



Crop and livestock value chains in Basona Worena district, Ethiopia

Abiro Tigabie, Temesgen Alene, Animut Tarik, Shenkute Goshme, Eliud Birachi, Dirk Hoekstra, Wellington Jogo, Annah Kimeu and Edith Wairimu

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Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

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Acronyms

AEZ	Agro-Ecological Zone
AI	Artificial insemination
AIB	Agro-industrial by products
BOA	Bureau of Agriculture
CIAT	International Centre for Tropical Agriculture
CIP	International Potato Center
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
PCA	Participatory Community Analysis

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Executive summary

The rapid value chain assessment study covered two types of enterprises; crop and livestock enterprises. The study focused on the role and functioning of the agribusinesses involved in the purchase, processing and consumption of products generated by these value chains. The main aim of the assessment was to obtain a better understanding of these businesses and how they can play a role in expanding the volume of raw products produced, processed and sold. Three crop and three livestock enterprises were selected.

The selection was based on preferences of men, women and youth, the enterprises' commercial orientation or importance and finally, the enterprises that were well preferred for ease of scalability and learning. With respect to this market assessment findings, various reliable interventions have been suggested. A total of 147 actors consisting of 85 crop actors and 62 livestock actors were interviewed using a well-structured questionnaire. Based on the market assessment, participatory community analysis (PCA) and other studies conducted earlier, various interventions have been suggested and ready for implementation.

Crop value chains

A rapid market assessment was carried on three crops; faba bean, wheat and potato. Also the input system that supports the value chain of the three crops was surveyed. It included seed, fertilizer, farm implement and chemical. To understand the crop value chain, two major actors were interviewed, that is, traders and processors. The traders interviewed involved those who only carried out wholesale or retail business but do not process the product.

The wheat value chain in Amhara region seems more established. Wheat grain is used in the preparation of a range of products such as: the traditional spongy flat unleavened bread ('injera'), bread ('dabo'), local beer ('tella'), and several other local food items (i.e. 'dabokolo', 'ganfo', boiled coarse-ground wheat ('kinche'), boiled-whole grain ('nifro'), roasted grain ('kollo')). Besides, wheat straw is commonly used as a roof thatching material, and as a feed for animals. Wheat market involves both retailers and wholesalers who sell wheat grain to collectors, end consumers and processors. Primary cooperatives are key collectors in this region who play a very important role in wheat grain collection from individual farmers. There was a difference in average selling price by traders owning the business and the primary cooperatives. Primary cooperatives sold wheat grains at a lower price of (7.4 Ethiopian birr (ETB)¹) compared to both the wholesaler (ETB 7.5) and sole proprietor retailer (ETB 8.00). The primary cooperatives majorly supply wheat grain to the union flour factory.

The processor on the other hand buys wheat grain and changes the form by milling flour. Major traded outputs of wheat processor are flour, bread and wheat bran. The flour processors and bakeries are the main actors involved in wheat processing. The flour processing factory is owned by union.

Faba bean value chain also involved retailers, wholesalers and processors. Dried faba bean grain is sold mostly in retailing form but also a small number of wholesalers are involved. Wholesalers and retailers sell the grain to individual consumers and processors. The processors transform faba bean grain by roasting, splitting, labelling and selling. Roasting was identified to be a very manual and hard task which calls for better simple efficient methods. In this region production of faba bean is high compared to other sites and processing of faba bean is more developed and organized. Faba

1. In February 2015, USD 1 = ETB 20.3225.

bean processors in this district have organized themselves into an association which owns a faba bean processing factory. The cooperative does processing of faba bean as a service with a fee to its members. Although members process collectively, they sell their processed faba bean and by-product individually. Faba bean processing also involves hotels/restaurants as major processors who utilize faba bean. The hotels use the faba bean to make local dishes; *'full'*, *'shiro'* and *'wot'*.

Potato value chain in the district is not fully developed. It is still 'young' and therefore potato utilization is still minimal. Several potato retailers with very small number of wholesalers were identified. Both retailers and wholesalers are involved in potato trading. Retailers not only sell potato but also trade other products. During the market visit, it was observed that retailers trade small amounts of potato with tomato, onions and other vegetables/goods.

During the market assessment survey in the sites, very minimal processing was observed. The major potato actors involved in processing are street vendors, hotels and restaurants. The street vendors also prepare French-fries and supply to consumers at dusk. The hotels and restaurants commonly use potato as boiled and as part of traditional dishes or *'wot'* (sliced, boiled potato with pepper, onion, salt and oil) or *'Beyaynet'* and there is little processing into chips. The few hotels and restaurant processors interviewed during the survey preferred large sized potato for processing.

The three value chains are supported by the input system and therefore the market survey also studied the input market. The input system is majorly steered by the government with the private sector players having minimal contribution. In this region fertilizer, seed, farm implement and chemicals are supplied by the research centre, Bureau of Agriculture (BoA), cooperatives and unions. Seed production business, chemical spraying services, farm implement hiring among others, are suggested interventions. Production of seed by producer owned agribusinesses is an entry point towards achieving a sustainable seed supply system in the sites. There is also potential for new enterprises that can be based on provision of chemical spraying and farm mechanisation services, some of which would easily appeal to the youth in the rural areas.

Livestock value chains

The rapid value chain assessment study covered three main livestock value chains i.e. the dairy value chain, the large and small ruminants' value chains.

The role of the agribusinesses in the dairy value chain is the most advanced in Basona Worena as compared to the other Africa RISING districts. It is noted that the bulk of the milk produced and sold through the commercial system is in fact 'exported' to the larger Addis Ababa milk shed for further processing. Part of the local demand for fresh milk is met by the dairy businesses, including dairy shops, cafes and hotel/restaurants, however most milk for urban consumers is purchased directly from farmers. Production of fresh butter by the dairy cooperative is significant and reaches 1350 kg/month (equivalent to 27,000 litres of milk) during periods when demand for milk is less. Also, two of the three sampled privately owned dairy cafes produce substantial quantities of butter during the same period (up to 1,500 kg/month). Part of the fresh butter is also destined for the Addis Ababa market. Furthermore, the economics of butter making is enhanced because of the 'ayeb' making from the skimmed milk remaining from the butter processing. It is noted however that the by-product from 'ayeb' making i.e. whey, is underutilized and it is proposed to stimulate its use for livestock production (especially for raising calves). Besides the fresh butter produced by the businesses, on farm production of lactic butter from soured milk is also significant in the district and a network of traders collects butter from markets in and outside the district with quantities ranging from 80 to 1400 kg/month/trader during peak months. Some traders reported sales outside the district. Quality pricing has been introduced in sampled butter shops in Debre Birhan, with highest prices paid for young—fresh butter. Linkages have also been established between the commercially produced fresh butter system and the butter traders for the sale of fresh butter. An interesting

development is the emergence of milk shops and dairy cafes. The former facilitates trade in fluid milk between producer and consumer while the dairy cafes also get involved in serving processed milk products (boiled milk and 'irgo') as well as small scale processing of butter and ayeb. Both businesses can be assisted in expanding their role in selling fresh milk through additional linkages with consumers and producers. The dairy cafes may also consider expanding their product range (e.g. butter milk, ice cream) and introducing food safe 'irgo' through heating. Also new businesses and/or roles of existing businesses could be expanded, in particular the establishment of business models for butter processing in rural areas using new processing methods and churning technologies. Not only could this reduce the labour burden on women but also offer new business opportunities for women. To determine the commercial demand for the various dairy products, it is proposed to conduct a consumer demand study, which may also include testing of new products. To meet such increased demand, formation of marketing groups for butter and milk should be encouraged to reduce individual marketing cost.

The role of agribusinesses in large and small ruminants' trade is also significant in Basona Worena in terms of number of animals traded by the traders and purchases by butchery restaurants and hotel restaurants. Both large and small ruminants are purchased and sold inside and outside the district. Considerable seasonal fluctuation was observed in the number of animals traded—on average 63% decline in number of animals per trader between peak and low months—and price paid—on average 33% drop in price per trader. The average age of traded large and small ruminants is rather high indicating a traditional consumption demand through the businesses involved. However a consumer survey is proposed to explore demand by institutional and individual consumers. Such a study should explore possibilities for alternative products (younger animals, fattened animals). Based on the findings, different production cycles should be explored to produce for targeted markets/buyers and periods. Formation of marketing groups of producers should be encouraged to meet specific demands during the year as well as reduce marketing cost per animal through collective sales arrangements.

To support the commercialization of all three value chains, some key service and input supply businesses require attention.

In general input/services in rural areas for dairy (butter) and large and small ruminants' production are less developed than in the peri-urban areas. While the government aims to improve the public sector veterinary and artificial insemination (AI) services, by developing a more decentralized system, improvements can be made for producers in the rural areas through collective action by groups of producers/primary cooperatives for the bulk purchase of inputs and services.

The improvement in genetic resources, in particular for dairy animals is insufficient and the introduction of a more efficient system based on mass insemination supported by mobile teams and hormones has shown some improvements but require study to improve its performance.

The district is 'blessed' with an abundance of agricultural by-products (AIB), with the exception of oilcake. The use of commercially available pulse bran produced in the district should be examined further since all pulse bran is 'exported' to producers in Adama. To increase demand for AIB components or mixes, awareness creation and demonstration of the use of AIBs is proposed together with collective (bulk) purchasing of feed by marketing groups and/or primary cooperative.

1 Introduction

1.1 Africa RISING Project

The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises of three research-for-development projects funded by the United States Agency for International Development (USAID) as part of the U.S. government's Feed the Future initiative. Working in collaboration with research and development partners, Africa RISING's goal is to improve food, nutrition, and income security of smallholder farmers (in particular vulnerable groups such as women and children) through sustainable intensification of farming systems.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). International Food Policy Research Institute (IFPRI) leads the monitoring, evaluation and impact assessment component of the projects.

In Ethiopia, the project (from here onwards 'the project' refers to the Africa RISING project in Ethiopia) is being implemented in, a total of 8 *kebeles*, 2 from each of the 4 regions of Amhara, Tigray, SNNPR and Oromia regions.

The Africa RISING project works with partners from CG centres, local universities, regional research institutions, *Woreda* agricultural offices and federal research organizations. In consultation with partners, the project identified seven thematic areas for implementation in the coming three years (2014–2016), including cross cutting themes one of which is markets and value chains

1.2 Rapid value chain study objective

In 2013, the Africa RISING project conducted detailed diagnostic analysis in the eight project *kebeles*. As part of the diagnostics, Participatory Community Analysis (PCA) were conducted in all the project sites to characterize agricultural production and livelihood systems, identify priority farm enterprises, major income sources, farm resources, and farmer-perceived constraints and opportunities for improving income, food security and/or reducing overall risks by intensifying farm enterprises.

The value chain assessment study reported here builds on the PCA findings. The PCA identified farmer perceived priority enterprises and also mapped value chains for some crop and livestock enterprises including the constraints and opportunities faced by different chain actors. However, much of the focus in the PCA was at the production stage of the value chain and little attention was paid to other elements of the value chain, particularly the agribusinesses such as input suppliers, traders, processors which are key for the performance of the whole value chain. This study therefore focused on value chain of agribusinesses for the priority crop and livestock enterprises identified in the PCA.

The specific objectives of the rapid value chain study were:

- To identify and get an understanding of the role/importance of the value chain and input/services agribusinesses in each of the value chains
- To get an understanding of market demand and supply of crop and livestock products in and outside the district and suggest potential interventions based on the findings
- To identify opportunities for strengthening linkages between value chain actors (input suppliers, producers, traders, processors and end consumers) and including suggestions for improvement in agribusiness performance (the latter will have to be discussed with

specialized projects operating in the districts—in particular Agricultural Growth Program and the Livestock Marketing Development Program).

1.3 Description of the study site

Basona Worena district is comprised of 30 *kebeles* of which Goshe Bado and Gudo Beret have been selected for testing the initial set of production interventions. The total population of the district is 134,600 (2014, *Woreda* office of Finance and Economic Development report) and almost 100% Orthodox in religion. The district capital, Debre Birhan also serves as the zonal capital for the North Shoa zone and is therefore a major supplier of inputs and services and trading and processing. Part of the district has a well-developed road network—see map with main socio economic characteristics.

Most of Basona Worena is classified in Agro-Ecological Zone (AEZ) ‘moist Dega’. The bulk of the area receives rainfall between 900 and 1050 mm annually and most of the area is between 2250 and 3200masl. Average temperature in most of the district varies between 9–15°C. The majority of the soils are Cambisols and Vertisols with some Arenosols in the undulating lower parts of the district. Most of the area is cultivated with some grazing areas at mid and high altitude—see compilation of biophysical maps (Figures1 and 2).

Figure 1. Basona Worena district

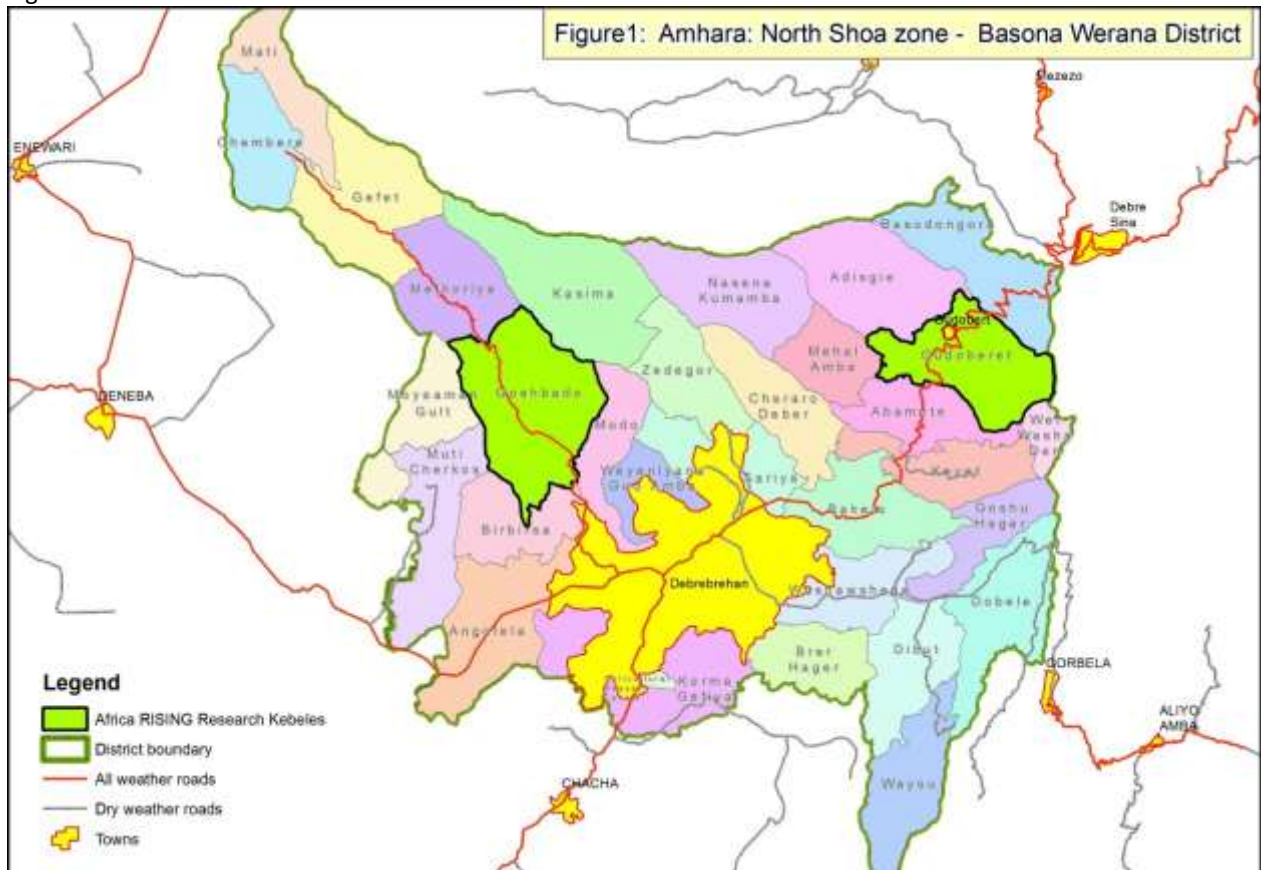
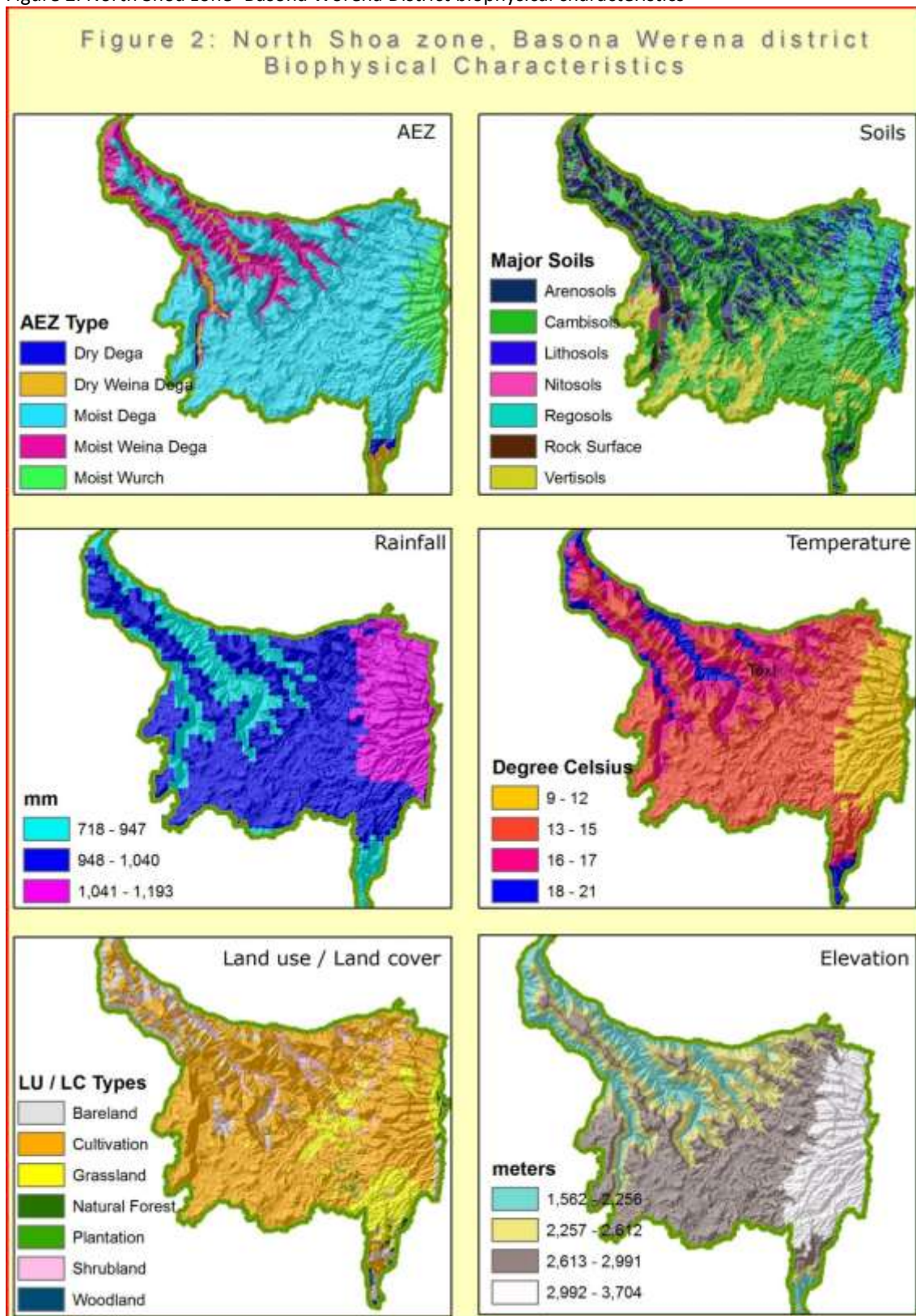


