

ALAMATA PILOT LEARNING SITE DIAGNOSIS
AND PROGRAM DESIGN

June 23, 2005

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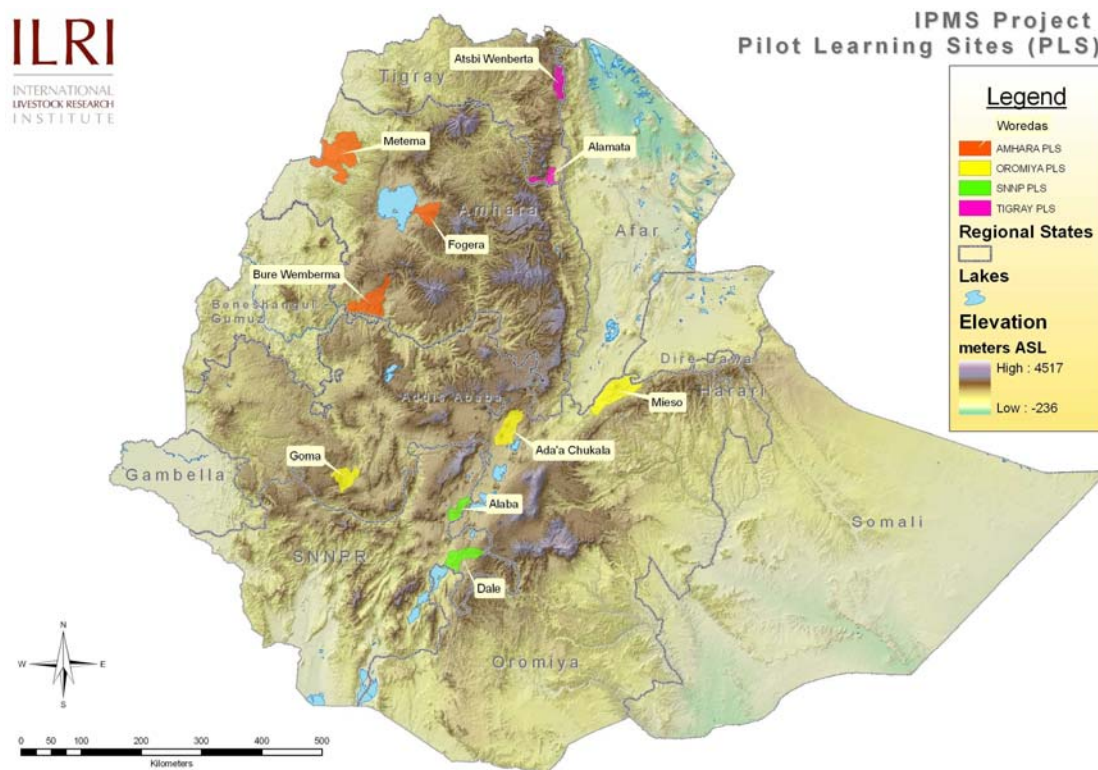
Alamata Pilot Learning Site diagnosis and program design

By IPMS team

1. INTRODUCTION

The International Livestock Research Institute (ILRI) and the Ministry of Agriculture and Rural Development (MoARD) initiated a 5 year project in June 2004 with the financial assistance from the Canadian International Development Agency (CIDA). The project, entitled: “Improving productivity and market success” (IPMS) of Ethiopian farmers, aims at contributing to a reduction in poverty of the rural poor through market oriented agricultural development.

The IPMS project will assist by bringing knowledge on technologies generated by International and National Research Institutes as well as from other sources to the attention of the technology transfer agents and the farming community. It will also facilitate the feedback on these technologies. Such assistance will be provided to 10 pilot learning sites (PLS) across the country; (See map 1) Alamata district is one of the 10 sites selected. To further enhance the utilization of such knowledge and the introduction of technologies, the IPMS project will also provide assistance to extension, input supply, marketing and finance institutions, including cooperatives. Such institutional support will be in the form of technical assistance, capacity building, supply of demonstration and training materials, some limited funds for innovative institutional arrangements and studies aimed at developing innovative institutional arrangements.



Map 1. Map of Ethiopia with IPMS Pilot Learning Sites (PLS)

2. FARMING SYSTEM, CROP AND LIVESTOCK PRIORITIES

2.1 Description of Alamata Woreda

Alamata woreda is located 600 km north of Addis Ababa and about 180 km south of the Tigray Regional capital Mekelle. It is the south most woreda of the Tigray Region and borders with Amhara region from the south and west and Afar region from the east. There are 10 peasant associations and 2 town dwellers associations in the woreda. The number of agricultural households of the woreda is 17,597. The total population of the woreda was 128,872 in 2003/04. Altitude in the area ranges from 1178 to 3148 m and 75% of the woreda is low land (1500 masl or below) and only 25% is found in intermediate highlands (between 1500 and 3148 m asl). The small undulating mountains surrounding the woreda are very steep and with low vegetation cover. These mountains cover a large area and drain to the Alamata valley. The mountains surrounding Alamata cover a large area and have a series of dissected gullies which serve as a source of runoff water to the Alamata valley. The gullies join together and form rainy season rivers down the foot of the mountains. The dissected channels slowly spread over the valley depositing silts and water down to the valley. The fine silt is relatively fertile and the water becomes a source of supplementary irrigation. The Alamata valley is one of the most agriculturally potential area in the Tigray. Farmers in the woreda extensively cultivate cereals and vegetable; and raise mainly sheep and cattle in the valley.

Eutric Vertisols, Lithic Leptosols (Cambic) and Lithic Leptosols (Orthic) are the soil types covering nearly 100% of the land in the woreda. However, the lack of differentiation in the soil types may be due to the scale of the soils map that has been used (1:2.0 million). Soil pH for profiles tested by Relief Society of Tigray (REST) from the valley bottoms indicate that it ranges from 7.4 to 8.5 and is reported to increase with depth. This characteristic is also believed to render phosphorus and micronutrients unavailable. The soil for majority of the valley bottom is Vertisols. Traditionally, fertility of the soils on the plains is believed to be fertile because of the silt coming from the adjacent mountains. The mountains in the western and northern parts of the valley are believed to be the major sources of alluvial soil because of relatively higher rainfall in these areas. However, previous studies by the Raya Valley Project indicate that soil fertility is low. For example, total nitrogen was analysed to be between low and very low ranging from 0.03 to 0.13%, while phosphorus content on surface layers is between low and medium at 5 to 13 ppm with amount decreasing with depth. The electrical conductivity measured in 1:2.5 soil-water suspension is less than 0.3 mmho/cm in all sampled profiles indicating no risk of salinity problem at present in the soil and the irrigation schemes. However, field observations demonstrated that the soils in some areas indicated salinisation problems and needs careful reassessment of the area. The information above takes care of 8 peasant associations (PAs) in the valley bottom while Information for the two midland PAs is totally absent. However, it is obvious that soil fertility is very poor as could be seen from the performance of the crops. In addition the soil depth of these PAs is also very shallow and stony probably due to the dissected terrain of these areas enhancing erosion.

Ground water potentials of the Valley, part of the woreda, has a recharge rate of 85 million cubic meters per year (MCM/yr), a ground water reserve of 7150 MCM/yr and

an estimated exploitable ground water resources of about 160 MCM/yr. These figures indicate that there is high prospect of developing ground water resources in the valley. As a result of this, the Relief Society of Tigray (REST), which is a local NGO, has already dug 12 deep wells with the intention of developing irrigation in the valley and 2 have been made ready for use. Of these two deep wells, one is currently functional and irrigating 20.4 ha of land where different crops, such as onion, tomato, vernonia, cotton are grown using this well. Informal discussions from people in OoA indicate that up to 100 deep wells will be made ready by REST and each well is expected to irrigate about 25 ha.

The lowlands of Alamata woreda are surrounded by a chain of mountains from the east, west and partly north. As a result of this even if sufficient rainfall is not received in the valley, rainfall from the surrounding mountains become the main sources of supplementary irrigation. Therefore rain from the surrounding areas, especially the western and northern highlands are the major sources of supplementary irrigation and enable farmers harvest a reasonable production. For this reason, The Tigray commission of Water Resources, IFAD and REST have developed a series of 30 ponds that could enable supplementary irrigation of 133 ha in the woreda. In addition, primary, secondary and tertiary irrigation canals have also been developed by REST for trapping flood waters that comes from the northern highlands for supplementary irrigation. Spate irrigation is used for any crop grown in the area. There are as many as 8 major sources of flood water, one of it was coming from as far away from Eda Mokeni (Maichew). Farmers are accustomed to directing flood water for supplementing their crops (spate irrigation).

Tef and sorghum are the dominant crops covering around 75% of the woreda cultivated area even though yield of these crops are very low at 5 and ~7 qt/ha, respectively. *Parthenium hysterophorus* L. (congress weed) is becoming a major weed in the area, especially in the lowlands of the woreda. This weed has also been identified as a major weed in the adjacent Kobo woreda of the Amhara regional state.

The total area of the woreda is estimated at 550 sq. km (Table 1). However, the total area based on a digital data obtained from IPMS GIS Unit is 725.39 sq. km (Annex 3). According to Table 1, the areas of the 10 PAs range from 11 sq. km. (Merewa PA) to 87.29 sq. km. (Selen Weha PA).

Table 1. Name of Peasant and town association of Alamata Woreda

Number	NAME of PA	Households			Area (km ²)
		Male	Female	Total	
1	Kulugize Lemlem	604	332	936	37.2
2	Selam Bekalsi	967	668	1635	68.855
3	Limaat	1309	690	1999	21.80
4	Tumuga	1391	1204	2595	50.86
5	Selen Weha	1811	892	2703	87.29
6	Tao	1051	471	1522	37.945
7	Laelay Dayu	1309	580	1889	51.70
8	Gerjelle	1185	579	1764	54.295

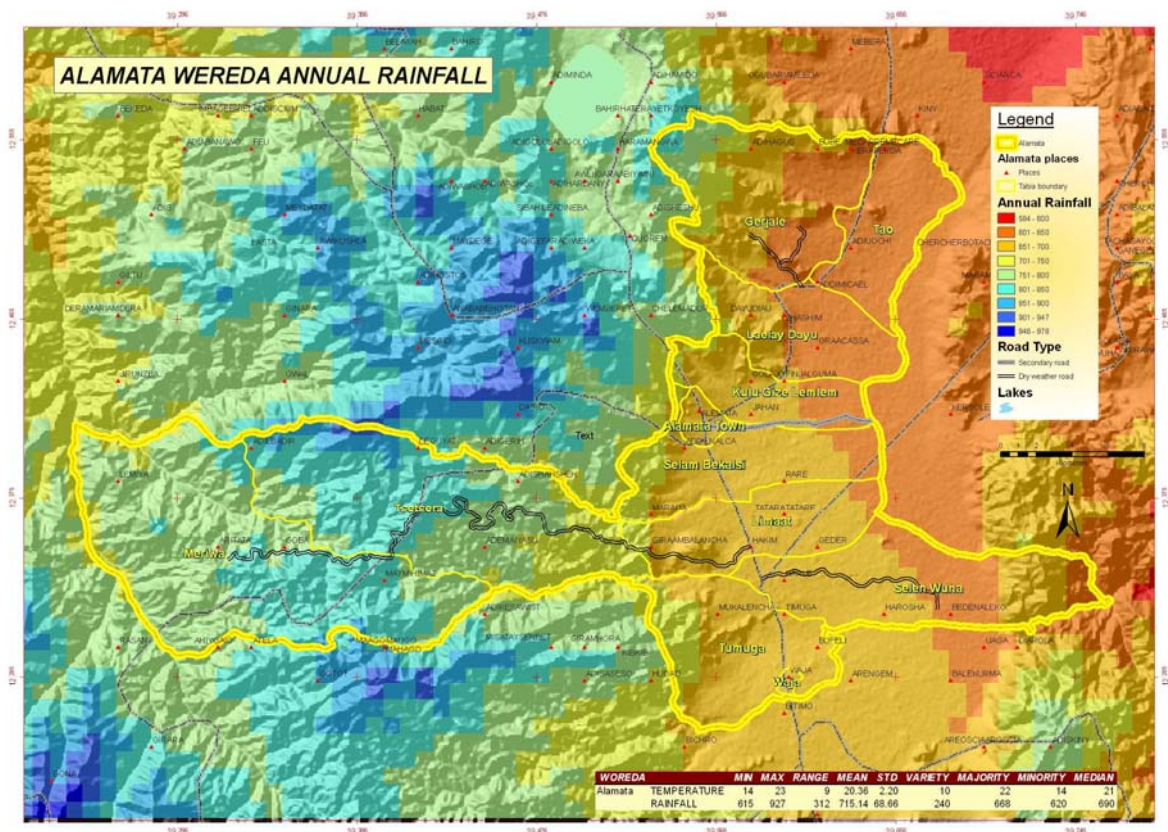
9	Merewa	2032	830	2862	11.125
10	Tsetsera	1730	577	2307	75.58
11	Alamata town*	14085	12094	26179	**
12	Waja town*	1515	935	2450	**
Total					

