57.2

Source: FEED III baseline survey (2018)

The major market outlet for poultry is directly selling to consumers. 52 and 75 percent of the respondents in Amhara and Tigray regions respectively reported direct sell to customers as the major outlet market for poultry. In Oromia and SNNP regions, small retail traders serve equally as outlet markets with direct sells to consumers. This is probably due to the proximity of the two regions to major cities and towns like Addis Ababa, Nazerte, Hwassa and Arbaminch (Figure 12).



Figure 12 Household Poultry production market outlet

As indicated in Table 55, the average number of local chicken ownership per household is high in Amhara (5.2) and Oromia (3.9) and is lowest in Tigray (1.6) and SNNP (1.5). The ownership of improved layers per household is highest in Tigray (4.0 layers) and lowest in Oromia (0.7 layers). This is mainly due to lack of improved layer chickens (in this case of exotic and commercial type) in Oromia. Ownership of improved broilers per household is high in Tigray when compared to the other three regions. The improved poultry

ownership in Tigray might be associated with strong input supply by Ethio-chicken, a private company based in Tigray that produces improved pullets and chicken feed.

Table 54 Average poultry ownership and productivity by Region

Poultry Type	Breed	Region				Total
		Tigray	Amhara	Oromia	SNNP	
Layers	Local	1.4	3.4	3.4	1.6	2.4
	Improved	4.0	1.9	0.7	1.3	2.0
Broilers	Local	0.5	1.2	0.7	1.1	0.9
	Improved	1.8	0.1	0.0	0.4	0.6
Female chickens (Over 3 months of age not laying - Pullet)	Local	0.5	1.1	1.9	0.4	1.0
	Improved	0.8	0.1	0.4	0.4	0.4
Male chickens (Over 3 months of age)	Local	0.4	0.5	1.0	0.4	0.6
	Improved	0.4	0.0	0.1	0.3	0.2
Chicks (up to 3 months of age)	Local	0.9	2.3	2.4	0.4	1.5
	Improved	0.8	0.2	0.2	0.1	0.3
Total	Local	1.6	5.2	3.9	1.5	3.0
	Improved	3.3	1.4	0.6	1.0	1.6
	Total	4.9	6.6	4.5	2.5	4.6

Source: FEED III baseline survey (2018)

Egg production for improved layers is the highest in Tigray with 166 egg/hen/year and lowest in Oromia and SNNP due to lack of inputs like improved pullet breeds, feed, drugs and vaccines. A more detailed poultry ownership and productivity is indicated in Figure 13.

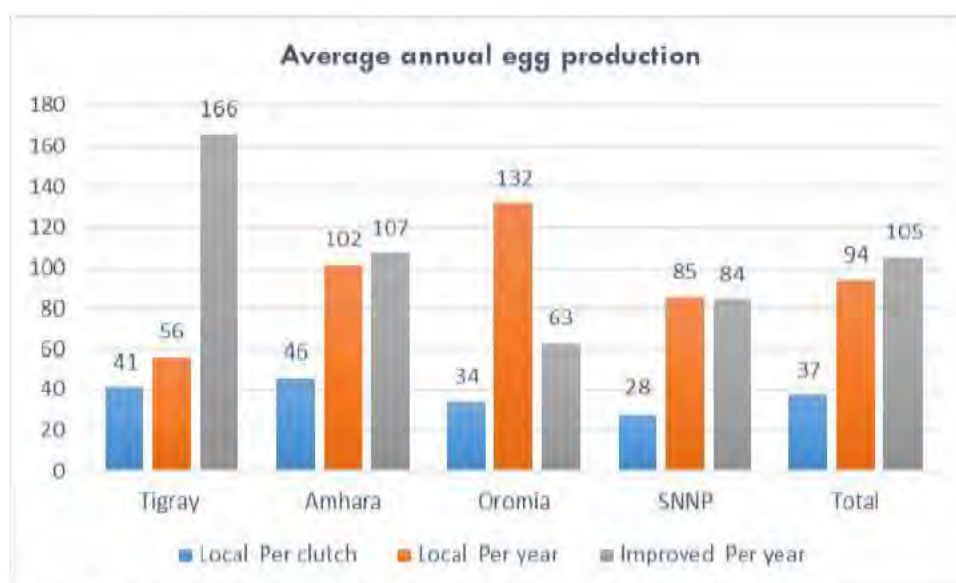


Figure 13 Average poultry egg productivity egg/hen/year by Region

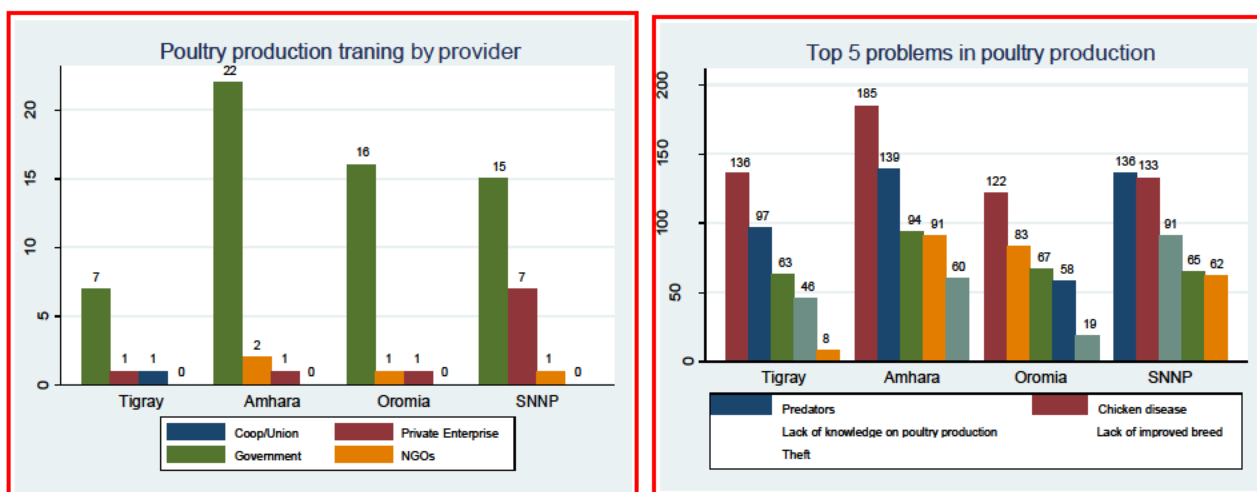
As evidenced from Table 56, respondents in the study area earned an average of 792.03 Birr annually selling an average of 5.44 hen, 4.94 male chicken and 4.44 female chicken, and 307.4 eggs each year. The sales volume and sales revenue of poultry products except eggs is found to be higher in Tigray region compared to the other regions. The higher sales in Tigray may be due to the higher improved poultry breed possession among respondents in the region.

Table 55 Average annual sales of poultry products

Production Type	Sales	Region				Total
		Tigray	Amhara	Oromia	SNNP	
Hen	Quantity (No.)	10.27	3.51	4.80	3.19	5.44
	Revenue (Birr)	2,433.65	415.42	789.82	370.96	1,002.46
Male chicken	Quantity (No.)	10.74	2.49	4.10	2.42	4.94
	Revenue (Birr)	1,950.87	391.24	740.60	459.53	885.56
Female chicken	Quantity (No.)	6.13	3.44	5.69	2.50	4.44
	Revenue (Birr)	678.75	299.91	621.96	335.00	483.90
Eggs	Quantity (No.)	348.18	349.22	168.35	363.82	307.40
	Revenue (Birr)	941.81	760.51	537.31	945.07	796.17
Average revenue (Birr)		1,501.27	466.77	672.42	527.64	792.03

Source: FEED III baseline survey (2018)

Government extension system is the major trainer (See Figure 14 –left panel) and input supplier for pullets, drugs, as well as vaccines. The private sector, largely located at Zone and district levels, is mainly involved in feed and drug supply. Recently, national private companies like Ethio-chicken and Alema farm are emerging as suppliers of pullets and chicken feed throughout the country. In backyard systems, poultry keeping is often an activity undertaken by women and is considered as a source of supplementary income and consumption for festivals and special occasions. FGD respondents explained that the income from poultry provided about 10 to 15% of household expenditure, much of which is controlled by women. Women also play an active role in decision making in backyard production and marketing systems.



Source: FEED III baseline survey (2018)

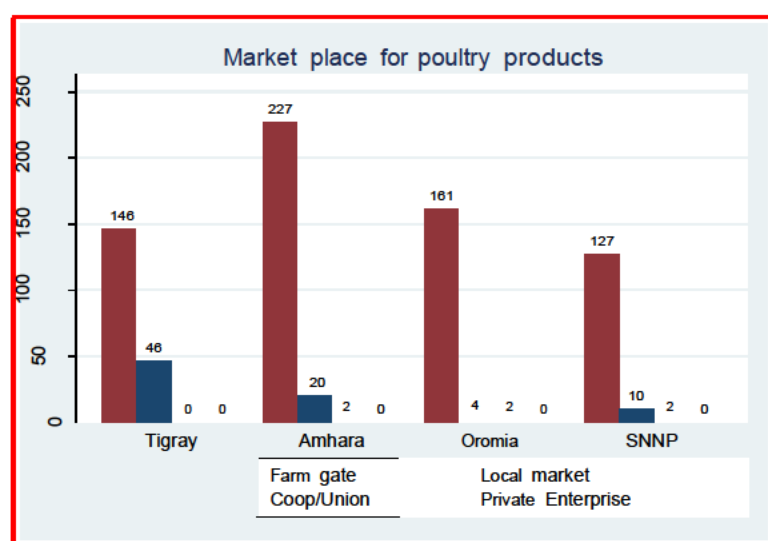
Figure 14 Improved poultry management training providers (left panel) and major challenges to poultry production (right panel) by regions

Smallholder poultry production does not put pressure on limited household resources such as land, labor or capital, and instead requires little if any investment. Backyard poultry producers use locally procured, often poor quality inputs to feed chicks. Outputs from this system include eggs and mature chickens. The

main by-product from production is chicken manure for horticultural crops in the garden. The major constraints to this activity identified in the household survey include inadequate healthcare, predators, inappropriate housing, poor knowledge of poultry management, theft and lack of improved breed (Figure 15-right panel).

3.10 Poultry value chain

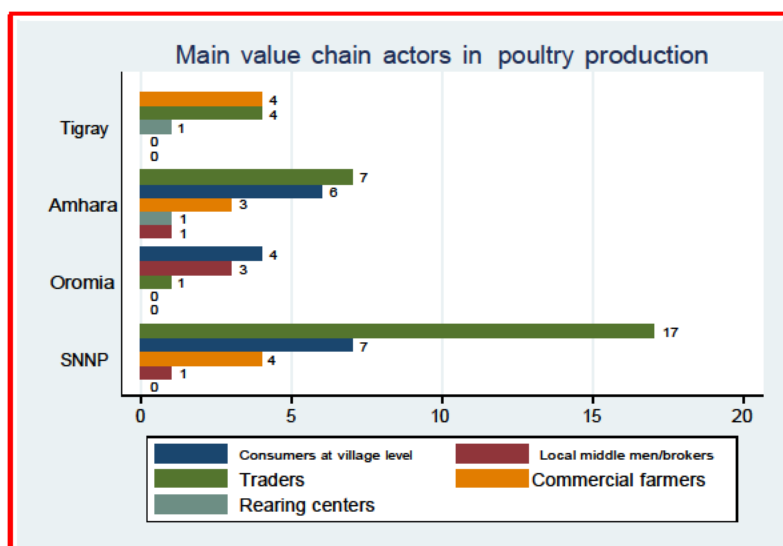
The households covered in the survey sell eggs and chickens formally in markets in town and informally for individual consumers. They also retain some of their produce for household consumption. Chickens are transported to markets using pack animals or simply on foot if only a few birds are being sold. Traders sometimes collect and assemble a number of chickens from villages and transport them using small trucks to distant markets like Addis Ababa, Bahir Dar, Hawassa and Mekkele. As indicated by Figure 15, the value chain in the backyard system is not complex and in some cases involves direct sales to nearby consumers.



Source: FEED III baseline survey (2018)

Figure 15 Market places for smallholders' poultry products

Traders intervene in village markets via collectors/assemblers usually local resident farmers who bulk chickens coming from different village markets and transfer them to secondary and terminal markets. Market demand for backyard poultry is higher than for commercial breeds due to consumer preferences for local breeds. Consumers are also reported to prefer the yellow color of egg yolks and the taste of meat from local breeds compared to commercial ones. Extension services that provide support to the sub-sector in the form of improved breeds, vaccines, etc are weak. At a grassroots level, there is no coordination among actors and chain participants to participate in a simple chain from producers to consumers. The major actors involved in the simple chain include farmers, agricultural research stations, agricultural extension services, NGOs, consumers and, to some degree, traders (Figure 16). However, this interaction is very limited and often on an ad hoc basis. There are no known associations established to serve producers in the backyard production system. Most FGD respondents further noted that they were not aware of any public service relevant to poultry production practices. Some did not know sources for vaccines or other treatment and rely instead on traditional methods of treatment.



Source: FEED III baseline survey (2018)

Figure 16 Main value chain actors for poultry production

Feed millers and concentrate feed producers

Inputs for processed poultry feed include cereal grains, cereal grain by-products and oilseed cakes. These ingredients are mixed and processed by the few existing modern feed millers and commercial poultry farms that prepare their own feeds. Most available feed formulations do not have balanced mixes of vitamins and minerals and as a result have variable nutritional value. There is no regular quality control for marketed feed. The price of concentrate feed is unaffordable to the majority of the smallholders-56 percent of respondents in Tigray, 50 percent in Amhara, 57 percent in Oromia and 97 percent in SNNPR. Majority of respondents approved feed price stability except those in Tigray region. There, price instability was reported by 67 percent the respondents. The lack of feed quality legislation and laboratory facilities for chemical analysis also contributes to the poor quality of processed feeds. All respondent households made no laboratory analysis for feed quality, but the majority made physical inspection using indigenous knowledge (Table 57).

Table 56 Concentrae feed price affordability, price stability and quality assurance

Region	Concentrate feed price affordability & stability				Purchased concentrate feed Quality				
	Affordable		Stable		quality Checked		Ways of Quality Checks		
	Yes	No	Yes	No	Yes	No	Laboratory	physical detection - indigenous knowledge	physical detection livestock experts
Tigray	4 (44%)	5 (56%)	3 (33%)	6 (67%)	0	9	0	0	0
Amhara	6 (50%)	12 (50%)	11 (61%)	7 (39%)	10	8	0	10	0
Oromia	3 (43%)	7 (57%)	9 (90%)	1 (10%)	4	6	0	4	0
SNNP	1 (3%)	30 (97%)	26 (84%)	5 (16%)	13	18	0	13	0
Total	14	54	49	19	27	41	0	27	0

Source: FEED III baseline survey (2018)

Major commercial feed operators are large poultry farms such as ELFORA, Genesis Farms Ethiopia, Ethiochickens and Alema Farms. These actors dominate the market and make it difficult for smaller millers to obtain feed ingredients. Smaller millers and toll millers operate parallel to the modern farms and are predominantly concentrated in Debre Zeit, Addis Ababa, Hawasa, Mekelle and Bahir Dar. Medium private feed enterprises or toll millers prepare small quantities of poultry feed at home level, but the quality of feed can vary given lack of materials and technical competence. Private feed enterprises contribute only a small share, around 10 percent, for layers feed and 75 percent for broilers feed. Cooperatives, on the other hand, have a 10 percent share in layers feed. Layers feed produced at home accounts for 48 percent (Table 58).

Table 57 Types of poultry feed used and source of feed

Feed Type	Tigray		Amhara		Oromia		SNNP		Source of feed				
	Qty (KG)	Cost (Birr)	Qty (KG)	Cost (Birr)	Qty (KG)	Cost (Birr)	Qty (KG)	Cost (Birr)	Coop	Own production	Private Enterprise	Other farmers	NGO
Layers Feed	102	231	88	611	56	552	43	299	10 (24%)	20 (48%)	4 (10%)	8 (18%)	0
Broilers Feed	105	310	150	750	46	292	99	697	0	0	39 (75%)	1 (25%)	0
Grain	139	713	12	73	50	175	260	346	2 (13.3%)	0	2 (13.3%)	7 (46.7%)	4 (26.7%)

Source: FEED III baseline survey (2018)

In terms of concentrate feed supply adequacy, 55 (81 percent) of farmers reported that the supply of poultry concentrate feed was not adequate. This is mainly due to inaccessible supply, high supply-demand gap and higher numbers of customers compared to service provision capacity of distribution channels (with almost equally reported reasons). Feed market information is accessed only by 28 percent of the respondents and the top three information sources are local feed dealers, feed suppliers and fellow farmers. Most farmers access information through farmer-to-farmer communication and community meetings (Table 59).

Table 58 Poultry feed market channel, source of market information and means of information access

Region	Average distance to distribution channel (Minutes)	Channel adequacy					
		Adequate		Reasons for inadequacy			
		Yes	No	Serves too many farmers	Inaccessibility	Supply -demand gap	
Tigray	69.22	3	6		4	3	
Amhara	51.33	2	16	7	11	5	
Oromia	96	2	8	3	5	3	
SNNP	55.32	6	25	19	12	21	
Total	62.09	13 (19%)	55 (81%)	29	32	32	
Region	Feed market information						
	Accessed Information		Information source (Top 3)			Ways of accessing information (Top 2)	
	Yes	No	Local feed traders	Feed suppliers	Fellow farmers	Farmer to farmer	Community meeting
Tigray	1	8	1	1	0	1	1
Amara	6	12	0	2	5	6	2
Oromia	1	9	1	0	0	1	0
SNNP	11	20	9	4	2	10	4
Total	19 (28)	49 (72)	11	7	7	18	7

Poultry feed is found to be inadequate mainly due to high feed price, limited supply and low quality. Hence, poultry producers take different options to cope with inadequacy such as using other feed materials, producing their own ingredients and reducing quantity offered to chicken. This has a negative impact on productivity and household income. The size and weight of improved chicken and egg sold by undernourished chicken is lower and fetch lower price (Table 60).