Figure 2. North Shoa zone -Basona Worena District biophysical characteristics



2 Methodology

The market value chain studies used various approaches to gather information on different enterprises. This study built on earlier findings from the Participatory Community Analysis (PCA) and Rapid Telephone Surveys which were conducted in the project in 2013. Basing on these earlier studies, priority enterprises were selected for detailed value chain analysis focusing on agribusinesses related to these enterprises.

2.1 Selection of the enterprises

Building on the previous work on PCA and telephone surveys, the survey team narrowed down the enterprises for value chain analyses to three crop and three livestock enterprises. The criteria used in prioritizing the enterprises were that the enterprises were equally preferred by men, women and youth; the enterprises had a commercial orientation or importance and finally; that the enterprises were well preferred for ease of scalability and learning across the four project areas. Based on these criteria, the selected crop and livestock enterprises are presented in Table 1.

Table 1. Summary of suggested crop and livestock enterprises in the Basona Worena district

Site	crop Enterprises	Livestock Enterprises
Gudo Beret	<ul style="list-style-type: none">• Wheat	<ul style="list-style-type: none">• Dairy Cattle
Goshe Bado	<ul style="list-style-type: none">• Faba bean• Potato	<ul style="list-style-type: none">• Beef cattle• Sheep

2.2 Value chain mapping

This approach was used to identify value chain actors and service providers for the input and output markets for the six selected enterprises. The mapping of the value chains was conducted in all Africa RISING sites. Tools used to carry out the study included: focus group discussions, key informants interviews and platform meetings with value chain actors.

The key objectives of using this approach were;

- To determine the value chain actors and processes for the supply of inputs/services and the processing and marketing of selected marketable livestock and crop commodities.
- To determine the main channels used for processing and marketing of the produce by farmers.
- To analyse the mapping information to propose some initial (best bet) interventions to improve the efficiency of the input/service supply and processing/marketing system
- To use the mapping information to select actors/processes for more detailed assessment/analysis.
- To identify the roles and responsibility of key actors on the value chain of crop and livestock enterprises.

During the value chain mapping exercise core problems and opportunities were identified that warranted further research by Africa RISING. The strengths, weaknesses and gaps were also noted and these were further analysed in this value chain assessment study.

2.3 Detailed market assessment

Based on the value chain mapping, actor and service providers were selected for the detailed survey. The market assessment survey took place during the month of February 2014.

Questionnaires were used as the key tool to collect data. Field pretesting exercise was carried out across all the sites to assess the relevance of the questions for different value chain actors. By

pretesting of the questionnaires, the team was able to validate the findings of value chain mapping which had been conducted earlier and also implemented sample selection of the actors.

Actor sampling was based on the potential actors who were identified during the mapping exercise. The sample selected was composed of the team sample of actors and service providers who were significant to work with in implementing the interventions suggested. For crop enterprises the actors sampled for interviews included seed suppliers, seed producers, farm implement suppliers, crop chemical suppliers; wheat, faba bean, potato traders and processors.

For livestock enterprises the value chain actors included; large and small butchery/restaurant, dairy agribusiness, dairy restaurants, local butter, livestock feed, large and small ruminant traders, large and small abattoirs and veterinary drugs/services. A total of 85 and 62 actors were interviewed for crop and livestock enterprises value chain survey, respectively (Tables 2 and 3).

Table 2. Detailed sample of number of crop actors interviewed in Basona Worena district

	Actors	Actual number interviewed
Fertilizers	Primary cooperative	6
	Union	1
Chemicals	Primary cooperative	3
	Union	1
	Government institution-BOA	1
Seeds	Primary cooperative	6
	Union	1
	Government institutions—BOA and Research	2
	Wheat seed producer farmer	2
	Potato seed producer farmer	2
	Potato seed producer cooperatives	2
Farm implements	Government institution—BOA	1
	Private shop	5
	Union	1
	Primary cooperative	1
Input suppliers subtotal		35
Wheat traders	Primary cooperative	3
	Wholesalers	3
	Retailers	6
Faba bean traders	Wholesalers	3
	Retailers	5
Potato traders	Wholesalers	2
	Retailers	4
Traders subtotal		26
Wheat processors	Union	1
	Bakeries	5
Faba bean processors	Private processor	5
	Hotels and Restaurant	5
Potato processors	Roadside processor	3
	Hotels and Restaurant	5
Processors subtotal		24
Total		85

Table 3. Detailed livestock sampled number of actors in Basona Worena district

Agribusiness/ Value Chain	Actors	Number
Feed	Feed shops	2
	Pulses/ traders	5
	Cooperative feed processing factory	1
	Multipurpose Primary cooperatives	4
Veterinary drugs/ services	Private veterinary drug shop/service	5
	Public sector (district)	1
	Public sector (PA)	1
Abattoir	Cooperative abattoir	1
Traditional butter value chain	Butter shop	2
	Village butter traders/collectors—collectors	5
Fluid milk value chain	Commercial collection centres (private companies)	2
	Privately owned dairy collection/processing/selling	4
	Cooperatively owned collection/processing/selling businesses	3
	Cooperative collection centres (now deliver milk to commercial collection centre)	1
	Restaurants	5
Large and small ruminant agribusinesses	District traders large ruminants—large traders	5
	District traders small ruminants—large traders	5
	Butcheries	5
	Restaurants—Hotel/ restaurants	5
Total		62

2.4 Data collection

This value chain/market assessment builds on earlier studies done in the Africa RISING project, specifically the telephone survey and PCA which were conducted in 2013. Following this, a value chain mapping exercise was done by conducting interviews with a few key informed actors, talking with the key informative people in the community, getting information from government data, journals and other secondary data.

To verify the findings of the value chain mapping and also understand the six enterprises value chains in detail, a market assessment study was carried out in February 2014 through interviewing input and output market actors. For this detailed market assessment, primary data was collected, analysed and consolidated with the other findings to produce interventions for each research site.

2.5 Data analysis methods

Data entry, cleaning and analysis were done in March 2014. Using the SPSS statistical package data was divided into livestock data and crop data which was entered in different data templates. Descriptive statistics such as mean, frequency tables and ranges were used to analyse the data.

2.6 Report writing

After data analysis, the site coordinators and partners met in a writing workshop to interpret the results and came up with this report. The key objective for the writing workshop was:

- 1) Sharing market value chain results
- 2) Writing up the value chain report for the Africa RISING project
- 3) Discussion and documentation of the best bet interventions for the project
- 4) Developing protocols for the value chains and market work for the project.

3 Crop value chains

3.1 Crop value chain findings and results

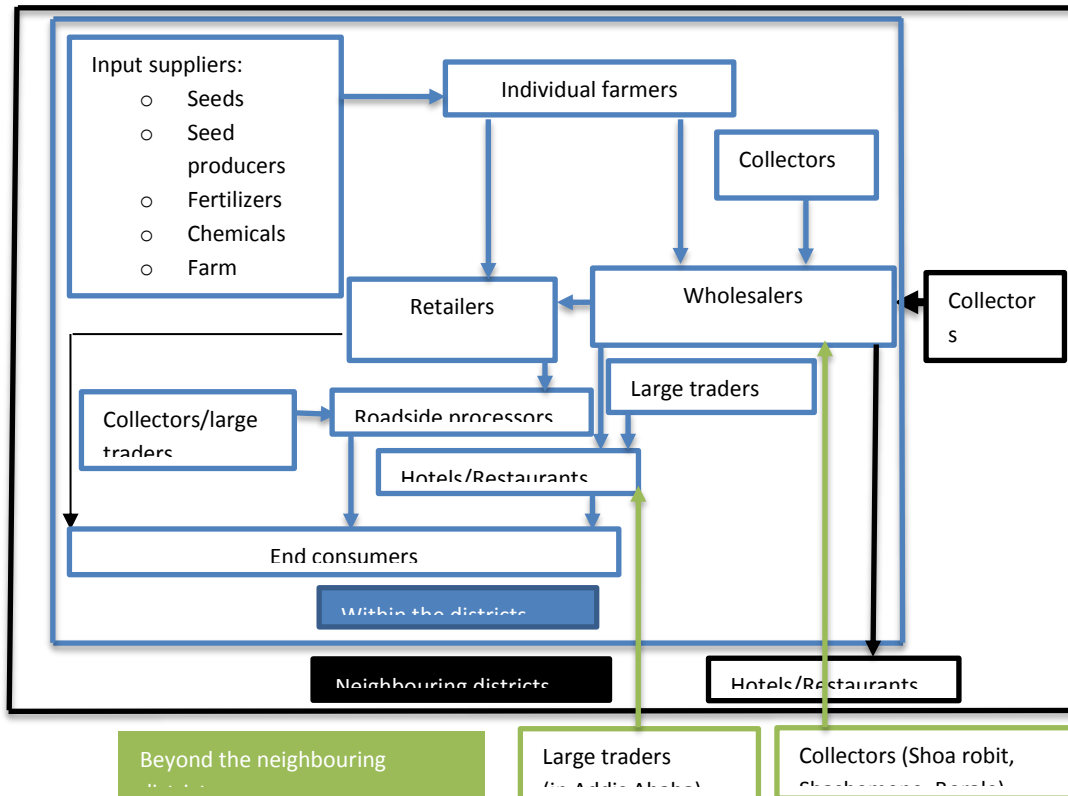
This chapter presents the findings of the value chain/market assessment study for crop enterprises for potato, faba bean and wheat as well as input supply chain; fertilizer, chemical, seed and farm implement. Value chain actors are classified as those individuals who take ownership of a product, through the exchange of money or equivalent goods or services during the transaction process of moving the product from conception to the end user. Those individuals or firms providing a service without taking ownership of the product are classified as service providers. The primary actors in the value chain are traders and processors. In this study the service providers interviewed were input suppliers for fertilizers, seed, crop chemical and farm implements while the traders include both retailers and wholesalers. Each of these actors adds value in the process of changing product title and form.

The main processes of assessed value chains include input supply, processing and trading. Input suppliers involve those that supply fertilizer, crop chemical, seed and farm implements to the farmers. The seed suppliers also comprised the seed producers, government organizations and cooperatives. Trading involves wholesalers and retailers who are in the business of buying and selling the crop products without carrying out any change in the form of the good. The processing activities involved any transformation of the form of the product to a different product. The traders who purchased crop product and carried out any process to change the form before selling the commodity to other traders or end consumers were considered as trader processors. They consist of traders, hotel restaurants, cafeterias and roadside (street) processors.

3.1.1 Potato value chain

The processes and general actors in the potato value chain in Basona Worena district and the subsequent market outlets along the chain are shown in Figure 3.

Figure 3. Potato value chain in Basona Worena district



3.1.1.1 Potato traders

Potato trading is done mainly by retailers and a few wholesalers in Basona Worena district. The major potato traders interviewed were wholesalers and retailers and most of them were sole proprietors. Most of the wholesale businesses were owned by males who attained secondary level of education while the retailers were women with secondary school education. The wholesaling businesses were started earlier (1994–2009) compared to the retailing (2011–2013) according to this study (Table 4).

Table 4. Potato trader business characteristics

Business type	Wholesaler N=2	Retailer N=4
Ownership (No.): Sole proprietor	2	4
Gender owner (No.): Male	2	1
Female		3
Education owner (No): Primary	1	1
Secondary	2	3
Year started	1994–2009	2011–2013
Licensed (No.) : Yes	3	3
No	0	1

Buying: The potato traders purchase potatoes from large traders, individual farmers, agents/brokers and collectors. About half of the wholesalers' suppliers are from within the district and half from distant districts. All the retailers source potatoes from within the districts in Debre Birhan town while wholesalers buy within the district, neighbouring district and from distant districts (Holeta, Shashemene and Borale).

The wholesalers have buying arrangements with potato traders which is not written but rather based on trust. They use mobile phones to call traders outside the region and consequently sell to the retailers in Debre Birhan market. In a week a wholesaler can purchase an average of 5000 kg at a price of ETB 3/kg while retailers purchase about 66 kg at a price of ETB 4.75/kg. The main season of potatoes production is during the period of September to November. In the months of June to November the supply is high while in the months of February to May the supply is low (Table 5).

The fluctuations in supply during the year is attributed to inability to store potatoes for a long duration and therefore market supply peaks during the high production months and declines during the low production months.

Table 5. Ware potato purchasing information

Business type	Wholesaler (2)	Retailer (4)
Type of supplier	Individual farmers, Collectors, Agent/brokers	Wholesalers, Individual farmers
Average quantity purchased/week in kg	5000	66
Average purchase price (ETB/kg)	3	4.75
High supply months	June, July, September, October , November	
Low supply months	February, March, April, May	
Source (No.): Within the district	2	4
From district beyond neighbouring district	2	0
Name of source location	Holeta, Milki, Shoarobit, Shashemene, Borale	Debre Birhan
Purchase on credit (No.): Yes	All	2
No	All	2
Transport means	Animal transport and Public transport	Non-motorized transport and public transport

Selling: The main buyers for wholesaler are end consumers, retailers and the hotel and restaurants (processors) who are within the districts and also from neighbouring districts. The retailers mostly sell to the end consumers within the district. In a week the wholesalers sell on average 4750 kg at a price of ETB 4.2/kg while the retailers sell 58 kg at a price of ETB 6.2. All wholesalers allow credit and majority of retailers sell on cash basis with one allowing both the cash and credit sale in different situations (Table 6).

Storage: Generally, Wholesalers and retailers manage to store potatoes for an average of 5 days.

Table 6. Potato selling information

Business type	Wholesaler (2)	Retailer (4)
Buyer	End consumers, Retailers, Hotels and restaurants	End consumers
Average Quantity sold/week in kg	4750	58
Average selling price (ETB/kg)	4.2	6.2
Selling place	Within the district , From the district around the business	Within the district
Terms of sale: Cash	All	3
Credit	All	0
Both	0	1

3.1.1.2 Constraints and suggestions

The main challenges faced by the actors include; spoilage through sprouting and rooting, poor storage facilities, poor market place condition and lack of market information, inconsistent and low supply of potato, poor quality potato supplied: some potatoes supplied are affected by pests on the farm and others are of poor varieties which processors are not interested in, weight loss during storage, price fluctuations as well as illegal and unlicensed traders

Some of the proposed suggestions to curb the mentioned constraints include strengthening regulation of non-registered enterprises and to support potato production and marketing. Increasing potato product awareness among potential consumers will change food habits of the people and create demand.

3.1.1.3 Potato processors

The main potato processors in Basona Worena district are hotels/restaurants and roadside chips vendors. Most of the potato processing businesses are sole proprietorships and six out of eight sampled processors are owned by women with two owned by men. The reason for female dominance in potato processing in hotels and restaurants as well as the roadside businesses could be because most of the food activities are done by women and they have experience in these businesses. Most of the roadside businesses have just been recently established; between 2013–2014 unlike the hotel and restaurants which were established in between 2003 and 2012. According to the findings of the study, roadside selling was done by women only and this could be because this business needs less start-up capital and therefore women are more likely to take it up (Table 7).