*Total population

** Missing data

Source: Alamata woreda Office of Agriculture, 2004

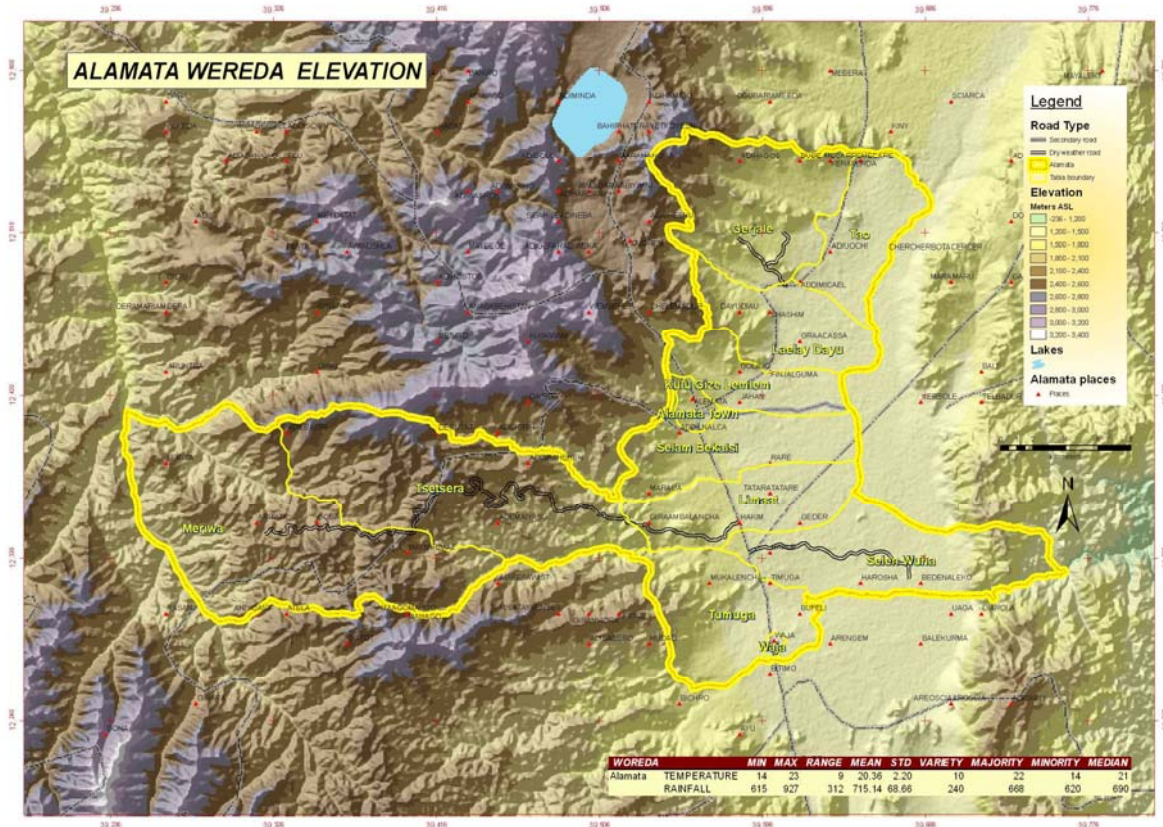
Altitude and rainfall increase from south to north and east to west (Map 2 and 3). Shortage of rainfall (moisture stress) is a major constraint of agricultural production in the woreda. Rainfall is usually intense and short duration. The average annual rainfall for 8 years (1995 to 2002) was 831 mm/yr. The variability is very high that the annual rainfall for these years ranged from 498 (2001) to 1429 mm (1997). Even though data was not available for 2004, rain started very late, around end of August and only rained for a few days. Under normal conditions, however, rain starts around the last decade of June. As a result of all these, Alamata is one the 16 drought prone woredas in the Tigray region. Alamata experiences bimodal rainfall, but since recently the rainfall pattern has drastically changed that the main rains at times start at around the mid of August and stops soon after and the small rains is very uncertain. The rainfall pattern of Alamata woreda is shown on map 2 below.



Map 2. Rainfall Map of Alamata Woreda

The belg (short rains) is from January to February and Meher (long rains) from July to August. In this area both the short and long rains were below average. Reliability of rainfall is increasingly becoming so low year after year that crop production is affected significantly. The short rains are used for land preparation for the main rainy season and also for growing grass for livestock. In addition, it is also used to grow vegetable seedlings in areas where irrigation is not available. The main rains are not also reliable because the rains do not last long enough for supporting crop growth. In the old days, the big rain usually used to start in April at which time farmers would plant sorghum (which lasts for 8 months) and harvest it in November. Farmers in the area still exercise the planting of the long seasoned sorghum but with difficulties of obtaining good harvest. Even if the crop does not fail totally because of the crop's drought tolerance, yield is substantially low. On the other hand, rainfall in the midlands is slightly reliable but because of poor soil fertility and shallow soil depth, productivity is also very low.

Livestock are integral component of the farming system. Oxen provide almost the entire traction and threshing power. Despite the large population of livestock, especially cattle and sheep, productivity is low as in many other parts of Ethiopia. As most of the woreda is in the lowlands, it is suitable for small ruminants, both sheep and goats production. Livestock feed is a major limiting factor in the area. However, sorghum contributes a significant proportion of the supplementary feed resource. Economically important diseases of cattle in Alamata woreda were Black Leg (during rain season), *Bovine Pastureolosis* (in dry season), Antrax, Internal Parasite (Liver fluke etc), Pests (ticks, meng, fleec), Contagious Bovine Preuro Pneumonia (CBPP), Foot and Mouth Disease (FMD), Lamp skin disease, *Strepto trycosis* (Fungal), *Coccidiosis*, Tick born disease (*Anaplasmosis*, *Babisiosis*, Heart water). For sheep and goats, Internal Parasite, External Parasite (Menge, ticks, etc), Antrax, *Ovine Pasteorolosis*, Sheep Pox, *Strepto Trycosis*, Orf (viral disease around mouth and leg) are the common diseases reported.



Map 3. Elevation of Alamata woreda

2.2 Priority farming systems

Two major farming systems were identified in consultation with woreda agricultural experts and confirmed by field observations.

1. Barley, wheat, pulses and livestock farming system (hereafter referred to as pulse/livestock system)

Two of the 10 PAs belong to this farming system and are found on the western ridges bordering Sekota and Kobo (Amhara region) and Ofla (Tigray region) weredas, respectively. Barley is the dominant crop in the area followed by wheat and pulses. For example in 2003/04 cropping season, more than 70% of the cultivated land in these two PA was covered by barley, wheat and teff. The altitudes of these PAs in this farming system are mostly above 2000 meters above sea level (m asl) and are found west of the valley.

The important marketable crop commodities in this area are pulses (field pea, faba bean and lentils, in that order). The average household land holding of the area is between 0.5 and 0.75 ha of which about a fourth of the land area could be covered by the pulses, mainly under field pea and faba bean. Pulses generally fetch higher prices but lentils fetch higher prices (currently at about 400-500 birr/100 kg), than the rest, even though they have lower yield. Soil erosion is a major problem in this farming system and crop productivity is very low as a result.

Regarding livestock production, sheep appear to be more important in this farming system. Sheep fattening, skin, apiculture and dairy for butter production are important marketable commodities in this farming system. Sale of raw milk is culturally not accepted, except for those areas close to the woreda town. Goats are also important in the low lying areas of this farming system.

2. Teff, sorghum, maize and livestock farming system (hereafter referred to as teff, sorghum, maize/livestock farming system)

This is a farming system where altitude is below 1600 m asl and the major crops currently grown are teff, sorghum, maize and pepper (in order of importance). Eight PAs belong to this farming system. The 8 PAs occupy about three fourth of the woreda total area. The average household land holding in this farming system ranges from 1.25 – 1.5 ha. Growing of pepper is very common and farmers prefer this crop more than any other vegetable or even cereal because of its ability to be stored for longer periods without loss and also for fetching higher prices. In addition because it can be sold fresh when farmers are in need of cash.

In this farming system, REST is developing the use of underground irrigation systems. The area is suitable for growing many types of crops, including vegetables (tomato, onion, pepper, lowland garlic). Currently, some of the newly introduced crops are being tested in one of the PA (Limaat), under sprinkler and drip irrigation systems. REST and TAMSA are introducing some industrial crops like cotton and vernonia under irrigation in this farming system. There are about 340 ha which are totally under irrigation (deep and shallow well, treadle, overflow pump and sprinkler). With the development of irrigation system in the area, horticultural crops (tropical fruits and vegetables) are also becoming important activities. Tropical fruits like mango, papaya and orange fruits are being introduced. The growing of guava has however been going on for many years. With the current development efforts, the valley could be soon be an excess production area and be out of the list of drought affected woredas of Tigray. The water table of this area is shallow where some are 3-8 m deep (southern PAs), while it may be around 10-15 metres in other areas (northern PAs). There is some difference in altitude between the southern and the northern parts of the valley.

Culturally, people in Alamata are not used to selling milk. However, it is becoming common for those PAs close to the town. Milking cows fed on parthenium weed produce sour milk and is affecting milk sale in the town and making people to only trust milk that is coming from stall fed cows in the town.

2.3 Priority crop commodities

Currently, Field pea, faba bean, lentils (highlands) teff and pepper (lowlands) are the most important marketable commodities in Alamata. The pulses are grown on rainfed while teff could be grown on rainfed but with supplementary irrigation (spate irrigation), while pepper is totally grown using irrigation. However, the woreda strategic plan has identified other newly introduced crop commodities for the lowland areas as the future focus using underground water as a source of irrigation. The newly introduced crop commodities and identified as future potential are, cotton, tomato and pepper, onion, fruits (papaya, avocado, oranges, guava, mango banana,

and grape vine), haricot bean (rainfed) and groundnut, cowpea and popcorn (in order of importance). Among these crops, farmers traditionally grow pepper, papaya and guava in smaller plots in the valley bottoms. The following table (Table 2) illustrates the area under different crops and their productivity in the woreda.

Table 2. Types of crop, area and expected production from 1999 and 2002 - 2003 cropping seasons

No.	Crop	1999			2002			2003		
		Yield (qt/ha)	Area (ha)	Production (qt)	Yield (qt/ha)	Area	Production (qt)	Yield (qt/ha)	Area	Production (qt)
1	Teff	8.4	9732	81,988	4.5	12836	57730	4.0	13847	55404
2	Sorghum	14.0	3905	54677	0.9	9399	7998	9.1	10356.25	94337
3	Maize	10.2	8569	87335	0	2745		3.0	2606.25	7851.75
4	Wheat	9	2023	18207	5.0	1427	7136	8.2	1751	14280
5	Barley	8.5	3959	33661	3.0	1509	4526	8.7	1858.75	16152
6	Finger millet	4.0	567	2275	2.0	500	998	4.5	305.5	1380
7	Faba bean	8	590	4720	4.0	456	1825	5.5	307	1688
8	Field pea	5.5	680	3740	4	400	1600	4.3	400	1705
9	Chick pea	4	893	3572	1.5	946	1419	4	1511.75	6047
10	Lentils	3	385	1155	2	205	410	2.5	172	430
11	Others	4	150	600	2	76	152	1.5	130	195
12	Flax	3	45	135	1	75	75	2	103	206
13	Noug	2	23	46	1	80	80	2	62.5	125
14	Safflower	4	2	8	2	75	150	2	52	104
15	Sesame	0	0	0	0	0	0	3.0	28.5	86.75
	Total	9.3	31523	292119	-	30,729	84,099		33,491.5	199,991.5

REST is trying to introduce other commercial crops like *Vernonia galamensis L.* (vernonia) to the valley. Vernonia is an indigenous weed plant grown in many parts of the country including Harar, with an average seed yield of 2 to 2.5 t/ha. Amongst the Vernonia spp., the Ethiopian vernonia has the highest oil content of up 41.9% with up to 80% vernolic acid, used in paint formulations, coatings plasticizers, reagent for many industrial chemicals. This crop requires 5-9 months from planting to harvesting depending on the temperature of the area. As the crop is still in its introduction phase no one in the woreda was aware of the current price, market channels, etc. The plant was observed growing well under irrigation in the valley. Different hybrid haricot bean varieties have been introduced to the area, including from South Africa and Italy. It was possible to see some the produced haricot bean in the field being cleaned and ready for sale. The price of the imported hybrid seeds was 750 birr/qt. The woreda strategic plan also indicated that groundnut is a potential crop but due to the soil conditions the productivity of this crop may be limited.