Table 59 Poultry feed adequacy rate, reasons and strategies for coping.

Region	Poultry concentrate Feed Adequacy										
	Adequate		Reasons for Inadequacy			Strategy way out in case of Inadequacy			Consequences of Feed Inadequacy (T0p 3)		
	Yes	No	High price	Low quality	Limited supply	Reduce feed quantity	Shift to own production	Use some other feed materials	Decreased income from poultry production	Reduced in the quantity of poultry production	Reduced in the quality of poultry production
Tigray	5	4	0	0	3	0	1	3	3	2	3
Amhara	3	15	4	2	7	2	9	4	14	11	6
Oromia	2	8	6	2	0	5	2	1	3	7	5
SNNP	3	28	14	1	13	2	7	18	24	25	16
Total	13	55	24	5	23	9	19	26	44	45	30

Source: FEED III baseline survey (2018)

On the account of the above information, it would be good for the FEED-III project to critically take into account the major gaps identified in relation to access to market, distance to distribution channel, major feed information sources, feed price affordability, price stability, farmers' strategies in time of crisis and modalities of accessing the feed information among others, which will contribute improve conditions for poultry owners over the project period.

3.12. Gender perspectives in the feed management practices and household dietary diversity

3.12.1. Gender roles in dairy production and management tasks

In the Ethiopian context, household members have different roles in the agriculture sector depending on their sex, age and state of physical condition. Even though the major duty of rural children from age 7 is schooling, they also start playing their own small roles in agricultural activities including herding, bird scaring and other activities that can be implemented by children. While they attend schools during one half of the day, they are involved in farming activities in the other half. As they grow up, children start engaging in weeding, feed collection, feeding dairy cows, clearing and plowing farmlands, milking and milk selling, and other activities. At about the age of 15, the child (both boys and girls) is perceived to be capable of implementing all types of farming activities along with their parents and elder siblings. This being the common scenario in most parts of rural Ethiopia including FEED III project areas; the following table illustrates specific details on gender perspectives and extent of participation of household members at various dairy management activities.

As shown in Table 59, 70% of dairy management activities were mainly carried out by women while men contributed to 30% of the task. The youth support all activities even though they did not play a major role. As attested by 91% of the households, women played the major role in cleaning the barn and washing cows (81%). Other activities mainly implemented by women include feeding cows (84%), milking (87%), milk processing (98%), selling dairy products (88%), calf feeding and management (91%), watering dairy

cows (87%), and udder washing (83%). On the other hand, as pointed out by 85% of the households, feeds and forage collection is the major responsibility of men. Other roles for men were related to market participation such as purchasing concentrate feeds (85%) and feed ingredients (87%), and selling cows (85%). The involvement of women and men in various dairy management activities was similar across all regions except for milking which is the major role of men in Amhara region while it is the role women in other regions. The major roles being played by women and men are also similar across all agro-ecologies.

Without making such assessments through a gender lens, it used to be assumed that men carried out all farming activities including dairy management. However, most of the dairy management activities are mainly implemented by women. The implication is that targeting interventions should be aligned to the roles and responsibilities played by men and women. For instance, if there is a technology or training on how to collect feeds of dairy cows, more priority should be provided to men while trainings for women should focus on interventions related to techniques of feeding dairy cows. On trainings, demonstrations and experience sharing visits related to improving milking and hygiene practices, milk processing and calf management technologies, women's participation should be prioritized. Following identification of gender roles, subsequent projects should be designed in a gender responsive approach. Assessment of gender perspectives also helps to identify who to work with and make the right targeting in research, extension and development interventions.

Table 60 Gender roles in dairy management practices (% of households) in FEED III project regions, 2018

Task mostly carried out	Household members	Tigray	Amhara	Oromia	SNNP	Total
Participation in Cleaning the barn	Women	86	85	94	96	91
	Men	58	41	55	30	45
	Youths (under 18)	43	28	15	35	29
Participation in Feeding the cows	Women	80	80	87	88	84
	Men	85	80	69	79	78
	Youths (under 18)	46	35	25	29	32
Participation in Forage collection	Women	61	60	55	78	65
	Men	89	90	76	85	85
	Youths (under 18)	34	32	17	32	29
Participation in concentrate feed purchasing	Women	63	38	57	60	55
	Men	83	87	79	92	86
	Youths (under 18)	15	10	10	12	11
Participation in factory ingredients purchasing	Women	74	31	50	54	49
	Men	85	88	83	92	87
	Youths (under 18)	11	9	11	8	10
Participation in milking	Women	84	64	98	99	87
	Men	78	75	20	14	44
	Youths (under 18)	8	10	8	18	11
Participation in milk processing (butter, chees)	Women	98	97	97	99	98
	Men	18	5	18	5	11
	Youths (under 18)	9	13	12	21	14
Participation in selling cows and calves	Women	30	23	36	60	39
	Men	86	91	83	79	85
	Youths (under 18)	4	5	10	10	8

Task mostly carried out	Household members	Tigray	Amhara	Oromia	SNNP	Total
Participation in selling dairy products	Women	92	77	86	95	88
	Men	24	36	39	23	31
	Youths (under 18)	56	10	11	22	13
Participation in calf feeding and management	Women	92	86	92	95	91
	Men	56	80	55	60	63
	Youths (under 18)	41	34	30	43	37
Participation in watering	Women	83	76	91	95	87
	Men	62	82	54	54	63
	Youths (under 18)	67	45	36	47	47
Participation in cow cleaning	Women	66	72	88	87	81
	Men	71	72	47	59	60
	Youths (under 18)	49	31	32	36	36
Participation in under washing	Women	76	67	88	97	83
	Men	65	56	35	27	43
	Youths (under 18)	40	15	19	25	22
Participation in others dairy production task	Women	94	35	79	97	80
	Men	69	87	35	58	57
	Youths (under 18)	17	10	34	46	30

Source: FEED III baseline survey (2018)

3.12.2. Gender roles in forage production and management

Forage production and management is also another activity in the dairy sector which requires involvement of family members. As provided in Table 62, about 70% of the forage production and management activities were implemented by men. For instance, land preparation and planting of forage crops was evidently the men's task as affirmed by 82% of the households. Apart from weeding, which was the major task of men (89%), other activities including cultivation (88%), fertilizer application (80%) and harvesting (89%) were major responsibilities of men. On the other hand, watering of forage crops was the major task of women in 75% of the households. Any of the interventions related to enhancement of forage production should be targeted towards men without losing sight of the need for women and youth should participation in accordance with the extent of their contributions.

Table 61 Gender roles in the management of forage crops in FEED III project regions, 2018

Forage production activities	Household members	Tigray		Amhara		Oromia		SNNP		Total	
		n	%	n	%	n	%	n	%	n	%
Participation in Land preparation/ planting	Women	1	100	20	69	5	71	60	57	86	61
	Men	1	100	18	62	4	57	94	90	117	82
	Youths (under 18)	0	0	6	21	2	29	10	10	18	13
Participation in Weeding	Women	1	100	19	66	4	80	55	55	79	59
	Men	1	100	25	86	4	80	90	90	120	89
	Youths (under 18)	0	0	6	21	2	40	15	15	23	17
Participation in Cultivation	Women	1	100	19	66	4	57	60	61	84	62
	Men	1	100	24	83	5	71	90	91	120	88
	Youths (under 18)	0	0	6	21	2	29	20	20	28	21
Participation in Fertilization	Women	1	100	19	79	4	67	27	49	51	59
	Men	1	100	17	71	3	50	48	87	69	80

Forage production activities	Household members	Tigray		Amhara		Oromia		SNNP		Total	
		n	%	n	%	n	%	n	%	n	%
	Youths (under 18)	0	0	7	29	3	50	10	18	20	23
Participation in Watering	Women	1	100	14	58	4	80	55	80	74	75
	Men	1	100	19	79	4	80	44	64	68	69
	Youths (under 18)	0	0	8	33	2	40	27	39	37	37
Participation in Cutting or harvest	Women	1	100	21	75	5	71	62	60	89	64
	Men	1	100	24	86	5	71	94	90	124	89
	Youths (under 18)	1	100	9	32	2	29	22	21	34	24
Participation in Other tasks	Women	1	100	17	85	2	50	32	84	52	83
	Men	1	100	11	55	4	100	30	79	46	73
	Youths (under 18)	1	100	3	15	2	50	18	47	24	38

Source: FEED III baseline survey (2018)

3.12.3. Gender roles in poultry production and management tasks

In rural Ethiopia, poultry activities are perceived to be tasks for women and youth. The reason why men are not involved in such activities is that poultry sales do not bring in substantial incomes. Instead, men get involved in marketing of products that fetch higher incomes such as sale of cows and other large ruminant livestock. The findings of this study have also confirmed that all the poultry management related activities are mainly managed by women. For instance, chicken house cleaning was the major task of women in 87% of the households and the trend is similar across all regions (Table 63). The implication is that any technology and development related interventions on poultry production and management should prioritize women. Agricultural extension systems and any interventions intending to empower women would be successful if they focused on poultry, an activity in which women have better experiences of management.

Table 62 Gender roles in poultry management practices in FEED III project regions, 2018

Poultry production tasks	Household members	Tigray		Amhara		Oromia		SNNP		Total	
		n	%	n	%	n	%	n	%	n	%
Household members participation in chicken house cleaning	Women	170	97	173	77	121	82	146	94	610	87
	Men	41	23	85	38	63	43	45	29	234	33
	Youths (under 18)	75	43	75	34	35	24	60	39	245	35
Household members participation in Vaccination and treatment	Women	103	90	129	74	134	84	112	91	478	84
	Men	50	44	78	45	68	43	58	47	254	45
	Youths (under 18)	31	27	51	29	29	18	50	41	161	28
Household members participation in egg collection	Women	160	97	183	75	129	79	139	93	611	85
	Men	20	12	85	35	59	36	36	24	200	28
	Youths (under 18)	76	46	105	43	50	31	73	49	304	42
Household members participation in House construction	Women	126	82	158	71	75	46	95	81	454	69
	Men	77	50	112	50	111	68	53	45	353	54
	Youths (under 18)	48	31	61	27	25	15	51	44	185	28
Household members participation in chicken feeding and watering	Women	170	97	193	78	117	82	149	92	629	86
	Men	33	19	115	46	67	47	42	26	257	35
	Youths (under 18)	101	58	123	49	54	38	83	51	361	50
Household members participation in chicken and egg selling	Women	150	96	164	73	102	72	134	98	550	84
	Men	40	26	93	41	63	45	27	20	223	34
	Youths (under 18)	33	21	65	29	21	15	43	31	162	25
Household members participation in Other poultry production	Women	101	93	81	67	64	67	63	97	309	79
	Men	54	50	71	59	57	59	28	43	210	54
	Youths (under 18)	34	31	36	30	27	28	35	54	132	34

Source: FEED III baseline survey (2018)

3.12.4. Gender perspectives in decision making

In rural Ethiopia, in general, and in FEED III project regions, in particular, all household members participate not only on operational activities, but also in decision making despite variation between men, women and youths depending on the nature of issue under consideration. Since dairy cows are kept and managed around homesteads, the participation of women and youth in feeding, watering, barn cleaning and milking activities is often substantial. When it comes to decision making, there are cases where both the husband and wife make joint decisions or the man would take the lead position in making the decision. For instance, this study has shown that decision making in 53% of the households concerning sale of dairy products is made jointly by the husband and wife while wives take the lead in 32% of the households (Table 64). There is also regional variability in participation of women and men in decision making. For instance, women are decision makers on how and where to sale dairy products in Tigray region while joint decision making on the same issue dominates in other regions. Decision making practice was also similar in poultry production and sale, an issue on which both the husband and wife made joint decisions in 58% of the households while it was the responsibility of wives in 33% of the households (Table 65). In Tigray region, it was inspiring to see that women are taking the lead in making decisions in the poultry sub-sector as in dairy sub-sector.

Table 63 Participation of household members on decision making to sale dairy products in the regions, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Wife only	84	61	41	21	47	23	65	31	237	32
Husband only	11	8	12	6	4	2	2	1	29	4
Jointly (Both husband and wife)	37	27	98	50	132	66	129	68	396	53
Children under 18	1	1	1	0.5	0	0	1	0.5	3	0.4
Other	5	4	44	22	17	8	12	6	78	10

Source: FEED III baseline survey (2018)

Table 64 Gender perspectives on decision making practices of production and sales of poultry products, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Wife only	87	49	70	28	45	27	50	31	252	33
Husband only	10	6	9	4	7	4	5	3	31	4
Jointly (Both husband and wife)	70	40	152	61	116	69	99	61	437	58
Children under 18	1	0.6	11	4	0	0	2	1	14	2
Other	3	2	5	2	0	0	0	0	8	1
No sale	5	3	4	2	1	1	7	4	17	2

Source: FEED III baseline survey (2018)

Gender perspectives in decision making over production and sale of forages was also illustrated in Table 66, where joint decision is still dominant in 64% of the households while the man takes the lead in making same decision in 21% of the households. In Oromia region, however, decision making related to production and sale of forages was the responsibility of women in 43% of the households while joint decision is dominant in other regions except in Tigray region where forage production and sale is not yet a strong practice. Both the husband and wife brainstorm the issue of purchasing concentrate feeds and make a

common decision in 53% of the households (Table 67). However, men take the lead in decision making over concentrate feed purchase in 31% of the households. The trend of joint decision making is also similar across all regions and agro-ecologies.

Table 65 Gender perspectives on decision making practices of production and sales of forages, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	N	%
Wife only	0	0	1	3	3	43	6	6	10	7
Husband only	0	0	8	26	1	14	22	21	31	21
Jointly (Both husband and wife)	1	100	21	68	3	43	68	64	93	64
Children under 18	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	3	0	0	10	9	11	8

Source: FEED III baseline survey (2018)

Table 66 Gender roles in decision making practices on concentrate feed purchase in FEED III project regions, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Wife only	7	30	2	5	6	18	11	12	26	14
Husband only	13	56	11	30	5	15	27	30	56	31
Jointly (Both husband and wife)	3	13	21	57	22	67	51	57	97	53
Children under 18	0	0	1	3	0	0	0	0	1	0.5
Other	0	0	2	5	0	0	0	0	2	1

Source: FEED III baseline survey (2018)

As presented in Table 68, joint decision is still dominant on the production and sales of poultry products in 58% of the households. On the other hand, the role of women is substantial in making decisions related to poultry sale and production in 33% of the households. When regional variability is viewed, it appears that women in Tigray region took the lead role in decision making of poultry related issues.

Table 67 Gender perspectives in decision making practices about the production and sales of poultry products in FEED III project regions, 2018

	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Wife only	87	49	70	28	45	27	50	31	252	33
Husband only	10	6	9	4	7	4	5	3	31	4
Jointly (Both husband and wife)	70	40	152	61	116	67	99	61	437	58
Children under 18	1	0.6	11	4	0	0	2	1	14	2
Other	3	2	5	2	0	0	0	0	8	1
No sale	5	3	4	2	1	0.6	7	4	17	2

Source: FEED III baseline survey (2018)

In general, decision making trend is similar across FEED III project agro-ecologies where joint decision of the husband and wife is dominant in the highlands, midlands and lowlands. In the context of Ethiopia, gender disparity in decision making and other perspectives is an issue in male headed households where

there are husbands and wives, but not an issue in female headed households where the woman is the sole decision maker. In earlier days, decision making on almost all of the farming and even non-farming issues used to be the sole responsibility of the man who was perceived as the bread-winner and head of the household. Over time, however, the role played by women in all aspects of the economy was recognized to be a missed opportunity. Because of this, massive awareness creation was launched all over the country promoting the advantages and significance of considering gender equality not only in economic but also in political and social spheres. This has brought improvements in gender equity providing opportunities for women to participate in trainings, decision making and other economic initiatives.

3.12.5. Gender perspectives in participation to trainings and capacity building initiatives

In the FEED III project regions, Office of Agriculture, NGOs and other development partners are involved in providing capacity building initiatives to enrich the knowledge and skills of dairy farmers. Even though all household members participate in the management of dairy, access to trainings is not equally accessible to all of them. It is evident that the participation of women in the management of dairy cows and calves is substantial in rural Ethiopia including FEED III project areas. As revealed in Table 69, however, they were men who got better opportunities of participation in the capacity building initiatives. In this regard, 83 % had training on improved dairy management while only 16 % of women had access to the training. The trend is the same in all the regions except that participation of women in trainings is higher in SNNP region (30%) than in others. Even though the man receives trainings, it is rare for him share the newly gained knowledge or skill with his spouse and, as a result, women continue to manage through traditional ways making impact of training on women almost non-existent.

Even though engagement of women is high in poultry production and management, it was the men who had better access to participate in trainings on improved poultry management as reported by 43% of the households (Table 70). This is still because of the perception that the man is heading the household and that he will share the knowledge and skills he gained from the training with his spouse and other family members, which in most of the cases doesn't hold true. Instead, women should receive capacity enhancing programs directly if the poultry sub-sector is to improve and trainings are required to bring concrete impacts.

Table 68 Participation of household members on trainings related to dairy animal nutrition and management, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Overall	
	n	%	n	%	n	%	n	%	n	%
Men	10	91	26	90	23	89	26	70	85	83
Women	1	9	2	7	3	11	11	30	17	16
Other household member	0	0	1	3	0	0	0	0	1	1
Total	11	100	29	100	26	100	37	100	103	100

Source: FEED III baseline survey (2018)

Table 69 Gender perspectives in participation of women and men on improved poultry management trainings, 2018

Household members	Tigray		Amhara		Oromia		SNNP		Total	
	n	%	n	%	n	%	n	%	n	%
Wife only	3	37	10	42	2	11	7	47	22	34
Husband only	4	50	8	33	13	72	3	20	28	43
Jointly (Both husband and wife)	0	0	6	25	2	11	5	33	13	20
Other	1	12	0	0	1	6	0	0	2	3

Source: FEED III baseline survey (2018)

3.13. Dietary diversity and nutrition in small-holder households

Farming households in FEED III project regions feature economic scarcity which has direct association with the status of dietary diversity that household members get. Not only that diversified food items are not easily accessible at all times, but there is also attitudinal problem fail to recognize the importance of nutritional balance for growth, health and disease prevention. An assessment was made on access of households to various types of food items in a period of 24 hours at the time of the study the findings of which have been presented in Table 71.