Table 7. Potato processors characteristics

Business type	Hotels and restaurant N = 5	Roadside processors N = 3
Ownership (No.): Sole proprietor	5	3
Gender owner: Male	2	
Female	3	3
Education owner (No.): Primary		3
Secondary	2	
College/University	3	
Year started range	2003–2012	2013–2014
Licensed (No.): Yes	5	2
No	0	1

Buying: Hotels and restaurants purchase potato from large traders mostly while the roadside processors buy from collectors and large traders. In a week the hotels buy an average of 88 kg of potato at ETB 5/kg while roadside processors buy an average of 33 kg at a price of ETB 6. The place where potato is commonly sourced is Debre Birhan and Addis Ababa. In most cases no vehicle is used to transport the potato because the purchases are in small quantities (Table 8).

Table 8. Potato purchasing information

Business type	Hotels and restaurant (5)	Roadside processors (3)
Type of supplier	Large traders	Collectors, Large traders
High supply months	June, July, August , September, October , November	
Low supply/High demand months	February, April	
Source	Within the district, from districts beyond neighbouring districts	Within the district
Name of source/location	Debre Birhan ,Addis Ababa	Debre Birhan
Quantity purchased weekly (kg)	88	33
Price range (ETB/kg)	5	6
Transport	No vehicle used	No vehicle used

Processing: Potato is commonly consumed as boiled and as part of traditional dishes or 'wot' (sliced, boiled potato with pepper, onion, salt and oil) and there is little processing into chips. The few hotels and restaurants processors interviewed during the survey preferred large size potato for processing but could not tell the quantity of potato processed as the product is sold mixed with different products like vegetables and other dishes. Hence, it is hardly possible to report on the volume of potato processed in Basona Worena district.

Selling: The main buyers of the processed potato are end consumers within the district. All the processors interviewed pointed out that they only sell on cash basis

Demand and supply of potato products: The main months considered to be of high potato supply is from June to November while low supply coincides with high demand which is experienced in the month of March, April and December because of the fasting period.

3.1.1.4 Constraints and suggestions

Challenges faced by potato processors were: Poor potato variety/quality for processing, price fluctuation, poor market condition and place, fast spoilage of potato and high cost of processing potato.

To curb the mentioned challenges various interventions were proposed: Better harvesting methods to avoid damage of potato tubers during harvesting, enabling good marketing environment, ensure continuous supply of the potato and better variety or quality of potato for processing

3.1.2 Faba bean value chains

The processes and general actors in the faba bean value chain in Basona Worena district and the subsequent market outlets along the chain are shown in Figure 4.

Figure 4. Faba bean value chain map in Basona Worena district

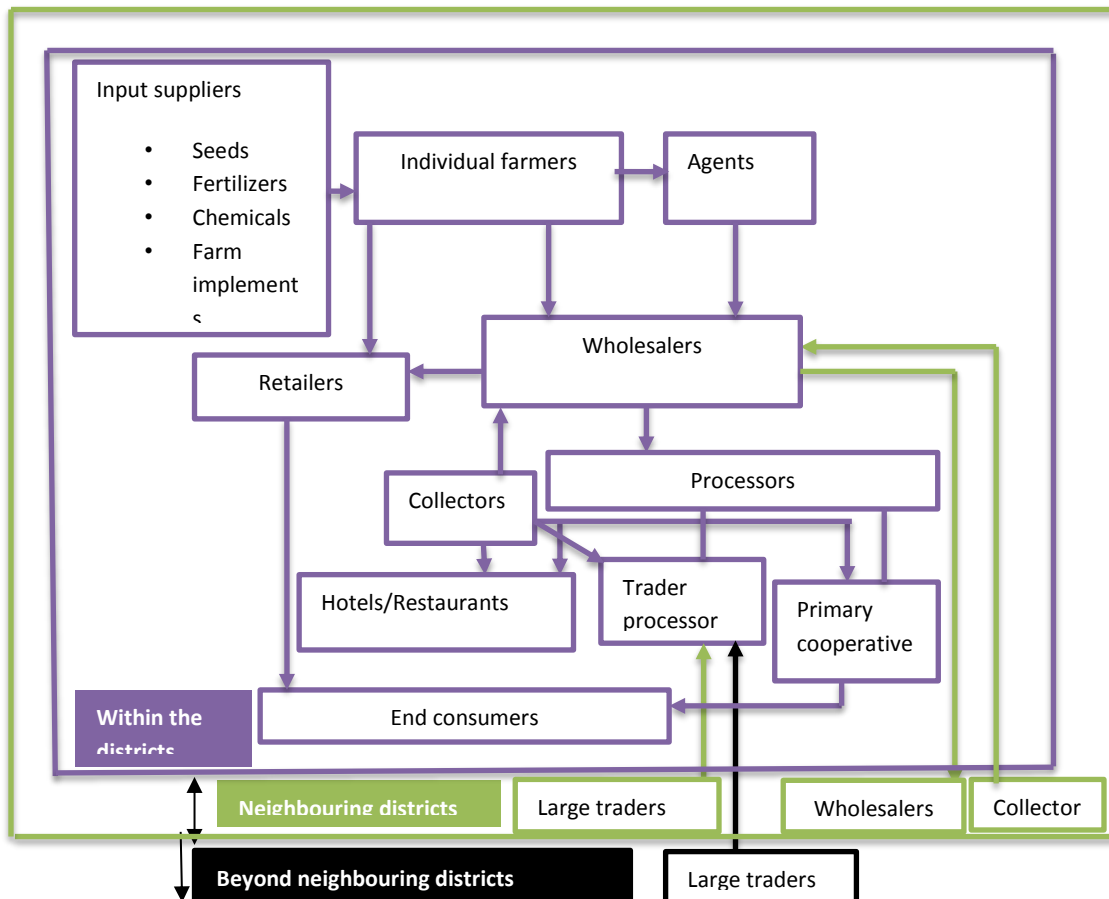


Table 9. Business characteristics for faba bean traders

Business type	Retailers N=5	Wholesalers N=3
Ownership (No.): Sole proprietor	5	3
Gender owner: Male	0	3
Female		0
Education owner: Adult education	3	1
Secondary	2	2
Year started	2012–2013	1991–2006
Licensed (No.):		
Yes	0	All
No	All	0

Buying: The major suppliers of faba beans include agent/brokers, individual farmers, large traders, and collectors within the district. The retailers purchase on average of 168 kg at a price range of ETB 6.20 to 11.0/kg while wholesalers purchase about 3333kg at a constant price of ETB 6.30/kg. This is because of their capacity to purchase during the high supply seasons. The supply of faba bean is high in the months of November to January with low supply faced in the month of June to August. The major sources of faba beans are Debre Birhan, Goshe Bado, Keyit and Kotu (Table 10).

Table 10. Purchasing dried faba bean information

Business type	Retailers (5)	Wholesalers (3)
Ownership (No): Sole proprietor	5	3
Type of supplier	Individual farmer, wholesalers	Collectors, Individual farmer, agents
Average quantity purchased per week (kg)	16	3333
Range purchase price(birr/kg)	6.20–11.0	6.30
High supply months	February, December, January	
Low supply months	June, July, August, September	
Source	Within the district and outside	
Name of the place of source	Debre Birhan, Goshe Bado, Keyit, Kotu	
Transport means	No vehicle used, Hired vehicle	

Selling: Retailers primarily sell to end consumers within the district while the wholesalers sell to retailers, processors and even fellow wholesalers who are within the districts and also beyond the neighbouring districts. The wholesalers sold about 2667 kg at a price range of ETB 6.50 to 6.70/kg while retailers sold an average quantity of 132 kg at a price range of ETB 6.50 to 12.0/kg per week. Most of the transactions were on cash basis as indicated by all the retailers while all the wholesalers made payment in both cash and on credit basis (Table 11).

Table 11. Selling dried faba bean information

Business type	Retailers	Wholesalers
Buyer	End consumer	Retailer, Processor, wholesalers
Quantity sold/week (kg)	132	2667
Selling Price range (ETB/kg)	6.50–12.0	6.50–6.70
Selling place	Within the district	Within the district, from district beyond neighbouring district but within the country
Terms of sale (No.): Cash	All	0
Both cash and credit	0	All

3.1.2.2 Constraints and suggestions

Most of the traders cited lack adequate capital as an impediment for expanding and diversifying their business. It was also pointed out that government charges a high interest rate on credit it offers, and that there is low production of faba bean, marketing conditions are poor arising from the market place that is dusty for traders, price instability and poor storage facilities.

Some of suggestions made to solve the constraints include mechanizing processing of faba bean especially roasting, improving storage conditions and the government to ensure fair taxation systems for all value chain actors. A stable seed faba bean seed supply system will also contribute to the improvement in production of faba bean.

3.1.2.3 Faba bean processors

Hotels/restaurants and trader processors are the major actors involved in faba bean processing.

Faba bean trader processors in the district organized themselves into a cooperative for the processing of the faba bean produced inside and outside the district. The trader processor does roasting, splitting, labelling and selling. The trader processors in Basona Worena district are either sole proprietor and there are also other processors who have formed a trader cooperative. The

cooperative does processing of faba bean as a service to its members. The processed faba bean and the by-products remain the property of the traders, who sell them. All the processing businesses interviewed were individually owned. Hotels are primarily owned by women while trader processing businesses are owned by male. All the businesses interviewed are licensed.

Buying: The hotels buy roasted and splitted faba bean from collectors and traders from within the districts, mostly Debre Birhan. The trader processors source the dried grain from the collectors from within the district, mostly Debre Birhan, Chacha and Jiru (Table 12).

Table 12. Dried grains, roasted and splitted purchase information

Business type	Hotels and restaurants N = 5	Trader processors N= 5	
Ownership	Sole proprietor	Sole proprietor (4)	Primary Cooperative (1)
Product purchased	Roasted and splitted	Dried grains	Dried grains
Type of supplier	Retailers, wholesalers	Collector, wholesalers, agents	Collectors, wholesalers, agents
Source	Within the district	Within the district, districts around and beyond the districts	
Name of the source location	DebreBirhan	DebreBirhan, Chacha, Jiru, Sheno	DebreBirhan, Sela Dingay
High supply months	January, February, April and December	January, February and December	
Low supply months	June, July, August, September and October	June, July, August, September and October	
Average Price (ETB/kg)	12–13	6.3–6.5	7.40
Transport	Own motor vehicle, Non-motorized transport	Hired vehicle	Supplier delivers

Processing: The hotels use the faba bean to make ‘full’ and ‘wot’ local foods and in a week they use an average of 16 kg. The trader–processors process an average of 3125 kg of splitted and unroasted together with roasted and splitted faba bean grain in a week (Table 13).

Table 13. Dried grains, roasted and splitted sales information

Business type	Hotels and restaurant (5)		Trade processors	
			Sole proprietor (4)	Primary cooperative (1)
Product sold	‘Full’	‘Wot’	splitted (roasted and unroasted) and	
Buyer (ranked)	End consumer	End consumer	Retailers, Wholesalers	Retailers, Wholesalers
Average quantity sold/week (kg)	6.4	14.6	3125	2500
Selling Price range/ETB/kg	13–16	19–36	Roasted= 9.0–9.3 Unroasted= 9.7–9.8	Unroasted = 9.70
Selling place	Within the district	Within the district	Within the district and district beyond neighbouring district	Within the district, From district beyond neighbouring district
Months of high demand month	October, November, March and December			March, September, October and December
Months of Low demand month	January, February			January, February, April
Adequate market for the product: Yes	All		All	Yes

Selling: Hotels sell to the end consumers within the district while trader processors mostly sell to wholesalers and retailers within and to beyond the neighbouring districts. The demand of faba bean is high during the fasting periods (Months of February, March, September, October and December).

Training: Only one of ten interviewed processors was trained on faba bean processing and storage.

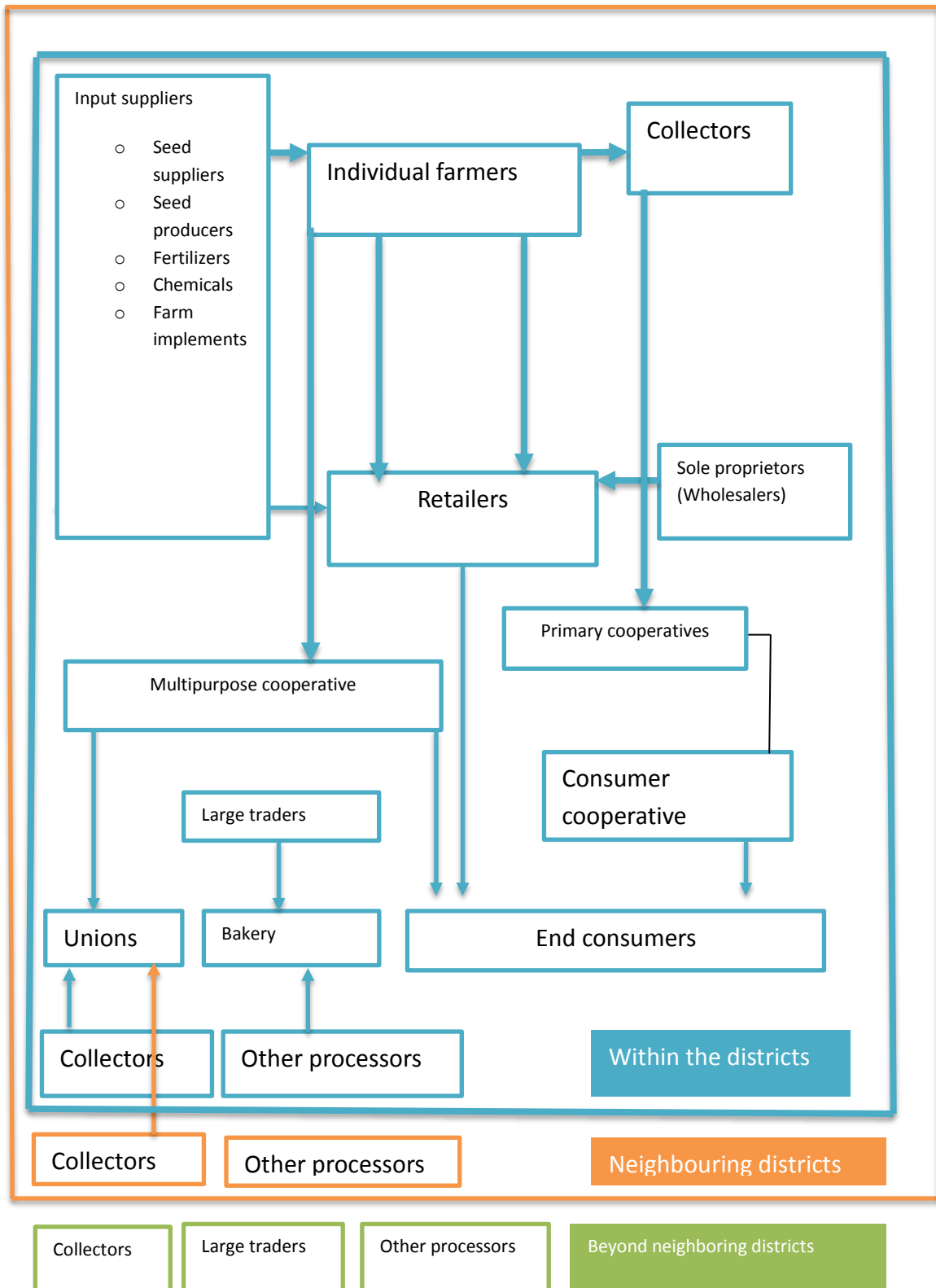
3.1.2.4 Constraints and suggestions

The major constraints faced by faba bean processors include the following: Difficulties in faba roasting, poor quality of faba bean supplied by traders, price fluctuation and lack of sustainable market linkage between traders and processors. Mechanization of roasting of the faba beans and increasing the supply of faba bean are possible ways to address the constraints. With respect to processing, mechanization can play a vital role in reducing the drudgery associated with processing faba bean. Progressive linkages between different value chain actors will also contribute to improving linkages between processors and traders of faba bean.

3.1.3 Wheat value chain

The processes and general actors in the wheat value chain in Basona Worena district and the subsequent market outlets along the chain are shown in Figure 5.

Figure 5. Wheat value chain map in Basona Worena district



3.1.3.1 Wheat traders

In Basona Worena district, wheat trading is mainly done by cooperatives and individual who are involved in wholesaling. Retailing businesses interviewed were all sole proprietorships mainly owned by men.

Buying: The wheat grain is supplied by collectors and individual farmers. There are primary cooperatives that buy from individual farmers then sells to the union. There was a difference in average purchase price by traders owning the business and the cooperatives. Consumer cooperative has a contract agreement with the suppliers or customers to supply the wheat grain when it is needed. The major source of wheat supply is Moretina Jiru district which is 65 km from Debre Birhan town. Primary cooperatives offered low purchase price (7.00) compared to both sole proprietor retailer and wholesaler who offered an average price of ETB 7.50 (Table 14). This could be because primary cooperatives buy wheat grains from individual farmers and then sells to the union and therefore they buy at a lower price so that they can earn profit.