The teff, maize sorghum/livestock farming system has a good potential for growing a variety of crops provided reliable source irrigation water is available. The area has a total cultivable land of about 25,500 ha in the 8 PAs. Many types of crops (food and industrial) can be grown in the area. Presently the major crops grown in the area are

mainly teff and sorghum. With the current attempts of introducing new crops to the area, sustainable water supply is going to be critical for the productivity of these crops. Efforts towards solving problems related to these are going to be one of the major activities. This needs to be done in collaboration with NGOs like REST.

With the number of water harvesting schemes increasing, especially with the construction of deep wells by REST and the small ponds (“horeye”), both the industrial and horticultural crops, including fruit trees (tropical fruits in the teff, sorghum, maize and livestock system), will soon become important commodities. In the pulse/livestock system soil erosion and land fragmentation are important problems. On the other hand, the area of these two PAs is very small in addition to being mountainous hence unsuitable for agriculture. This farming system may be suitable for apiculture and small ruminant production. Some livestock may also be reared in this area using cut and carry system. The area is so degraded with very shallow soil depth it is not suitable for agriculture. During the PRA some people informed us that the Raya Valley and even the current administration had intended to resettle the population, even though the farmers refused.

The market oriented priority crop commodities by farming systems have been identified as follows:

I. Pulse/Livestock farming system:

1st: Pulses (faba beans, field peas, lentils and chick pea)

2nd: Oil crops (safflower, noug and flax)

II. Teff, sorghum, maize/livestock system

1st: Cotton

2nd Sesame

3rd Tomato and pepper

4th Onion

5th Tropical fruits (Papaya, avocado, orange, guava, mango, banana, grape vines)

6th Haricot bean

Vernonia*

Rice*

*This crop seems to have a huge potential in this farming system but this potential need to be determined by appropriate studies. Results from the current introduction efforts are encouraging. There are about 600 ha around Tumuga and Gerjele PAs. These areas need to be assessed for growing rice. In addition to these, the potentials of ground nut, cow pea and popcorn need to be explored as well. Efforts towards introducing and testing these crops in appropriate areas will be essential.

2.4 Priority livestock commodities

Animal resource is one of the potential that is not yet exploited in Alamata woreda. The performance (milk, meat, egg and honey production) and contribution to the regional and national economy is very low mainly due to poor management, low genetic potential, inadequate and low quality feed supply, and the prevalence of

various animal diseases. Animal species reared in the woreda are entirely local breeds except few crosses in one dairy farm in Alamata town. Local breeds popularly known as Raya breed have high milk yield potential.

Economically important diseases of cattle in Alamata woreda were Black Leg (during rain season), Bovin Pastureolosis (in dry season), Antrax, Internal Parasite (Liver fluke etc), Pests (ticks, meng, fleec), Contagious Bovine Preuro Pneumonia (CBPP), Foot and Mouth Disease (FMD), Lamp skin disease, Strepto trycosis (Fungal), Coccidiosis, Tick born disease (Anaplasmosis, Babisiosis Heart water). For sheep and goats, Internal Parasite, External Parasite (Menge, ticks, etc), Antrax, Ovine Pasteorolosis, Sheep Pox, Strepto Trycosis, Orf (viral disease around mouth and leg) are the common diseases reported.

The major animal feed resources during the dry season in Alamata woreda were natural grazing land, crop residue (Teff straw, sorghum and maize stover) and stubble feed. During the rain season, communal grazing land is the most important feed resource. Smallholder dairy farm in Alamata town uses hay, oil seed cake (noug cake), milling by-product (wheat bran) and molasses.

Table 3. Livestock Population of Alamata Woreda

Livestock Species	Population
Cattle	74853
➤ Cows	23334
➤ Heifers	14210
➤ Oxen	16434
➤ Bulls	9456
➤ Calves	
○ Female	6429
○ Males	4990
Sheep	12685
Goats	12286
Donkeys	5274
Mules	91
Horses	75
Poultry	45733
Bee Hives	2742
Camels	1197

Source: Alemata Woreda BoA census (2003)

The marketable livestock commodities for both farming systems are shown below.

Pulses/livestock farming system

- 1st Sheep/goat fattening
- 2nd Skins
- 3rd Apiculture
- 4th Dairy for butter

Teff, sorghum, maize/livestock farming system

- 1st Cattle fattening (Beef)
- 2nd Cattle for dairy (Butter)
- 3rd Sheep/goat production (Meat)
- 4th Skin and hides
- 5th Poultry

The pulse/livestock farming system covers only 2 PAs. The area is not accessible during most of the rainy season and the terrain is very difficult to support sustainable agriculture, except few activities (apiculture). Land holding is very small, erosion hazard is intense and farm lands are fragmented and are mostly on steep slopes. It is very difficult to find some 10 ha adjacent to each other. As a result of this, the woreda administration had identified these 2 PAs as unsuitable for farming. Farmers were then asked for resettlement elsewhere, even though the farmers refused and are still struggling to survive. As a result, the project activities will not consider this farming system, instead will only focus on the teff, sorghum, maize/livestock farming system, which is located in the in the low lying areas of the woreda.

3. INSTITUTIONS

3.1 Marketing

Cooperatives

A cooperative development desk, now under the Office of Agriculture and Rural Development (OoARD), is mandated for the organization and development of cooperatives in the woreda. The desk is organized with 3 teams: credit and marketing; cooperative organization; and auditing, inspection and registration teams. A special team of input supply is currently reporting to the cooperative desk. However, it is not clear whether the input supply team will be permanently under the cooperatives desk. Prior to restructuring the input supply unit was under the crop production team of the office of agriculture. The cooperatives desk has no staff based below the woreda level. All experts of the cooperatives desk perform their duties by traveling to the PAs.

The cooperative desk is mandated to give legal entity to multipurpose cooperatives. Legal entity to saving and credit, and irrigation cooperatives, and to unions is currently the authority of the regional sector of cooperative development, which is under the regional Bureau of Agricultural and Rural Development (BoARD).

There are 11 multipurpose cooperatives in the woreda. Each of the 10 PAs has one multipurpose cooperative. The 11th multipurpose cooperative is at the woreda town of Alamata. Except one cooperative (which is at PA Merewa), all multipurpose cooperatives have been organized under the new cooperatives organization law (which stipulates that the cooperatives should be organized based on share holding basis). The value of a share varies from cooperative to cooperative as decided by the members.

It was reported that every effort is being made to make farmers join or establish cooperatives through persuasion, as opposed to coercion. The multipurpose cooperatives are managed by a 5-person executive committee. In addition, the cooperatives have 3-person, credit committee, 3-person audit committee, 3-person education and awareness committee, and 3-person saving committee. None of the cooperatives is run by a professional hired manager. One cooperative (at PA Limaan) used to have a hired professional manager until 2000. Money embezzlement was reported as one major problem of the multipurpose cooperatives. The experts of the desk believe that farmers strongly view the cooperatives are useful to them, although that perception does not always translate into strong commitment by members.

No cooperative union has yet been established in the woreda. The desk has planned to establish a union during January, 2005. The multipurpose cooperatives have a total membership of about 3541, of which 928 are female. In addition to the multipurpose cooperatives, there are 4 saving and credit cooperatives, all of which are based in rural areas; and 2 construction cooperatives which are based in urban areas. The net capital worth of the cooperatives range from Birr -33, 480 to 47, 343. Three of the cooperatives have negative net capital worth. The negative figures are due to the loss the cooperatives incurred when the price of the grain (esp. teff) they

bought during the beginning of 2000 collapsed, which rendered the cooperatives unable to pay their marketing credit debt. The multipurpose cooperatives had purchased about 6000 quintals of teff, sorghum and maize in 2000. It was reported that marketing credit of about Birr 950, 000 was provided to cooperatives at that time. Because of the loss cooperatives incurred, no grain purchase was made by the multipurpose cooperatives until 2003. The marketing credit was obtained from the Dedebit Credit and Saving Institution (DCSI).

There is no dairy cooperative established in the woreda, but it was reported that the desk had planned to establish two cooperatives soon (one in PA Selam Bekalsi, and another one in Kulugize Lemlem). Although moisture stress is a key limiting factor in the woreda, no irrigation cooperatives have been established yet. Farmers who use the irrigation infrastructure that is developing in the woreda, operate individually. It seems that irrigation cooperatives development needs to be given due consideration alongside the development of irrigation infrastructure in the lowland plain of the woreda. The Relief Society of Tigray (REST) has planned to develop about 100 deep wells for irrigation with an average irrigation capacity of about 25 ha each. These wells are planned to use electric power for their pumps, and farmers are expected to pay for the electric power cost (reportedly about Birr 700.00/0.2 ha/year). Use of electricity is believed to be much cheaper than the fuel pumps. Farmers in the irrigation command areas seem to have about 0.2 ha of irrigable land each.

Only four of the ten PAs have markets in their localities. In the PAs which have no market place, farmers sell almost all of their marketed grain produce to the multipurpose cooperatives. The cooperatives do not buy in markets, but only from their members. Cooperatives also buy from non-members. It was reported that farmers are willing to sell their grain to cooperatives, although private traders may at times provide higher price. The cooperatives sell their purchased grain to traders at the town of Alamata, or sometimes in the capital town of Mekelle. Sometimes the cooperatives sell back to their members. The cooperative desk supply market information and provide technical assistance such as regarding quality of produce to the cooperatives. The fact that cooperatives are the major grain marketing outlet to farmers in the woreda indicate the important role that strengthening the cooperatives can play in improving grain marketing in the woreda.

One cooperative around the town of Alamata has been involved in the marketing of hides and skins. The cooperative sells the hides and skins at the towns of Mekelle, Wukro (where Sheba tannery is located), and Kombolicha (where a tannery also exists).

In addition to money embezzlement, other problems of the cooperatives include lack of confidence of members on their cooperatives, lack of commitment by cooperative leaders, lack of adequate institutional support by woreda level public institutions, and low capital. The major problems of the cooperatives desk include low capacity of staff (esp. experts), shortage of operational budget, lack of office equipment such as computers.

Others

Private traders are actively involved in cereal grain marketing in the woreda, especially in the PAs which have market places, and in the woreda town of Alamata. During good rainfall seasons, the woreda is an important supplier of teff, sorghum and maize to the regional capital of Mekelle.

The fledgling horticultural production using irrigation in the woreda is also selling to private trades or directly to consumers in the woreda. Farmers are seriously concerned about market availability and price stability for their horticultural produce, especially in view of the push to produce these crops using irrigation water by the woreda extension service. There seems to be a good potential to produce horticultural crops in the lowland plain of the woreda, which covers about 75% of the cultivated land. The ground water potential also seems to be high. It is quite crucial to develop markets for these produce if farmers are to be involved in producing them in a sustainable way. Farmers reported that their concern of market availability for horticultural crops is much more serious than for cereal crops, because the latter can always be stored by the household and consumed as food later. Lack of market for horticultural crops can result in heavy loss if the produce are not sold in time or if prices plummet. It was reported that a farmer can get a revenue of up to Birr 2000.00/year from a 0.2 ha of onion and Birr 4,000 from tomato production, if prices are reasonable. It was observed that farmers have been unable to sell their haricot bean produced, which was newly introduced last cropping season using supplementary irrigation. The haricot bean was destined for export.

Private traders are also involved in the marketing of hides and skins, and honey. These are private traders located at the town of Alamata, and some come from Mekelle and other places. Butter and milk are marketed individually, mostly directly to consumers.

3.2 Input Supply

Commercial fertilizer use in the woreda is low, given the relative moderate soil fertility in the lowland plain of the woreda. The lowland areas seem to be benefiting from the top soil eroded from the surrounding mountains and deposited in the lowland plots. Commercial fertilizer is used in the two highland PAs and in irrigated plots of the lowland PAs. For example, during the last cropping season, only 252 quintals of DAP and 250 quintals of urea were distributed to farmers. Most of this fertilizer was used in the irrigated plots of the lowlands. Some of the commercial fertilizer was used for the newly introduced haricot bean production that used supplementary irrigation. Cooperatives were involved in distributing the fertilizer on credit to their members.