Protein source food items, such as beef, lamb, goat and egg were not commonly accessible to 52% of the households. These types of food items are considered occasional in small-holder households while most of the medium to high income level households have better access. On the other hand, food items processed from beans, peas and lentils are almost staple foods in Ethiopia. Food sources of such type are mainly used for consumption along with various dishes including “injera”, which is the most popular food in Ethiopia. Households tend to convert various flours into injera.

The major problem related to nutrition is attitudinal caused by inadequate awareness among rural households on the effects of consuming nutritionally unbalanced food. Cases of households preferring to sale all of their produced eggs and live lamb to generate cash to consumption at home are common. They describe “eating egg is to mean eating money”. Therefore, most of household sales are composed of diverse products which can provide the required nutrition for health, growth and maintenance.

Table 70 Accessibility of required nutrition to small-holder households in FEED III project regions, 2018

Nutrition types consumed	Accessibility	Tigray		Amhara		Oromia		SNNP		Total	
		n	%	n	%	n	%	n	%	n	%
Consumed any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?	Yes	225	55	216	52	243	59	103	25	787	48
	No	186	45	197	48	167	41	309	75	859	52
Consumed any eggs?	Yes	222	54	192	47	240	59	136	33	790	48
	No	189	46	221	54	170	42	276	67	856	52
Consumed any foods made from beans, peas, lentils, or nuts?	Yes	355	86	338	82	319	78	232	56	1244	76
	No	56	14	75	18	91	22	180	44	402	24
Consumed any cheese, yogurt, milk or other milk products?	Yes	238	58	179	43	275	67	253	61	945	57
	No	173	42	234	57	135	33	159	39	701	43
Consumed any foods made with oil, fat, or butter?	Yes	374	91	376	91	307	75	322	78	1379	84
	No	37	9	37	9	103	25	90	22	267	16

Nutrition types consumed	Accessibility	Tigray		Amhara		Oromia		SNNP		Total	
		n	%	n	%	n	%	n	%	n	%
When you are not fasting, how often do you consume at least one of the following foods (meat, fish, egg, dairy (milk, fish, yoghurt, butter, etc)?	Daily	8	2	40	10	67	16	41	10	156	10
	More than once per week	154	38	96	23	180	44	110	27	540	33
	Once per week	129	31	156	38	160	39	113	27	558	34
	other	120	29	121	29	3	1	148	36	392	24

Source: FEED III baseline survey (2018)

4. Conclusions and recommendations

4.1. Conclusion

In terms of unions or cooperative membership, 449 (27.24%) of households are members of unions or cooperatives, which are multipurpose in nature, suggesting limited involvement in unions or cooperatives among the studied regions. The socio-economic data reveals that 1511 (91.69%) are male-headed households while only 137 (8.31%) are female-headed households. On the other hand, 1505 (91.32%) have formed families which can help to mobilize household resources to take part in any of the livelihood options. 739 (44.84%) reported to being illiterate while 558 (33.86%) households only have primary education with the mean age of the surveyed respondent being 45 years. The average household size stands at 6. The average land owned was 1.4 hectares. Concerning livelihoods, the majority of the surveyed sample are involved in crop production. Dairy production is becoming a common enterprise in rural areas to produce and sale milk and milk products, and generate supplementary on-farm incomes (about ETB 950 per month from sale of milk).

Even though milk selling practice is improving over time, it is not yet a well developed practice (only 17% of households engaged in milk selling in FEED III project areas). Due to inadequate management practices, milk productivity from crossbred cows is still very low (only 5 liters per day per cow) even though it would have been possible to produce more than 10 liters per day per cow. One of the major factors responsible for low milk productivity is inadequate feed provided to cows by dairy farmers. While concentrate feed is the most essential feed component, only 11% of the dairy farmers claimed to have purchased and used industrially processed concentrate feed. The high and unaffordable price of concentrate feeds is one of the reasons behind inadequate use of concentrate feeds. Limited availability and supply are other factors contributing to high concentrate feeds prices. The major challenges in the dairy sub-sector were associated with feed problems such as limited supply and consequent high prices of concentrate feeds.

In terms of animal fattening, 49 (11.92%), 142 (34.38%), 125 (30.34%), and 121 (29.37%) smallholders were involved in animal fattening in Tigray, Amhara, Oromia and SNNPR respectively. On cattle ownership, farmers in Oromia owned on average 2.07, 1.81 in Amhara, 1.7 in Tigray and 1.41 in SNNPR. A large number of farm households have purchased feed for their fattened animals from private enterprises and the smallest amount being supplied by the government. On the purchase of animal concentrate feed, the largest purchased amount was 604.5 kg with the average cost of birr 2775.2 in Oromia and the lowest purchased amount was 113.54 kg with the average cost of birr 2310 in Tigray.

In all regions, farmers used rotational grazing as part of feeding practices for fattened. Shortage of animal feed resulting from drought and land use change, limited animal health service, competition between formal and informal animal traders, livestock disease and lack access to concentrate feed for fattened animals are major reported challenges for animal fatteners in order of severity, which may discourage smallholders' engagement in fattening as one viable livelihood option.

On feed production, the major livestock feed are crop residues in Oromia, Amhara, and Tigray while grazing lands and crop residues in SNNPR. The contribution of cultivated forage, hay and AIBPs is small in all regions. Although crop residues are abundant, their utilization is low due to wastage, late harvest and lack of feed improvement technologies. Grazing land size is shrinking. Grazing land management is largely poor. Forage genetic material multiplication sites are not supported by proper research and are operating with insufficient budget and manpower. Thus, the overall management does not guarantee production of quality planting materials. Although there is shortage of feed in general, there are feed resources that are available but underutilized due to improper collection, conservation, storage and low adoption of feed quality improvement technologies.

Assessment of gender perspectives has revealed disaggregated roles and participation of women, men and youth in various operations of dairy management. Against the perception which states that men are the ones who make substantial contribution in farming, in general, the study shows that the participation, roles and contributions of women and youth is considerable in various farming activities. It was even recognized that most of the dairy and poultry production and management activities were dominantly implemented by women. The implication of gender assessment is that any of the research, development and policy interventions to be designed shall be gender responsive. Development initiatives shall identify the right target to on focus as per the roles and responsibilities mainly implemented by women, men and youths. On initiatives to improve efficiency of activities that are mainly implemented by women, development targets shall, therefore, be women.

4.2. Recommendations

Alleviate feed marketing constraints: Balanced concentrate feed are not widely used by all livestock farmers, especially those located in the rural production systems. A delivery mechanism needs to be created to facilitate access of smallholders to improved livestock feed. FEED I and II approaches targeting, smallholders, feed traders, primary cooperatives and unions in capacity development and knowledge management is effective; and it should be followed by FEED III but more effort is needed to link enterprises to input supply chains and to market outlet networks.

Improvement of natural grazing land: Although grazing lands are the major basal feed for livestock in the highlands of Ethiopia, most development projects neglect improvement of natural grazing land. So far the major interventions in the improvement of grazing lands were through fertilization and area enclosure. However, varying approaches can be followed based on community consultations and problem analysis. FEED III project together with national and international partners can intervene through community participation to improve natural pasture lands and communal grazing areas such as support in few pilot areas for drafting bylaws for grazing land closure and use, fertilization and over sowing of natural and communal grazing land etc. Even though high grass biomass yield is reported in north-western Ethiopia during wet season, but over mature and not of use in dry season; attention has not been given to conservation and use of this feed resource. FEED III in partnership with local, national and international institution can contribute on ways of conserving and utilizing this grass resource during dry season and

drought period.

Organizing learning platforms: The major government institutions working on feed resources are livestock and fishery departments and co-operative promotion offices. The government structures of the two institutions are available from region to kebele (lowest administrative unit) in all regions, which is a conducive environment for project implementation. However, there is a limitation in the vertical and horizontal integration of institutional actors. For instance, the link between farmers' union feed enterprises and livestock office is weak and most of the development agents (DAs) interviewed are not aware of the existence of farmers' cooperative union feed enterprise in their Zone (e.g., Alamata). A forum for a collaborative learning is absent in most of the survey districts, zones and regions. Therefore, FEED III can contribute to link actors for collaborative learning through vertical and horizontal integration of feed value chain actors by organizing platforms and forums.

Capacity building of regulators and millers: Most privately owned medium and small millers' mix ingredients and label as a concentrate feed with sources from unhygienic market, making their products more attractive to cost-sensitive buyers. They may not even have the competence to mix quality feed or formulate the appropriate ration from a given set of raw materials. The other point is food safety production of these enterprises. Most importantly from the standpoint of disease, the largely ad hoc nature of the millers' production and sourcing practices make them more susceptible to the spread of poultry diseases through contaminated re-used bags and containers, their storage as well as their feed source. The major concern are the potential quick spread of aflatoxin, avian flu, and other poultry diseases through these feed producers and their distribution channels. Such feed producers are not knowledgeable on how to manage such risks and are difficult to monitor and track. The government regulatory system is inadequate in terms of facilities, man power and structural organization to follow up such irregulars. Like the previous FEED projects, FEED III could contribute much in capacity building of regulatory institutes and upgrading of the technical skill of privately owned millers.

Research and development: FEED III in collaboration with IRS like ILRI and NRS (EIAR) can explore ways for efficient and effective use of non-conventional feeds and crop-residues as well as agro-ecology based cost effective ration formulation.

Gender participation: FEED I and II projects have been addressing gender through proportional involvement of male headed and female headed households. This approach has a positive implication in empowering women ownership and decision making capacity. However, the current survey result reveals that most of the livestock management activities particularly feeding and sanitation are mainly carried out by women in men headed households. It is therefore, necessary to find means of enhancing women's participation under men headed household through couple's involvement (husband and wife) and/or by organizing interventions that target women only. FEED III, following further gender assessment in livestock and feed activities could address women participation based on their contribution in livestock and feed management practices.

Human nutrition: The Ethiopian rural households' sources of staple foods in the north and central parts are low productive crops. In order to meet the demand for nutritious food, productivity of high quality agricultural commodities has to surpass population growth rates. FEED III project through livestock and feed enterprises promotion will contribute in increasing livestock productivity and thereby improve nutritional status of project beneficiaries.

Annex 1: Baseline survey selected Woredas by mode of production and agro-ecology

S.N O	Region	Zone	FEED II/III target Unions	FEED III Target Woredas	Types of livestock production	Agro-ecology	Stratum (1=Fattening 2=Poultry 3=Dairy)	Selected Woreda
1	Oromia	West Shewa	Ambo	Toke Kutaye	Fattening and Dairy	Moist highland	Toke Kutaye: Fattening	Toke Kutaye (R1)
		North Shewa	Biftu Selale	Wora Jarso	Dairy and Fattening	Wet highland	Wora Jarso: Dairy	
		Arsi	Galema	Shirka	Dairy and Forage	Wet highland	Shirka: Dairy	Shirka (R2)
		East Wollega	Gibe Didessa	Leka Dulecha	Fattening	Wet Mid-highland	Leka Dulecha: Fattening	
		South-West Shewa	Liben Wolisso	Ilu	Fattening	Moist highland	Ilu: Fattening	
		Surrounding Finfinee	Selale	Mulo	Dairy and Forage	Wet highland	Mulo: Dairy	Mulo (R3)
		East Shewa	Wonji	Bosset	Fattening	Dry Mid highland	Bosset: Fattening	Bosset (R4)
2	SNNPR	Sidama	Sidama Elto	Aleta Wondo	Dairy, fattening and poultry	Moist highland	Aleta Wondo: Dairy	Aleta Wondo (R3)
		Kanbata Tambaro	Ambericho	Kacha Bira	Dairy, poultry	Moist highland	Kacha Bira: Dairy/poultry	
		Wolaiyta	Damota Wolayita	Bolosore	Fattening, dairy	Moist Mid highland	Bolosore: Fattening	Bolosore (R4)
		Hadiya	Licha Hadiya	Misrak Badawacho	Dairy, fattening and poultry	Moist highland	Misrak Badawacho: Dairy	Misrak Badawacho (R2)
		Siltie	Melik	Mirab Azernet	Fattening, dairy, poultry	Moist highland	Mirab Azernet: Fattening	
		Gamogofa	Gamogofa	Bonke	Fattening, dairy	Moist Mid highland	Bonke: Fattening	Bonke (R1)
		Guragie	Walta	Meskan	Dairy	Moist Mid highland	Meskan: Dairy	
3	Amhara	West Gojam	Merkeb	Dera	Dairy and poultry	Wet mid highland	Dera: Dairy	

				Adiet	Fattenin g	Wet Mid highland	Adiet: Fattening	Adiet (R4)
		South Gonder	Megena gna	Lay Gayent	Sheep and goat	Wet highland	Lay Gayent: Sheep and goat	Lay Gayent (R3)
		Awi Zone	Admas	Guangua	Dairy	Wet Mid highland	Guangua : Dairy	Guangu a (R1)
		West Gojam	Damot	Burie	dairy, fattening and poultry	Wet mid highland	Burie Dairy:	
		East Gojam	Gozame n	Awabel	Fattenin g and poultry	Wet Mid highland	Awabel: Fattening	Awabel (R2)
				Anedid		Moist Mid highland	Anedid: Not listed	
		North Shewa	Wodera			Moist Mid highland	Not listed	
		South Wollo	Erikum			Wet Mid highland	Not listed	
4	Tigra y	Western	Setit Humera	Tsegede	Fattenin g, dairy, Concentr ate feed utilizatio n and marketin g potential	Moist lowland	Tsegede: Fattening	Tseged e (R1)
		Southern	Bokra	Alamata	Fattenin g, dairy, Concentr ate feed utilizatio n and marketin g potential , Forage producti on	Dry Mid highland	Alamata: Fattening	Alamat a (R4)
		North Western	Shewit	Tahitay- adyabo	Fattenin g, dairy, Concentr ate feed utilizatio n and marketin g potential , Forage producti	Dry highland	Tahitay- adyabo: Fattening	

					on			
		Central	Geter Aduwa	Tahitay – maychew	Dairy production and forage production and use.	Dry highland	Tahitay–maychew : Dairy	Tahitay – maychew (R3)
			Debre-assa	Mereb-leke	Dairy production and forage development	Dry highland	Mereb-leke: Dairy	
		Eastern	Wolwalo	Gulomekeda	Dairy production and forage development	Dry highland	Gulomekeda: Dairy	
		South East	Enderat	Hintalo Wajirat	Fattening, dairy, Concentrate feed utilization and marketing potential , Forage production	Dry highland	Hintalo Wajirat: Fattening	Hintalo Wajirat (R2)
Total Target		27	28	28				16

Annex 2: CAPI-based survey questionnaire

Annex 2A: CAPI-based household survey questionnaire



A HOUSEHOLD SURVEY QUESTIONNAIRE

BASE LINE EVALUATION FOR FEED ENHANCEMENT FOR DEVELOPMENT OF ETHIOPIA

[FEED-III]

A STUDY OF ACDI/VOCA

Informed consent

Dear respondent!

Good morning/afternoon! My name is (YOUR NAME) and I am working as part of the data collection team assigned by A44CDI/VOCA. We are conducting a survey to understand the current situation of livestock fattening, dairy, poultry, and feed production and its marketing. You are being asked to participate in this survey because of your important role as a target farmer. I will ask you a series of questions that would take about 45-60 minutes. It is your choice whether or not to take part in this interview and if you choose to participate, you have the right not to answer any question or to stop the interview at any time. If you don't choose to participate, it will in no way impact your relationship with ACDI/VOCA. Before we begin, do you want to ask me any questions about the survey? Shall I continue in asking you each question? If "Yes" Continue...