Table 14. Wheat grain purchasing information

Business type	Retailers N=6		Wholesalers N=6	
Ownership	Sole proprietor	Sole proprietor (3)	Primary cooperative	
			Multipurpose (2)	Consumer (1)
Gender of the owner (No.): Male	4	2		
Female	2	1		
Source of wheat produce	Jiru	Jiru	Goshe Bado, Mush	Moretina Jiru
Type of supplier	Collector	Collector	Individual farmers	Collector
Quantity purchased/week in kg	200	227	300	700
Range of purchase price ETB/kg	7.20–8.00	7.10–7.55	6.50–7.00	7.40
High supply months	January, December			
Low supply months	June, July, August, September, October			
Source	From neighbouring districts, Within the district			
Name of the source of wheat	Moretina Jiru, Goshe Bado, Mush			
Credit term of payment: Yes	2	1	1	1
No	4	2	1	
Transport means	No vehicle used, Supplier delivers			

Selling: The wheat grain is sold to end consumers and retailers by the retailers, wholesalers and primary cooperatives. There was a difference in average selling price by traders owning the business and the primary cooperatives. Primary cooperatives sold wheat grains at a lower price (ETB 7.4/Kg) compared to both the wholesaler (ETB 7.5/Kg) and sole proprietor retailer (ETB 8.00) (Table 15).

Training: Only one cooperative was trained on storage and post-harvest control in the year 2006.

Table 15. Wheat grain sales information

Business type	Retailers (6)	Wholesalers (6)		
Ownership (No.): Sole proprietor	6	Sole proprietor (3)	Primary cooperative (3)	
Primary cooperative	0	0	Multipurpose (2)	Consumers (1)
Buyer	End consumer	End consumer, Retailer	End consumer, Union	End consumers
Average Quantity sold /week (kg)	200	1800	250	550
Selling Price range(ETB/kg)	7.70–8.50	7.25–7.70	7.10	7.80
Selling place	Within the district	Within the district, Neighbouring districts	Within the district	Within the district
Credit terms of sale: Yes	6	1	0	0
No	0	2	2	1

3.1.3.2 Constraints and suggestions

Constraints encountered by wheat traders included: Capital constraints leading to inability to expand their business due to limited access to capital; lack of suitable market linkage between traders and processors, poor storage facilities and conditions, price fluctuations and instability and unstandardized taxation rates and especially in the presence of non-registered traders who may not some of the taxes.

There is need for the union to buy on cash from the cooperatives to avoid delayed payments and this will require injection of funds from the credit market. This requires innovation in the way unions operate and closer linkages with financial institutions. In addition, there is need to create a suitable marketing system where buyers and sellers with appropriate standards being made available through support from the government.

3.1.3.3 Wheat processors

The main business types involved in wheat processing are bakeries and flour processing factories which were all licensed. The flour processing factory is owned by union while the bakeries are owned by individuals with secondary school education. The flour factory was started in 2001 however most of the bakeries were started between 1984 and 2014.

Buying: The flour processor (union) buys wheat grain from multi-purpose cooperatives while bakery buys from large traders and other processors. The flour processors buy wheat grains at a low price (ETB 6.40) while the bakery owners' buys wheat flour at ETB 9.40 (Table 16).

Table 16. Processors' wheat buying information

Business type	Bakers (5)	Flour processors (1)
Ownership	Sole proprietorship	Union
Product purchased	Flour	Wheat grain
Type of supplier	Large traders, other processor	Cooperatives
High supply months	January, February, March	January, February, March
Low supply months	April to November	April to October
Source	Within the district; From nearby districts; from other districts within the country	Within the district, outside the district
Name of the place of source	Debre Birhan, Kombolcha,	Moretina Jiru, Gozamen (East Gojam)
Average quantity purchased/week (kg)	414	80,000
price range (ETB/kg)	7.96–11.00	6.40–7.50
Transport	Hired vehicle, No vehicle used	Hired vehicle

NB: The average quantity purchased per week is average quantity of four bakeries. One bakery was using 129,500 kg of flour to make bread supplied to a university and was not included in calculation of the average sale of (414) in table above.

Selling: The bakeries mostly sell their wheat products which include bread, biscuits and 'sambusa' to the end users and retailers. Three of bakery owners highlighted that they have adequate market for their product while two said they did not always have a market for their products. The flour processing business owned by union manages to sell about 35000 kg of flour per week to end consumers, retailers and bakeries at a price of averaging ETB 7.96/kg. Wheat flour and its products are sold within the district and in other districts. The demand for wheat flour and other wheat product is high during ceremony seasons, holidays and fasting period (Table 17).

Table 17. Selling of wheat flour and wheat products

Business type	Bakers (N =5)			Flour processors (N= 1)
Ownership	Sole proprietor			Union
Product form sold	Bread	Biscuit	'Sambusa'	Flour
Buyer	End consumer	End consumer, Retailers	End consumer	End consumer, bakeries, Retailers
Range quantity sold/week (kg)	250–129500	8–300	150	35000
Selling Price (ETB/kg)	12	15–33.33	12.5	7.96
Selling place: Within the district	4	4	1	
Both within and beyond the district	1			1
Terms of sale (No.): Cash	3			
Credit	2			
Both cash and credit				1
Adequate market for the product: Always	3			1
Sometimes	2			
Months of high demand	January, February, April, May, June, July			January, February, April, May, June, July
Months of low demand	September			March

NB: One kg of wheat flour makes 10 pieces of bread (100 gm of flour = 1 bread) sold at ETB1.20 each.

Storage: The storage capacities of bakeries range between 1,000 to 60,000 kg while the union has a storage capacity of 450,000 kg. Inadequate storage facilities is a major challenge facing processors.

Training: Only the union has been trained on wheat storage and processing while none of the bakeries has received training on this.

3.1.3.4 Constraints and suggestions

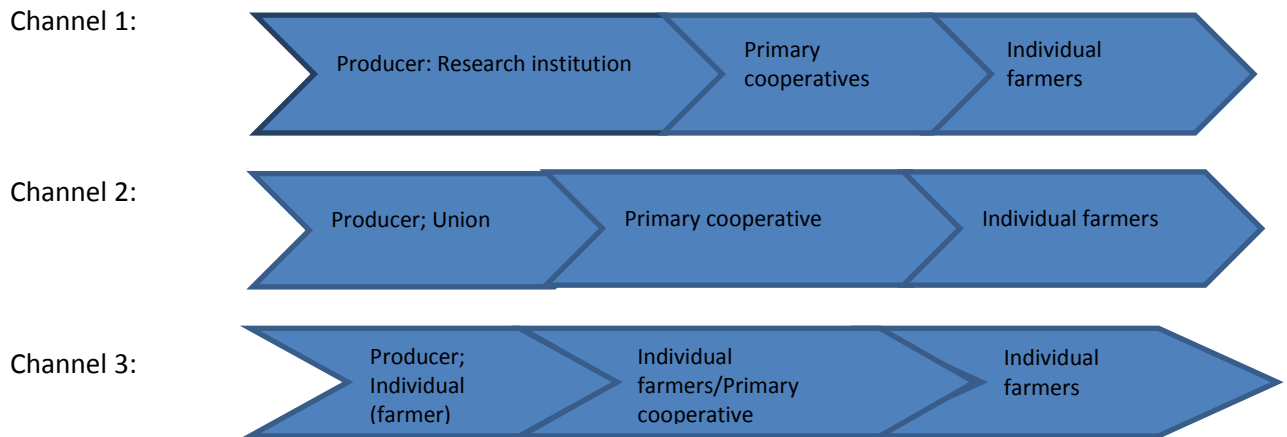
The major constraints highlighted by wheat processors were: Unstable electricity supply, tax increases and poor quality of wheat grain supplied to the flour processors. The bakeries do not get quality wheat flour from the flour factory (union). This is mainly because the factory majorly uses variety ET-13 as raw material, which has poor bread making quality traits like lower grain and flour protein content and its soft grain. The main indications to address the constraint relate to was prevention of rodents and pest attack of the wheat grains during storage. However, it is also important to upgrade wheat quality starting from production to storage management.

3.1.4 Crop services provided

Input suppliers are very important actors in the value chain and various input suppliers were interviewed including seed, chemical, fertilizer and farm implement suppliers.

Potato and wheat seed producers were interviewed in this study. The wheat seed production in Basona Worena district involves research institution, and individual seed producers while potato seed production involves research institutions, primary cooperatives and individual seed producers as the only actors. The research institute which produces basic and pre basic wheat and potato seed in the district was started in 1982. The individual seed producers started seed production between 2006 and 2013. In addition to wheat seed, individual seed producers also produce potato seed. Primary cooperative are licensed while individual farmers are not licensed in the district. Figure 6 shows channels for seeds production in Basona Worena district.

Figure 6. Channels for seeds production in Basona Worena district



Wheat seed

The area under production of wheat seed averages 1 hectare. The common improved bread wheat varieties were Bollo, Dendea and Digalu; and average estimated cost of production is ETB 2.5/kg. The individual seed producers received basic seed lastly in the year 2012. Different suppliers are involved in supplying the basic and certified seeds to the seed producers. The research centre source from their own production, the union source from primary cooperatives whereas others source beyond the neighbouring districts but within the country. The individual seed producers source seed from individual farmers and research centres within the district.

The main wheat buyers are individual farmers and primary cooperatives. The average quantity sold per season by research centre, union and individual seed producers are about 1700, 3600 and 200 kg respectively. The selling price is on average ETB 11/kg.

Potato seed

Potato seed production in Basona Worena district is carried out by two actors; the research centre and individual seed producers. With respect to the seed producers interviewed, seed production area under potato averages 0.75 hectares for the individual seed producers. The research institute has 2 hectares of land for seed production. The main produced potato varieties include Gorebella and Gera varieties which were only produced by the research centre. Most of individual seed producers received basic or foundation seeds from the agricultural research centre in the year between 2006 and 2009. The research centre uses basic seeds from its research output.

In the study areas most of the buyers of the potato seed are individual farmers and primary cooperatives. The primary cooperatives buy from individual seed producers while the research centre sells to individual farmers within the district. The research centre on average sells 100 kg per season while individual seed producers sell 5.12 kg. Selling prices range from ETB 12 to 18/kg.

Storage: Most of the stores are made up of wood for individual farmers and cement for primary cooperatives and research centres. The homemade mini Diffused Light Storage (DLS) is the kind of store used for the potato seed storage. The storage capacity among various actors is different and ranges from 700 kg to 30,000 kg. Majority of the seed producers have storage problems which include poor storage facilities which are not modernized hence not efficient, inadequate storage, rodents and pest attack and sprouting identified as key storage problems among various potato seed producers.

Training: Half of the sampled individual seed producers have been trained on seed storage with most of the actors trained on seed production.

Other services: Only three of six seed producers offer other services apart from producing and supplying seeds. Other services offered by research centre include training on seed production and marketing; and management of cooperatives. Some of the individual seed producers share production information with other farmers.

The most used means of communication are mobile phones and face to face communication which are used across all the actors. Internet was identified to be used by only the research centre.

Constraints and suggestions

For the research centre, inadequate land, budget and irrigation access for potato seed multiplication is a major constraint. The research centre has potential to supply good quantity of seeds if they had adequate land to produce seed. For other seed producers, land under seed production is also small. Inadequate budget allocated to seed production is another challenge for the research centre due to the high costs incurred in the seed production compared to budgeted amounts. The cost of labour was also noted to be high in the district.

Poor seed quality supplied was also a major problem for the cooperatives. The potato seeds that they receive from individual farmers are not of good quality standards. In addition, pests and diseases during the seed production are common, such as leaf diseases (blight). Also rats and other rodents attack the seed in storage. Some ways to address the challenges are:

- Establishment of seed business among the cooperatives and other agribusinesses: For sustainability of the cooperatives and other farmer led agribusinesses which are the main

channel to supply seed to individual farmers, they should be supported to establish seed production and supply as a business.

- Establishment of a strong research, extension and farmer linkage: The research centre and other seed producers come up with new improved seeds which need to be made known to the farmers and also ensure good seed distribution to the farmers.
- Development and use of improved disease resistant varieties
- Forging strong sustainable market linkage between seed supplies and grain production
- Training on seed production: the individual seed producers showed interest on being trained on land preparation, fertilizer application, and crop seed management.
- Diffused light system (DLS) houses and modern storages: Most of the seed producers of potato have poor storage facilities.
- Strengthening and establishing the existing and new community based seed multiplication schemes so as to sustain the seed production and supply system in the community mainly for wheat and faba bean.

Seed suppliers

The main seed suppliers in Basona Worena district include the government office of agriculture, union and primary cooperatives. The office of agriculture started in the year 1979 while all of the primary cooperatives and the Union were formed between 1978 and 2001.

Buying: The primary cooperatives receive seed from various suppliers that include farmers, government seed enterprise, private company and the union who are within the district and also from other districts around. The office of agriculture is supplied with about 40,000 kg wheat seeds at a price of about ETB 9.00/kg while the cooperatives purchase an average of 3800 kg per season at a price range of ETB 12.71 to 14.61/kg.

Faba bean seeds

Among the eight primary cooperatives interviewed only one was supplied by government seed enterprise. This cooperative was supplied with about 12,000 kg of seeds at a buying price of ETB 16.00/kg. The office of agriculture is supplied with seed on average amounting to 6500kg at a cost of ETB 12.00/kg while the cooperative purchased averagely 120 00 kg at a price of ETB 16.00/kg.

Potato

The amount of potato bought by office of agriculture was 6500 kg at price of ETB 12.00/kg.

Selling: The office of agriculture is the key supplier of the seeds to all the primary cooperatives who sells directly to individual farmers. The office of agriculture sells about 20000 kg at a price of ETB 13.00 and 3250 kg at a price of ETB 12.50/kg for wheat and faba bean seed respectively. The cooperative sells wheat seed averagely 3800 kg at a price of ETB 14.61/kg while faba bean seed; seasonally it manages to sell at about 6500kg at a price of ETB 16.34/kg. All the seeds purchased are sold within the district. Office of agriculture sold 6500 kg at a price of ETB 12.5/kg.

Storage: The seed suppliers have various store type; modern Diffused Light Store (DLS, mud stores, wooden made and corrugated iron sheets made stores. The average store capacity is 181,800 kg. Most of the seed suppliers have major challenge in storage which includes; leaking stores, poor storage facilities, inadequate storage capacity and rodent and pest attack.

Training: About eight out of ten seed suppliers were trained on seed quality management and storage in the year 2013. Face to face and mobile phone are the main means of communication used.

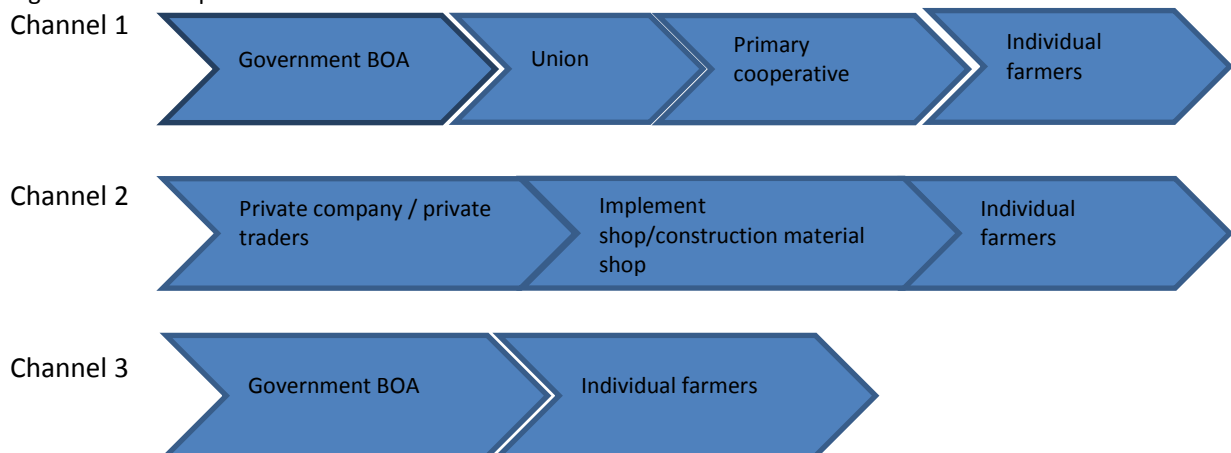
Constraints and suggestions

- Unavailability of seeds within the district; the office of agriculture has to source seed outside the district
- The high seed cost; the office of agriculture and cooperatives have had arguments over increasing prices of seeds in the recent years.
- Heavy work load among the cooperative committee members; the committee members have much work to handle despite the voluntary nature of the cooperatives.
- Shortage of improved varieties: The supply of the improved seeds is not adequate and in some seasons the cooperatives receive very little quantity to meet the farmers demand.
- Cooperative management skills and member participation: Most of the cooperatives pointed out there are conflict between leaders and that has affected their performance.
- Engage the local research centres to produce seed at a fair price
- Timely Supply of improved seed varieties on time
- Provide cheap credit
- Reduce the high cost of seeds
- Provide incentives to the cooperative workers

3.1.4.1 Farm implements suppliers

The key supplier involved in farm implement business is government office of agriculture, union, primary cooperatives and individual private business (figure 7). The individuals involved in the supply of farm implements sell along the construction material business (i.e. as a side business).

Figure 7. Farm implements channels



Buying: The union and government office of agriculture source the implements from private company in the districts beyond the neighbouring districts but within the country. The primary cooperatives purchases farm implements from the union within the district while the individual shops source from private company and traders who are in the districts beyond neighbouring districts but within the country. The individual shops supply various implements such as sickle, hoe, shovel, ox plough, cart, pipes, and watering can. The union, office of agriculture and primary cooperative mostly supply sickles. About six of the suppliers provide transport services whereas in the case of union the implements are delivered to them by the suppliers.