Seed supply for teff, maize, wheat, cotton, and horticultural crops (onion, tomato, fruit crops etc.) were reported to be below the need and not arriving in time. The planting material shortage for fruit crops is almost non-existent. Given the high potential to produce fruit crops in the lowland areas, the lack of planting materials has left the production of fruit crops completely undeveloped. There is a newly established fruit crops and vegetables nursery in the woreda, managed by the OoARD. It was reported that the nursery might be converted into a federally managed nursery to supply seeds and planting materials to a wider area along the

valley. Strengthening this nursery site and establishing similar nurseries can play important role in alleviating the problem. Moreover, farmer to farmer supply of seedlings and planting materials is another approach that needs to be explored in the future, since there are signs of private farmers selling seedlings and planting materials in the woreda. Technical training and support to farmers is crucial in this regard.

An encouraging sign has been observed in the supply of farm equipment such as improved beehives, treadle pumps and energy saving improved stoves. These equipment are now being produced by private business men in the town of Alamata. These private business men were given technical training and are now producing the equipment according to model. The improved beehives are mostly used in the highland areas. About 100 improved beehives were distributed to farmers (mostly in the highland PAs) in 2003/4 cropping season. Farmers complain that price of the beehives, which is about Birr 500, is high. The demand for treadle pumps is increasing and farmers appear content with the supply and quality of the treadle pumps.

Family drip (which contain a water tanker, a hose and pipe), hand pumps, watering can, and motor pumps are also being distributed to farmers, especially in the lowland areas. Farmers supplied with family drip fill the water tankers and use drip irrigation to grow horticultural crops. While treadle pumps are mostly used to pump water at or less than 6 meters deep, hand pumps and motor pumps can be used to pump water beyond 6 meters deep. It was reported that about 1487 watering cans water distributed to farmers in 2003/4 cropping season. Farmers were reported to be happy with the watering cans. Using treadle pumps or motor pumps to pump water from ponds has not been appropriate, since the water exhausts quickly. Treadle and motor pumps are more suitable for wells. About 23 motor pumps were distributed to farmers so far, mostly through the household package credit.

3.3 Rural finance

Dedebit Credit and Saving Institution (DCSI)

The Dedebit Credit and Saving Institution (DCSI) is the major supplier of credit and saving services for the rural population in the woreda. Three sub-branch offices provide the service to the rural people. One of the sub-branch offices is located at the capital of the woreda, Alamata; the other two are located at Waja, and Merewa. The sub-branch located at Alamata reported to the Dedebit micro finance office located at Alamata. The other sub-branch offices report to the branch office located at the town of Maichew. The three sub-branches supply credit to about 10, 000 clients.

The credit given to the rural areas in the woreda can be classified into two types: Regular credit and Household Package Credit. Most of the credit is supplied through the household package extension program. A farmer cannot get credit of more than one type. Moreover, a husband and wife can not get credit at the same time. The activities for which regular credit is given include the purchase of fertilizer and improved seeds, livestock fattening, horticultural production, apiculture, handicraft, and small businesses. The household package credit is attached with the household

package extension program. The sub-branch offices give loans in cash or coupon. Loan groups (3-7 people) and loan centers (7-9 groups) are formed at the PA level. There can be several centers in one PA. Before the formation of groups, the sub-branch office gives education and awareness creation to farmers regarding the nature of credit, loan and repayment procedures etc..

Regular credit

There is a credit committee in each PA. The committee is chaired by the loan officer and includes the PA chairperson and vice chairperson, and representatives of PA rural development, women's association, farmer's association, and youth association. The PA credit committee approves credit requests of farmers. The sub-branch office then makes further screening of its own before it disburses credit. For example, farmers with outstanding debts, believed to be not hard working, or have counterproductive habits such as drinking may not be approved for new credit.

After loan request is approved, disbursement document is prepared. The term of the credit is 1 – 2 years, with interest rate of 15%. At third cycle, a borrower can get a loan of Birr 25001 – 5000. The maximum loan in rural areas is Birr 5000. A mandatory saving of 5% of the principal plus Birr 2/month saving is required of borrowers. The savings are now being important sources of loanable fund. It seems that there availability of loanable fund in the woreda is not a problem.

There is no loan insurance system used. Family members are responsible for loan repayment in case of death of the borrower. The group together with the sub-branch office work to get defaulters repay their loans. It was reported that legal litigation has not been found to be effective in loan repayment, as much as social pressure is. The repayment rate of the regular credit to date (for the last 10 years) was estimated to be more than 90%.

The only ineligible category of population for loan are those under the age of 18. Every body else is eligible for loan provided that the person fulfils the requirements of DCSI. The landless and singles can also get credit. However, not all members of a group may be landless.

The Household Package Credit

This credit is tied to the household package extension program. The household package extension program is also popularly called food security program. The DAs, PA leaders subject matter specialists contact farmers to convince them to be involved in the household package program. The Office of Agriculture then gives training to volunteer farmers who opted to be involved in the package extension program. There is no group formation requirement for the package credit. Farmers take the credit individually. It was reported that 30% of the collateral is provided by the woreda and 70% by the regional administration. The fund for the credit also comes from DCSI (50%) and the Regional Food Security Desk (50%). The goal of the household package credit is to help farmers attain an income level that will bring them above the poverty line.

At the Tabia level, a steering committee is established composed of the tabia chair and vice chair, representative of the rural development and the loan officer. The loan committee approves the credit request. The sub-branch office then makes further screening before final approval. Credit given in coupons is used for the purchase of inputs supplied through the OoARS, which may include improved beehives, treadle pumps, improved seed and improved poultry. The sub-branch office provides the farmers with the coupon and farmers get their input from the Office of Agriculture input supply unit.

Credit given in cash is used for such purposes as the purchase of dairy cows, oxen for traction, bee colony, fattening (cattle and small ruminants), fertilizer, local poultry, and local seed. There is a purchase committee organized at tabia level responsible for ensuring that farmers who got cash credit have in fact bought the inputs for which the credit was intended. The sub-branch office is mandated for the collection of credit repayments and pay to the Regional Bureau of Agriculture. The term of the household package credit is 2 – 4 years, with an interest rate of 9%. The only ineligible category are those under 18 years of age. There is no mandatory saving associated with this credit. It was reported that there was no shortage of loan fund for the package credit yet.

The household package credit is expected to be repaid over 2-4 years time. For the 4 years credit, no payment is expected during the first year, only interest is expected to be paid during the second year, interest plus half of the principal is expected to be paid during the third and fourth years each. Simple interest rate is applied, as opposed to the compounded one.

Some of the problems encountered by the credit service (both regular and household package) include low or delayed repayment during drought years, and lack of transportation facilities for the such-branch offices. Credit channelled through cooperatives is limited, except for the marketing credit.

3.4 Agricultural Extension

The agricultural extension service in the woreda is provided by the woreda Office of Agriculture and Rural Development (OoARD). The OoARD is organized with four sectors: agricultural development; natural resources, environmental protection and land administration; water supply and rural roads; and cooperatives development. The input supply service is currently within the cooperatives development sector, although it is not clear yet if it will stay there permanently.

The agricultural development sector is further organized with three teams: crop production, animal production and extension. The extension team will have a team leader, two extension supervisors and a home-economics agent, all of whom will be located at woreda level. An extension supervisor is expected to supervise about five extension centers (PAs or FTCs), while the home agent will supervise home-economics extension activities across the ten PAs. The crop production team has currently 3 BSc (in agronomy and irrigation) and 2 diploma holders (in crop protection and irrigation). The animal production team has currently 1 BSc, 1 DVM, 2 assistant vets with diploma, 2 veterinary technicians with certificate, 2 AI technicians

with certificate, and one meat inspector. Two staff of the livestock production team are completing their BSc degrees.

The extension team has just been reinstated and is currently staffed with only one expert who is not trained in extension. Extension supervisors have not been appointed yet. The extension supervisors' positions were terminated in early 2003. The termination of the extension supervisors' positions had resulted in serious problems of controlling and supervising the DAs. Prior to termination of the extension supervisor positions, the extension supervisors were based in the rural areas. The new structure stipulates that the extension supervisors be located at the woreda level. Ten FTCs have been established in the woreda, i.e. nine of the ten PAs (except Merewa) have FTCs constructed. However, none of the FTCs have been equipped yet.

The extension service in the woreda can be classified into three: the minimum, regular and household packages. The minimum package stipulates that farmers can use improved seeds with traditional soil fertility management and moisture conservation practices. The regular package stipulates farmers to use improved seeds together with commercial fertilizer, chemicals and soil moisture management practices. The household package requires farmers to choose from a menu of extension packages centred around the use of a pond, ground well, or other forms of irrigation such as river diversion. Partial adoption of the household package is permissible, provided that the household proves that it has additional income sources to enable it get above the poverty line.

There are a total of 19 DAs in the woreda, out of which 10 are fresh TVET graduates. Of the remaining DAs 4 are diploma holders and the remaining have certificate of 6-9 months training. Twenty two DAs are currently under training in TVETs. Seven of the 10 fresh TVET graduates, 7 have been working as DAs in the woreda. Evaluation of the performance of the TVET graduates may be needed to assess the competence of the graduates and the relevance of their training to solve problems farmers face in agricultural production and improving their livelihoods.

There is a better understanding of the crucial importance of getting farmers adopt technologies and improved practices voluntarily, rather than through coercion by different means as appears to have been mostly the practice so far. However, pressure still appears to exist on DAs to fulfil quota of farmers expected to join the extension program, since fulfilment of quotas is still a criterion in DA performance evaluation. Further study is required to verify the extent to which such pressure result in coercive involvement of farmers in extension programs. The food-for-work approach for investment on private lands has been terminated, except for some kind of incentives (mainly food aid) used to encourage farmers to make private investment (such as construction of ponds) on their land.

There is a plan to involve all farm households in extension programs, mostly the household package, by the end of 2006. The annual extension activities proceed in steps classified in quarters. Education and persuasion to convince farmers to be involved in the extension programs is conducted during October to December. Training farmers and related preparatory activities (such as construction of ponds, barns etc.) are done during January to March. From April to June, credit delivery and

input supply activities are conducted. Evaluation of the annual extension activities is done during July to September.

Some of the major problems confronted by the extension service include low capacity of DAs and subject matter specialists, lack of pilot testing of programs, lack of learning from experience, serious shortage of operational budget (such as per diems, fuel etc.), shortage of transport facilities, and lack of realistic evaluation of package prior to introduction to farmers.

An interesting phenomenon in the woreda, and in deed in the region, is the shift to zero grazing of livestock from the current free and uncontrolled grazing system. Several research results have been indicating that the free and uncontrolled grazing system in the region is not compatible with the soil and water conservation efforts in the region. Zero grazing may also reduce livestock diseases incidence, in addition to reducing land degradation and destruction of conservation structures. While the shift to zero grazing system may be a timely response, the process through which the shift will take place needs to be planned carefully, in order for the shift not to be coercive.

The Relief Society of Tigray (REST) is working on irrigation water development in the woreda, and introducing new crops to farmers, such as the Ethiopian crop Vernonia. Such activities involve extension work. It is important for the IPMS project to develop close working relationship with REST in the woreda. Moreover, IPMS project needs to plan working collaboratively with the regional BoARD which is preparing to implement an IFAD funded irrigation development project in the woreda.

Table 4. Staffing of Alamata Woreda Office of Agriculture and Rural development

Desk (Department)	Level of education.	Number
Crop production Technical Coordination	12+2 yr; 12+4 yr	2; 5
Natural Resources	12+2 yr;12+4 yr	2; 4
Livestock Production	12+2 yr; 12	3; 5
Cooperatives (DA)		
Development Agents	12+2 yr; 12+9 months; 12+3 months; 10 + 3 yr	30;2; 2; 3
Home economics (DA)	12+9 months	10
Extension Supervisors	12+2	25

3.5 Gender and HIV-AIDS service

The woreda women's affairs office has been established in 2002 to handle women's affairs issues. About 28% of household heads in the woreda are female headed. Although the office does not have its own structure below the woreda levels, gender issues are handled by different sectors at PA level. The home-economics agent together with other sectoral staff (health, education, agriculture) are involved in education regarding gender issues. Special support for girl's at school, such as additional classes for girls, is being organized at schools. It was reported that, partly because of special support to girls at school, about 300 girls stood from 1st to 10th

during the 2003/4 school year. Girl's are also being organized at school to help each other.