MODULE 1: HOUSEHOLD IDENTIFICATION

MODULE 2: HOUSEHOLD DEMOGRAPHICS

MODULE 3: HOUSEHOLD LIVELIHOOD ACTIVITIES AND INCOME SOURCES

MODULE 4: DAIRY PRODUCTION

MODULE 5: DAIRY VALUE CHAIN

MODULE 6: ANIMAL FATTENING

MODULE 7: ANIMAL FATTENING VALUE CHAIN

MODULE 8: POULTRY PRODUCTION

MODULE 9: POULTRY VALUE CHAIN

MODULE 10: FORAGE PRODUCTION

MODULE 11: FORAGE PRODUCTION VALUE CHAIN

MODULE 12: HOUSEHOLD DIETARY DIVERSITY

MODULE 1: HOUSEHOLD IDENTIFICATION

S.No.	Questions	Code Description
M1.1	Household identification No.	_____
M1.2	Region	1 = Tigray 2 = Amhara 3 = Oromia 4 = SNNP
M1.3	Zone	1= Western 2= Southern 3= Central 4= South East 5= West Gojam 6= South Gonder 7= Awi Zone 8= East Gojam 9= West Shewa 10= Arsi 11= Surrounding Finfinee 12= East Shewa 13= Sidama 14= Hadiya 15= Wolaita 16= Gamofofa
M1.4	Woreda	1= Tsegede 2= Alamata 3= Tahitay-maychew 4= Hintalo Wajirat 5= Lay Gayent 6= Guangua 7= Awabel 8= Yilmana Desnsa 9= Toke Kutaye 10= Shirka 11= Mulo 12= Bosset 13= Aleta Wondo 14= Misrak Badawacho 15= Boloso Sore 16= Bonke
M1.5	Kebele	_____
M1.6	Village/Gotte	_____
M1.7	Agro-ecology type	1= Highland 2= Midland 3= Lowland
M1.8	Respondent sex	1= Male 2= Female
M1.9	Coop/union membership status	1= Member 2= Non-member
M1.10	Coop/union type	1= Livestock 2= Multi-purpose
M1.11	Date of interview	_____
M1.12	Enumerator	Name _____

MODULE 2: HOUSEHOLD DEMOGRAPHICS

S.No.	Question(s)	Code Description
M2.1	Sex of the household head	1=Male 2=Female
M2.2	Age of the household head (write in years)	_____
M2.3	Level of education of the household head	1=Illiterate 2=Informal education (religious, adult education) 3= Primary 4= Secondary 5= Above secondary
M2.4	Marital status of the household head	1=Single 2=Married 3=Widowed 4=Divorced 5=Separated 6=Other (Specify)
M2.5	Household size (write number)	1=Male_____
		2=Female_____
		3=Total_____
M2.6	Number of underage household members (0 to 17 years) (write number)	_____
M2.7	Number of economically active household members (18 to 64 years) (write number)	_____
M2.8	Number of old age members (above 65 years) (write number)	_____
M2.9	Total land size in hectare (2010)	_____
M2.10	Total cultivated land size in hectare (2010)	_____

MODULE 3: HOUSEHOLD LIVELIHOOD ACTIVITIES AND INCOME SOURCES [PLEASE INDICATE THE TYPE OF LIVELIHOOD INVOLVED IN AND ESTIMATED ANNUAL INCOME EARNINGS FOR ALL HOUSEHOLD MEMBERS DURING THE LAST 12 MONTHS] [CIRCLE ALL THAT APPLY]

S.No.	Question(s)	Code Description	Estimated annual income in birr
M3.1	Crop production	1 = Yes 2=No	
M3.2	Fruit production	1 = Yes 2=No	
M3.3	Vegetable production	1 = Yes 2=No	
M3.4	Root crop production	1 = Yes 2=No	
M3.5	Dairy production	1 = Yes 2=No	
M3.6	Animal fattening	1 = Yes 2=No	
M3.7	Poultry production	1 = Yes 2=No	
M3.8	Off-farm activities	1 = Yes 2=No	
M3.9	Non-farm activities	1 = Yes 2=No	
M3.10	PSNP transfer	1 = Yes 2=No	
M3.11	Remittance/gift	1 = Yes 2=No	
M3.12	Others specify	1 = Yes 2=No	

SN	Type of livestock	Have you owned any of the animals listed? 1=Yes 2=No [Skip to next]	Number of animals in the last 12 months			Total value of animals in the last 12 months (Birr)
			Indigenous	Crossbreed	Total	
M3.13	Mature cow	1 = Yes 2=No				
M3.14	Mature bull/Ox (> 2 years)	1 = Yes 2=No				
M3.15	Heifers (6 months to first calf)	1 = Yes 2=No				
M3.16	Male cattle (6 months to 2)	1 = Yes 2=No				

	years)					
M3.17	Calf (male < 6 months)	1 = Yes 2=No				
M3.18	Calf (female < 6 months)	1 = Yes 2=No				
M3.19	Sheep	1 = Yes 2=No				
M3.20	Goats	1 = Yes 2=No				
M3.21	Chicken	1 = Yes 2=No				
M3.22	Horses	1 = Yes 2=No				
M3.23	Mules	1 = Yes 2=No				
M3.24	Donkeys	1 = Yes 2=No				
M3.25	Camel	1 = Yes 2=No				
M3.26	Others(specify)	1 = Yes 2=No				

MODULE 4: DAIRY PRODUCTION

S.No.	Question(s)	Code Description
M4.1	Does your household participate in dairy production?	1 = Yes 2=No [Skip to Module 6/animal fattening, if No to qn # M4.1]
M4.2	Who decides on the production and sales of dairy products?	1=Wife only 2=Husband only 3=Jointly (Both) 4= Children under 18 5= Others
M4.3	How many lactating indigenous cows have owned in the last 12 months?	_____
M4.4	How many lactating crossbreed cows have owned in the last 12 months?	_____
M4.5	Total amount of milk collected per	Maximum _____

	day in liter from all indigenous cows?	Minimum_____
M4.6	Total amount of milk collected per day in liter from all crossbreed cows?	Maximum _____ Minimum_____
M4.7	Average number of months of lactation per indigenous cow in a single lactation?	_____
M4.8	Average number of months of lactation per crossbreed cow in a single lactation?	_____
Cow feeding and management practice		
M4.9	What types of feed did you feed your milk cow during the last 12 months? [Circle all that apply]	1= Concentrate feed 2=Agro-industrial by-products (Wheat bran, Nug Cake etc.) 3= Other high quality feed (Atela, grains) 4=Green forage, grass, hay, silage 5=Crop Residue (Teff straw, wheat straw, maize Stover, and others) 6=Others specify_____
M4.10	What type of animal feed preservation and storage practices do you use for your dairy cows? [Circle all that apply]	1=Hay making 2=Baling 3=Silage 4= Others specify_____
M4.11	What are the equipment you have used for drinking and feeding activities? [Circle all that apply]	1=Feeding trough 2=Water trough 3=Others specify
M4.12	What type of physical and chemical treatment of feed did you use for your dairy cows? [Circle all that apply]	1=Cut and carry 2=Crop residue treatment 3=Others specify_____
M4.13	What type of feeding practices have you implemented for your dairy cows? [Circle all that apply]	1=Cut and carry 2=Rotational grazing 3=Feeding of factory produced formulated feed

		4=Mixed or balanced ration feeding 5=Others specify_____				
M4.14	Did you/your household member receive any training in dairy animal nutrition and management during the last 12 months?	1= Yes 2=No [Skip to qn # M4.17, if no to qn # M4.14]				
M4.15	If yes for qn # M4.14, who has provided the training to you? [Circle all that apply]	1=Coop/Union 2=Private Enterprise 3=Government 4=NGOs 5=Other (Specify)_____				
M4.16	If yes for qn # 4.14, who received the training? [Circle all that apply]	1=Husband 2=Wife 3= Children less than 18 4= Another household member specify_____				
Monthly sales of dairy products [March 1-30, 2018]						
	Product type	Have you sold any of the following product type? 1=Yes 2=No [Skip to next]	Quantity	Unit 1=Litter 2=KG 3=Other Specify	Unit Price (Birr)	Total price (Birr)
M4.17	Milk	1= Yes 2=No				
M4.18	Butter	1= Yes 2=No				
M4.19	Cheese	1= Yes 2=No				
M4.20	Other	1= Yes 2=No				
M4.21	Where do you sell your dairy products? [Circle all that apply]				1=Farm gate 2=Local market 3=Coop/Union 4=Milk collection business 5=Milk processors	

		6=Other (Specify)
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Household members' participation [Mostly] in dairy production tasks [Circle all that apply]/Tick on ☐

	Tasks	Adult male	Adult female	Children under 18
M4.22	Cleaning the cows' house	☐	☐	☐
M4.23	Feeding the cows	☐	☐	☐
M4.24	Forage collection	☐	☐	☐
M4.25	Concentrate feeds purchasing	☐	☐	☐
M4.26	Factory ingredients purchasing	☐	☐	☐
M4.27	Milking	☐	☐	☐
M4.28	Milk processing (butter, Chees)	☐	☐	☐
M4.29	Selling cows and calves	☐	☐	☐
M4.30	Selling dairy products	☐	☐	☐
M4.31	Calf feeding and management	☐	☐	☐
M4.32	Watering	☐	☐	☐
M4.33	Cow cleaning	☐	☐	☐
M4.34	Uder washing	☐	☐	☐
M4.35	Others specify	☐	☐	☐

Challenges in dairy production [Circle all that apply]/Tick on ☐ – Do not Probe

	Challenges	Responses
M4.36	Shortage of consternate feed	☐
M4.37	Land problem/limited land size	☐
M4.38	Disease prevalence	☐
M4.39	Lack of crossbred cows	☐

M4.40	Lack of cooling and storage facilities at milk vending sites	☐
M4.41	Water availability problem	☐
M4.42	Low milk price	☐
M4.43	High feed price	☐
M4.44	Lack of knowledge for modern dairy cow management	☐
M4.45	Limited access to credit	☐
M4.46	Others (specify)_____	☐

MODULE 5: DAIRY VALUE CHAIN

S.No.	Question(s)	Code Description
M5.1	Did your household purchase dairy concentrate feed for your milk cow?	1 = Yes 2 = No [Skip to Module 6/animal fattening, if No to qn # M5.1]
M5.2	Who decides on concentrate feed purchase?	1 = Wife only 2 = Husband only 3 = Jointly (Both) 4 = Children under 18 5 = Others
M5.3	Who are the actors in your dairy production in your locality? [Circle all that apply]	1 = Input suppliers like forage seed, vet drugs, AI service, vaccine 2 = Market and processing (processors, market agents, shops, milk collection center) 3 = production service providers like extension, forage production, hay producers, research support etc 4 = wholesalers, retailers and consumers 5 = Others specify_____

	Type of feed purchased [Specify feed purchased during the last 12 months]	Quantity	Unit 1=KG 2=Litter 3=No. 4=Kimir 5=Chinet 6=Esir 7=Shekim 8=Other specify	Unit Price	Total Price (Birr)	Main Source of feed	From whom do you buy feed?
						1=Coop/Union enterprise 2= Own production 3= Private Enterprise 4=Government 5= Other farmers 6= NGO 7=Other (Specify)_____	1=Agro-processors (flour factory, oil factory, etc) 2=Traders (for factory products) shops 3=Farmers' cooperative unions, 4=Primary cooperatives 5= Feed manufacturers 6=Agro-dealers (private) 7= Others (specify)
M5.4	Dairy concentrate feed						
M5.5	Oil seed cake						
M5.6	Wheat bran						
M5.7	Pea bran						
M5.8	Maize						
M5.9	Pulse bran						
M5.10	Molasses						
M5.11	Green forage						
M5.12	Grass						

M5.13	Hay						
M5.14	Silage						
M5.15	Crop residue						
M5.16	Atela (Tela, Areke, Teji)						
M5.17	Others (specify)_____						

S.No.	Question(s)	Code Description
M5.18	How long does it take to reach concentrate feed sales/distribution point from your farm? (Average walking distance in minutes' single trip)	_____
M5.19	Do you think that there are adequate number of concentrate feed sales/ distribution channels that fulfill the feed demand of the farmers in your area?	1= Yes 2=No
M5.20	If no for qn # M5.19 , what are the reasons? [Circle all that apply]	1= It serves too many farmers 2=The service is too far/not accessible 3=Unbalanced supply and demand 4=Other (Specify)_____
M5.21	Have you ever accessed feed market information in the last 12 months?	1=Yes 2=No (Skip to qn # M5.24 if No to qn # M5.21)
M5.22	If yes for qn # M5.21 , what was your source of information? [Circle all that apply]	1=Local feed traders 2=Feed suppliers 3=Development Agents 4=Fellow farmers 5= Community meeting 6=Radio 7=Other (Specify)_____

M5.23	How did you get this information? [Circle all that apply]	1=Text message 2=Mobile call 3=Farmer to farmer communication 4= Community meeting 5=Other (Specify)_____
M5.24	Was the concentrate feed adequate to properly feed your milk cow?	1= Yes 2=No [Skip to qn # M5.28, if yes to qn # M5.24]
M5.25	If no for qn # M5.24 , what was the problem? [Circle all that apply]	1=High price 2=Low quality 3=Limited supply 4=Other (Specify)_____
M5.26	What strategies did you follow if you think that you do not access enough feed for your dairy cows? [Circle all that apply]	1= Reduce the quantity of feed given to cattle 2=Shift to own production 3=Use some other feed materials 4=Other (Specify)_____
M5.27	What do you think are the possible consequences of the limited access to feed for dairy production? [Circle all that apply]	1=Reduced in the quality of production 2= Reduced in the quantity of production 3=Decreased income from dairy products 4=Dairy health effects 5= Other (Specify)
M5.28	Was the price of concentrate feed for dairy production affordable to you?	1= Yes 2=No
M5.29	Did the price of dairy concentrate feed fluctuate across time in the last 12 months?	1= Yes 2=No
M5.30	Did you check the quality of concentrate feed purchased for dairy production?	1= Yes 2=No
M5.31	If your answer is yes for qn # M5.30 , how did	1= Through quality check services in

	you check the quality?	the laboratory 2= Through physical detection using indigenous knowledge 3= Through physical detection by livestock experts' 4= Other (Specify)
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MODULE 6: FATTENING

S.No.	Question(s)	Code Description				
M6.1	Does your household participate in animal fattening?	1 = Yes 2 = No [Skip to Module 8/poultry production, if No to qn # M6.1]				
M6.2	Who makes the decisions about the production and sales of animal products?	1 = Wife only 2 = Husband only 3 = Jointly (Both) 4 = Children under 18 5 = Others				
M6.3	Did you buy any animal for fattening?	1 = Yes 2 = No [Skip to qn # M6.7, if No to qn # M6.3]				
M6.4	If yes for qn # M6.3 , how much did it cost to buy cattle? (write in birr)	_____				
M6.5	If yes for qn # M6.3 , how much did it cost to buy Sheep? (write in birr)	_____				
M6.6	If yes for qn # M6.3 , how much did it cost to buy goat? (write in birr)	_____				
	Description	Type of animal fatten				
		<table border="1"> <thead> <tr> <th>Cattle</th><th>Sheep</th><th>Goat</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td></tr> </tbody> </table>	Cattle	Sheep	Goat	
Cattle	Sheep	Goat				

M6.7				
M6.8		M6.9	M6.10	M6.11
A	Number of fattened animal during the last 12 months (write in number)			
B	Typical length of fattening period for an animal (write in days)			
Animal feeding and management practice [Circle all that apply]				
M6.12	What types of feed did you feed your fattening animal during the last 12 months? [Circle all that apply]	1= Concentrates feed 2=Agro-industrial by-products (Wheat bran, Nug Cake etc.) 3= Other high quality feed (Atela, grains) 4=Green forage, grass, hay, silage 5=Crop Residue (Teff straw, wheat straw, maize Stover, and others) 6=Others specify _____		
M6.13	What type of animal feed preservation and storage practices do you use for your fattening? [Circle all that apply]	1=Hay making 2=Baling 3=Silage 4= Others specify _____		
M6.14	What are the equipment you have used for drinking and feeding activities? [Circle all that apply]	1=Feeding trough 2=Water trough 3=Others specify _____		
M6.15	What type of feeding practices have you implemented for your fattening? [Circle all that apply]	1=Rotational grazing 2=Feeding of factory produced formulated feed 3=Mixed or balanced ration feeding 4=Others specify _____		
M6.16	Did you/your household member receive any training in animal fattening during the last 12 months?	1= Yes 2=No		

		[Skip to qn # M6.19, if no to qn # M4.16]		
M6.17	If yes for qn # M6.16 , who has provided the training to you? [Circle all that apply]	1=Coop/Union 2=Private Enterprise 3=Government 4= NGO 5=Other (Specify)		
M6.18	If yes for qn # 6.16 , who received the training?	1=Husband 2=Wife 3= Children less than 18 4= Other household member Specify		
Annual sales of live animal				
	Product type sold	Quantity (No.)	Unit price (birr)	Total value (Birr)
M6.19	Fattened ox/bull			
M6.20	Fattened cow			
M6.21	Sheep			
M6.22	Goats			
M6.23	Where do you sell your fattened animals? [Circle all that apply]	1=Farm gate 2=Local market 3=Coop/Union 4=Private Enterprise 5=Abattoir 6=Other (Specify)		

Household members' participation [Mostly] in animal fattening tasks [Circle all that

apply]/Tick on [<input]<="" th="" type="checkbox"/>				
	Tasks	Adult male	Adult female	Children under 18
M6.24	Cleaning the animal house	☐	☐	☐
M6.25	Feeding the fattening animal	☐	☐	☐
M6.26	Forage collection	☐	☐	☐
M6.27	Concentrate feed purchasing	☐	☐	☐
M6.28	Factory ingredients purchasing	☐	☐	☐
M6.29	Watering	☐	☐	☐
M6.30	Cattle cleaning	☐	☐	☐
M6.31	Selling fattened animal	☐	☐	☐
M6.32	Others specify_____	☐	☐	☐

Challenges in animal fattening [Circle all that apply]/Tick on [<input]]<="" th="" type="checkbox"/>		
	Challenges	Responses
M6.33	Shortage of animal feed resulting from drought and land use change	☐
M6.34	Limited animal health services	☐
M6.35	Formal trade competes with substantial informal trade	☐
M6.36	Livestock disease	☐
M6.37	Lack of access to concentrate feed	☐
M6.38	Unpredictable cattle market	☐
M6.39	Lack of knowledge on improved cattle fattening	☐
M6.40	Lack of improved fodder for livestock fattening	☐
M6.41	Limited access to credit	☐
M6.42	Lack of market linkages	☐
M6.43	Others (Specify)	☐

MODULE 7: FATTENING VALUE CHAIN

S.No.	Question(s)	Code Description
M7.1	Did your household purchase animal concentrate feed for your fattening animal?	1= Yes 2= No [Skip to Module 8/poultry production, if No to qn # M7.1]
M7.2	Who decides on the concentrate feed purchase?	1=Wife only 2=Husband only 3=Jointly (Both) 4= Children under 18 5= Others
M7.3	Who are the actors in your animal fattening in your locality? [Circle all that apply]	1=Producers 2=Collectors 3=Small private and cooperative fatteners/feedlots 4=Middlemen/brokers 5=Livestock trading cooperatives 6=Individual traders and exporters 7=Others specify _____

	Type of feed purchased [Specify feed purchased during the last 12 months]	Quantity	Unit 1=KG 2=Litter 3=No 4=Kimir 5=Chinet 6=Esir 7=Shekim 8=Other specify_____	Unit Price	Total Price (Birr)	Main Source of feed 1=Coop/Union enterprise 2= Own production 3= Private Enterprise 4=Government 5= Other farmers 6= NGO 7=Other (Specify)	From whom do you buy feed? 1=Agro-processors (flour factory, oil factory, etc) 2=Traders (for factory products) shops 3=Farmers' cooperative unions, 4=Primary cooperatives 5= Feed manufacturers 6=Agro-dealers (private) 7= Others (specify)
M7.4	Animal concentrate feed						
M7.5	Oil seed cake						
M7.6	Wheat bran						
M7.7	Pea bran						
M7.8	Maize						
M7.9	Pulse bran						
M7.10	Molasses						
M7.11	Green forage						
M7.12	Grass						

M7.13	Hay						
M7.14	Silage						
M7.15	Crop residue						
M7.16	Atela (Tela, Areke, Teji)						
M7.17	Others (specify)						
M7.18							