Selling: Individual shops sell to individual farmers and primary cooperative while office of agriculture and cooperative supplies implement to individual farmers only. Different methods are used to determine the selling price for example the office of agriculture uses the market price while the individual farm implements shops, union, and primary cooperatives uses set price plus commission.

Other services: In the office of agriculture the extension workers teach farmers how to operate the implements.

Means of communication: Face to face communication was mostly used followed by mobile phone. Use of internet is very minimal only four of individual shop interviewed pointed out that they used it.

Constraints and suggestions

Various challenges are faced by the farm implement actors;

- Untimely and inadequate supply of the implements
- Low demand; most of the farmers have less know-how on how utilize the available implement to improve their farming techniques. Also the high price of the implements discourages farmers from buying them.
- Poor quality implements supplied; Most of the suppliers argued out that the implements that are supplied to them are of low quality standards.

Various suggestions were proposed;

- Establishing agricultural farm implement shops: It was noted that in this region there is no single shop that specialize in selling of farm implements. Most of the implements are sold in construction shop as a side business.
- Supply of modern implements: the supply of modern implement like thresher, mixers, combiners and other innovative technological implement is not done within the union or office of agriculture or primary cooperative.

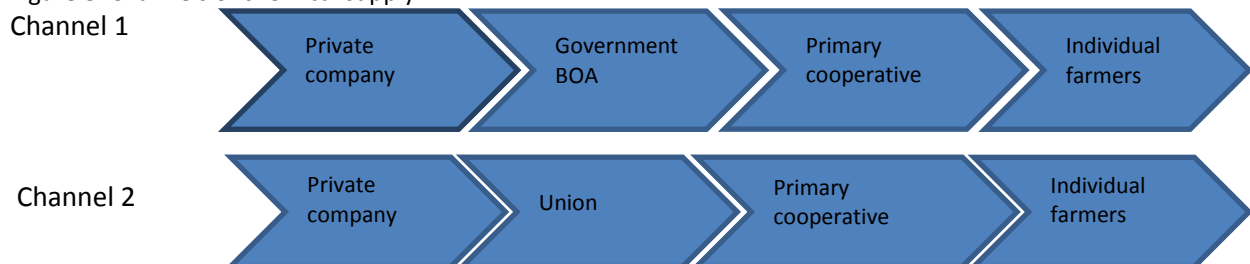
3.1.4.2 Chemical suppliers

The main key actors supplying crop chemicals in Basona Worena district are office of agriculture, union and primary cooperatives. It was noted that there is no private shops selling chemicals in the district. Various types of chemical supplied include pesticides, fungicides and herbicides while insecticides were only supplied by office of agriculture.

Buying: The key suppliers are private company and union which are in districts beyond neighbouring districts and also others within the district. The office of agriculture and union is supplied by private companies while primary cooperatives are supplied by union.

Selling: The office of agriculture and union sells to cooperatives who then sell directly to farmers

Figure 8. Channels of chemical supply



Other services: Both office of agriculture and primary cooperatives offer extension services to farmers.

Training and communication: The actors who are supplying chemicals pointed out that they have not received training on chemical quality control, storage and usage. Mobile phone and face to face were commonly used as means of communication by the suppliers.

Constraints and suggestions

- Supply shortage and transport problems: The union and office of agriculture sometimes lacks transport to carry the chemicals which causes delay in delivering them to the cooperatives.
- Poor chemical quality supplied: The cooperatives are not happy of the chemical quality supplied to them.
- Illegal chemical traders: It was noted that there are traders who are not licensed in the district.
- High cost of the chemicals

Various suggestions were proposed;

- Empower the cooperatives plan their demand and report to union in advance
- Timely supply of the chemicals
- Establishment of agrochemical stores

3.1.4.3 Fertilizer suppliers

The main actors involved in fertilizer supply in Basona Worena district are union and primary cooperatives. Urea and DAP fertilizer are the commonly supplied fertilizers to the farmers.

Buying: The union buys fertilizer from private company in districts beyond the neighbouring districts but within the country. The union then sells to primary cooperatives who sell to individual farmers. In a season, the union is supplied with DAP fertilizer of about 8729200 kg at a price of ETB 13.46/kg while cooperatives receive averagely 41775 kg of urea and 50375 kg DAP which is delivered by the suppliers. The price range of urea was ETB 11.21 to 11.68/kg and for DAP ETB 12.58 to 13.46/kg (depending on the time lags). The union manages to purchase about 10,136,750 kg at a price ETB 11.68/kg.

Selling: The union sells to primary cooperatives who then sell to individual farmers. Union sells urea 10136750 kg at a price ETB 11.75/kg and DAP 8729200 kg at a price ETB 13.53/kg. The primary cooperatives sells to farmers at a price range of ETB 11.31 to 11.78/kg and ETB 12.68 to 13.56/kg for urea and DAP respectively. It was noted that most of the cooperatives allow credit to farmers. The selling price is determined by the set price plus commission.

Figure 9. Channels in fertilizer supply



Other services in some of the cooperatives were training farmers on fertilizer application and usage benefits.

Training and communication: Three of the primary cooperatives interviewed have been trained on fertilizer storage, handling and usage. Most of them were trained between 2013 and 2014. The commonly used means of communication is face to face and mobile phones.

Storage: Most of the storage facilities are not up to the required standards. The primary cooperatives have various types of stores; mud made and wooden made stores. The union stores the fertilizer for about 60 days and the store has a capacity of 450000 kg. The cooperatives store capacity ranges between 20000 and 600000 kg and they store fertilizer for an average of 140 days.

There are various storage problems that are faced by the actors in the supply chain which include; inadequate storage, rodents and pest attacks, roof leaking which leads to spoilage of the fertilizer.

Constraints and suggestions

Union faces challenge on transporting the fertilizer to the primary cooperatives and high prices of fertilizer.

Various suggestions were proposed;

- Private companies to supply inputs on time
- Reduce the cost of fertilizers
- Give updates on the date of supply: in most cases the cooperatives have no idea when they will be receiving the fertilizer from union.

3.2 Crop value chain analysis and potential interventions

Some of the interventions to support value chain actors in marketing of the outputs include:

1. Establishment of warehouse especially for potato which will be an avenue for farmers to store and sell potatoes at a later date when prices are expected to be higher. Furthermore, warehouse will enable consistent supply of produce year round between the producers and traders.
2. Enhance market linkages among the actors in the value chain. Stronger linkages all the way from the input suppliers to the end consumers will lead to a more efficient value chain where inputs will be available to ensure proper production of the necessary products. In addition, demand signals will be clearly communicated to the producers.
3. Supply quality seed suitable for processing. Quality seeds should be supplied to farmers along with knowledge on how to maintain them accordingly. This will be a key step in bridging the yield and quality gap between current and potential production.
4. Improved post-harvest management practices (post harvesting and handling).
5. Seed system (community seed production) and linking it with seed producing cooperatives especially for faba bean.
6. Strengthen Market linkage for producers and primary cooperatives (seed as a business) in wheat production.
7. Establishment of irrigation facilities for the research centre to produce potato seed and improved varieties suitable for the processing.
8. Capacity building intervention for research centre, seed production and marketing cooperatives (SPMS).
9. Training on how to use farm implements, sensitization and linkages with producers plat forms.

4 Livestock value chains

4.1 Livestock value chains results and findings

4.1.1 Dairy value chains

Milk is produced by local (23,512) and cross breed cows (6145) in Basona Worena district. Most cross breed cows are kept by farmers in urban and peri-urban areas where they are used to produce fresh milk for urban consumers and the dairy businesses interviewed and described in this section. Local cows are found in rural and peri urban areas. The milk produced from these cows is processed on farm into butter using local churning technologies. Part of the milk from local cows in peri-urban areas is also sold as fresh milk, especially during peak demand periods.

In Basona Worena district, dairy agribusiness value chain actors include commercial companies, peri-urban producers' marketing cooperatives, and small scale urban private or cooperatively owned businesses involved in selling, processing and using dairy products. Furthermore, private traders are involved in butter buying and selling activities.

Table 18 shows that female ownership in dairy value chain related businesses is high (>50%). While some businesses were established more than 10 years ago, several new businesses emerged more recently include privately owned dairy cafes and village butter traders—perhaps indicating a growing commercial demand. Most businesses are licensed.

Table 18. Ownership of dairy enterprises

Indicator	Dairy businesses				Dairy cafes		Hotel restaurant	Village butter traders	District butter shops
	Coop (prod)	Company	Coop urban	Private own.	Cooperative	Private own.	Private own	Private own	Private own.
Sample size	1	2	2	1	1	3	5	5	2
Gender	NA	NA	NA	1 F	NA	2 F 1M	2 F 3 M	3 F 2M	1 F 1M
Education	NA	NA	NA	1 sec	NA	1 prim 2 sec /more	1 prim 4 more	2 prim 3 more	2 sec
Year started	1>10yr	1 > 10yr 1< 10yr	1>10yr 1<10yr	1<10yr	1<10yr	3<10yr	2>10yr 2<10yr	1>10yr 4<10yr	2>10yr
Licensed	1–100%	2–100%	2–100%	1–100%	3–100%	2–67%	5–100%	5–100%	2–100%

4.1.1.1 Dairy collection/processing businesses

Dairy collection and selling businesses are here defined as commercial enterprises involved in the collection, processing and selling of dairy products. Results of these businesses are summarized in Table 19.

The (sampled) Angolela dairy cooperative purchases milk from its 259 members (204 male and 55 female), and sells it to commercial companies (Etete PLC—on contract basis). Some milk is processed into fresh butter using a cream separator. The remaining skimmed milk is processed into 'Ayeb' (local cheese). The butter is sold to consumers and traders in and outside the district (Sheno, Addis), while the 'Ayeb' is sold to hotel/restaurants and end consumers. Butter milk (by-product butter processing) and whey (by-product 'Ayeb' making) are not commercially traded.

The two sampled commercial dairy companies (Lame and Rute/Hirut PLC) operating in the district have established collection points in urban and peri-urban areas, from where they collect milk from individual farmers and farmers groups. They transport the unprocessed milk to Chacha (Rute and Hirut PLC) and Addis Ababa (Lame) for processing. A third company (Etete PLC) recently also started collecting milk from Angolela cooperative and some farmers groups (not interviewed).

In Debre Birhan, cooperatives have been formed who purchase milk from urban farmers and sell the milk to individual consumers (referred to as milk shops). Also, one privately owned dairy business buys milk from urban and peri urban farmers and processes it into mozzarella cheese, which is sold in Addis Ababa.

Peak milk supply month are August and September, reportedly because of sufficient feed availability. Months of low supply are January to April, coinciding with the dry season.

All businesses purchase evening milk, however it is noted that commercial companies only collect milk in the morning. Farmers who sell morning milk to the companies actually deliver a mixture of morning milk and well preserved evening milk from the previous day. Milk testing is based on lactometer and alcohol test. The lactometer aids in detecting milk dilution with water and the alcohol test aids in detection abnormal milk such as colostrum; milk from animals in late lactation; milk from animals suffering from mastitis and milk in which mineral balance has been disturbed.

Table 19. Purchase and sale data of sampled dairy businesses in Basona Worena district

Type of business	Processing	Collection	Selling (shop)	Processing
Ownership	Cooperative	Company	Cooperative	Private owner
Sample size	1	2	2	1
Purchase				
Litres of milk/month low peak period	39,000–51,000	21,000–33000 62,000–231,000	1500–3000 9000–12,000	9000–24,000
Purchase price/l	8	9	7.5 (2)	7.5
Evening milk purchase	yes	Yes (see text)	Yes	yes
Suppliers	Cooperative members	Urban farmers Collection centres Cooperatives	Urban farmers	Urban–peri-urban
Test method used	Lactometer	Alcohol	Alcohol	Lactometer
Sales				
Litres raw milk/month low–peak period	12,000–51,000	Transported outside (Addis Ababa)	1500–3000 9000–12000	600–1500
Sale price raw milk/l	8.9	NA	9.3, 10	11
Buyers	Companies (outside the district)	All purchased milk delivered to processing units outside district	Consumers Hotel restaurant	End consumers Hotel/restaurants
Kg butter/month low–peak period	39–1350			
Sales price butter/kg	140–150			
Buyers	End consumers Traders (in and outside district)			
Kg of Azeb/month low–peak period	200–400			840–1350 (mozzarella)
Sales price/kg	3–15			90
Buyers	Hotel restaurants End consumers			

The cooperative mentions lack of processing equipment as a bottleneck and would like to have access to cheap credit to purchase equipment. One of the companies would like to see a more free market situation with less government interference. The newly established company mentions milk storage as a bottleneck and highlights opportunities for training of farmers and service providers.

4.1.1.2 Butter traders

Lactic butter (from soured milk) produced in Basona Worena is traded by village and district level traders, who buy from farmers and or traders in village markets. Some butter is also purchased from neighbouring districts of (Abichuna Egna, Tarma Ber and Menz). Traders use public transport to visit markets and use smell and visual inspection to determine quality. Supply is low during the dry season (February–April) and peak supply months are August–October when feed is available (see Table 20). District level traders reportedly also purchase some fresh butter produced by the dairy cafes and the Angolela Cooperative.

Table 20. Purchase and sales data of sampled butter traders in Basona Worena district

Indicator	Village collector/trader	District trader/shop
Sample size	5	2
Kg butter/month: Low–peak period	20–80 40–140 140–600 184–560 200–400	100–240 220–1400
Type of supplier	Individual farmers	Farmers, village traders and own production, Coop, Dairy cafe
Source	Within and outside the district	Within and outside the district
Type of buyer	End consumers, hotels/restaurants and butter shops	End consumers and hotels/restaurants Outside traders
Destination	Within and outside district	Within and outside the district
Purchase price range butter/kg	85–150 100–150 110 90–120 100–120	110–150 120–130
Sales price range butter/Kg	120 100–170 110–170 110–150 100–140	130 130–140

Sale of butter is mostly to end consumer and hotel restaurants in the district and to customers in Addis Ababa. Buyers use their own means of transport to buy/collect butter from traders/shops. During the testing phase, butter shop owners indicated that sales of butter was based on quality with fresh (young) butter sold at ETB 170/kg (used for cosmetic purposes and cooking), medium aged ETB 140/kg (cooking) and very mature at ETB 120/kg (cooking). The latter was purchased by hotels and restaurants.

Village level traders complained about lack of market space, unfair taxation, price fluctuation and lack of credit. District traders also mentioned the constraints of lack of quality supply and would encourage training of farmers.

4.1.1.3 Hotels/restaurants/cafes

Two types of dairy serving businesses are distinguished in Debre Birhan, Basona Worena i) hotel/restaurants and ii) dairy cafes

The hotel restaurants purchase raw milk, butter and 'Ayeb' from various sources within the district, especially farmer (associations), traders and dairy cafes. These products are then used to prepare meals and drinks for their restaurant customers.

The dairy cafes/kiosks buy raw milk from various sources including farmer groups and serve boiled milk and 'Irgo' (naturally fermented yoghurt) in their cafes for their customers. The cafes in Basona Worena are also engaged in small scale retail and processing of dairy products to outside customers, including sale of raw milk and processing/sale of fresh butter (with cream separator and 'Ayeb'. Butter is sold to individual consumers, hotel/restaurants and butter traders. 'Ayeb' is sold to individual consumers and hotel/restaurants. The by-products from Ayeb and butter processing are not commercially utilized.

Café owners complained about lack of demand during the fasting period (March); hence some process the milk into butter and 'Ayeb'.

Hotel/restaurant owners complained about low quality, imbalance between supply and demand, insufficient cooperatives. Training and credit were mentioned as potential solutions/opportunities.

Purchase and sale data of the sampled dairy cafes and hotel/restaurants are summarized in Table 21. It is noted that seasonal influences have a significant effect on the quantities of milk and dairy products purchased and sold in the dairy cafes.

Table 21. Purchase and sales data of sampled restaurants in Basona Worena district

Indicator	Dairy cafe		Hotel/restaurants
	Cooperative	Private owner	Private owner
Sample size	1	3	5
Purchase			
litres of raw milk/month: low–peak period	900–2100	300–1650 360–660 5700–13,500	100, 200, 280, 420, 480
Purchase price/l	7.5	8, 9.0 (2)	9.0, 10 (2), 10.5, 11
Suppliers	Urban farmers Peri-urban	Urban farmers	Milk shop/dairy cafe Farmers (associations)
Evening milk purchase	yes	yes	Yes
Test method	Alcohol test and Lactometer	alcohol Lactometer	Non
Kg Ayeb/month (average)			15,28,40 (2),60
Price Ayeb/kg			22,23(2),30,35
Supplier			Traders Farmers(associations)
Kg butter/month (average)			40, 80,100,140,160
Price butter/kg			137,140,143,155(2)
Suppliers			Traders Farmers (associations)
Sales			
Litres of raw milk/month: Low–peak period	150–1200	150–450 (2) 450–7500	
Sales price raw milk/l	10	10, 11	
Buyers	End consumers and hotel/restaurants	End consumers and hotel/restaurants	
Litres boiled milk/month: low–peak period	30–150	60–150 60–450	
Sales price boiled milk/l	24	20–24	
Buyers	In cafe	In cafe	
Litres Irigo/month: low–peak period	210–540	30–90 (2) 30–1200	
Sales price/l	15	12–15	
Buyers	In cafe	In café	
Kg Ayeb sold/month: low–peak period	60–90	30–60 150–600 0–1500	
Sales prices Ayeb/kg	40	25 (2)–40	
Buyers	End consumers and hotel/restaurants	End consumers and hotel/restaurants	
Kg butter sold/month: low–peak period	0–30	0–1200 60–150	
Sales prices butter/kg	140	130–140	
Buyers	Consumers	End consumers, hotel/restaurants and traders	

4.1.2 Large and small ruminants value chains

The number of animals in Basona Worena district which are used for ploughing, reproduction and ultimately sold for meat consumption total 47,210 oxen (7,346 cross breeds) and 11,150 bulls (2,127 cross breeds). The number of small ruminants total 182,935 (133,521 sheep and 49,414 goats). Farmers who produce these animals may sell them with or without fattening. Sales may take place from producers to consumers and through the agribusinesses interviewed and described below.