The culture in the lowland areas of the woreda is heavily biased against women and girls. Underage marriage and girl circumcision are commonly practiced. In 2004, the woreda women's affairs office estimated that there were about 300 planned underage marriages, of which 260 were cancelled by concerted efforts to convince families against the marriages. Six underage marriages were brought to court. The minimum girl's age for marriage is 18 years, but parent over report the age of their daughters in order to get them married early. Divorce appears to be common, mainly because of underage marriage. Multiple wives is common, especially among the Muslim population.

Marriage registration and pre-marriage HIV test are being encouraged widely. All marriages that took place 1998 and are not registered are not being legally recognized. Recently, about 240 couples were tested for HIV, of which about 12 girls were found positive. Voluntary test for HIV appears to be higher in rural than in urban areas. The woreda has two HIV testing clinics (one in the health centre and another one at the hospital). Distribution of contraceptive pills by the home-economics agents is proving more effective as women tend to be more comfortable with the home agents than with clinic workers. It was reported that husbands consider taking contraceptive pills as a sin, and wives take the pills in secret from their husbands.

Rural land is equally distributed among husband and wife. However, women who settle their divorce cases traditionally may not get their share of land upon divorce. The women's affairs office head believes that production of vegetables and fruits can benefit especially women.

A woreda level AIDS Board oversees the AIDS prevention and control activities in the woreda. A similar board exists at PA level, as well. The woreda level board consists of the woreda administrator (chairperson), representative of the health bureau (secretary), and representatives from the capacity building, and education bureaus. The PA level board consists of health agent, PA chair and vice-chair, and representative of youth, women and farmer associations. There is one full time expert at woreda level who works on HIV-AIDS issues. There is no paid staff below the woreda level.

The reporting to the woreda HIV-AIDS expert by the different boards is weak due to the absence of line authority over them. Training is given to staff of different sectors on HIV-AIDS. There are anti-AIDS committees at every office in the woreda. Moreover, anti-AIDS clubs have been organized at schools. Voluntary testing for HIV is increasing in the woreda, especially among rural residents. The testing centres are sometimes unable to give service to all who come for testing, because of the shortage of staff who could give the pre-testing counselling. No association of people infected by the virus has yet been organized in the woreda.

Awareness about HIV-AIDS is now high, but change in behaviour is very slow. Some people think that if one can live for up to 10 years after infected, that is a long enough time not to worry about the disease. The cultural factors for the spread of HIV-AIDS include inheritance of widow by a brother (among Muslim community),

suckling of one's child by another women, and multiple wives (esp. by Muslim community).

4. PRIORITY COMMODITY DESCRIPTION, ANALYSIS AND POTENTIAL INTERVENTIONS

There were two farming systems identified for the woreda, however, the project activities in this PLS will focus only on the Teff, sorghum, maize/livestock farming system, which is located in the low lying areas of the woreda. As a result, Chapters 4 and 5 will not consider commodities for the other farming system. Please see reasons for not considering this farming system at the end of Chapter 2.

The following tables provide a brief description of production, input supply and marketing aspects of the priority commodities together with areas requiring attention and potential interventions as suggested by farmers and professionals during the Woreda planning workshop. In addition, the possible institutions to be involved in executing these activities are also shown.

Teff, sorghum, maize/livestock farming system

Table 5. Cotton		
Production		
<p>Cotton production is a new venture in Alamata. The environment of the Raya valley is suitable for cotton production. It has been interesting to hear that cotton was growing during the Italian invasion and some time after. Experts of the OoA informed us that there are still parts of a Ginnery present in Alamata town which was operational then. After breaking for so many years cotton is being reintroduced to Alamata.</p> <p>The average land holding in the woreda is around 0.75 ha. The proportion of land under cotton is dependent upon the availability of irrigation water. Currently, REST is digging deep wells to be used for irrigation and 12 wells are already dug. It is expected that about 100 deep wells will be dug by REST, where each well is expected to irrigate about 25 ha at an average. Once these underground irrigation sources all completed it is expected that cotton production will be boosted. The Raya Valley is one of the areas considered suitable for cotton production in the country. The central government is intending to develop 4 million ha to be planted for cotton production. Currently, the government is intending to develop the Raya Valley as part of this scheme. Of the 12 dug deep wells developed by REST, 1 is completed and irrigating 20.4 ha in Limaat PA using sprinkler and drip systems. Another one at Tumuga PA was completed and was irrigating 37.4 ha even though farmers had dismantled this system and is no more operational. This scheme will soon be renovated and ready. Every household in the REST developed irrigation sources is allowed to have 0.2 ha for irrigation. Furthermore, there is a possibility of growing cotton on about 16,000-23,000 ha of land using supplemental or spate irrigation. At present, some of the spate irrigation is improved by construction of series ponds (to stabilise runoff and serve as temporary storage and improve water distribution) and distributory canals. Field visits to the site indicated that cotton Acala SJ-2 variety is doing well in the area. Other improved variety called Deltapine-90 is also introduced to the area. These two varieties were developed by Werer Research Centre.</p>		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
New introduction	Training of both experts and farmers	Werer /EARO, TARI

hence lack of knowledge on agronomic practices in both farmers and experts (plant population, sowing date, crop rotation, etc.)		OoA – extension IPMS - TA
Limited number of varieties introduced	Increase number of varieties to be introduced for a wider choice	Werer/EARO, TARI
Poor yield	Introduce high yielding improved varieties	Werer/TARI IPMS -TA
Potential problem due to irrigation water application	need to consider salinity problems using appropriate irrigation methods.	TARI/EARO, OoA
Water requirement not known (frequency and amount of water)	Establish cotton water requirements.	TARI/EARO-Werer, IWMI IMPS-TA
Insect pests (aphids, white fly, spider mites, jassids and boll worms)	Development of resistant varieties and avail insecticides timely, use of crop rotation, Environment friendly control techniques, Establish threshold levels for control.	TARI/EARO Melka Werer Wadimedani Research Centre/Sudan, OoA – Extension, IPMS - TA
Unwise use of insecticides	Environment friendly control techniques and efficient application in relation to insect and crop development stages.	Werer/EARO IPMS -TA
Drip irrigation equipment handling, maintenance problems	Train private handcrafts, experts and farmers on equipments handling and maintenance.	OoA-Rural Technology IPMS-TA
Input supply		
Currently the OoA is supplying cotton seed. The seed comes from Werer, Isreal and Seed enterprise. One hundred kg of cotton seed costs 800 birr.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Cotton seed supply availability	Establish cotton seed producers	OoA-extension IPMS-TA
High prices of cotton seed	Establish cotton seed producers and develop small scale ginneries	OoA-extension, REST IPMS-TA
Shortage of insecticides	Organise cooperatives to supply pesticides	OoA-extension, IPMS-TA
Availability of cotton sacks	Organise cooperatives to supply cotton sacs	OoA-extension, IPMS-TA
Availability of irrigation equipments	Strengthen existing private efforts through continued training	REST, OoA-extension, IPMS-TA
Credit		

Credit not available for buying cotton seed and pesticides	Facilitate credit for cotton production	OoA/DCSI IPMS - TA
Marketing		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Requirement of organic cotton for international market	Knowledge on level of pesticide for organic cotton needed	TAMSA IPMS - TA
Lack of knowledge about market information in cotton	Direct linkage between producers, textiles and private exporters	TAMSA IPMS - TA
Lack of knowledge on cotton quality pricing	Training of both experts and farmers (service cooperatives) on quality cotton production and facilitate contract farming	TARI/EARO-Werer, Almeda Textile PLC IPMS-TA
Service cooperatives for buying and selling cotton not organised	Organise service cooperative	OoA/Cooperatives IPMS - TA
Storage facilities inexistent	Assess and introduce storage facilities	EARO/ICARDA, TARI – technology assessment OoA/Coop – extension

Table 6. Tropical fruits –(Papaya, mango, avocado, banana, orange, grape vine)

Production		
<p>The area is suitable for tropical fruit production. Many farmers have the experience of growing papaya in their backyards. Banana is also grown in the backyards to a lesser extent. Grape vine and avocado are also grown in some houses in the town and are reported to be doing well, indicating the suitability for growing these fruits. Currently the woreda OoA has established a nursery and is raising mango where about 28,000 is seeding area ready for grafting. There has already been 115 mango seedling (2-3 seedling per farmer) of Dado variety distributed to farmers. About 360 banana suckers from three different banana varieties (Payo, Giant Cavendish and William-2) were also distributed to farmers each receiving 3-20 suckers each. Considering the easy availability of underground water by households, the potential of these fruits in improving livelihoods of the small scale farmers will be important. These fruits are also planned by the woreda Strategic Plan Management (SPM).</p>		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Newness to the technology and lack of knowledge of fruit management	Practical training of DAs and farmers experience exchange programmes, increased on-farm introduction, appropriate management practices	Melkassa/TARI/ICRAF on farm research, including economic assessment OoA – extension IPMS - TA
Lack of technical backstopping and experience	Capacity building of staff and farmers.	Melkassa/TARI/ICRAF OoA-Extension IPMS - TA
Input supply		
<p>Currently, seedlings are produced in a government nursery with support from the woreda administration. There is a high demand for fruits seedling by farmers but the OoA has only got mango in a reasonably good amount even though they are not yet grafted and distributed.</p>		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Lack of sufficient planting materials (seed, seedlings)	On-farm program of multiplication of planting material (fruits) by farmers	TARI/Melkassa/ICRAF – TA for establishing cooperative/on farm nurseries system and capacity building including grafting OoA – extension
Limited numbers of fruit varieties available	Introduce and test different types of fruit varieties	TARI/Melkassa/ICRAF - TA
Marketing		
<p>Some of the fruits are newly introduced and will require some time before they are ready for marketing. As at now, there is no marketing problem, especially for papaya. Future market opportunities will be wider because Alamata lies between two big towns (Mekelle and Dessie). In the future value added activities of fruits might contribute significantly to the livelihood improvement.</p>		

Table 7. Vegetables –(Pepper, tomato and onion)**Production**

Many types of vegetables could easily be grown in the valley because of the conducive climate and easy access to water. Among these vegetable the culture of growing pepper has a longer history in the area. As a result, farmers have developed own systems. During our visit, farmers were observed growing pepper for sale. Young seedlings of about 60 days from a 2m² area could be sold at 40–70 birr. The seeds used for raising these seedling could cost about 4 birr. Normally pepper is transplanted after about 60 days. Similar systems need to be developed for the other vegetables for successful promotion of vegetable. Efforts are under way through the OoA and REST to introducing different vegetables. Currently prices of vegetables are not encouraging. For example . a crate full (net weight of 50 kg) of tomato is sold at 12-15 birr. Last year, this same crate was sold at 120 birr. Similarly, onion is also sold cheaply and some of the farmers we talked seemed to be discouraged with the low prices of these vegetable. Even then different vegetables were observed grown using the irrigation schemes developed by REST. The current attempts of boosting irrigation in the area is likely to drive prices low and hence other innovative ways of producing and marketing need to be assessed. During the PRA process, the group was informed that TAMSA was trying to create a market for dried tomato to Germany.

Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Poor seedlings management	Practical training vegetable seedling management.	Melkassa/TARI OoA – extension IPMS - TA
Poor yield	Introduce high yielding improved varieties (Pepper, onion & tomato).	Melkassa/TARI/ICRAF OoA-Extension IPMS - TA
Amount and frequency of water application unknown	Establish optimum water application schedules for vegetables.	TARI, EARO/Werer, OoA OoA – extension, IWMI IPMS - TA
Lack of knowledge on proper agronomic practise of vegetables	Introduce and verify appropriate management practices to optimise quality vegetation production.	TARI, EARO/Werer, OoA OoA – extension IPMS - TA
Disease (root rote, late and early blight, purple blotch, powdery and downy mildew) and pest (boll worm, thrips) problems.	Introduce disease and pest resistant varieties. Manipulation of management practise (e.g., crop rotation and sowing date).	TARI, EARO/Werer, OoA OoA – extension IPMS - TA
Lack of proper knowledge on post-harvest handling.	Practical training to improve the proper time of harvest, transport, handling and storage.	TARI, EARO/Werer, OoA OoA – extension IPMS - TA
Improved seeds unavailable	Avail research supported improved varieties through farmer seed multipliers	OoA – extension, PAs-coop IPMS - TA

Input supply

Currently, there are no improved varieties of vegetables, hence farmers grow own seeds or seeds bought from town. However, pepper trials showed that Marekofana variety to perform better than the local varieties. However, seed of this variety, even though selected by farmers is

not available in the market. Similar problems exist for tomato and onion. Vegetable growers purchase fertilizer from AISCO, pesticides and watering cans from OoA and small scale private shops. The supply of fungicides is not available in the Alamata town. With these vegetables prone to fungus, unavailability of this input may determine productivity of these vegetables. Efforts are under way to encourage private metal workshops to produce a replica of already existing irrigation equipments (treadle pump, hand pump). Some workshops are already producing these equipments in Alamata town.

Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Lack of sufficient planting materials for improved vegetables (seed, seedlings)	On-farm program of multiplication of planting material (vegetables) by farmers	TARI/Melkassa/ICRAF – TA for establishing cooperative/on farm nurseries system and capacity building including grafting OoA – extension
High fertiliser and pesticide cost	Use manure and compost, introduce and test insect resistant vegetable varieties	TARI/Melkassa/ICRAF - TA
Unavailability of fungicide in Alamata	Encourage cooperatives and private small scale traders to purchase and sell fungicide	OoA – extension, PAs Coop IPMS-TA

Credit

Vegetable growers get credit from for fertiliser and watering cans from DCSI. Pesticides and seeds need to be purchase from cash in hand. The existing credit system is not flexible. For example farmers complain that the credit they get for vegetable production want to repay their loans immediately after harvest (4-6 months). However, according to DCSI regulation farmers need to pay an interest for 8 months. The other problem mentioned by farmers was the group credit system.

Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Rigid credit system	Encourage development of flexible credit system	DCSI, REST, OoA-extension
Group credit system discouraging farmers	Create other convenient (farmer preferred private credit systems)	DCSI, OoA-extension IPMS-TA
Weak capacity of service cooperatives	Strengthen service cooperatives	DCSI, OoA-extension IPMS-TA

Marketing

Market potentials for vegetables may need to be assessed because there will be high number of vegetable growers in the future. Currently marketing of vegetables is done on an individual basis. The marketing of vegetables will also depend, especially up on the production of vegetables in other areas. However, the farmers in general lack market information and are severely affected by lower prices of their produces. During the PRA farmers were complaining of very low prices of onion and to the extent informed the group that farmers were even dumping their onions and tomato because unexpectedly low prices.

Areas which need to be addressed	Potential interventions	Responsibilities/tasks
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Market fluctuation	Organize cooperatives to buy and sell member cooperative	OoA-extension, REST, IPMS-TA
Lack of market information	Strengthen cooperatives and link with TAMSA	TAMSA/OoA IPMS - TA
Weak capacity of service cooperatives	Strengthen service cooperatives	OoA-extension, REST, IPMS-TA
Poor shelf life, especially for tomato and onion	Introduce improved cool storage facilities from research	Adet Research Centre/TARI IPMS -TA

Table 8. Sesame –		
Production		
Currently, the area under this crop is less than 30 ha and productivity is less than 5 qt/ha. However, there is a great potential for sesame in the lowlands of Alamata. Two improved varieties, Adi from Were and <i>Hirhir</i> from Humera, are already introduced to the area. These varieties are intended to grow under rainfed and sometimes supplementary spate irrigation.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Poor yield of local varieties	Popularise better performing improved sesame varieties.	TARI, EARO/Werer OoA – extension IPMS - TA
Low quality sesame (grain color and oil content)	Popularise the Humera type sesame variety “ <i>Hiri</i> ” (white grain with high oil content).	TARI, EARO/Melka Werer Wadi Medeni/Sudan OoA – extension IPMS - TA
Lack of knowledge on improved agronomic practices	Training of extension staff and model farmers on improved management practices.	TARI, EARO/Melka Werer, OoA OoA – extension IPMS - TA
Diseases and insect pests	Develop sustainable disease and insect control of sesame such as Resistant varieties and crop rotation.	TARI, EARO/Werer, OoA OoA – extension IPMS – TA
Improved seeds unavailable	Avail research supported improved varieties through farmer seed multipliers	OoA – extension, PAs-coop IPMS - TA
Input supply		
Currently, there are two improved varieties of sesame introduced but are not widely adopted, because they are still on demonstration in one FTC (Selam Bekalsi PA) hence farmers grow own seeds or seeds bought from town. The Alamata Research Centre is also conducting adaptive research for 8 different released sesame varieties. Reports from the centre indicate encouraging performance of sesame varieties under rainfed conditions.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Lack of sufficient improved seeds	Introduction and on-farm multiplication sesame by farmers	TARI/Werer OoA – extension/cooperatives IPMS – TA
High fertiliser cost	Encourage organic farming	OoA - extension
Credit		
Farmers buy fertiliser on credit from DCSI or own cash and do not need chemical application for sesame.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks

Group credit system discouraging farmers	Create other convenient (farmer preferred credit systems)	DSCI/REST, OoA-extension IPMS-TA
Weak capacity of service cooperatives	Strengthen service cooperatives	OoA-extension
Marketing		
There is no marketing problems as at now. The price of sesame around Woldiya (next big town to the south) is about 700 birr/qt. In Humera the farm gate price is 850 birr/qt. What is currently produced is not much. Besides, sesame can have value added market advantages (oil and sesame cake) for small scale farmers.		
<i>Areas which need to be addressed</i>	<i>Potential interventions</i>	<i>Responsibilities/tasks</i>
Poor quality (grain colour and oil content) of the current variety	Change local varieties with <i>Hirhir</i> type (white grained, high oil content) and others with similar quality characteristics	TARI, EARO-Werer OoA-extension IPMS-extension
Storage facilities in existent	Strengthen cooperative capacity	OoA-extension, REST IPMS-extension

Table 9. Lowland pulses – (Chick pea and haricot bean)

Production		
Chick pea is grown using residual moisture and the average yield is between 8-10 qt/ha. Farmers usually grow local Cultivars. Recently, improved chickpea varieties Shashu, Ararti and Marye showed a better performance than the local cultivar. Marye is a big seeded variety usually preferred to be consumed green and is available on sale in the local market. At present, this crop fetches about 300-400 birr/qt. On the other hand haricot bean is a newly introduced pulse to the lowlands of Alamata, through contract farming in 2004. Hybrid haricot bean seeds from South Africa (Red Spike variety) were distributed to about 800 and grown on 212 ha of land. Other haricot bean varieties from Italy (Borletto, Yellow pod, Black seed and Contender) were grown on 10 ha of land by 40 farmers. The vegetative growth was reported to be very good but the yield was low due to late planting and early cessation of rainfall.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Low soil moisture	Early planting (August) for chick pea and application of supplementary irrigation for haricot bean.	OoA – extension IPMS - TA
Poor yield	Verification of better yielding improved chick pea and haricot bean varieties	TARI, OoA – extension IPMS - TA
Lack of knowledge on improved agronomic practices on haricot bean	Training of extension staff and model farmers on improved management practices	Melkassa/Awasa OoA – extension IPMS - TA
Diseases and insect pests	Verify resistant varieties and crop rotation or seed treatment.	TARI, Melkassa/Awasa Research Centres OoA – extension IPMS – TA
Damage by camel (chick pea)	Community based regulations instated	PA OoA-Cooperatives
Improved seeds unavailable	Avail research supported improved varieties through farmer seed multipliers	OoA-extension/Cooperatives IPMS-TA
Input supply		
Farmers in the lowlands of Alamata do not apply fertilisers for chick pea. The use of improved seed is poor, instead farmers use own seed or locally bought seeds from the market. For haricot bean seeds were obtained from abroad at a price of 750 birr/qt, while fertiliser was obtained from AISCO.		
Areas which need to be addressed	Potential interventions	Responsibilities/tasks
Lack of sufficient improved seeds of chick pea	Introduction and on-farm multiplication sesame by farmers	TARI/Werer/ OoA – extension/cooperatives IPMS – TA
Late arrival of improved seeds of haricot bean	Timely arrival of planting material and encourage farmers for seed multiplication	Cooperatives OoA – extension IPMS

Credit		
Farmers buy insecticides for chick pea and haricot bean on cash. Both haricot bean seed and fertiliser were obtained from OoA and AISCO on credit basis. With the introduction of improved inputs of chick pea and intensified production of haricot bean, there is an expected increase in input requirements and credits.		
<i>Areas which need to be addressed</i>	<i>Potential interventions</i>	<i>Responsibilities/tasks</i>
Limited use of credit (chick pea)	Encourage use of improved inputs on credit/cash on hand	DCSI, OoA-extension IPMS-TA
Marketing		
The local market for chick pea is high (300-400 birr/qt). However, the market channel for haricot development attempts is unclear and this might affect the current problem initiatives.		
<i>Areas which need to be addressed</i>	<i>Potential interventions</i>	<i>Responsibilities/tasks</i>
No clear market channel on haricot bean marketing	Strengthen service cooperatives to enable buy and sell haricot bean	TAMSA, OoA-extension IPMS-TA
Market quality of haricot bean was not known to farmers initially	Link producers and buyers for meeting quality standards	TAMSA, OoA-extension IPMS-TA
Lack of storage facilities	Strengthen cooperatives	PAs Coop, OoA-extension

Table 10. Cattle Fattening (Beef)		
Production		
Cattle fattening in Alamata Woreda is not very well practiced. There is cultural trend of cattle rearing with no intention to increase meat productivity of the local breeds. However, few farmers fatten their draught oxen after cultivation operations are completed and buy thinner oxen to be used the following season. This exercise helps them earn extra income. Large number of cattle holding is a common practice for prestige value. Oxen are reared for plowing purposes than for meat. Old oxen therefore, come to market for meat sell. Meat from female animals is used from those with reproductive problem (sterile, old etc). Direct beef cattle sell in Alamata market is common that came from Afar and Amhara region. Rahwa Private Enterprise started fattening livestock in this area.		
Areas which needs to be addressed	Possible intervention	Responsibility
Few farmers practice fattening of cattle because of lack of knowledge	Training farmers on the the techniques and benefit of cattle fattening.	OoA– extension IPMS - TA
No practice of urban cattle fattening	Training, give access to credit and required facilities	OoA– extension IPMS - TA
Lack of large body sized bulls	Selection of large body size breeding bulls from Afar	OoA– extension TARI, IPMS- TA
Lack of feed resources	Encourage fodder tree plantation around closure areas and irrigation dike	OoA– extension TARI, IPMS- TA
Problem of large cattle holding for prestige	Train farmers limited and selected breeds for fattening	OoA– extension TARI, IPMS- TA
Transhumance during draught condition	Develop grazing land renovation, area closure and enrichment	OoA– extension REST, IPMS- TA
Lack of proper castration technique	Train farmers on proper castration	OoA– extension
Uncontrolled movement of animals (from Afar and Amhara regions)	Train farmers on animal disease control	OoA– extension TARI, IPMS- TA
Poor knowledge on improved feeding systems	Increased utilization crop residue, supplementation, improved forage production	OoA– extension TARI, IPMS- TA
Marketing		
There are only one slaughter house and 7 Boucher in Alamata town. Most cattle are slaughtered during holidays and non-fasting months. Currently beef market is restricted to local consumption. However, Rahwa Cattle Fattening Enterprise was providing live animals to military and Mekelle town Boucher. Live animal sale is common and selling is done on an individual basis.		
Areas which need to be addressed	Possible intervention	Responsibility
Limited market information, resulting in low prices	Use all means of communication (Radio, etc)	OoA –coop. TAMSA, IPMS TA
Poor cattle price due to poor feed resources	Develop proper feeding systems	OoA– extension TARI, IPMS- TA
Limited linkage with traders	Increase linkages with local and export market system	OoA –coop. TAMSA, IPMS TA
Limited local market	Increase linkages with local	

	and export market system	
Alamata is a major centre for cattle market including from Afar and Amhara regions	Strengthen quarantine in order to supply disease free cattle	
Low anti-mortum and post-mortum examination service	Training of farmers to improve quality of marketable meat and cattle	
Input supply		
Input supply specifically for cattle fattening purpose is not available in Alamata woreda. Use of feed supplements and improved feed resources are not common. Veterinary services from OoA are provided during programmed vaccination period and during disease outbreak cases. There are no well organized facilities for animal movement control and disease inspection for healthy animal delivery to the slaughter houses.		
Areas to be addressed	Potential Intervention	Responsibility
Poor supply and few sources of industrial by-products (oil seed cakes, molasses, etc)	Forage development, crop residue improvement, Chemical and material supply Technology and material supply	OoA –coop. TAMSA, IPMS TA
Inadequate water supply for improved fattening	Use of hand dug wells and Avail materials for watering	OoA –coop. REST, IPMS TA
Insufficient veterinary service and drug input	Encourage private traders to supply veterinary drug and materials, Train privates	OoA –coop. IPMS TA
Lack of trained man power	Training and capacity building	OoA –coop. IPMS TA
Credit		
DCSI is the only institute available in Alamata woreda. Credit is accessed for food security packages on individual household basis and on collateral basis for any other activity. The maximum amount of money allowed is 4700 Birr/household.		
Areas to be addressed	Potential Intervention	Responsibility
Credit not available specifically for fattening	Negotiate with DCSI to give credit for fattening	OoA, DCSI
Credit arrangement for fattening inconvenient	Apply individual loan scheme	OoA, DCSI
Credit process too long (2 weeks up to 1 month)	Shorten loan processes	OoA, DCSI