S.No.	Question(s)	Code Description
M7.19	How long does it take to reach concentrate feed sales/distribution point from your farm? (Average walking distance in minutes' single trip)	_____
M7.20	Do you think that these distribution channels are enough?	1= Yes 2=No
M7.21	If no for qn # M7.20 , what are the reasons? [Circle all that apply]	1= It serves too many farmers 2=The service is too far/not accessible 3=Unbalanced supply and demand 4=Other (Specify)
M7.22	Have you ever accessed feed market information in the last 12 months?	1=Yes 2=No (Skip to qn # M7.25 if No)
M7.23	If yes for qn # M7.22 , what was your source of information? [Circle all that apply]	1=Local feed traders 2=Feed suppliers 3=Development Agents 4=Fellow farmers 5=Community meeting 6=Local cattle market

		7=Radio 8=Other (Specify)
M7.24	How did you get this information? [Circle all that apply]	1=Text message 2=Mobile call 3=Farmer to farmer communication 4= Community meeting 5=Other (Specify)
M7.25	Was the concentrate feed adequate to properly feed your cattle?	1= Yes 2=No [Skip to qn # M7.29, if yes to qn # M7.25]
M7.26	If no for qn # M7.25 , what was the problem?	1=High price 2=Low quality 3=Limited supply 4=Other (Specify)
M7.27	What strategies did you follow if you cannot access enough feed for fattening?	1= Reduce the quantity of feed given to cattle 2=Shift to own production 3=Use some other feed materials 4=Other (Specify)
M7.28	What do you think are the possible consequences of the limited access to feed for fattening animals? [Circle all that apply]	1=Reduced in the meat quality 2= Reduced in the number of cattle fattened 3=Decreased income from animal fattening 4= Meat health effects 5= Other (Specify)_____
M7.29	Was the price of concentrate feed for fattening animal affordable to you?	1= Yes 2=No
M7.30	Did the price of concentrate feed for fattening animal fluctuate across time in the last 12 months?	1= Yes 2=No

M7.31	Did you check the quality of feed purchased for fattening animals?	1= Yes 2=No
M7.32	If your answer is yes for qn # M7.31 , how did you check the quality?	1= Through quality check services in the laboratory 2= Through physical detection using indigenous knowledge 3= Through physical detection by livestock experts' 4= Other (Specify)_____

MODULE 8: POULTRY PRODUCTION

S.No.	Question(s)	Code Description		
M8.1	Does your household participate in poultry production?	1 = Yes 2=No [Skip to Module 10/forage production, if No to qn # M8.1]		
M8.2	Who makes the decisions about the production and sales of poultry products?	1=Wife only 2=Husband only 3=Jointly (Both) 4= Children under 18 5= Others		
M8.3	How do you sell your poultry products?	1=Directly sell to consumers 2=Directly sell to small retail traders 3=Others specify_____		
	Type of chicken	Number chicken kept in the last 12 months		
		Local	Improved	Total
M8.4	Layers			
M8.5	Broilers			
M8.6	Female chickens (Over 3 months of age not laying - Pullet)			

M8.7	Male chickens (Over 3 months of age)			
M8.8	Chicks (up to 3 months of age)			
M8.9	Total (M8.4 to M8.8)			
Poultry feeding and management practice [Circle all that apply]				
M8.10	What types of concentrate feed did you feed your chicken during the last 12 months? [Circle all that apply]	1=Layers feed 2=Broilers feed 3=Grain 4=Others specify _____		
M8.11	What types of management practices do you apply for your poultry production?	1= Scavenging 2=Scavenging with supplements (home grains) 3=Scavenging with supplements (Commercial feed) 4=Full feeding with home grown grains 5=Full feeding with manufactured feed 6=Others specify _____		
M8.12	What type of poultry housing system do you use for your chickens?	1= No housing 2= Shelter, but unconfined 3= Shelter and confined at night 4= Confinement and sheltered year-round		
M8.13	What was the typical total egg production (number of eggs) layed per local hen during the past 12 months (one year)? per clutch and then annual	Per clutch _____ Per year _____		
M8.14	What was the typical egg production (number of eggs) layed per improved hen during the past 12 months (one year)?	_____		
M8.15	What was the total egg production (number of eggs) layed per improved hen and local hen during the past 12 months (one year)?	_____		
M8.16	Have you ever received any training on	1=Yes 2=No		

	poultry production during the last 12 months?	[Skip to qn # M8.19, if no to qn # M8.16]		
M8.17	If yes for qn # M8.16 , who has provided the training to you? [Circle all that apply]	1=Coop/Union 2=Private Enterprise 3=Government 4=NGOs 5=Other (Specify)		
M8.18	If yes for qn # 8.16 , who received the training?	1=Husband 2=Wife 3=Children less than 18 4=Other household member Specify		
Annual sales of from poultry production				
	Product Type	Quantity (No.)	Unit price (Birr)	Total price (Birr)
M8.19	Hen			
M8.20	Male chicken			
M8.21	Female chicken			
M8.22	Eggs			
M8.23	Where do you sell your poultry products? [Circle all that apply]	1=Farm gate 2=Local market 3=Coop/Union 4=Private Enterprise 6=Other (Specify) _____		

Household members' participation [Mostly] in poultry production tasks [Circle all that apply]/Tick on ☐				
	Tasks	Adult male	Adult female	Children under 18
M8.24	Chicken house cleaning	☐	☐	☐
M8.25	Vaccination and treatment	☐	☐	☐
M8.26	Egg collection	☐	☐	☐
M8.27	House construction	☐	☐	☐
M8.28	Chicken feeding and watering	☐	☐	☐
M8.29	Chicken and egg selling	☐	☐	☐
M8.30	Others specify	☐	☐	☐

Challenges in the poultry production [Circle all that apply]/Tick on ☐		
	Challenges	Responses
M8.31	Predators	☐
M8.32	Theft	☐
M8.33	Lack of improved breed	☐
M8.34	High feed price	☐
M8.35	Limited vaccination and health service	☐
M8.36	Chicken disease	☐
M8.37	Chicken concentrate feed supply problem	☐
M8.38	Lack of knowledge on poultry production	☐
M8.39	Others (Specify)_____	☐

MODULE 9: POULTRY PRODUCTION VALUE CHAIN

S.No.	Question(s)	Code Description
M9.1	Did your household purchase poultry concentrate feed for your chicken?	1 = Yes 2 = No [Skip to Module 10/forage production, if No to qn # M9.1]
M9.2	Who decides on the concentrate feed purchase?	1 = Wife only 2 = Husband only 3 = Jointly (Both) 4 = Children under 18 5 = Others
M9.3	Who are the actors in your poultry production in your locality? [Circle all that apply]	1 = Consumers at village level 2 = Local middle men/brokers 3 = Traders 4 = Commercial farmers 5 = Rearing centers 6 = Others specify_____

	Type of feed purchased [Specify feed purchased during the last 12 months]	Quantity	Unit 1= KG 2=Others specify _____	Unit price	Total Price (Birr)	Source of feed 1=Coop/Union enterprise 2= Own production 3= Private Enterprise 4=Government 5= Other farmers 6= NGO 7=Other (Specify)	From whom do you buy feed? 1=Individual sales agent 2= Enterprise retail shops 3= Enterprise Warehouse 4=Others specify
M9.4	Layers Feed						
M9.5	Broilers Feed						
M9.6	Grain						
M9.7	Others specify						

S.No.	Question(s)	Code Description
M9.8	How long does it take to reach concentrate feed sales/distribution point from your farm? (Average walking distance in minutes' single trip)	_____
M9.9	Do you think that these distribution channels are enough?	1= Yes 2=No
M9.10	If no for qn # M9.9 , what are the reasons? [Circle all that apply]	1= It serves too many farmers 2=The service is too far/not accessible 3=Unbalanced supply and demand 4=Other (Specify)
M9.11	Have you ever accessed feed market information in the last 12 months?	1=Yes

		2=No (Skip to qn # M9.14 if No)
M9.12	If yes for qn # M9.11 , what was your source of information? [Circle all that apply]	1=Local feed traders 2=Feed suppliers 3=Development Agents 4=Fellow farmers 5= Community meeting 6=Radio 7=Other (Specify)
M9.13	How did you get this information? [Circle all that apply]	1=Text message 2=Mobile call 3=Farmer to farmer communication 4=Community meeting 5=Other (Specify)
M9.14	Was the concentrate feed adequate to properly feed your chicken?	1= Yes 2=No [Skip to qn # M9.18, if yes to qn # M9.14]
M9.15	If no for qn # M9.14 , what was the problem?	1=High price 2=Low quality 3=Limited supply 4=Other (Specify)_____
M9.16	What strategies did you follow if you cannot access enough feed for your poultry production?	1= Reduce the quantity of feed given to chicken 2=Shift to own production 3=Use some other feed materials 4=Other (Specify)_____
M9.17	What do you think are the possible consequences of the limited access to feed your chicken? [Circle all that apply]	1=Reduced in the quality of poultry production 2= Reduced in the quantity of poultry production 3=Decreased income from poultry

		production 4= Poultry health effects 5= Other (Specify)_____
M9.18	Was the price of concentrate feed for poultry production affordable to you?	1= Yes 2=No
M9.19	Did the price of concentrate feed poultry production fluctuate across time in the last 12 months?	1= Yes 2=No
M9.20	Did you check the quality of feed purchased for poultry production?	1= Yes 2=No
M9.21	If your answer is yes for qn # M9.20 , how did you check the quality?	1= Through quality check services in the laboratory 2= Through physical detection using indigenous knowledge 3= Through physical detection by poultry experts' 4= Other (Specify)

MODULE 10: FORAGE PRODUCTION

S.No.	Question(s)	Code Description
M10.1	Does your household participate in forage production?	1= Yes 2=No [Skip to Module 12, if No to qn # M10.
M10.2	Who makes the decisions about the production and sales of forage production?	1=Wife only 2=Husband only 3=Jointly (Both) 4= Children under 18 5= Others
	Type of forage	Amount of forage produced/consumed in the last 12 months
		UnitProducedConsumedMode of plantation

		1=Kimir 2=Chinet 3=Esir 4=Shekim 5=Other	(unit specified)	(unit specified)	1 = Over sowing 2=Under sowing 3= Along the terrace/boarder 4=Other (Specify)
M10.3	Grass annuals				
M10.4	Legumes annuals				
M10.5	Grass perennials				
M10.6	Legumes perennials				
M10.7	Others specify				
M10.8	Total Land under forage last year (local unit) and then in (hectare)				_____
M10.9	What type of improved forage planting materials did you use during the last 12 months? [Circle all that apply]				0=Not applicable 1=Seeds 2=Seedlings 3=Cuttings 4=Split 5= Fertilizer 6=Other (Specify)
M10.10	What types of forage management practices did you use in your farm? [Circle all that apply]				1=Cut and carry 2=Rotational grazing 3=Other (Specify)
M10.11	Did you/your household members receive any training on improved forage production during the last 12 months?				1= Yes 2=No [Skip to qn # M10.15, if no to qn # M10.11]
M10.12	If yes for qn # M 10.11 , what was the focus on the training? [Circle all that apply]				1=Improved technology and techno of forage production 2=Pasture/rangeland

		management 3= Nursery establishment 4=Others specify_____			
M10.13	If yes for qn # M 10.11 , who has provided the training to you? [Circle all that apply]	1=Coop/Union 2=Private Enterprise 3=Government 4=NGO 5=Other (Specify)_____			
M10.14	If yes for qn # M10.11 , who received the training?	1=Husband 2=Wife 3= Children less than 18 4= Other household member specify			
M10.15	Did you use improved forage planting materials last year?	1= Yes 2=No			
M10.16	If yes for qn # M10.15 , please specify the source?	1= Government 2= NGO 3= Purchased (Private seller) 4= Exchange (Farmer to farmer)			
Annual sales from forage products					
	Product Type	Quantity	Unit 1= KG 2= Other (Specify)	Unit price (birr)	Total price (Birr)
M10.17	Sinar				
M10.18	Vetch				
M10.19	Pigeon pea				
M10.20	Others specify				
M10.21	Do you have seed/seedling nursery?			1=Yes 2=No	

M10.22	What types of improved forages do you grow in your seed/seedling nursery? [Circle all that apply]	0=Not applicable 1=Elephant grass 2= Sesbania 3= Rhodes grass 4= Alfalfa 5= Vetch 6= Sinar 7= Pigeon pea 8=Lablab 9=Cowpea 10=Desho 11=Buffle grass 12=Guatemala grass 13= Others specify
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Household members' participation [Mostly] in forage production tasks [Circle all that apply]/Tick on [☐]				
	Tasks	Adult male	Adult female	Children under 18
M10.23	Land preparation/planting	☐	☐	☐
M10.24	Weeding	☐	☐	☐
M10.25	Cultivation	☐	☐	☐
M10.26	Fertilization	☐	☐	☐
M10.27	Watering	☐	☐	☐
M10.28	Cutting or harvest	☐	☐	☐
M10.29	Others specify	☐	☐	☐

Challenges in forage production [Circle all that apply]/Tick on [☐]		
	Challenges	Responses
M10.30	Improved forage seed/cutting	☐
M10.31	Shortage of land	☐
M10.32	Not digestibility of the forage	☐
M10.33	Pest/disease	☐
M10.34	Lack of water for irrigation	☐
M10.35	Lack of awareness on the usage	☐
M10.36	High seed price	☐
M10.37	Lack of knowledge on forage production	☐
M10.38	Others (Specify)	☐

MODULE 11: FORAGE PRODUCTION VALUE CHAIN

S.No.	Question(s)	Code Description
M11.1	Did your household purchase forage inputs?	1= Yes 2=No [Skip to Module 12, if No to qn # M11.1]
M11.2	Who decides on the forage purchase?	1=Wife only 2=Husband only 3=Jointly (Both) 4= Children under 18 5= Others

	Type of Seed/seedling Purchased during the last 12 months	Quantity	Unit 1= KG 2= No. 3= Other specify	Unit price	Total price (Birr)	Source of feed 1=Coop/Union enterprise 2= Own production 3= Private Enterprise 4=Government 5= Other farmers 6= NGO 7=Other (Specify)	From whom do you buy feed? 1=Individual sales agent 2= Enterprise retail shops 3= Enterprise Warehouse 4=Others specify
M11.3	Seed						
M11.4	Seedling						
M11.5	Cuttings						
M11.6	Splits						
M11.7	Others specify						

S.No.	Question(s)	Code Description
M11.8	How long does it take to reach concentrate feed sales/distribution point from your farm? (Average walking distance in Minutes single trip)	_____
M11.9	Do you think that these distribution channels are enough?	1 = Yes 2=No
M11.10	If no for qn # M11.9 , what are the reasons? [Circle all that apply]	1= It serves too many farmers 2=The service is too far/not accessible 3=Unbalanced supply and demand 4=Other (Specify)

M11.11	Have you ever accessed forage market information in the last 12 months?	1=Yes 2=No (Skip to qn # M11.14 if No)
M11.12	If yes for qn # M11.11 , what was your source of information? [Circle all that apply] [Circle all that apply]	1=Local traders 2=Forage suppliers 3=Development Agents 4=Fellow farmers 5=Community meeting 6=Others specify _____
M11.13	How did you receive the forage production information in your locality? [Circle all that apply]	1=Text message 2=Mobile call 3=Farmer to farmer communication 4=Community meeting 5=Other (Specify)_____
M11.14	Was the forage adequate to properly keep your cattle?	1=Yes 2=No [Skip to qn # M12.1/ household dietary diversity, if yes to qn # M11.14]
M11.15	If no for qn # M11.14 , what was the problem? [Circle all that apply]	1=High input price 2=Low input quality 3=Limited input supply 4=Skill and knowledge gap 5=others specify
M11.16	What were the alternatives that you applied to overcome the challenges?	1=Reduce the quantity given to cattle 2=Started own production 3=Borrowed from neighbors 4=Brought inputs from other areas 4=Other (Specify)
M11.17	What do you think are the possible consequences of the limited access forage production?	1=Reduced in the quality of cattle production 2=Reduced in the quantity of cattle

		production 3=Reduced income from livestock 3=Associated health effects 4= Other (Specify
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MODULE 12: HOUSEHOLD DIETARY DIVERSITY

Now I would like to ask you about the types of foods that you or anyone else in your household ate since this time yesterday. Since this time yesterday have you or anyone else in your household eaten / taken any of the following things to eat or drink? However, if the previous day was a fasting day ask them about the day before (or the last non-fasting day) READ THE LIST OF FOODS. PLACE/CIRCLE ONE IN THE SPACE PROVIDED IF ANYONE IN THE HOUSEHOLD ATE THE FOOD IN QUESTION, PLACE/CIRCLE ONE IN THE SPACE PROVIDED IF NO ONE IN THE HOUSEHOLD ATE THE FOOD.		
S.No.	Question(s)	Code Description
M12.1	Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?	1 = Yes 2=No
M12.2	Any eggs?	1 = Yes 2=No
M12.3	Any foods made from beans, peas, lentils, or nuts?	1 = Yes 2=No
M12.4	Any cheese, yogurt, milk or other milk products?	1 = Yes 2=No
M12.5	Any foods made with oil, fat, or butter?	1 = Yes 2=No
M12.6	When you are not fasting, how often do you eat at least one of the following foods (meat, fish, egg, dairy (milk, fish, yoghurt, butter, etc), etc)	1=Daily 2=More than once per week 3=Once per week 4=Others (specify) _____ -

Annex 2b: CAPI-Based Primary Cooperatives Questionnaire

SECTION A: AREA IDENTIFICATION

Region	Zone	Woreda	Kebele	Cooperative name	Type of Coop. 1=Multi-purpose 2= Livestock	If it is livestock cooperative 1= Dairy 2= Fattening 3= Both

SECTION B: BASIC INFORMATION OF COOPERATIVE

S. No	Questions	(Put the answer code in front of the question)
1.	How many individual members does this cooperative has? 1A. Male _____ 1B. Female _____ 1C. Total _____	
2.	How many years has it been since this cooperative was established?	
3.	What is the maximum share paid per member? (in birr)	
4.	What is the minimum share owned per member? (in birr)	
5.	What is the net capital of the coop (Birr)?	