Businesses involved in trading large and small ruminants/products included traders (village and district level), butcheries and restaurants, which are all privately owned.

The level of education of the owners, gender and year of establishment of sampled businesses are summarized in Table 22. It is noted that all sampled animal traders and butchery owners are male owned. The majority of the traders, hotel/restaurants and butcheries started < 10 years ago. Most live animal traders are not licensed.

Table 22. Sampled small and large ruminants value chain actors in Basona Worena district

Indicator	Small ruminants traders	Large ruminants traders	Hotel restaurant Small ruminants	Butchery/restaurants Large ruminants
Sample size	5	6	5	5
Gender	5 M	6 M	2 M 3 F	5 M
Education	2 prim 3 sec	2 prim 4 sec	5 sec or more	1 prim 4 sec/more
Year started	1 > 10yr 4 < 10yr	2 > 10yr 4 < 10yr	1 > 10yr 4 < 10yr	2 > 10yr 3 < 10yr
Licensed	0 (0%), 2 (67%)	0 (0%)	5 (100%)	5 (100%)

4.1.2.1 Small and large ruminants traders

All sampled traders were involved in the purchase and sale of animals for slaughter; some small ruminants' traders also traded in animals for fattening/reproduction. All large ruminants' traders also traded in animals for fattening/ploughing. One sampled small ruminants' traders also was involved in both trade of large ruminants.

Traders mostly purchased large ruminants for 'slaughter' from farmers or other traders from inside and outside the district (Moretina Jiru, Menz, Tarma Ber, Mojana Wodera and Angolelana Tera). Purchase from within the district are centred on the peak demand periods (religious, cultural holidays, wedding months and crop harvesting months), while purchase from outside the district take place during normal (non-fasting, non-peak demand) periods. Large ruminants are sold to urban consumer groups and butchery restaurants inside and outside the district. Parts of the large ruminants are sold for markets in Addis Ababa and Sheno.

Small ruminants are also purchased from in and outside (Moretina Jiru, Menz, Tarma Ber, Mojana Wodera, Abichuna Eгна and Angolelana Tera) the district and sold to hotel restaurants, butchery restaurants and individual consumers. It was noted that younger small ruminants were purchased by individual consumers (during holidays), while the older ones were purchased by butcheries and hotel/restaurants.

Traders of animals who purchased for 'fattening' or reproduction/ploughing were from in and outside the district and sold them to farmers in the district. Most this trade in animals for fattening, reproduction and ploughing reportedly takes place between farmers.

Table 23. Purchase and sale data of sampled animal traders in Basona Worena district

Indicator	Small ruminants trader	Large ruminants trader
Sample size	5	6 (one also traders in SR)
Animals for slaughter		
Av no. animals/month	16, 60, 80, 180, 200	8 (2), 16(2), 40, 68
Av age of animals purchased	24 Month average	6–8 years average
Suppliers	Farmers Traders Farmers association	Farmers Traders
Source	Within and outside district	Within and outside district
Buyers	Consumers(<12 months) Hotel/rest(More than 24 month) Traders from AA	Butchers (8 years) Consumer groups (<6 years)
Destination	District Outside AA	District Outside
Price range: purchase–sale	700–1000/750–1200 400–550/400–600 450–500/480–550 600–800/ 630–820 400–2500/ 420–2550	4000–8000/4300–8500 7000–9000/7200–9400 6000–7000/6200–7150 6000–8000/6200–8200 6000–22,000/6300–22,500 5000–30,000/5400–31,000
Animals for	Fattening/reproduction	Ploughing/fattening
Av no. animals/month	12, 20	4(2), 8(2), 20
Average age animals purchased	Ram with 12 month age For fattening with age from 12 month up to 24 months or more (Lean animals)	For ploughing 4–6 years For fattening 6–8 years (also animals with 4–6 years for fattening only)
Suppliers	Farmers Traders	Traders Farmers
Source	District Outside	District Outside
Buyers	Farmers Cooperatives	Farmers Traders
Destination	District Outside	District Outside
Price range: purchase–sale	800–100/850–1035 600–850/650–900	3000–5500/3400–5800 4000–6000/4300–6500 3000–5000/3500–6000 5000–10,000/5500–11,000 3000–5000/3150–5200

Animal trade is subject to seasonality, which results in significant variations in number of animals traded and prices paid (see Table 24). It is noted that 2 of the 5 sampled large ruminants' trader stopped completely during the low demand periods. Decline in supply of animals traded was more significant than decline in prices.

Table 24. Seasonality of animal trade in small and large ruminants in Basona Worena district

Types of animals	Small ruminants	Large ruminants
Animals for slaughter		
Peak months	December, January, April, July, September	April and August
Low/peak supply %	50%, 28%, 17%, 7% and 25%	33%, 50%, 0%, 60% and 0%
Low/peak price %	59%, 63%, 55%, 45% and 75%	89%, 61%, 84%, 70% and 69%

Bottlenecks mentioned by the sampled traders included presence of illegal traders, limited market space, seasonality resulting in lack of demand. Measures to increase demand were welcomed, including improved processing facilities (export abattoir) and improved animal fattening practices.

4.1.2.2 Hotel/restaurants and butchery restaurants

Debre Birhan town has several hotel/restaurants and butchery restaurants which sell/serve meat.

Hotel restaurants purchase small ruminants from various sources and prepare the meat for the customers in their restaurants. Slaughtering can take place in the abattoir and/or hotel. The hotel/restaurants purchase meat of slaughtered large ruminants from butchery/restaurants.

The butchery restaurants buy large ruminants from various sources and prepare meat for the customers in their restaurants. Part of the meat of large ruminants is sold to individual outside consumers and hotel/restaurants. Butchery restaurants also purchase small ruminants which are served to their customers inside their restaurants as well as to outside individual clients.

Hotels/restaurants reportedly purchase predominantly older sheep (> 33 months), while butcheries buy large ruminants ranging in age from 3.5 to 8.5 years old.

Peak supply months of animals are the dry season, when feed is scarce. During the ploughing season, supply of oxen is low.

Businesses complain about high cost of animals during peak periods, resulting in low margin, low demand, and unfair taxation. Improving supply and quality through training is advocated.

Table 25. Purchase and sales data of sampled butchery/restaurants in Basona Worena district

Indicator	Restaurant/hotel Small ruminants	Butchery/restaurants Large ruminants	Butchery restaurants Small ruminants
Sample size	5	6	2
Average age range animals (months)	24–84 12–72 18–72 18–72 18–48	60–120 24–72 84–120 24–60 18–84 24–120	15–25 24–48
Av monthly no of animals: low and peak period	40–80 20–28 4–12 28–40 32–60	4–12 4–12 0–28 4–16 12–20 12–20	10–15 5–10
Av. purchase price range/animal	380–450 600–700 650–700 550–700 350–800	3500–8000 2900–8000 2000–12,000 3000–12,000 3500–7000 7000–15,000	1800–2200 2000–2500
Supplier	Farmers Traders	Farmers Traders Farmer association	Farmers Traders
Source (district)	Within	Within Outside (Normal and low season periods)	Within the district
Sales to outside customers	Non	Consumers Hotel/restaurants	Customers in the restaurant End consumers

4.1.3 Livestock services/input providers

Four main service providers support the dairy and large and small ruminants' value chain actors i.e. the district abattoir, livestock feed producers/traders, the veterinary services and AI services.

4.1.3.1 Abattoirs

The district has one abattoir, which is owned by group of veterinary officers. They slaughter large and small ruminants for butchery restaurants, university and hotel/restaurants. Data on slaughtered animals are summarized in Table 26. As can be seen from the table, both young and older animals are butchered.

Table 26. Number of slaughtered animals in Basona Worena abattoir

Type of animal ¹	Total number animals/year	Peak months ²	Daily number in peak period	Low months ²	Daily number in low period	Slaughtering charges	Customers ³ (can be more than one—start with highest %)
LR < 4 yr	1238	4,1,9	20	3,2,11	1	100	2
LR > 4 yr	4380	4,1,9	55	3,2,11	5		2
SR < 1 yr	1917	4,1,7	11	3,2,11	1	10	2, 3
SR > 1 yr	2004	4,1,7	32	3,2,11	4		2, 3

¹Type of animal: LR= Large ruminants, SR = small ruminants

² Month: 1=January ; 2=February, 3=March ; 4=April ; 5=May ; 6=June ; 7=July ; 8=August ; 9=September ; 10=October ; 11=November ; 12=December

³ Customers:1 = End users 2= Butcheries 3= Hotel/restaurants

4.1.3.2 Livestock feed producers and traders

Basona Worena district produces 8,303 t of wheat (5,290Ha), 3,535t of pulse crops (2,178 ha) and 116 t of oil crops (500 ha). Wheat and pulse crops are processed commercially and produce wheat bran and pulses bran which can be used as animal feed.

Agribusinesses involved in the production of agro-industrial by products (AIB) in Basona district include a feed processing Union, a cooperatively owned pulse processing businesses (owned by private traders), and feed traders/shops.

Table 27 indicates that cooperatives and private (male) ownership dominate the feed business. Several businesses started in the past 10 years.

Table 27. Sampled feed producers/traders in Basona Worena district

Indicator	Pulse bran producer	Feed processing	Feed traders	
	Sole ownership	Union	Sole ownership	Cooperative
Sample size	5	1	2	4
Gender	5 M	NA	2 M	NA
Education	3 prim 2sec and more	NA	2 prim	NA
Year started	2>10yr 3 < 10yr	1<10yr	2 < 10yr	2 >10yr 2<10r
Licensed	5 (100%)	1 (100%)	2 (100%)	4 (100%)

Pulse bran producers

Pulse traders in the district organized themselves into a cooperative for the processing of the various pulses produced in and outside the district. The cooperative processes the pulses as a service to its members. The processed pulses and the by-products (pulses bran) remains the property of the traders, who sell them.

The 5 sampled pulse traders/processors produce on average 688 to 2280 kg of pulse bran/month. All of them sell the pulses bran to traders/fatteners outside the district (Adama). Limited market space and linkages were reported as bottlenecks.

Table 28. Production and sales data of sampled pulse bran traders in Basona Worena district

	Av monthly qt sold (kg)		Sale Price (kg)	Buyers	Destination
	Low period (Aug–Nov)	Peak period (Feb, March)			
Range	800	2800	2.7	Traders	Outside (Adama)
	600	800	2.3	Traders	Outside
	400	800	2.7	Traders	Outside
	440	4000	2	Traders	Outside
	1200	3000	2.8	Traders	Outside
Average	688	2280	2.5		

Feed processing union

The Wodera feed processing Union produces dairy and fattening concentrate mixtures from the bran produced in their flour factory. Other ingredients (mainly oilcake and some minerals/salt) are purchased from outside the district. The dairy and fattening mixtures are sold through the cooperative system i.e. either directly to individual members and/or primary cooperatives in and outside the district. They also sell to non-cooperative farmers and government institutions. The Union tests the quality of its products in its own laboratory and labels the feed mixes. Training in processing was arranged by ACDI/VOCA, however they would like to receive more training. The Union proposes to train farmers and traders in the use of concentrates to stimulate demand.

Table 29. Sales data of dairy and fattening feed processing union

	Low period	Peak period	Sales price/kg
Months	Sept, October, November and December	Feb, March, April, May and June	
Dairy mix kg sold/months	4000	100,000	3.36–3.7
Buyers	Cooperative farmers Non-member farmers Government institutions (research) Primary cooperatives		
Destination	Within district Outside district		
Fattening mix kg sold/months	4000	100,000	3.36–3.7
Buyers	Non cooperative farmers Cooperative farmers Primary cooperatives Government institutions		
Destination	Within district Outside the district		

Feed traders/shops

The sampled, privately owned feed shops and primary cooperative buy wheat bran from outside the district from traders and cereal mills. Oilcake is also purchased by the private traders and one of the primary cooperatives from outside the district.

Wheat bran is sold by private feed traders to rural, urban and peri-urban farmers (including cooperative farmers). Most farmers use it to feed large ruminants. Demand fluctuates considerably between peak and low demand periods. The primary cooperatives in the rural areas sell wheat bran to members and non-cooperative members

Oilcake is sold by the private feed shops to rural, urban and peri-urban farmers. Oilcake is sold by only one of the primary cooperatives to members as well as non-members.

Dairy mix and fattening mixes are only sold by the primary cooperatives, however not all sample primary coops sell these products (see Table 30). Primary cooperatives can sell to members and non-members.

Table 30. Purchase and sales data of sampled feed traders/shops

Indicator	Privately owned	Primary cooperative
Sample size	2	5
Wheat bran		
Suppliers	Cereal mill	Traders
Source district	Outside the district	Within district Outside district
Quantities wheat bran sold/kg per month: low–peak periods	1200–1600 4000–8000	1200–2000 800–6000 10,000–20,000
Sales price/kg	3.2, 3.25	3.1, 3.08, 2.8
Buyers	Urban farmers Peri-urban farmers Cooperative farmers	Cooperative farmers Non cooperative farmers
Destination	Within district	Within district (Angolela, Goshe Bado and Keyit Kebeles)
Oilcake		
Suppliers	Oil mill	Traders
Source districts	Outside the district	
Quantity oilcake sold Kg/month: low–peak periods	400–1200 0–800	4000–10,000
Purchase–sales price/kg	3.45, 3.8	3.28
Buyers	Urban farmers Peri-urban farmer	Cooperative farmers Non cooperative member farmers
Destination	Within the district	Within the district (Angolela dairy cooperative)
Dairy mix		
Supplier	NA	Feed processing Union
Source district		Within district
Quantity (kg) dairy mix sold: low–peak period	NA	800–1600 2000–4000
Sale price/kg	NA	4.00
Buyers	NA	Cooperative farmers Non cooperative member
Destination	NA	Within district (Keyit and Woshawshgen Kebeles)
Fattening mix		
Supplier	NA	Feed processing Union
Source district	NA	Within district
Quantity fattening mix sold: low–peak periods	NA	2000–4000
Sale price	NA	4.00
Buyers	NA	Cooperative farmers Non cooperative member farmers
Destination	NA	Within district (Woshawshgen Kebele)

Quantities sold vary by season—the peak season is February/March, the low season is July–September.

Table 31. Seasonality in AIB feed demand in Basona Worena district

	Month	Reasons
Peak demand	January, February, March, April, May and June	Lack of green feed Peak demand for fattening
Low demand	August, September, October, November and December	Green feed available

Traders and cooperative complained about low demand, lack of awareness on use of concentrates, lack of credit.

4.1.3.3 Veterinary services/shops

Veterinary drugs in Basona Worena are provided by the public and private sector.

The public sector provides veterinary service for all 30 *kebeles* in the district but each *kebele* may or may not have vet technician and therefore share vet-technical staff. Currently 14 *kebeles* in the *woreda* had veterinary technicians (2 DVM, 1BSC and 11 diploma).

Most of the vet services are handled by *kebele* veterinary technicians. However there is some times technical support from the *woreda* and support also during mass vaccination.

Privately owned vet shops are located in Debre Birhan town and owned/operated by educated persons (diploma or above). Two of the 5 sampled shops were started in the past 10 years ago.

Table 32. Sampled public and private veterinary services/drug shops in Basona Worena district

Indicator	Public veterinary service		Vet shops
	District	Kebele	Sole owner
Sample size	1	1	5
Gender	NA	NA	4 M 1 F
Education	NA	NA	4 diploma 1 college
Year started	1>10yr	1>10 yr	3>10yr 2<10yr
Licensed	1 (100%)	1 (100%)	5 (100%)

The most frequently purchased drugs by both private and public drug suppliers were antihelmets, followed by antibiotics. Private shops reportedly did not buy/sell vaccines. All drugs by the private vet shops were obtained from private traders/importers from outside the district.

The public sector also purchases drugs from traders/importers and distribute them to *kebeles* based on their demands. Vaccines are provided by the government system.

Most drugs are sold directly to (groups of) farmers and paravets and are used for large and small ruminants and dairy cows.

Public sector provides drugs at cost price at district level and adds about 15% for drugs purchased at *kebele* level. Private shops add a profit margin varying from 25 to 100%.

The public sector and 3 of the 5 drug shops also provides veterinary services for large and small ruminants and dairy cows, including diagnosis, drug prescription and injections. These privately owned shops are not licensed to provide veterinary services.

The public sector complained about lack of resources (including diagnostic kits) and transportation problems to provide adequate services. The private sector mentioned inadequate (seasonal) supply of drugs, taxation and poor adherence to prescriptions resulting in drug resistance.