Table 11. Dairy production		
Milk production is based on local cattle breeds in the rural areas of Alamata. There is, however, a start of urban dairying the town using exotic (Holstein) breed. Begait (western Tigray breed) heifers/cows were also introduced and joined the traditional management. Feed and feeding systems are based on low quality feeds with no intention for feed improvement and supplementation. Proper health service for dairy purpose is not available except regular vaccination and treatment during outbreaks. Production from the local breeds does not exceed 2 l/day.		
Areas to be addressed	Potential Intervention	Responsibility
Lack of improved forage	Improvement of forage development suitable to the system	TARI OoA IPMS - TA
Poor genetic potential of local breeds for milk production	Selection of better local breeds, improvement of the indigenous genetic makeup upto 50% exotic blood and introduction of better milk yielding breeds,	TARI OoA ILRI
Poor knowledge for increased utilisation of locally available feed resource	Feed preservation (hay), increase crop residue utilization, apply supplementation	TARI OoA ILRI
Animal health service is not satisfactory	Prevention and control of infectious and parasitic diseases	OoA ILRI
There is no improved husbandry	Apply sanitation and proper housing	OoA ILRI
Poor knowledge of farmers on specialised dairying	Training of farmers	OoA ILRI
Deterioration of milk quality because of <i>Partinum</i> weed	Confined feeding system Technology/ Research for its elimination	OoA ILRI
No selection for better milk yielding cows is practiced	Apply bull selection based on dams milk yield	TARI OoA ILRI
Swampy areas less used for animal production, except during the dry season	Train farmers on cut and carry so as to use the swampy areas.	TARI OoA ILRI
Cultural barriers on use of milk from small ruminants	Introduce goats for dual purpose, apply training on goat milk utilization	Pas-coop OoA ILRI
Marketing		

Milk supply from rural areas is seasonal and greatly confined to availability of feed during the rainy season. Milk from rural farmers however, has less preference due to its sour test that has developed due to feeding on <i>Partinum hystrofers</i> . Milk produced from smallholders in Alamata town and PAs close to the town is the current source for hotels and few residents.		
Areas to be addressed	Potential Intervention	Responsibility
Milk supply is seasonal mostly confined to the rainy season (when feed available)	Introduce improved feed supply for year round supply	
Consumer hesitation due to milk quality and hygiene that comes from rural farmers	Milk collection and inspection through cooperative formation; Training of farmers on tethering and milk processing and handling	OoA, ILRI-Debre Zeit, IPMS - TA
Cultural barriers on the sale of milk by rural farmers	Training of farmers on the benefits of milk production	OoA IPMS
Less attention to whole milk sale (butter processing is preferred)	Butter processing technology	OoA ILRI – Debre Zeit IPMS
Current urban milk supply of Alamata town is only from one farmer with 4 milking cows producing about 12 litres/day/cow and some farmers close to the town	Assist in expanding urban dairying and promote extension services	OoA ILRI – Debre Zeit IPMS
Partinum weed affecting milk consumption	Introduce cut and carry feeding system	OoA IPMS
Milk supply not fulfilling demands	Encourage urban dairying and cut and carry feeding so that partinum is not part of the feeding system	OoA IPMS
Input supply		
Input supply for dairy sector in Alamata Wereda is very low and only restricted AI and veterinary services to the local breeds. Extension packages on forage development, breed improvement, diversified species utilisation (like dairy goats), and locally available feed resource improvement is very weak. AI services are delivered by the OoA. There is one veterinary drug store that has opened recently. Veterinary services from OoA are provided during programmed vaccination period and during disease outbreak cases.		
Areas to be addressed	Potential Intervention	Responsibility
Less focus on dairy extension packages	Give emphasis to improved dairying	OoA IPMS
No training on improved dairy production	Train farmers and technicians	OoA IPMS
Lack of improved dairy breeds	Strengthen the AI service and private bull stations	OoA
Credit		
DCSI provides money to farmers, however, dairy as specialised activity does not yet receive loan, but instead for livestock reproduction purposes (4700 Birr). If the loan is diverted for dairy production, it is insufficient to start dairying. This particularly so in urban areas where land is also other limiting.		
Areas to be addressed	Potential Intervention	Responsibility
Credit insufficient for cattle dairying	Encourage formation of	DCSI, OoA-coop

	cooperatives and use of dairy goats once the taboo is removed	IPMS
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Table 12. Sheep and Goats (meat)		
Production		
Fat-tailed sheep called Eille is the most dominant in Alamata Woreda. There are some crosses (Eille x Highland sheep). Large sized highland goats were introduced in the last 7 years as a food security package. The goats are dual purpose and production was found to be very encouraging. They are however kept under traditional management with no improved feeding and housing system. Currently the population of both sheep and goats is about the same in the woreda.		
Areas to be addressed	Potential Intervention	Responsibility
Demand for Eille meat and its skin is low	Focus on crosses between Eille and highland sheep	
No exercise of supplementation and improved feeding	Train to adopt improved feeding systems	
Internal and external parasites and diseases problems affecting productivity	Train paravets, encourage private traders to sell veterinary medicine	
Lack of better breeds with faster weight gain	Introduce improved breeds and improved feeding, health and management aspects	
Lack sheep and goat fattening knowledge	Training on fattening	
Low value of meat and skin from Kolla sheep (Eille) has less preference	Focus on crosses	
Marketing		
Sheep and goat market is seasonal mostly during the holidays. Marketing is done on an individual basis as for the other commodities. Middle men collect from Alamata market and its surroundings and transport them to Mekelle town. Eille sheep is less preferred for its meat and attracts lesser price than the sheep from the highlands and the cross. Goats have better market than sheep in Alamata town because most hotels sell goat meat.		
Areas to be addressed	Potential Intervention	Responsibility
Less meat and skin preference from the Eille sheep	Introduce the cross between highlands and Eille	
Middle men based market to Mekelle and other towns during holidays		
Seasonal market, during holidays,	Awareness of farmers for direct selling of their product	
No market information given to farmers	Provision of market information	
Input supply		
Extension support for improved sheep and goat production and marketing is very weak. Veterinary service focuses on regular vaccination and treatment during disease outbreak. Local highland goats were introduced as food security package with no intention for improved dairy goat production. Nothing has been done to improve the local breed's genetic potential.		
Areas to be addressed	Potential Intervention	Responsibility
Less extension support, low package	Vet post construction,	

dissemination	Forage seeds and planting material provision	
Veterinary service low except for about 2 civil vet agents (CVA)	Supply of veterinary facilities and drugs	
No trend for breed improvement		
Credit		
There is credit facility for improved goat purchase. However, the credit service does not specifically focus on small ruminant production activity. However, many farmers start keeping goats after they have seen better reproduction from the last 7 years of goat introduction.		
Areas to be addressed	Potential Intervention	Responsibility
Lack of small ruminant focussed credit	Provision of credit to address small ruminants production	OoA, DCSI IPMS - TA

Table 13. Skin and Hides		
Production		
Skin and hides in both Kolla and Weina Dega of Alamata Woreda have similar production trend. Skin and hide is mostly collected during holidays. There are few traders which collect, salt, dry and transport this resource to different markets. There is however, poor quality product due to disease and poor collection and handling. Skin from Eille sheep is cheap in price and less preferred. Farmers in this woreda do not use skin locally and is a potential for takeoff to the market.		
Areas to be addressed	Potential Intervention	Responsibility
Poor quality product due to external parasites	Apply proper health follow up, train paravets, supply spraying equipments and chemicals	OoA
Absence of abattoirs	Introduce village abattoirs	OoA
Absence of close preserving, drying and storage centres	Establish cooperatives for organized collection, supply salt and drying facilities	OoA
Damage of skin and hides quality due to traditional practices (tattooing)	Training of farmers not to apply tattooing	OoA
Marketing		
There is no organised sale (eg. Cooperatives) of skin and hides and sale is made on an individual basis. There are few skin and hide traders in Alamata town. They send their agents to collect the product from village out side town. There is however, delay particularly products coming from the PAs of intermediate highlands (Tsetsera and Merewa PAs) of Alamata to reach quick to salting and drying centre. The nearest processing centre is Sheba Tannery in Wukro, eastern Tigray which is about 250 km away.		
Areas to be addressed	Potential Intervention	Responsibility
Poor quality product	Training of farmers	OoA
Lack of organized cooperatives for marketing skin and hides	Organise cooperatives for collecting, processing and marketing of skin and hides	OoA/Cooperatives
Less preference and lower price for sheep skins from kola (from Eille sheep)	Introduce crossbreds	
Unstable price	Provide market information and link cooperatives with tanneries	
Poor collection, drying and storage facilities	Organise cooperatives for collecting, processing and marketing of skin and hides	OoA/Cooperatives
Limited number of skin and hide traders	Organise cooperatives to collect and market skin and hides	OoA/Cooperatives
Lack of communication with Tanneries	Link cooperatives with tanneries	
Input supply		

Input supply for quality skin and hide production is not specific except for the general vet service provided by BoA. Disease is the main cause for quality deterioration in skin and hides. No salt and drying frame is provided to the producers. Traditional skin and hide items utilisation reduce their supply in market. No training is given to change such practices.		
Areas to be addressed	Potential Intervention	Responsibility
Limited vet service for better quality skin and hide production	Train experts and farmers on improved skin and hide production and management	OoA Tanneries, IPMS - TA
No trained manpower on by-products utilisation and management	Strengthen capacity of OoA staff	OoA – extension
Credit		
Credit service is not as such focusing on skin and hides business. There are no cooperatives involved on this activity.		
Areas to be addressed	Potential Intervention	Responsibility
No organised activity; and absence of credit facilities focused on developing skin and hides	Introduce awareness through training	OoA - extension IPMS – TA

5 OUTLINE OF PROGRAM OF WORK FOR ALAMATA PLS

5.1 Priority commodities and natural resource management technologies

During the project's first year, attention will be focused on innovative technology practices and institutional innovations for the following priority commodities and their supporting NRM technologies.

Teff, sorghum, maize/livestock farming system

Crops: Cotton, sesame, tomato and pepper, onion, tropical fruits (papaya, avocado, mango, banana, orange, grave vines), haricot bean, ground nut, cow pea and popcorn

Livestock: Sheep and goats production, cattle for dairy and beef and poultry

NRM technologies: soil and water conservation, irrigation water development (deep and shallow wells, ponds, river diversion, spate irrigation). Ground water potential in the Woreda is high and so the prospect for developing ground water for irrigation in this farming system was emphasized. The problems of salinity are surfacing in the low lying PAs of Alamata. This is because growing vegetables and fruits, during both seasons, will lead to higher use of water. Hence, appropriate irrigations techniques will be required.

Based on the knowledge captured and the lessons learned during the initial implementation of the innovation program some of the priorities commodities may be dropped, while others may be added.

5.2 PLS knowledge management – general (RBM code 100 series)

To improve the capturing and sharing of knowledge on priority commodities and the supporting NRM technologies in the PLS, the state of knowledge and knowledge requirements will have to be assessed on a continuous basis during the project life. The initial PRA and the subsequent assessments will form an integral part of this process. Several information gaps that deserve attention have already been identified in relation to each priority commodity. Annex 1 presents the knowledge gaps pertaining to each priority commodity.

The knowledge will be synthesized and assembled at the federal level in a Resource Information Centre using electronic data base formats. To share this knowledge with institutions and communities, various processes and mechanisms will be used including the distribution of appropriate printed materials (manuals, training materials, posters, leaflets in the local language), radio programs, local exhibitions etc.