6.	Which services does the cooperative provide for its members?															
	<table border="1"> <tr> <th>Service Types</th> <th>1=Yes 2=No (put the answer code in front of the question)</th> </tr> <tr> <td>6A= Commodities marketing</td> <td></td> </tr> <tr> <td>6B= Agricultural input supply</td> <td></td> </tr> <tr> <td>6C= Processing /milk/</td> <td></td> </tr> <tr> <td>6D= Credit Supply</td> <td></td> </tr> <tr> <td>6E= Livestock feed supply</td> <td></td> </tr> <tr> <td>6F = Other/Specify _____</td> <td></td> </tr> </table>	Service Types	1=Yes 2=No (put the answer code in front of the question)	6A= Commodities marketing		6B= Agricultural input supply		6C= Processing /milk/		6D= Credit Supply		6E= Livestock feed supply		6F = Other/Specify _____		
Service Types	1=Yes 2=No (put the answer code in front of the question)															
6A= Commodities marketing																
6B= Agricultural input supply																
6C= Processing /milk/																
6D= Credit Supply																
6E= Livestock feed supply																
6F = Other/Specify _____																
7.	Has the cooperative been provided with any support (technical or material or financial)? 1. Yes 2. No															
8.	If yes for qn # 7 , please specify the type of support provided? 1=Technical support 2=Material support 3=Financial support 4=Others specify_____															
9.	If yes for qn # 7 , please specify the organizations which provided the support? 1=Government 2=Locally deployed NGOs 3=Private Banks 4=Micro Finance Institutions 5=Others specify_____															

10.	If the cooperative is engaged in milk processing indicate the past 12 month's performance. <table border="1"> <thead> <tr> <th>The last 12 months' milk and milk products</th> <th>Amount in unit</th> </tr> </thead> <tbody> <tr> <td>Raw milk collected (liter)</td> <td>_____</td> </tr> <tr> <td>Processed milk (liter)</td> <td>_____</td> </tr> <tr> <td>Butter (kg)</td> <td>_____</td> </tr> <tr> <td>Cheese(kg)</td> <td>_____</td> </tr> </tbody> </table>	The last 12 months' milk and milk products	Amount in unit	Raw milk collected (liter)	_____	Processed milk (liter)	_____	Butter (kg)	_____	Cheese(kg)	_____			
The last 12 months' milk and milk products	Amount in unit													
Raw milk collected (liter)	_____													
Processed milk (liter)	_____													
Butter (kg)	_____													
Cheese(kg)	_____													
11.	If the cooperative provides livestock feed for members for qn # (6E=1), how many in average (quintal/month) does it supply? <table border="1"> <thead> <tr> <th>Feed type</th> <th>Quintal/month</th> </tr> </thead> <tbody> <tr> <td>11A= Manufactured feed</td> <td>_____</td> </tr> <tr> <td>11B= Hay/straw</td> <td>_____</td> </tr> <tr> <td>11C= Improved forage seed</td> <td>_____</td> </tr> <tr> <td>11D = Feed ingredients</td> <td>_____</td> </tr> <tr> <td>11E = Other/Specify _____</td> <td></td> </tr> </tbody> </table>	Feed type	Quintal/month	11A= Manufactured feed	_____	11B= Hay/straw	_____	11C= Improved forage seed	_____	11D = Feed ingredients	_____	11E = Other/Specify _____		
Feed type	Quintal/month													
11A= Manufactured feed	_____													
11B= Hay/straw	_____													
11C= Improved forage seed	_____													
11D = Feed ingredients	_____													
11E = Other/Specify _____														
12.	If the cooperative provides improved forage seed to its members for qn # (11C), which of the following is the main source? 1= Government 2= NGOs 3= Unions feed manufacturing units 4= Commercial feed manufacturers 5=Private vendors (retailers) 6= Whole sellers													
13.	Name of the union feed manufacturing units selling animal feed to the unions _____ _____													
14.	Name of the commercial feed manufacturers selling animal feed to the unions _____ _____													

15.	Name of the whole sellers selling animal feed to the unions _____ _____ _____	
16.	Name of the private vendors (retailers) selling animal feed to the unions _____ _____	
17.	What are the reasons the cooperative is purchasing the commercial feed from the specified sources? 1=Proximity to the cooperatives 2=Low price 3=Product quality 4=Others (specify)	
18.	What is the average distance of the unions feed manufacturing units from the cooperatives in km or in hours? _____	
19.	What is the average distance of the commercial feed manufacturers from the cooperatives in km or in hours? _____	
20.	What is the average distance of the commercial feed manufacturers from the cooperatives in km or in hours? _____	
21.	What is the average distance of the private vendors (retailers) from the cooperatives in km or in hours? _____	
22.	If the cooperative is purchasing commercial feed from the private vendors, where did the private vendor it purchases the commercial feed from? 1=Unions feed manufacturing units 2=Commercial feed manufacturers 3=Whole sellers 4=Others (specify)	
23.	What are the usual customers of commercial feed? 1= Small-holder 2=Farmers 3=Retailers 4=Others specify _____	
24.	What is the total volume of sale during the past 12 months (classify by customer types like small holder farmers, retailers, etc) 1=Small-holder: _____ 2=Farmers: _____ 3=Retailers: _____ 4=Others: _____	
25.	What is the total value of sale during the past 12 months (classify by customer types like small holder farmers, retailers, etc)? 1=Small-holder: _____ 2=Farmers: _____	

	3=Retailers: _____ 4=Others: _____													
26.	If the cooperative provides livestock feed for its members (6E=), what was its annual gross revenue in the last one year from livestock feed?													
27.	If the cooperative does not supply feed what are the main reason (s) ?													
	<table border="1"> <thead> <tr> <th>Reasons for not supplying feed</th><th>1=Yes 2= No</th></tr> </thead> <tbody> <tr> <td>27A= Shortage of suppliers</td><td></td></tr> <tr> <td>27B= No /less member demand</td><td></td></tr> <tr> <td>27C=Lack of knowledge regarding the importance of commercial feed</td><td></td></tr> <tr> <td>27D= Shortage of capital/resource</td><td></td></tr> <tr> <td>27E= Others (Specify) _____</td><td></td></tr> </tbody> </table>	Reasons for not supplying feed	1=Yes 2= No	27A= Shortage of suppliers		27B= No /less member demand		27C=Lack of knowledge regarding the importance of commercial feed		27D= Shortage of capital/resource		27E= Others (Specify) _____		
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27B= No /less member demand														
27C=Lack of knowledge regarding the importance of commercial feed														
27D= Shortage of capital/resource														
27E= Others (Specify) _____														
28.	Does the cooperative prepare an annual business plan? 1= Yes 2= No													
29.	Does the cooperative keep financial documents? 1=Practice Peachtree accounting 2=Record keeping like ledger, register books 3=Others (specify)													
30.	Does the cooperative run a dairy operation? 1= Yes 2=No													
31.	If yes for qn # 30 , what was the annual gross revenue (birr) from dairy production during the past 12 months?													
32.	Does the cooperative fatten livestock? 1= Yes 2= No													
33.	If yes for qn # 32 , what was the annual gross revenue (Birr) from the fattening operation during the last 12 months?													

34.	What resources/infrastructure does the cooperative own for running its feed/livestock related enterprise? <table border="1" data-bbox="277 302 1174 768"> <thead> <tr> <th data-bbox="277 302 787 359">Resources/Infrastructure type</th> <th data-bbox="787 302 1174 359">1=Yes 2 = No</th> </tr> </thead> <tbody> <tr> <td data-bbox="277 359 787 447">34A=Land</td> <td data-bbox="787 359 1174 447"></td> </tr> <tr> <td data-bbox="277 447 787 535">34B= Warehouse</td> <td data-bbox="787 447 1174 535"></td> </tr> <tr> <td data-bbox="277 535 787 623">34C= Working capital</td> <td data-bbox="787 535 1174 623"></td> </tr> <tr> <td data-bbox="277 623 787 711">34D= Vehicle</td> <td data-bbox="787 623 1174 711"></td> </tr> <tr> <td colspan="2" data-bbox="277 711 1174 768">34E = Other/Specify _____</td> </tr> </tbody> </table>	Resources/Infrastructure type	1=Yes 2 = No	34A=Land		34B= Warehouse		34C= Working capital		34D= Vehicle		34E = Other/Specify _____		
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Financial status of the cooperative	Birr													
Total annual gross revenue of the cooperative of the last year (birr)	_____													
Total annual sales from all operations in the last year (birr)	_____													
Total annual sales from milk and milk products in the last year (birr)	_____													
36.	What was the maximum annual dividend paid per member (birr) in the last payment?													
37.	What was the minimum annual dividend paid per member (birr) in the last payment?													
38.	What was the annual net profit of the cooperative (birr) after dividend payment?													
39.	Are you an agent for big concentrate feed companies or you retail their products? who are the companies? What is their market share from total feed sales?													
40.	If yes for qn # 39, what type of products? What are the buying and selling prices for each product?													

Annex 3A: Interview Guide to Ministry of Livestock and Fishery (MOLF) (at Ministry, Regional and Zonal levels)

Good morning/afternoon! My name is (YOUR NAME) and I am working as part of a data collection team assigned by ACIDI/VOCA. The purpose of this interview guide is to collect data that will be to understand the current situation of livestock and poultry production and feed production and its marketing. You are being asked to participate in this interview because of your important role and key person for the data to be generated. I will ask you a series of questions that would take about 45-60 minutes. It is your choice whether or not to take part in this interview and if you choose to participate, you have the right not to answer any question or to stop the interview at any time. If you don't choose to participate, it will in no way impact your relationship with ACIDI/VOCA. Before we begin, do you want to ask me any questions about the survey? Shall I continue in asking you each question? If "Yes" Continue...

Mobile **phone:**

1. What are the animal feed sources in various agro-ecologies of the country/region/zone?
2. How do you perceive animal feed problems in the country/region/zone?
3. What do you think are the effects of the feed problem on the economy?
4. What measures did the government take to address feed problems?
5. What are the initiatives in progress to address feed problems in the country/region/zone?
6. How does Ministry of Livestock and Fisheries intend to address feed problem differently since its establishment?
7. How do you perceive the emergence and growth of feed manufacturing enterprises in the country/region/zone?
8. What do you think are the weaknesses and strengths of these enterprises in processing and distribution of feed?
9. How is organizational strength of these processing enterprises? Is there any policy issue that constrains operations of feed processing enterprises?
10. Is there a policy (strategy) framework for feed production, processing and marketing in the country?
11. How do you consider feed standards and quality control issue in the country?
12. What experiences do you have in identifying and documenting farmer or enterprise innovations on are feed and forage production?
13. Have you ever identified and documented such innovations?
14. What approaches do you use to scale up such innovations? How helpful were these innovations?
15. How do you perceive the introduction and use status of forage production technologies in Ethiopia/region/zone? [***prove, availability of forage technologies, promotion and dissemination of forage technologies to the farmers; appropriateness of these forage technologies to smallholder farmers and commercial farmers; farmers' use (adoption) status of these technologies***]
16. Which regions do you think have adopted these technologies best? Weaknesses and strength of these forage technologies?
17. What activities do you think need to be done to catalyze sustainable forage production systems?

18. How is on-farm testing of forage technologies to help facilitate on-farm feeding?
19. What should be done to ensure sustainability of improved forage production technologies?
20. What do you think are the opportunities and challenges of collaborative learning in feed sector? How do you think collaborative learning in the feed sub-sector helps to foster and bring changes in the livestock production?
21. What do you think is the status of livestock production in response to the growth of feed sector, such as: (Growth of feed processing and supply enterprises; enhancement of dissemination and use of feed technologies; and collaboration of actors along the feed value chain)? I.e., is it constraining growth?
22. Have you ever heard of FEED I & II programs of ACDI/VOCA?
23. Do you think the interventions have brought changes in the feed sector in particular, and in the livestock sector, in general? What do you think are the weaknesses and strengths of these FEED projects?
24. How do you think is the growth status of market oriented feed and forage production practices in the country/region/zone? [**prove, engagement status of cooperatives/unions/ private enterprises (companies)/individual households/in feed processing and distribution**]
25. How is the demand status for purchased feed products? What do you think are the constraints in feed marketing? Possible solutions to these constraints?
26. How is the growth of livestock production in the country/region/zone, such as: (Improved crossbred dairy cows; distribution and adaptation of local best breeds/improved poultry) What are barriers to livestock production?
27. How is the practice of engagement in market oriented fattening in response to growth of feed market?
28. How is the status of providing market oriented feed and forage production practices for livestock owners in the country/region/zone?
29. How is feed ingredient supply and marketing system in the country/region/zone? Who are the suppliers? Types of ingredients they supply? Problems associated with suppliers?
30. What do you think are the constraints /barriers in the use of available feed resources in the country/region/zone? Constraints to: livestock owners and poultry farmers?
31. What do you think are the solutions to these feed related constraints? What potentials are available to address these constraints?

Annex 3B: Interview Guide to Ministry of Livestock and Fishery (MOLF) (at woreda level)

Name of respondent:

Position of respondent:

Mobile phone:

Guiding questions:

1. What are animal feed sources in the woreda?
2. How do you perceive animal feed problem in the woreda?
3. What do you think are the effects of feed problem on the household economy?
4. What measures did the Woreda government take to address feed problems?
5. What are the initiatives in progress to address feed problems in the woreda?
6. How does the woreda intend to address feed problem differently since establishment of the new sector office working on livestock and fishers? Are there any new strategies?
7. How do you perceive the emergence and growth of feed manufacturing enterprises in the woreda? What type of enterprises and what do they do?
8. How do you think are these companies addressing feed problems in the woreda? How is the quality control and regulatory issues to processed feed products?
9. How is the woreda supporting these enterprises?
10. What do you think are the weaknesses and strengths of these enterprises in processing and distribution of feed?
11. Do you have the experiences of identifying and documenting farmer or enterprise innovations on is feed and forage production?
12. Have you ever identified and documented such innovations? What are these innovations?
13. What approaches do you use to scale up such innovations? How helpful were these innovations?
14. How do you perceive the introduction and use status of forage production technologies in the woreda? **[prove, availability of forage technologies, promotion and dissemination of forage technologies to the farmers; appropriateness of these forage technologies to smallholder farmers and commercial farmers]**
15. How do you explain farmers' use (adoption) status of these technologies? Weaknesses and strength of these forage technologies?
16. What activities do you think need to be done to catalyze sustainable forage production systems in the woreda?
17. How is on-farm testing of forage technologies to help facilitate on-farm feeding?
18. What should be done to ensure sustainability of improved forage production technologies?
19. What are the challenges and opportunities for collaborative learning in feed sector?
20. How do you think collaborative learning in the feed sub-sector helps to foster and bring changes in the livestock production?
21. How do you see the status of livestock production in response to the growth of feed sector, such as (Growth of feed processing and supply enterprises, enhancement of dissemination and use of feed technologies, collaboration of actors along the feed value chain)?
22. How do you think is the growth status of market oriented feed and forage production practices in the woreda? How is the demand for purchased feed products? What do you think are the constraints in feed marketing? Possible solutions to these constraints?

23. How is the growth of livestock production in the woreda in terms of (Improved crossbred dairy cows; distribution and adaptation of local best breeds/improved poultry) What are barriers to livestock production?
24. How is the practice of engagement in market oriented fattening in response to growth of feed market?
25. How the status of providing market is oriented feed and forage production practices for livestock owners in the woreda?
26. What do you think are the constraints /barriers in the use of available feed resources in the woreda? What do you think are the solutions to these feed related constraints? What potentials are available to address these constraints
27. Are there NGOs making interventions on addressing feed problems in the woreda? Which NGOs are these? How helpful and relevant is their intervention? Was their intervention participatory (has the woreda been involved on planning of project initiatives) What were the achievements What are the weaknesses and strengths of NGO interventions?
28. How do you suggest that NGOs should focus to address feed problems on sustainable basis?

Name of respondent:

Mobile phone: _____

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22. What activities do you think need to be done to catalyze sustainable forage production systems in the country? What should be done to ensure sustainability of improved forage production technologies?
23. How do you think is collaborative learning practices in the feed sector? Challenges and opportunities of collaborative learning?
24. How do you think collaborative learning in the feed sub-sector helps to foster and bring changes livestock production?

Annex 3D: Interview Guide to Animal Feed Industry Association (AFIA) and Ethiopia Meat and Dairy Industry Development Institute (EMDIDI)

Name of respondent: _____

Position of respondent: _____

Mobile phone: _____

1. What is the mandate of AFIA?
2. What do you think are the problems related animal feed? (Livestock/poultry feed problems)
3. What are the strategies engaged by AFIA to address these problems? Strategies to address livestock/poultry feed problems?
4. What do you think is the growth of market oriented livestock and poultry sector in the country?
5. What do you think are barriers to market oriented livestock and poultry sectors?
6. Are there enterprises engaged in feed processing? Types of enterprises engaged in feed processing (government based, private based, household based), if any?
7. What do you think is the contribution of these enterprises in addressing feed shortage problem? What do you think is the contribution of these enterprises for growth of livestock and poultry sectors?
8. How is the quality control status of processed feed products? What are the strengths and weaknesses of processing enterprises?
9. Do you think that market oriented feed processing practice is growing in the country for livestock and poultry sub-sectors? What do you think are the barriers to livestock feed processing? What can be done to improve livestock feed processing?
10. What do you think is forage production and marketing practice in the country? How is policy framework for feed production, processing and marketing in the country?
11. What do you think is the growth of feed ingredient supply chain in the country? Who are the suppliers? What types of feed ingredient do they supply? Where do they get these feed ingredients?
12. How do you perceive introduction and use status of forage production technologies in the country? Weaknesses and strength of these forage technologies?
13. What activities do you think need to be done to catalyze sustainable forage production systems in the country? What should be done to ensure sustainability of improved forage production technologies?
14. How do you think is collaborative learning practices in the feed sector? Challenges of collaborative and opportunities of collaborative learning?
15. How do you think collaborative learning in the feed sub-sector helps to foster and bring changes livestock production?