Table 33. Purchase and sales data public and private drug suppliers in Basona Worena district

	Public veterinary services	Veterinary shops
Rank/use	1 Anthelmintic 2 Antibiotics 3 Vaccines 4 Supplements	1 Anthelmintic 2 Antibiotics 3 Supplements
Anthelmintic		
Price ratio sales/purchase	3.44–3.44—(1) district 1.12–1.28—(1.14)	0.9–1.50—(1.7) 0.98–2.00—(2.04) 2.5–2.6—(1.04) 2.0–2.50—(1.25) 3.12–4—(1.28)
Buyers	Farmer (groups) and private vets	Farmer (groups), farmers private vets
Type of animals	All	All
Peak demand months)	Aug, Sept, Nov	Sept, October, Nov, June
Antibiotics		
Price ratio sales/purchase	56–56—(1) district 26–29.9—(1.15)	5.25–8—(1.52) 22.5–26.5—(1.17) 25.0–35—(1.4) 25.5–34—(1.33) 28.0–35.5—(1.26)
Buyers	Farmers and farmer groups	Farmers,(farmers group) and private vet
Type of animals	All	All
Peak demand months	November October and august	June, July, Jan and Oct
Vaccines		
Price ratio: sales/purchase	43.13—(1) district 75–86.5—(1.15)	NA
Buyers/users	Farmers	NA
Type of animals	All	NA
Peak demand months	August , Sept, Nov	NA
Supplements		
Price ratio: sales/purchase	66–66—(1) district 69.4–79.8—(1.15)	17.5–25—(1.42) 25–50—(2)
Buyers	Farmer	Farmer (groups), private vets
Type of animals	All	All
Peak demand months	As needed	Aug, July and Sept

4.1.3.4 AI services

Basona Worena district has two AI technicians which are stationed at Debre Birhan town. The two technicians give the service for 15 *kebeles* of the district²—the remaining 15 *kebeles* don't get this service since they are not easily accessible. Development agents and farmers in the *kebeles* have the mobile phone number of the technicians. When there is a need for the AI service they call and the technicians give the service by moving from Debre Birhan town. In November, 2013 hormone

2. Abamotie, Angolela, Bakielo, Birbirs, ChiraroDebir, Debelie, Dibut, Dilila, GosheBado, Gudo Beret, Keyit, KorMargefiya, MutiCherkos, Sariya and Wushawushign.

assisted mass insemination had been introduced. Experts from the zone and other district have participated in the Basona Worena district campaign. The hormone assisted mass insemination was given to 956 cows but there is no record of the number of successful insemination. Besides servicing the *kebeles* which are normally serviced by the AI system, 5 more remote *kebeles* were covered by this campaign i.e. Adisgie, Baso Dengora, Mehal Amba, Goshu Ager and Moye Amangolte. The AI materials (liquid nitrogen and semen) and the hormone for mass insemination is channelled/provided by the Zone for the district.

4.2 Livestock value chain analysis and interventions

The analysis presented in this section is based on a review of the linkages described and the present status/performance of the agribusinesses and their supporting businesses/services. Potential interventions are identified through comparison (gap analysis) of these findings with other districts and projects. Potential interventions are subdivided into those which may contribute to increased demand and those which may contribute to increased supply of the raw product.

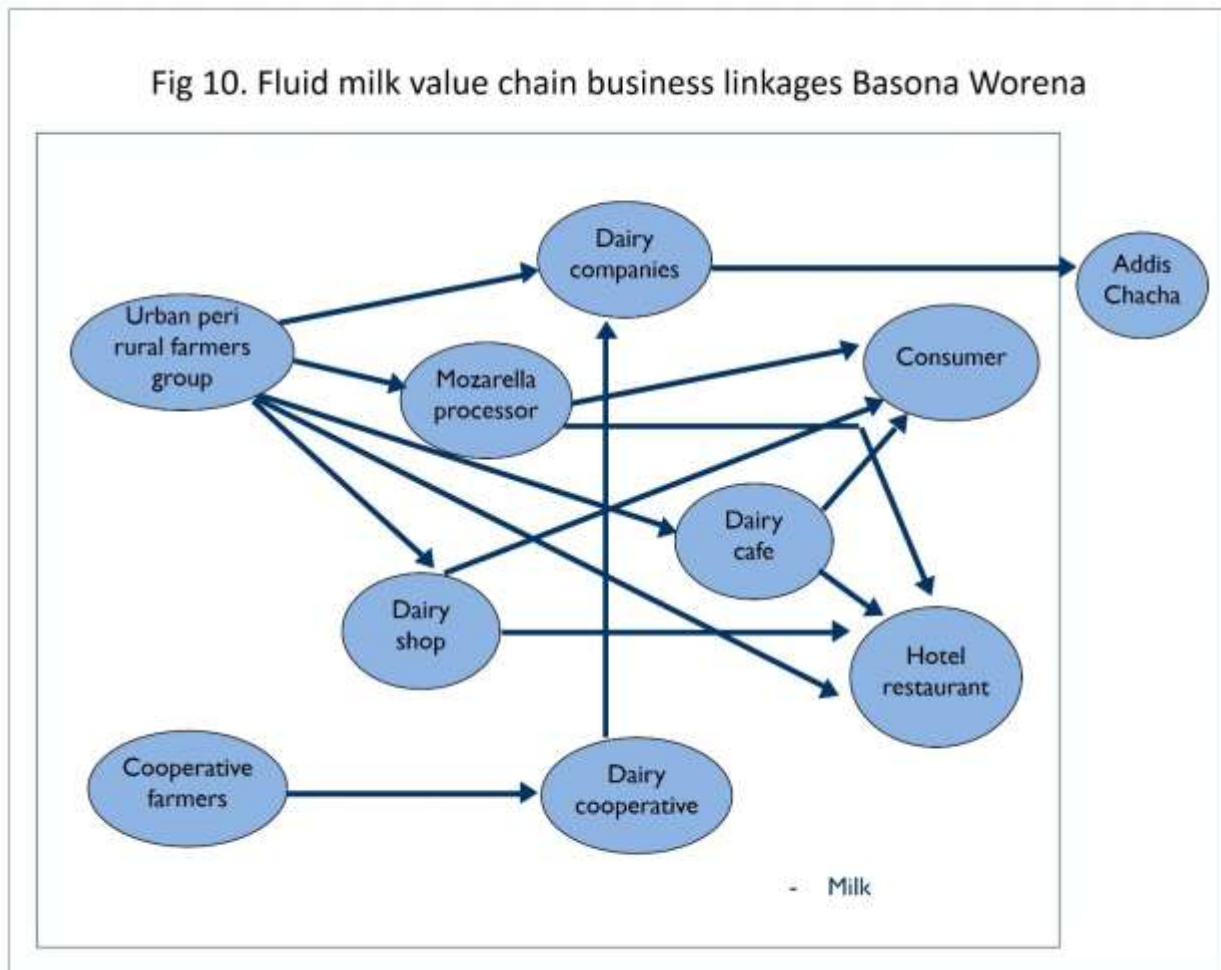
4.2.1 Fluid milk value chain

The number of cross breed cows, which are normally kept for fresh milk production/sale is high i.e. 20% of the total cow population as compared to 7.5 % nationally. The amount of milk produced from a 6154 cross breeds can be estimated at about 8.6 million litres annually by assuming that 50% of cows are lactating during any one year, lactation period is around 200 days and average daily milk yield is 7.0 litres/year (LIVES baseline data). This estimated production is large as compared to all other Africa RISING districts. It is therefore not surprising to see that the involvement of agribusiness in the fresh milk dairy value chain is most advanced in Basona Worena district. This can also be derived from the presence of commercial companies involved in the collection of substantial quantities of milk. Also In the past 10 years, several commercial outlets in the form of shops, dairy cafes and hotel restaurants have emerged, thus contributing to the demand for fresh milk and dairy products.

The fresh milk value chain consists of peri-urban producers, milk collectors and processors businesses, dairy shops, cafes and hotel restaurants.

Based on the data summarized in the result section, the linkages between the fresh milk agribusinesses in Basona Worena district are summarized in Figure 10.

Figure 10. Fluid milk value chain business linkages Basona Worena



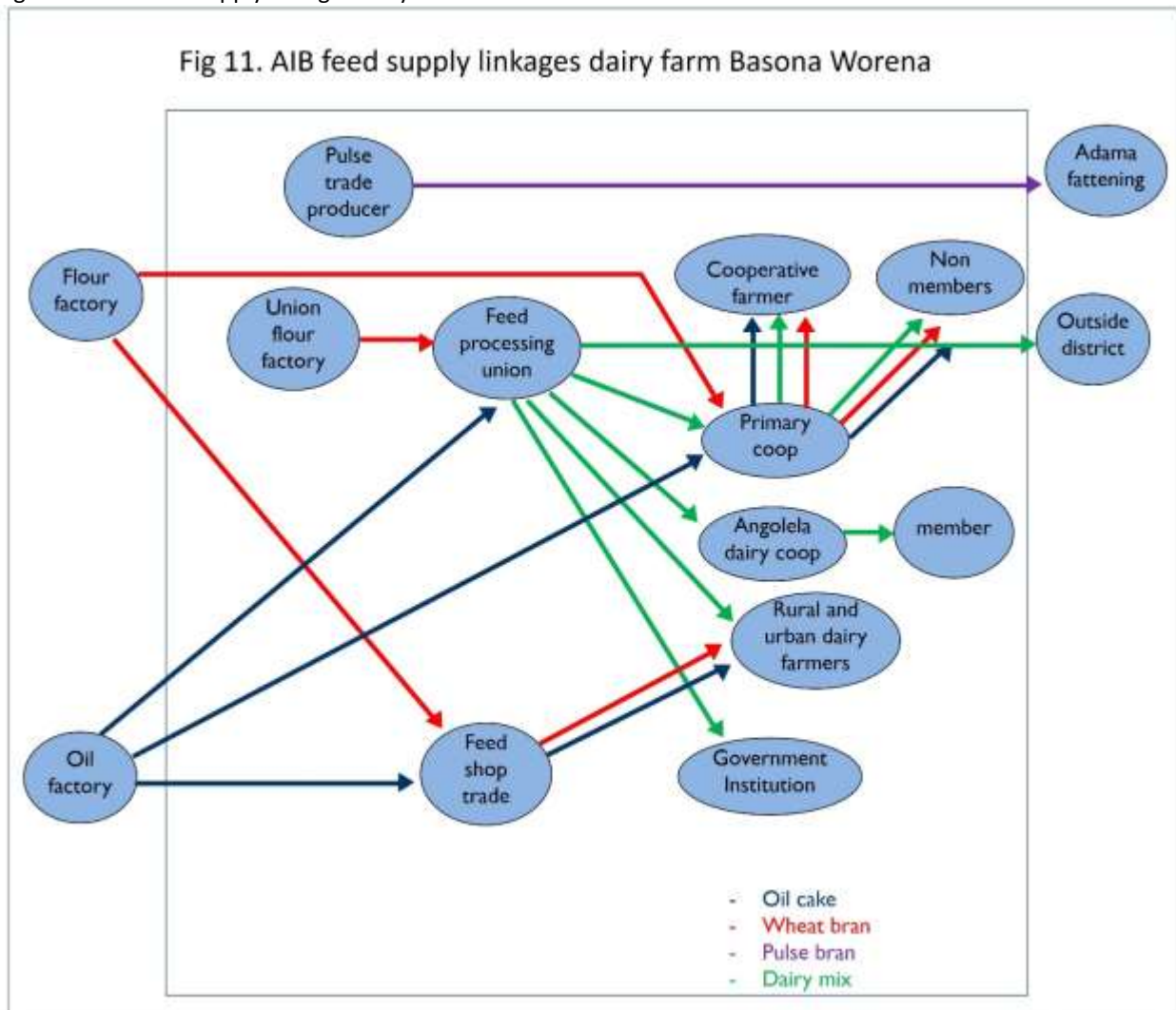
- It may be concluded that the variety of businesses involved and their linkages can serve as an example for other districts, in particular the recently established dairy cafes and shops.
- These outlets may stimulate local demand, especially by enlarging their product range, to attract more youth, as business operator or consumer. Possible new products may include ice cream, milk shakes and butter milk 'Arera' produced by the dairy coop.
- A consumer demand study is proposed to explore (present and future) local demand for milk by individual consumers, hotel/restaurants, hospitals offices and schools. Such a study may contribute to increasing commercial demand for milk, in part replacing the producer–consumer channel through better quality milk.
- Since all Irgo served in the dairy cafes is produced from soured fresh milk, heating the milk to reduce bacterial infection can be tested. Souring of the milk can then be stimulated with the help of pasteurized yoghurt culture.
- To facilitate the increased fresh milk supply for the businesses, more producers can be linked to the processors, dairy cafes and hotel restaurants either on individual basis or as groups. As can be seen from the figure, purchase of milk from groups or associations is already practiced and can therefore be introduced or expanded.

Input/service providers

- Results show that veterinary drugs for peri-urban dairy farmers are available from the public and private sector. It is noted that veterinary services are only delivered (officially) by the public sector. To expand the coverage of such services, it is proposed that private sector drug suppliers include veterinary services, once the necessary licenses have been granted,
- Similarly, for the genetic improvement of dairy animals peri-urban dairy farmers are relatively well served with public AI as compared to rural farmers. However it was noted that the attempts to increase the number of AI through hormone assisted mass insemination with mobile teams still requires fine tuning. It is therefore recommend that the present performance of the hormone assisted mass insemination by mobile teams, is studied in order to introduce additional measures to improve effectiveness and efficiency.

Agro-industrial by-products for dairy are sold by feed shops and in part produced in the district, including a dairy mix by the Wodera feed processing Union. The linkages between the peri-urban dairy farmers and the feed businesses are shown in the Figure 11.

Figure 11. AIB feed supply linkages dairy farm Basona Worena



- The figure shows that although pulses bran is produced commercially in the district, no use is made of pulses bran for dairy feed. It is therefore proposed to explore the possibility of mixing pulses bran with other AIBs at village level and/or the feed processing Union.³ Also the theoretical production of pulses bran from the pulses grown in the district could be as high as 530 t/year (assuming 15% by products from a total pulse grain yield of 3.534 t), if all pulses were processed commercially. A further study is recommended on village level pulses processing and the use of the by-products.
- While Basona Worena does produce and sell wheat bran commercially, the total amount seems small as compared to its theoretical potential i.e. 1245 t (assuming 15% by products from 8.3 million tonnes of wheat grains) if all wheat was processed commercially. A further study is recommended on village level wheat processing and the use of the by-products.
- Furthermore demand may be stimulated by increased availability through the cooperative structure (not all primary coops sell dairy mix) and linkages between the Unions and the private feed shops (dairy mix).
- As compared to other districts, the prices for AIB and the dairy and feed mixtures are about average or below average. However demand is still limited and confined to the season that green feed is not readily available. To stimulate demand and milk production, it is proposed to create awareness/demonstrate the beneficial effects of locally mixed AIB ingredients and commercial feeds.
- To increase production of individual farmers, new management interventions for health, genetics and feeding should be introduced.⁴

4.2.2 Butter value chain

The butter value chain in Basona Worena consists of 2 channels i.e. i) butter produced/churned on farms in peri-urban and rural areas, and ii) the butter/Ayeb produced by the dairy coop and dairy cafes from the milk produced by urban/peri-urban farmers.

As indicated in the result section, most butter is produced from the local cows which number 23,512 in total. The amount of butter produced from these cows is estimated at 154,297 kg, assuming that half of the cows are lactating, lactation period is 175 days, average daily production is 1.5 litres of milk/day and around 20 litres of milk are used to produce 1 kg of butter. (LIVES baseline survey)

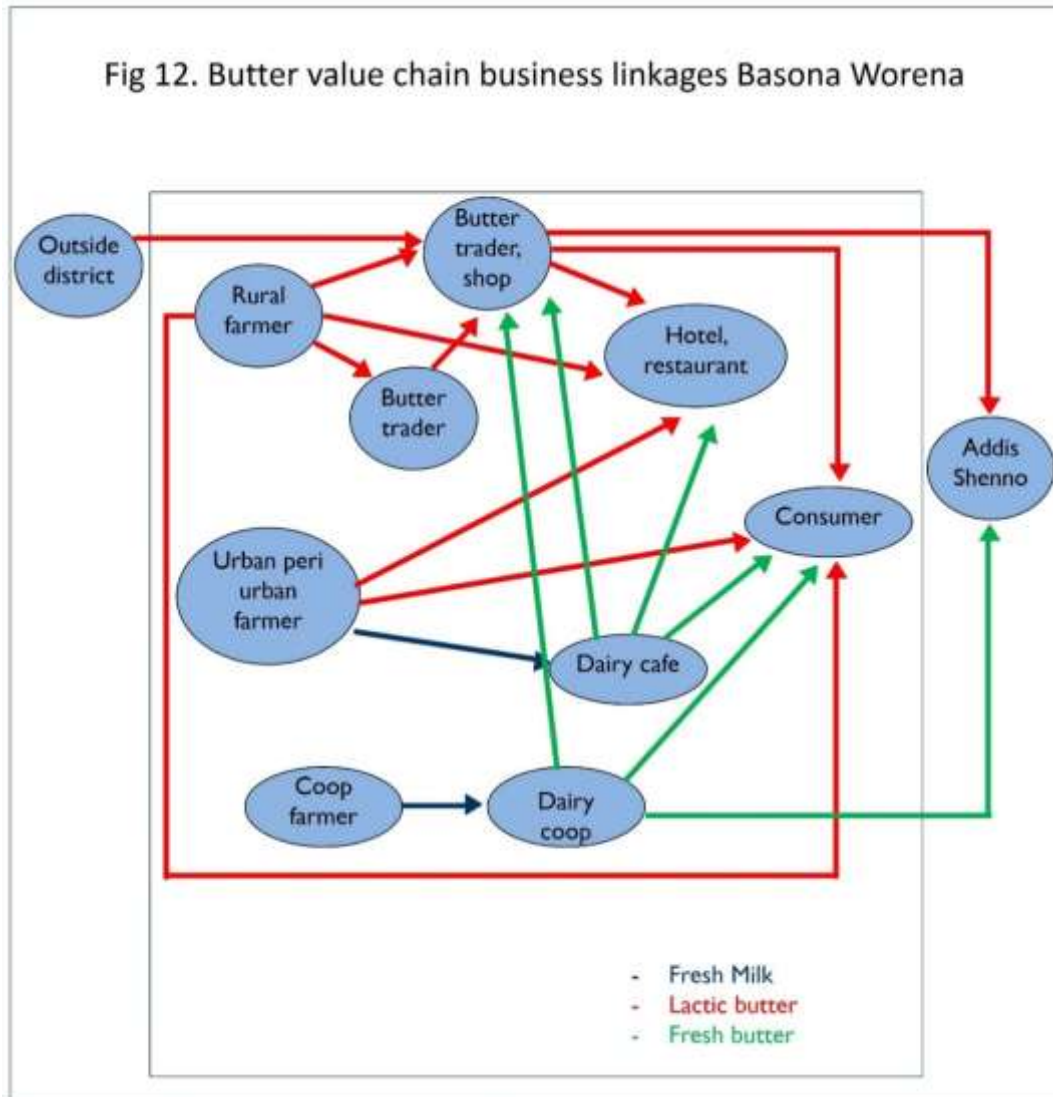
The data in the result section indicate that the butter produced by the fluid milk dairy processing businesses is seasonal and relatively small as compared to the butter produced by households in the rural areas. The butter produced by these agribusinesses is an integral part of their strategy to cope with the fluctuating demand for milk during the year i.e. butter and Ayeb are mainly produced during the periods of low demand for fresh milk products. A positive deviant is the recently established dairy business, which purchases raw milk and specializes in the production of mozzarella cheese for the Addis market.

The rapid assessment suggests that the traditional butter value chain in Basona Worena district is significant and not only serves the local demand but also serves the Addis market. Debre Birhan also acts as market hub for butter produced in other districts of North Shoa Zone. Traders and butter shops play a key role in the buying and selling of butter within and outside the district. Hotel and restaurants are purchasers of butter from farmers and traders. The existing value chain linkages for fresh and lactic butter agribusinesses are shown in Figure 12.

3. It is noted that pulses bran is known for fattening.

4. These production interventions are not discussed here since they are (hopefully) addressed by the Africa RISING production research.

Figure 12 Butter value chain business linkages Basona Worena



- To increase the profitability of commercially produced butter, attention could be paid to the use of by-products such as whey (from 'Ayeb' or mozzarella production) for animal feeding and the use of skimmed milk (from butter processing) in the dairy cafes and dairy cooperatives). The survey showed that these by products are not commonly used.
- Demand for butter produced in rural areas could be increased through production of better quality butter. The data in the result section indicate that better quality butter fetches a higher price (about 40%) than lowest quality butter. It was reported that some traders mix better quality butter with the lower quality in order to get higher prices.
- Quality of butter produced in rural areas, may be further improved by introducing small scale advanced churning and processing technologies. The introduction of such technologies can be combined with new business models, especially for women farmers in rural areas. Larger capacity churns may be operated by groups of women and or individual women who either process the soured milk (Irigo) from individual farmers and or the sour cream collected from the individual farmers. The latter will require new methods of souring milk in open containers, rather than in the traditional earthen churns. To reduce bacterial infection of butter produced from raw milk, heating may be introduced, thus producing a more health safe quality butter. Similar as for commercial butter processing, attention should also be

paid to the use of by-products from butter and 'Ayeb' making. To define improved butter processing interventions in the rural areas more precisely, a rapid assessment of the present processing technologies and organizational arrangements is proposed.

- Since demand for commercially and home produced butter is not known, a consumer study is proposed to assess demand for different types of butter by individual and institutional buyers.

Input/service providers

The supply of inputs and services for veterinary drugs/services, AI and feed for farmers in rural areas, where the bulk of the butter is produced, is relatively weak as compared to milk and butter produced in peri-urban areas.

- While government initiatives aim at improving such services in the rural areas, some progress can be made in the short run by creating economics of scale through collective (bulk) purchase of these services and inputs. The data suggest that some of the businesses/organizations already sell to farmer groups and or associations thus reducing market transaction cost for individual buyers.

4.2.3 Large and small ruminants value chain

The number of oxen and bulls in the district suggest that there should be a considerable supply of large and small ruminants for consumption. Assuming that oxen/bulls on average will be used for 5 years, the estimated number of animals for consumption would be 11,672 annually. Assuming an average slaughter age of small ruminants of 3 years, the number of sheep and goats for consumption could be estimated at respectively 44,500 sheep and 16,470 goats.

The Ethiopian livestock master plan clearly identifies deficits of red meat for the local market at present and even more in the future. It is therefore expected that prices and profit margins in this sector will be high and therefore investments in the development of the small and large ruminants' value chain should be encouraged.

Production and sale of ruminants for meat consumptions involves producers, traders, butchery restaurants, hotel/restaurants and consumers, including consumer groups. Based on the data summarized in the result section, the linkages between the small and large ruminants' agribusinesses in Basona Worena district are summarized in Figures 13 and 14.

Figure 13. Large ruminant value chain business linkages Basona Worena

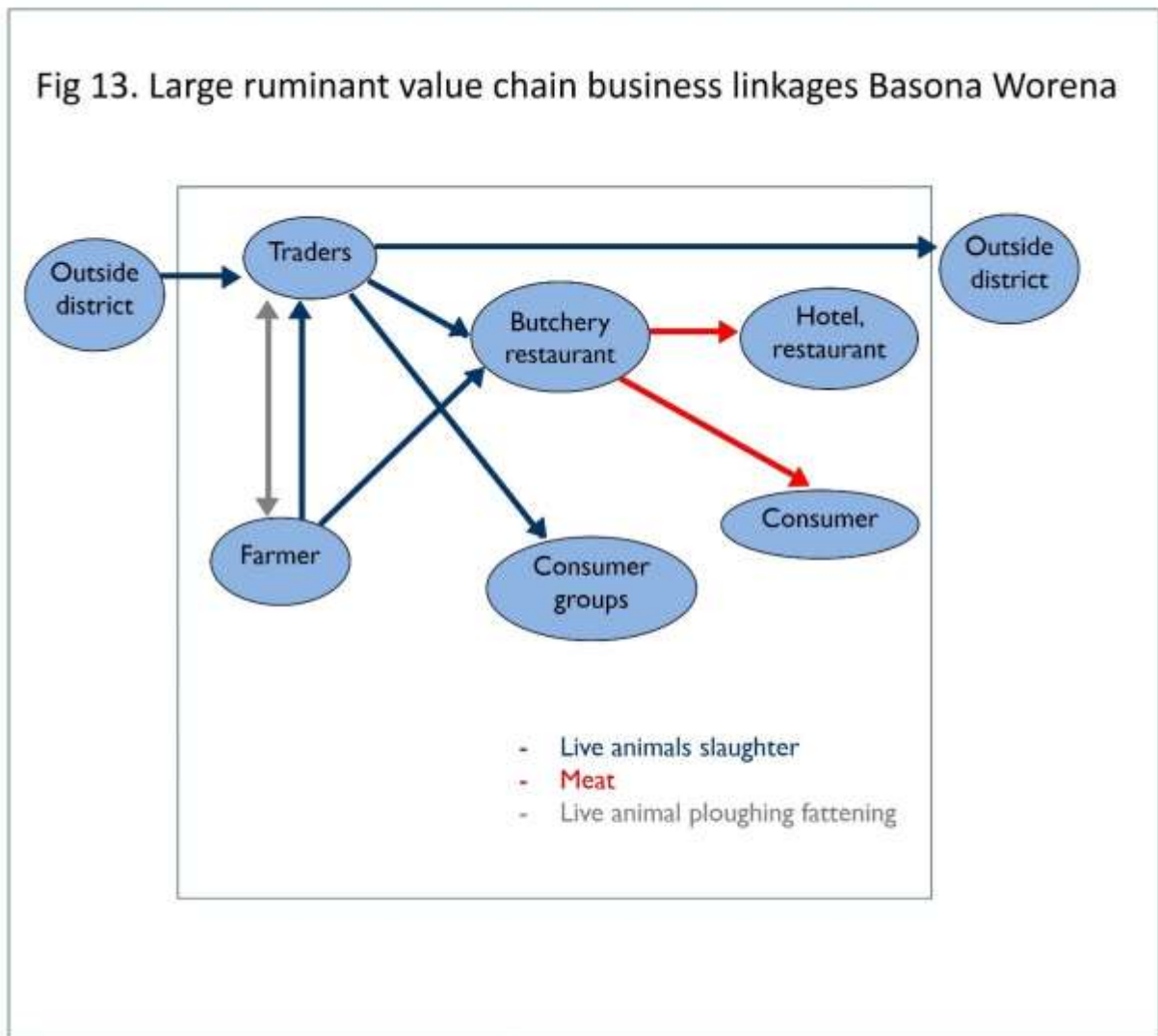
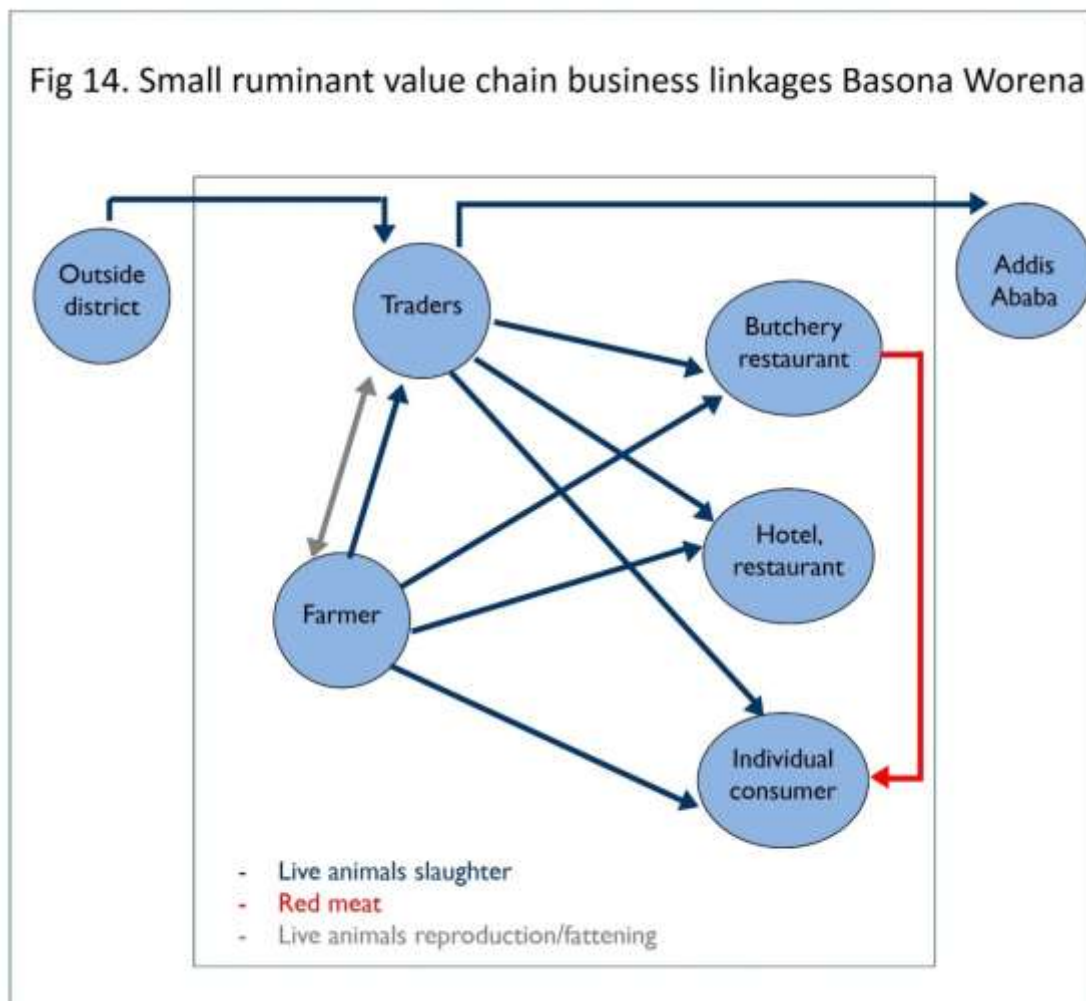


Figure 14. Small ruminant value chain business linkages Basona Worena



Butcheries and restaurants in the district are major ‘consumers’ of the animals. Data from these businesses and the abattoir, which provides slaughtering services for large ruminants, suggest that demand is traditional i.e. farmers mainly produce for the cultural and religious holidays periods and the average age of the animals is rather old (large ruminants above 6 years and small ruminants above 2 years). However a huge price variation (over 200%) exists, indicating variation in the type of animals purchased (fattened, lean) by traders, hotel/restaurants and butcheries. Also consumer groups reportedly have demand for specific type of animals. Furthermore, demand for younger animals (small and large ruminants) is increasing (including export market demand).

It is therefore proposed to conduct a demand study within the district for the type of small and large ruminants required by the different customers. Such a study should also consider demand for different types of animals during the year.⁵ The study would enable the establishment of linkages between producers/fatteners of animals and agribusiness and consumers to produce animals throughout the year based on market demand.

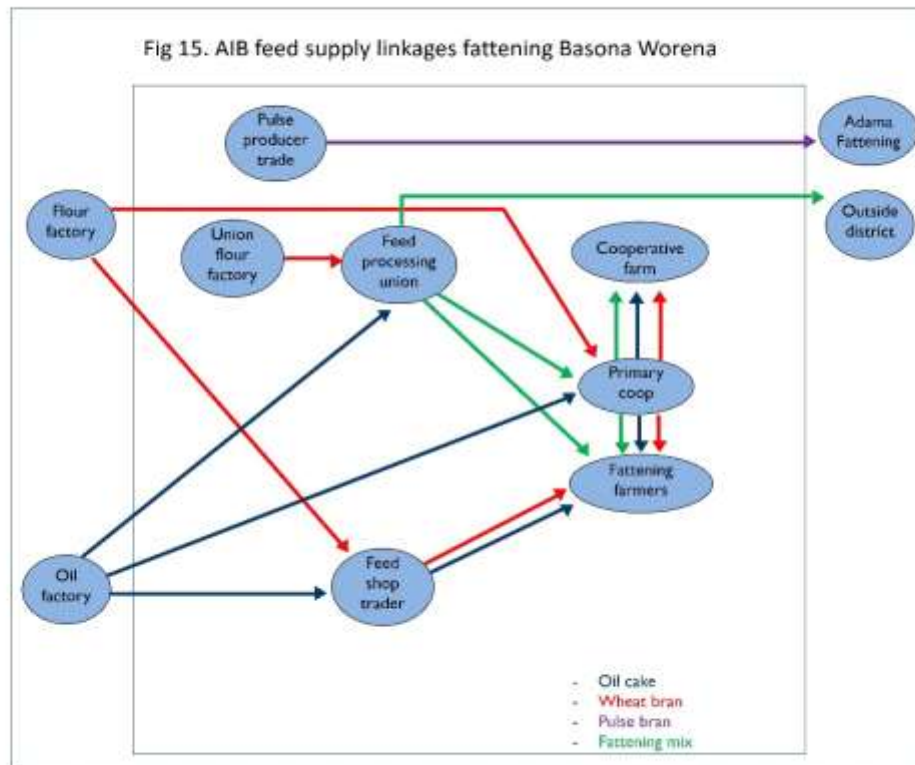
5. It is noted that some of these studies are conducted by others including FAO and LMD project.

Input/service providers

- The abattoir which provides slaughtering services for both large and small ruminants has been trained by the Livestock Marketing Project (LMD). It is expected that the business model can serve as an example for other Africa RISING district abattoirs.
- To support the production of large and small ruminants by (groups) of farmers, linkages with veterinary services should be established using collective action to purchase inputs and services in bulk to reduce transaction cost.

Presently very little linkages exist between the feed supply system and small and large ruminants producers in rural areas—see Figure 15.

Figure 15. AIB feed supply linkages fattening Basona Worena



Studies on the processing of wheat and pulses at village level—as proposed for dairy—also apply to fattening in order to determine the availability of by-products i.e. wheat and pulses bran

Demand for AIB should be encouraged through awareness creation/demonstration of potential beneficial effects. Furthermore, availability could be improved through the Union and their primary cooperatives (presently only a few primary coops are selling fattening mixes).

A priority link to be established is between (groups of) fatteners and the traders which produce and sell pulses bran.

Supply of feed inputs in rural areas should be based on collective action (group, cooperative) to purchase feeds in bulk from the private feed shops and the Union.