Annex 4: In-depth persons' interview (IDS):

Annex 4A: In-depth persons' interview (IDS): Union Feed Manufacturing Unit Manager

Name of the union	
Name of the respondent	
Interviewee position in the organization	
Sex	
Level of education	
Work experience within the current organization	
Telephone number	
Region	
Zone	
Woreda/Kebele	
Date	
Time	

1. Could you please give us a brief description about your union's feed manufacturing unit in terms of daily production capacity, actual production, staff, sources of inputs, users of manufactured feeds, annual revenue obtained from the unit and so on?
2. What kinds of the services and supports have you received from the FEED I and II projects? And what type of support would you like from FEED-III?
3. How would you evaluate your Union's current organizational capacity to run the enterprise? In terms of adopting new technologies and improved managements practices (namely manufacturing of livestock and poultry feed, improved operational and financial managements, improved business plan development, record keeping and marketing?
4. How do you evaluate your union's feed enterprise capacity to expand the service beyond the current distribution target Woredas? What challenges do you expect in the expansion of your feed business service beyond the current sphere of distribution?
5. How do you evaluate the demand for your concentrate feed? Which by-product has a high demand (Dairy feed, fattening feed, poultry feed)? Give some evidence for your suggestion. What needs to be done in this regard? Who are your direct and indirect buyers?
6. Who are the current suppliers of your inputs and users of your outputs? How linked are you with suppliers of inputs and buyers of your outputs? What challenges do you have in this regard? What suggestions do you have to improve the value chain?
7. How do you assess the affordability of your feed products to the target buyers? What challenges do you have in this regard?
8. To what extent are your buyers utilizing or putting your products into use?
9. What distribution channels do you use to sell your products?
10. What lessons did you learn so far in the production and distribution of the feed products?
11. Are you an agent for big concentrate feed companies or you retail their products? Who are the companies? What is their market share from total feed sales?
12. If yes for qn # 11, what type of products? What are the buying and selling prices for each product?
13. Do you use the products of other feed companies as your concentrate-mix? If yes explain the process and the quality, price & implications?
14. Are you involved in forage nursery development? Yes or No-----

15. If yes, how do you evaluate the demand for your forage seed/cuttings? Is it growing or declining?
What needs to be done in this regard?
16. Who are suppliers of forage seed/ cuttings? What suggestions do you have to improve the forage seed/fodder value chain?
17. How do you assess the affordability of forage seed/cuttings by smallholders? What challenges do you have in this regard? To what extent are farmers utilizing forage seed/cuttings to grow fodder and feed their animals?
18. What lessons did you learn so far in the production and distribution of forage seeds/cuttings?
19. What recommendations do you have for improvement?

Annex 4B: In-depth persons' interview (IDS): Private actors (Agri-Input Dealers)

Woreda-----

Kebele-----

Name-----

Sex-----Position-----Phone Number-----

1. When and how did you start Agri-input dealing?
2. What were you doing before you started Agri-input business?
3. Please provide a brief description of your business and the services or goods you provide

Type of goods or services provided e.g., dairy, poultry, fattening feed, crop input, animal health, forage seed etc	Description of what is provided (include cost of products/services sold)	Quantity/volume sold in the last 12 months	Number of farmers/livestock owners it is sold to in the last 12 months	Remark

4. Are you an agent for big concentrate feed companies or do you retail their products? Who are the companies? What is their market share from total feed sales?
If yes, what type of products? What are the buying and selling prices for each product?
5. Do you use the products of other feed companies as your concentrate-mix for home preparation?
If yes explain the process and the quality, price and implications?
6. Did you get any support from Go and NGOs to increase the profitability of your business?

What support, training and inputs have you received? (The support could be: capacity development support (training & coaching/advice), material/equipment support in the form of grant B2B linkage, etc.	When did you receive this support?	How has this support helped you?

7. Please describe how you are supplying your inputs to farmers. Be sure to mention any other actors that you rely on for this, including the Union, Kebele officials, DA, woreda Livestock and Fishery office, Cooperative Agency, NGOs, etc.

--

8. Describe the main challenges that you are facing in relation to the success of your business?

Type of challenge (availability inputs to be distributed, quality, capital, land, B2B linkage, etc.)	How is it affecting you?	How can it be addressed?

9. Overall, how do you see your business developing in the coming 3 years? Please give reasons.

--

Annex 4C: In-depth persons' interview (IDS): Forage Nursery Enterprises

Woreda-----Kebele-----

Name-----Sex-----

Position-----Phone Number-----

1. When and how did you start forage nursery operations?
2. What were you doing before you started forage nursery operation?
3. Please provide a brief description of your operation?

Forage types or planting materials produced	Quantity produced in last 12 months	Quantity/volume sold or provided in the last 12 months (if relevant)	Number of farmers it is provided to in the last 12 months	Number of Kebeles you provided planting material or your geographic coverage?

4. Did you get any support from Go and NGOs to increase the efficiency of your business?

What support, training and inputs have you received? (The support could be: capacity development support (training & coaching/advice), material/equipment support in the form of grant B2B linkage	When did you receive this support	How has this support helped you?

5. Please describe how you are supplying your inputs to farmers. Be sure to mention any other actors that you rely on for this, including the union, Cooperative Agency, MOLF, DAs, NGOs etc.

6. Describe the main challenges that you are facing in relation to the success of your business?

Type of challenge (availability inputs to be distributed, quality, capital, land, B2B linkage, etc.)	How is it affecting you?	How can it be addressed?

7. Overall, how do you see your business developing in the coming 3 years? Please give reasons.

--

Annex 4D: In-depth persons' interview (IDS): Development Agents

1. What kinds of supports did you get from government and NGOs with regard to feed and forage development extension?
2. To what extent have you addressed the priority needs of the farmers in promotion of concentrate feed and forage development in your kebele?
3. What type of approach do you use to promote concentrate feed and forage development in the Kebele?
4. How do you assess the current approach in improving the forage development and concentrate feeding? What are the strengths and weaknesses?
5. What are the type of training and demonstration you have so far provided to farmers in the Kebele in relation livestock and poultry feed and forage development?
6. How do you evaluate the participation of women in your training and other extension service in your Kebele? What constraints and challenges did women face that limited their knowledge and access to the various livestock production and marketing service?
7. What are the existing opportunities to enhance livestock and poultry development and its effectiveness?
8. Is there forage activity that has been implemented to reclaim or rehabilitate land in your kebele? How many hectares? If yes, how successful was it both in producing the forage production and in improving the quality of the reclaimed land?
9. To what extent are farmers ready to take up the technologies, techniques and farm management practices demonstrated to them? How do you characterize the farmers' perception to adopt and not adopt (or less adopt) improved practices (socio-economic, location, etc) (from desirability, affordability, and scalability point of view)?
10. Do farmers willing to participate in the followings? Forage seed multiplication, fodder production and animal feeding, concentrate feed purchase and feeding? Which of the following are most likely accepted and relevant to institutions, communities, cooperatives, and businesses societies?

Activities/initiatives	To whom can it be accepted and relevant and how?
improved forage growing systems	
manufacturing of feed	
improved fattening, dairy and poultry production	
Production of forage seeds	
Production of planting materials	
livestock nutrition management	
Improved feeding system	
business plan development, recordkeeping	

11. What would be the challenges expected in the implementation of the above activities? What steps should be taken to overcome these challenges?
12. What lessons did you learn from the current forage and feed development activities in your Kebele?
13. What recommendations do you have for improvement?

Annex 4E: In-depth persons' interview (IDS): Woreda Cooperative Promotion Agency

Region	
Woreda	
Name of Organization	
Interviewee Name	
Interviewee Position in the Organization	
Telephone	

1. What is your mandates or responsibilities?
2. How do you work with primary cooperatives?
3. What type of primary cooperatives are available in your locality?
4. How many cooperatives are functional in your locality?
5. What are the major focuses or functions of the primary cooperatives?
6. How do you work with the local people or beneficiaries?
7. What are the major challenges and opportunities of these cooperatives engaged in multipurpose or livestock?
8. What do you think can be done to make your cooperative promotion offices effective in the implementation of FEED-III project in the future?
9. How does unions imitations and government regulations impeded the progress of the union feed business?
10. What changes in government and union policies need to be changed to make greater progress possible?
11. How do you evaluate the engagement and performance of Unions in forage manufacturing and nursery activities?
12. What opportunities should the project take advantage of enhancing its effectiveness and broaden impact?
13. What are the external factors or conditions that could hinder the achievement of the project's results?
14. What can /could the FEED III project do to address these challenges?
15. How do you evaluate the project's strategy for sustainability of its activities and outcomes at unions?
16. What recommendations do you have for improvement?

Annex 4F: In-depth persons' interview (IDS): Feed Ingredients Suppliers

(Please conduct the interview with the owner or a senior manager of the ingredient supplier)

Woreda-----Kebele-----

Name-----Sex-----Position-----Phone Number-----

1. When and how did you start feed ingredient supply to the union feed enterprise?
2. What were you doing before you started supplying to the union feed enterprise?
3. Is this a primary or secondary business for you?
4. If secondary, what proportion of your revenue comes from the sale of feed ingredients?
5. Please provide a brief description of your operation?

Types of ingredients	Quantity produced in last 12 months	Quantity/volume sold or provided in the last 12 months to feed enterprise	Any constraints in supply of the ingredients to the union

6. Did you get any support from Go and NGOs to increase the profitability of your business?

What support, training and inputs have you received? (The support could be: capacity development support (training & coaching/advice), material/equipment support in the form of grant, B2B linkage, etc).	When did you receive this support	How has this support helped you?

7. Please describe how you are supplying your inputs to union feed enterprises? (e.g., forward contract, spot cash, and sale, etc)

8. Describe the main challenges that you are facing in relation to the success of your business?

Type of challenge (availability raw materials, price, capital, B2B linkage, etc.)	How is it affecting you?	How can it be addressed?

9. Overall, how do you see your business developing in the coming 3 years? Please give reasons.

Annex 5: Focus Group Discussion Guides

Group Discussion Facilitation Protocol to Facilitators

Part I: Introduction /Warm-up:

1. Acknowledge participants for their willingness to take part in the FGD.
2. Explain the purpose of the group discussion.
3. Introduce yourself.
4. Explain the role of the facilitator and note takers.
5. Let participants introduce themselves (list their name, sex, and other, if apt).

Part II: Instruction:

1. Assure all participants personal data will be kept confidential and will not be used for unintended purpose. I.e., all the data provided will be used only for the study purpose.
2. Make clear what is expected of participants.
3. Make clear the time length of the discussion (between 45-60 minutes).
4. Keep eye contact with the participants and make sure that the discussion is participatory for everyone.
5. Set ground rules for the group with the participants: Consider the following rules:
 - ✓ Respect for different views, no wrong answers, one person speak at a time, everyone has the right to speak without being interrupted, raise your hands and get a signal from the facilitator before your talk, keep your answers short and precise to allow others participate, switch off/silence your cellphones.
6. Do NOT promise what you cannot deliver.
7. Use a translator, whenever necessary.

Part III: Closing and post discussion activities:

1. Summarize the ideas which emerged from the focus group, noting where there was consensus and where there was no consensus) on the themes of discussion.
2. Let participants add anything before you close.
3. Thank everyone for their time and input in the discussion.
4. Make sure to write the group discussion report immediately after the discussion.

List of FGD participants

No	Name			Remark	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9					
10					
Places	Name	Code	Time	Time/date	
Region					
Zone					
Woreda			Date of discussion		
Kebele			Start time (HH:MM)		
Facilitator name			End time (HH:MM)		
Note taker name					

FGD guiding questions (Applicable to all FGD groups):

1. How do you describe the livestock production in your locality from breed and technology perspectives, including, dairy, poultry, and fattening?
2. How do you feed your livestock? Where do you get the feed or forage for your livestock? Is the livestock feed/forage available in this locality? How accessible is it? How do you get it? (do you produce yourself or buy the feed or forage? If yes, where do you buy it or who sells it?)
3. What are the major animal feed or forage development strategies practiced by farmers in this locality? What should be done to address the problems and enhance farmers' strategies?
4. How do you evaluate the accessibility and affordability of animal feed in your locality? What are the major problems that you face in terms of manufactured animal feed or forage? What causes this/sources of the problems?
5. Have you ever used /have access to use of manufactured feed, improved forage growing systems, improved fattening, and livestock nutrition and feeding system, dairy and poultry production? If yes, how do you get it? Who provided these services? Were they adequate or what were the challenges?
6. Is there market oriented livestock/poultry feed and forage production in this locality? How is the market, who is buying? Do you think this can be taken as a business venture?
7. Is there market oriented fattening, dairy, and/or poultry production in this locality? If yes, who is doing it? Are they profitable? What are the challenges and opportunities in doing these activities? What actions are needed to improve the performances of these activities in the future?
8. Do you get any training, inputs or financial assistances provided to farmers and other stakeholders from any organization? If yes, who provided it? Focusing on what? How frequently? How adequate and relevant are they for your livestock/poultry production and fattening?
9. Who benefited most (male/female) from the trainings or supports provided to address problems?
10. What constraints and challenges did women face in terms of the use of manufactured feed, improved forage growing systems, improved fattening, livestock nutrition, dairy and poultry production? Why is this? What can be done to resolve these challenges?
11. How do you perceive the marketing practices on the use of manufactured feed, improved forage growing systems, improved fattening, livestock nutrition, dairy and poultry production by private enterprises and coops/unions and others in your locality? How relevant and adequate are they in your locality? What are the major gaps and weaknesses in this regard?
12. What are the good practices that can be taken as lessons on the use of manufactured feed, improved forage growing systems, improved fattening, livestock nutrition, dairy and poultry production in your locality?
13. What do you think are the major capacity gaps (*input, management, knowledge, skill* etc) to engage in feed and forage production in your locality? What about for feed manufacturing and the supply of feed ingredients?
14. What do you think are the main constraints that farmers face on the use of the existing animal feed or forage in your locality? What can be done to resolve these challenges? Who should do what?

Annex 6: Field Observation Checklist

Part 1. Background information of the observation area

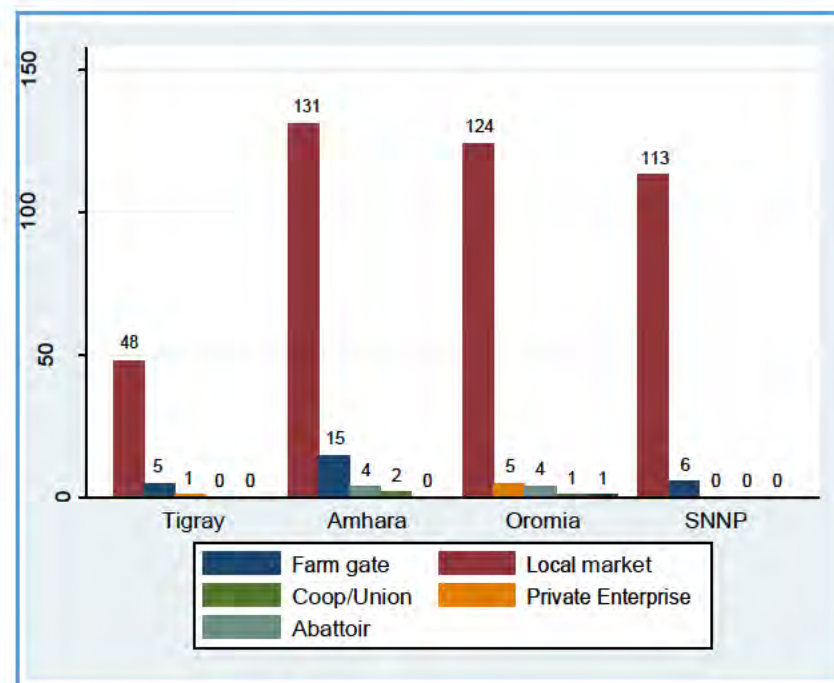
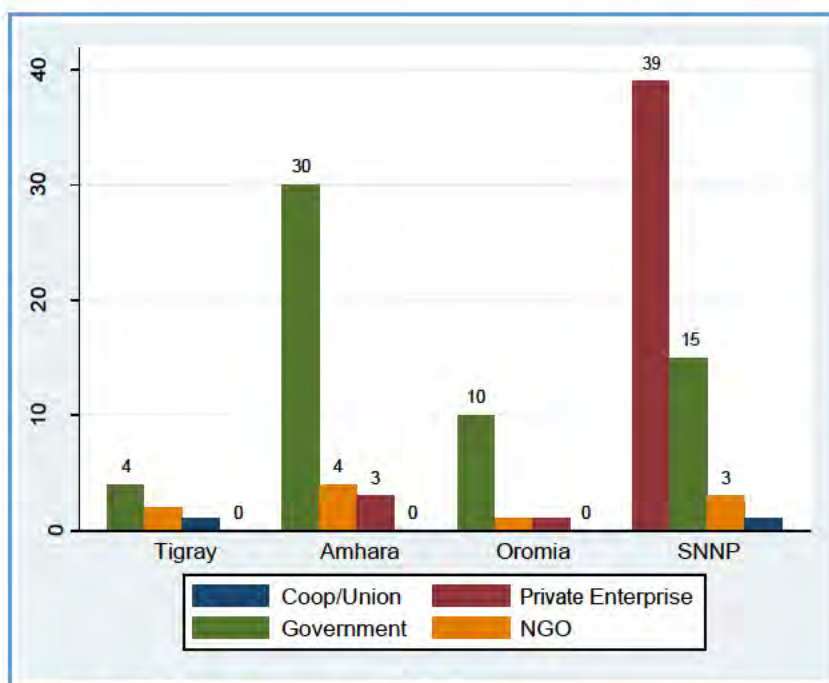
1. Region _____
2. Zone _____
3. Woreda _____
4. Kebele _____
5. Agro-ecological zone _____
6. Data and time of observation _____

Part 2. Guidelines for observation: the following issues will be observed during FEED-III baseline survey:

Observation point	Response	
	Observed (Yes=1) put (✓)	Not observed(No=2) Put (X)
Farming type		
Topography		
Major crops grown (list them as per the agro-ecology)		
Type of livestock owned		
Forage or feed production system		
Communal grazing areas		
Feed processors/ dairy processors		
Feed market places/ poultry sites		
On-farm innovative feeding practices		
Indigenous and adoptive forage management practices		
Smallholder farmers feed management practice		
Source of feed and forage for livestock/poultry		
Type of feed used for livestock/poultry		
Availability of feed and forage input for livestock		
Accessibility of feed and forage input for livestock		
Infrastructural availability (Electricity (power source), water source, feed mill, feed mixer, warehouse, packing/trading)		
Feed market networks		
Feed processors and enterprises		
Feed service providers		
Challenges for feed production;		
Opportunities for feed management practice		

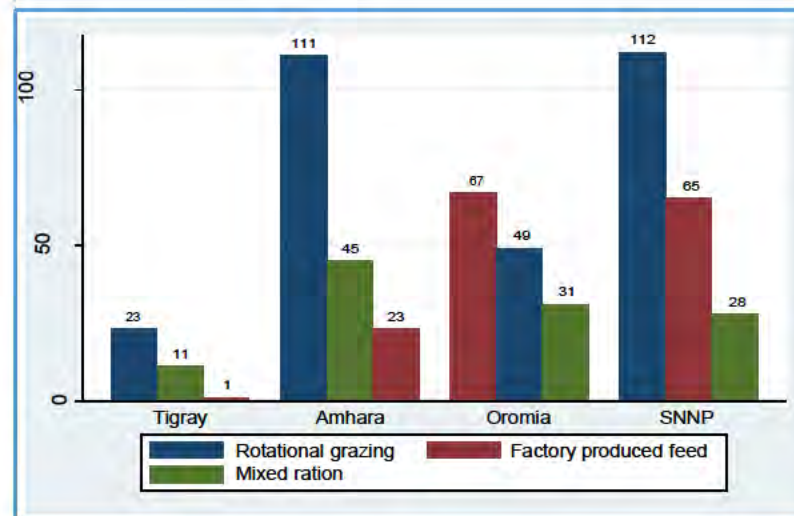
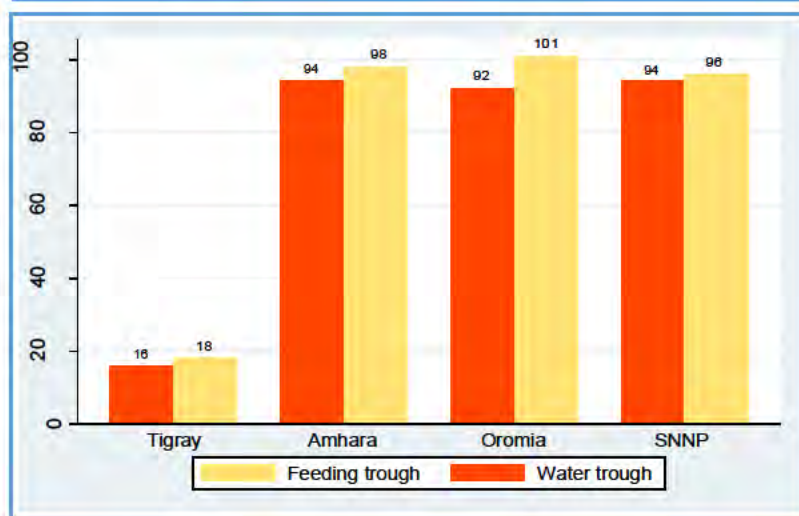
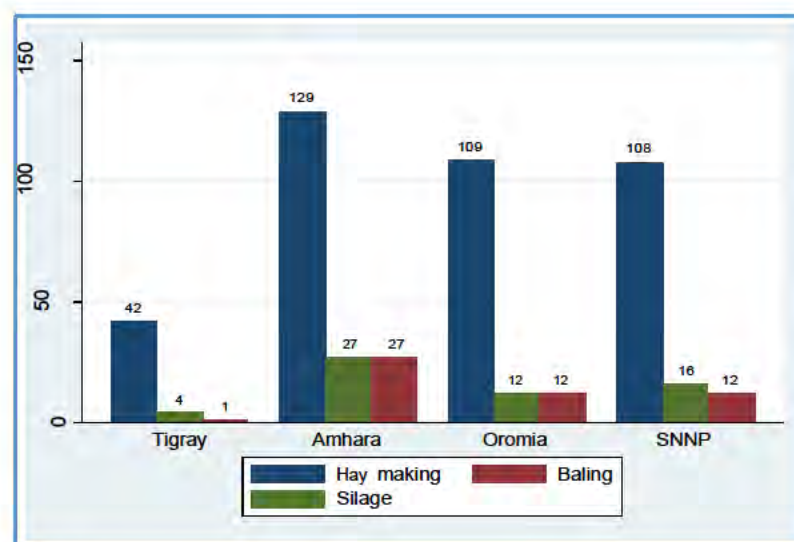
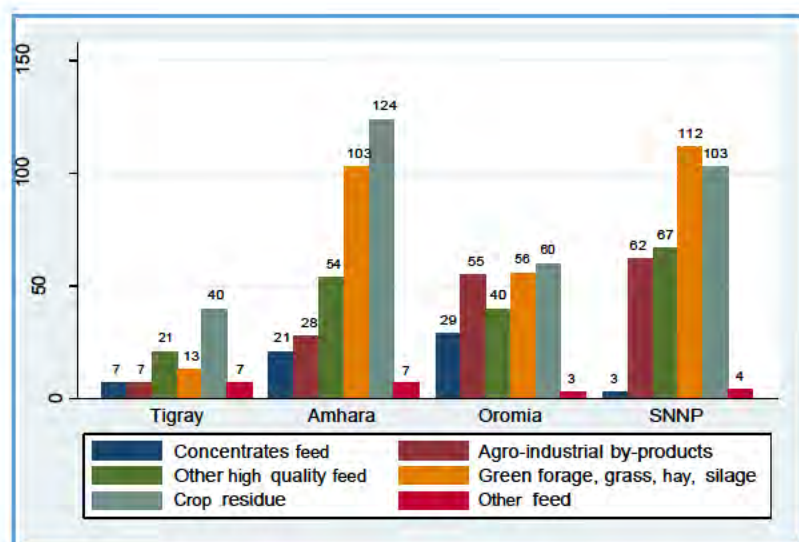
Annex A 1 List of FGDs for the baseline survey

No.	Region	# of Woreda	Type of FGDs	Number
1	Tigray	4 Sample Woredas	✓ Adult Men ✓ Adult Women ✓ Joint Adult Men and Women ✓ Youth Feed Growers ✓ Youth in fattening, dairy, and poultry production	5 FGDs Covering 3 Sample Woredas [1 FGD with Adult Men, 1 FGD with Adult Women, 1 FGD With Joint Adult Men and Women, and 1 FGD with Youth [Working in Groups] Feed Growers and 1 FGD with Youth in fattening, dairy, and poultry production was conducted among purposively selected groups in Tigray.
2	Amhara	4 Sample Woredas	✓ Adult Men ✓ Adult Women ✓ Joint Adult Men and Women ✓ Youth Feed Growers ✓ Youth in fattening, dairy, and poultry production	5 FGDs Covering 4 Sample Woredas [1 FGD with Adult Men, 1 FGD with Adult Women, 1 FGD With Joint Adult Men and Women, and 1 FGD with Youth [Working in Groups] Feed Growers and 1 FGD with Youth in fattening, dairy, and poultry production was conducted among purposively selected groups in Amhara.
3	SNNPR	4 Sample Woredas	✓ Adult Men ✓ Adult Women ✓ Joint Adult Men and Women ✓ Youth Feed Growers ✓ Youth in fattening, dairy, and poultry production	5 FGDs Covering 4 Sample Woredas [1 FGD with Adult Men, 1 FGD with Adult Women, 1 FGD With Joint Adult Men and Women, and 1 FGD with Youth [Working in Groups] Feed Growers and 1 FGD with Youth in fattening, dairy, and poultry production was conducted among purposively selected groups in SNNPR.
4	Oromia	5 Sample Woredas	✓ Adult Men ✓ Adult Women ✓ Joint Adult Men and Women ✓ Youth Feed Growers ✓ Youth in fattening, dairy, and poultry production	5 FGDs Covering 4 Sample Woredas [1 FGD with Adult Men, 1 FGD with Adult Women, 1 FGD With Joint Adult Men and Women, and 1 FGD with Youth [Working in Groups] Feed Growers and 1 FGD with Youth in fattening, dairy, and poultry production was conducted among purposively selected groups in Oromia.
Total	4	16	5 Different Sets of FGDs	20 FGDs

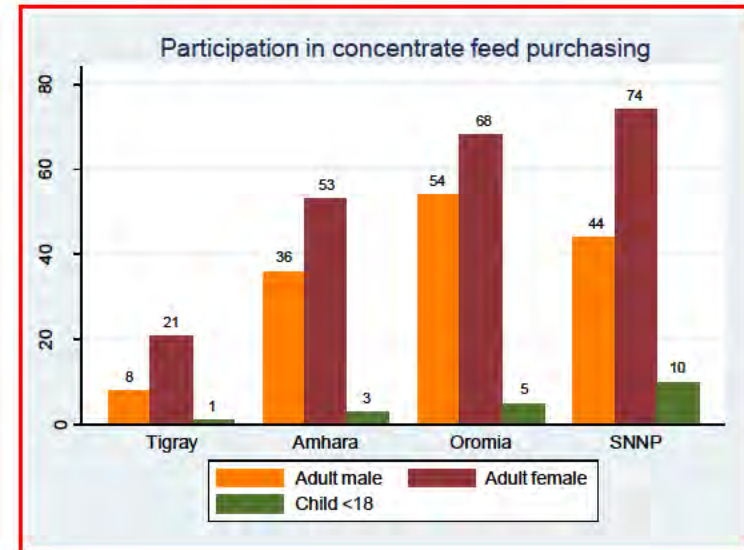
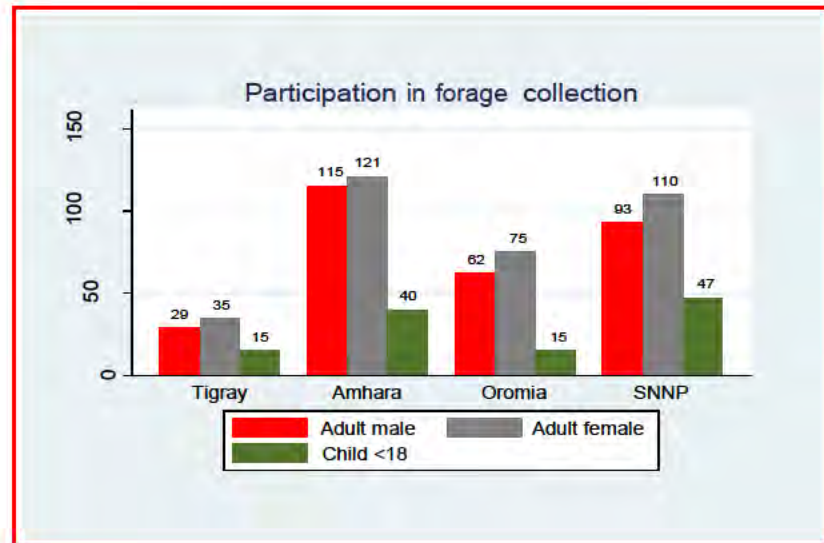
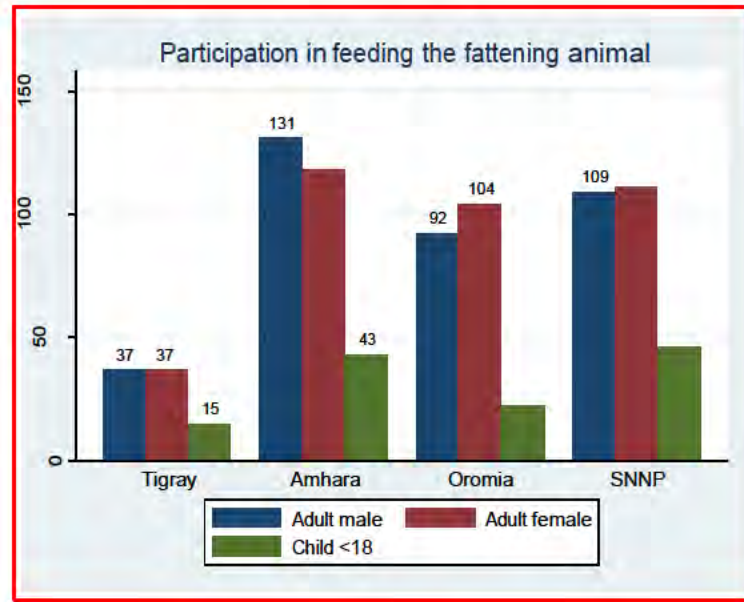
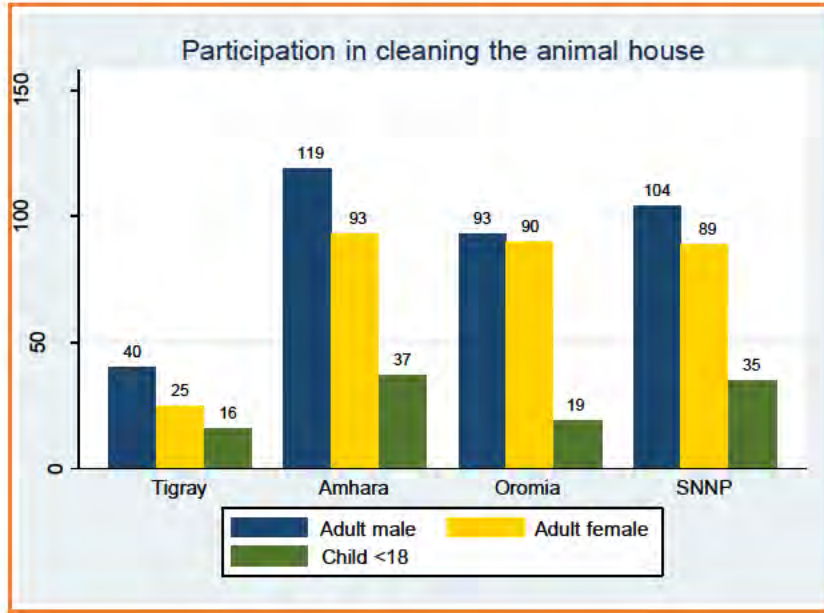


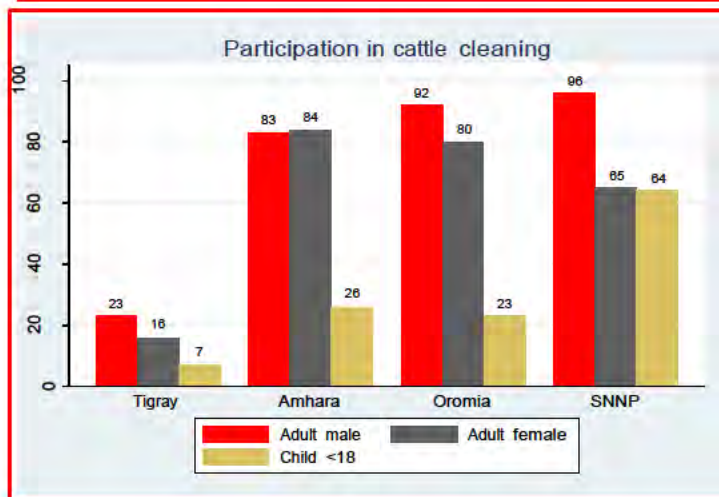
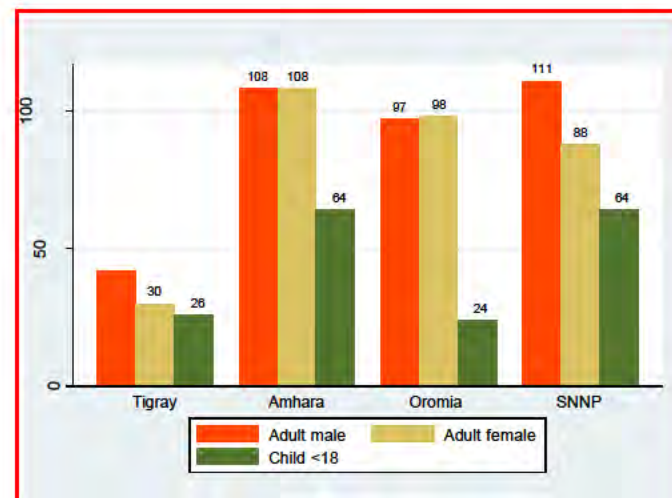
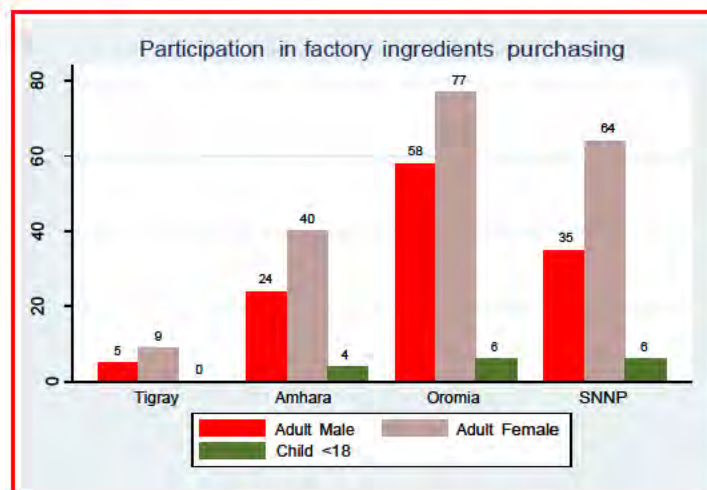
Source: FEED III baseline survey (2018)

Annex A 2 (a) Access to trainings in animal fattening by region; (b) market outlet by region



Annex A 3 (a) Fattening animal feed usage; (b) feed preservation and storage practices by region; (c) animal feeding equipment; (d) feeding practices by region





Annex A 4: (a) Cleaning the animal house; (b) Feeding the fattening animal; (c) Forage collection; (d) Concentrate feed purchasing; (e) Factory ingredients purchasing; (f) Watering; (g) cattle cleaning