To link the PLS institutions with the Resource Information Centre, electronic linkages with the Woreda Agricultural Development Sector will be established. This effort will have to be integrated and synchronized with other activities in this field i.e. Woreda Net, School Net and Agri Net. Woreda Net is operational in Alamata and the equipments are based in the woreda Office of Education. They have already started

using the facilities for video conferencing. On the other hand, there are two high Schools which have operational school-Net programmes. One of the high schools is located in Alamata town. This school has 20 plasma TV sets in which all are operational and receive lessons from Educational Media Agency (EMA) in Addis Ababa. In addition to the plasma sets there are 9 computers, even though they are not operational because of lack of telephone line. Therefore, the school can only handle direct transmissions. However, had the computers been networked students could have benefited because the transmissions could have been retrieved in the computers and retransmissions could have been possible. For each plasma TV set, there are 65 students. There are many junior high schools which this high school is expected to receive students from in the future. If number of classrooms and plasma TV sets are not increased, there will soon be problems of handling the students. On the other hand, there are 8 plasma TV sets in the rural high school one of which is not operational due to lack of spare parts and sufficient trained manpower. Only one teacher was trained in operating the plasma sets. This teacher does not have deep knowledge but is only turns on and off the TV sets. Transmission of the programme started around September 2004. However, agri Net is not operational and no body knows about it either.

Simultaneously innovative ways of creating a culture of knowledge capturing and horizontal knowledge sharing across the actors in the PLS and between the actors at PLS and the regional and federal level will have to be developed – see section 3 on capacity building.

Table 14. Project support for PLS knowledge management system

Activities	Target	Responsible
(100) Continuous assessment of current state of knowledge requirements based on field work and meetings	Woreda institutions	Woreda institutions involved in extension, input supply, micro finance, cooperatives, marketing under the supervision of project staff
(100) Collection and synthesis of data for PLS (GIS) database	Woreda institutions	Project staff with Woreda Agriculture Office
(100) Preparation of extension materials and methods and training materials *	Woreda institutions and farmers	Research and development partners with the help of project funding.
(100) Purchase and installation of computers and hard ware	Woreda Agricultural office, credit institution, cooperatives office, natural resources development office, and rural infrastructure development office	Project staff
(100) Training of staff in electronic knowledge management**	Office heads, OARD sector heads, extension team leaders, extension supervisors	Project staff

* For details see commodity program described in section 5.4.

** Training is suggested on basic computer utilization, data management including introduction to GIS, communication systems and technical support.

Some extension and training materials exist, especially at the regional level. However, they need to be customized to the priority commodities and the PLS level situation, including the use of inoculums. Moreover, since the focus of the extension work for the priority commodities will be the FTCs, new extension and training materials need to be developed that fit the requirements and operation of the FTCs. Annex 2 presents the type of demonstration materials required for each commodity.

5.3 PLS public institutional capacity building (RBM code 200 series)

In order to introduce the project, and to train institutional staff in innovative technology transfer methods, inter-institutional collaboration and cross cutting themes like gender and environmental assessment, various trainings will be conducted for Woreda staff. (Materials for such training will be prepared by the project with the help of consultants and contributions from the project partners). To stimulate the integration with private institution staff, some staff from the private institutions will also be involved in this training. The training will be continuous during the project life and the effectiveness of the training will be assessed regularly. Lessons learned will become an integral part of follow up training events. One of the critical trainings to be given will deal with innovative methods of agricultural institutional service delivery.

Table 15. Potential Woreda and Regional staff (Training of Trainers) to be included in the innovative methods training

Woreda Offices	Number
-Extension supervisors	3
-Office head of OARD	1
-OARD team leaders	4
-OARD sector heads	4
-Input supply experts	4
Cooperatives office	3
Micro finance institutions	4
Women affairs office*	1
Women's association*	1
HIV/AIDS office*	1
Land use planning and environmental protection*	1
Home agents*	17
Regional Office	
Experts at the Extension Department of the regional Bureau of Agriculture and Rural Development	4
Research and extension liaison of TARI/MRC	1

* These trainees are to be included only in the training on gender, HIV/AIDs and environment.

The trained Woreda staff (TOTs) are expected to introduce the innovation concepts to the Development Agents in the FTCs, who in turn will use these concepts during their daily work with the farmers and communities (see section 5.4). Use of these innovative methods by FTC staff will be monitored and evaluated by the project staff and form the basis for adjustment in the TOT trainings.

Besides the building of the capacity of the Woreda and FTC staff in the use of innovative methods and institutional arrangements, technical training on the priority commodities, including new production methods/techniques, farmer/group/cooperative based input supply and marketing systems will be provided (Materials for such training will be prepared by the project with the help of consultants and contributions from the project partners). Details for such training are included in the PLS sustainable livelihood development activities described in section 5.4.

Table 16. Potential Woreda staff to be included in technical training of priority commodities

Office	Priority commodity	Number
Agricultural Development Sector	NRM	1
Agricultural Development Sector	Cotton and sesame	5
Agricultural Development Sector	Tropical fruits and Vegetables	5
Agricultural Development Sector	Goat and sheep fattening	5
Agriculture development sector	Dairy and beef production	3
Agricultural development sector	Poultry and apiculture	3

Natural resources management is crucial in the woreda. In addition to the innovative methods and technical aspects of training, specialized training will be given to appropriate Woreda staff on sustainable management and development of natural resources, including soil and water conservation, water resources development and conservation for irrigation (deep and shallow wells, ponds, river diversions, spate irrigation). Salinity problems are being observed in some parts of the woreda, especially to the south of Alamata town. Irrigation methods used will determine the severity of salinity and hence trainings on the use of appropriate irrigation methods will be essential.

Table 17. Potential Woreda staff to be included in NRM training

Office	Number
Land use planning and environmental protection	7
Agricultural development sector	2
Water resources development office	6

An integral component of the capacity building activities at the Woreda level is the development of the FTCs. In the initial phase the project will support selected FTCs with printed materials and demonstration materials (see 5.2) in support of the priority commodities and supporting NRM technologies (see section 5.4 for details).

While many capacity building activities have been undertaken by numerous projects operating in Ethiopia, the actual use of the increased capacity by the staff in their daily work is often minimal because of a host of other bottlenecks and a lack of reward for those staff which have made progress despite the presence of these bottlenecks.

The project will introduce various other capacity building initiatives at the PLS level to alleviate some bottlenecks in order to facilitate the introduction of technologies and institutional innovations. This will include the supply of credit funds and financial and technical support for market studies and linkages for priority commodities and operational cost of experts to supervise and guide the DA staff at FTC level. These activities are integrated in the PLS sustainable livelihood activities (see section 5.4).

The project will furthermore set aside some funds for rewarding experts and FTC staff which have made good progress in technology and institutional innovations. One potential reward may be in the form of visits to places of interest (this will be introduced in the second project year).

Finally, an integral part of the PLS capacity building support is to create a learning system between the region and the PLS and to create an inter-institutional learning system at the Woreda and FTC level. To facilitate this arrangement the project has established Regional and Woreda level Advisory and Learning Committees (RALCs and WALCs). A budget will be made available to use/develop various learning mechanisms including field visits and small workshops. An integral part of this learning will be the sharing of knowledge between the regions and institutions concerned.

Table 18. Project support for PLS general capacity building support*

Activities	Target	Responsible
(200) TOT training and follow up in innovative methods	Woreda and 3 FTC staff	Project staff and consultants
(200) TOT training and follow up in gender	Woreda and 3 FTC staff	Project staff and consultants
(200) TOT training and follow up in environmental assessment	Woreda NRM staff and 3 FTC staff	Project staff and consultants
(200) Development of a reward system for institutional staff	Experts and 3 FTC staff	Project staff and WALC and RALC
(200) RALC and WALC learning activities including field visits and workshops	RALC and WALC	Project staff

* Commodity and or technology specific support to Woreda staff institutions and FTCs is described in section 5.4 - indicated with code 200.

5.4 PLS sustainable livelihood development (RBM code series 300)

The project will concentrate its efforts on introducing innovative technology (practices) and institutional innovations with farmers and communities near Farmer Training Centres (FTC) which have a potential for the identified market oriented priority commodities and supporting NRM technologies. These potentials were identified by Woreda staff during the national planning and PLS level workshops and will be (re-) assessed during the project's initial implementation phase with the farmers near the FTCs.

Table 19 FTCs with potential for priority commodities and NRM technologies in the teff, sorghum, maize/livestock system

FTC	Teff,../NRM	Sheep /goats	Dairy /beef	Vegetables	Fruits	Poultry
Kulugize Lemlem		X	X	X	X	X
Selam Bekalsi		X	X	X	X	X
Limaat		X	X	X	X	X
Tumuga	X	X	X	X	X	X
Selen Weha		X	X			X
Tao		X	X			X
Laelay Dayu		X	X			X
Gerjelle		X	X			X

Three FTCs have been selected for concentrated effort in training and other interventions in the Woreda. In the Teff sorghum, maize/livestock system, FTCs at --- --, ----- and ----- have been selected. The most important NRM interventions required in the Woreda include soil and water conservation in the mountain areas; temporary water harvesting (foot hills) for supplementary irrigation; small scale irrigation development (shallow wells); issues related to salinity, soil fertility management, especially the use of inoculums for pulses and feed resources and grazing land management. Due to the severe degradation of the land resource in some PAs of the woreda, NRM technologies that could address these problems are required across all the FTCs. The selected three FTCs will be used as the focal points for the introduction of the NRM technologies, since the project will not be able to reach out to all the 8 FTCs in the teff sorghum, maize/livestock system.

It is important to note that an initial set of potential interventions regarding the market oriented priority commodities were determined during the Woreda planning workshop (see chapter 4) and an initial set of activities were designed with regional and woreda representatives and partner institutions in the national planning workshop. However, a further (re-) assessment of these activities will take place with the farmers as an integral part of the PLS initial implementation program.

The following sections deal with activities on the priority commodities, which are envisaged to be accomplished within the first year of the project's life.

5.4.1 Cotton (Teff, sorghum, maize/livestock system)

Marketing

Currently, few hectares are under cotton, hence production is small. Therefore, marketing issue is not going to be a problem. However, with increased area under this crop in the future, marketing will need attention. Care also need to be made in order not to discourage farmers from producing more of this commodity due to lack of proper marketing channel. Rather plans need to be made foreseeing the potential volume that could be produced from this commodity in the area. Therefore, proper marketing channels need to be planned ahead of time. The marketing links also need to consider in helping attain maximum benefit by farmers. Hence, they need to be linked with those end users (textiles) or exporters.

Table 20. Project support for improving cotton marketing

Activity	Target	Responsibility
(400) Conduct profitability study on cotton production	In and around 3 FTCs	MRC, project staff, students, Werer/EARO
(400) Study on cotton marketing, including market chain	In and around 3 FTCs	MRC, Project staff, TAMSA, students
(200) Training on group marketing (importance and organization)	Woreda cooperative office staff (5) and staff of 3 FTCs	Project staff, consultants, TAMSA
(400) Establish marketing information system at woreda level	Farmers near 3 FTCs and DA posts	IPMS staff, woreda experts, cooperatives
(300) Training and follow up of program (in FTCs) in marketing group formation	Farmers in and around 3 FTCs	FTC staff guided by Woreda/project staff
(400) Study the effectiveness of contract farming on cotton marketing	Farmers in and around 3 FTCs	IPMS staff, woreda cooperatives experts,

Input supply

Currently the OoA is supplying cotton seeds that came from Melka Werer, Israeal, and Seed Enterprise. Once market demand for cotton is known, the supply of improved seeds has to be organized. Following the input supply privatisation strategy, emphasis will be put on farm seed production. This will require training of farmers in development of these schemes so that dependence on either the government or other companies will be minimised.

Table 21. Project support for input supply of cotton

Activity	Target	Responsibility
(400) Study the existing cotton input supply system	Woreda OoA, RBoARD, farmers	IPMS staff, Melka Werer Research Centre

	in and around 3 FTCs	
(400) Study farmer to farmer seed in put supply system	Farmers around 3 FTCs	Woreda in put supply Office, IPMS staff
(300) Facilitate credit for farmer to farmer seed supply system, chemicals and irrigation equipments	Farmers around 3 FTCs	Woreda in put supply Office, IPMS staff
(200) Supply of demonstration materials like pesticides, sprayers, seed treating drums, improved seed, seed drillers, row planters and others.	3 FTCs	Melka Werer/ERO, TARI, RBoARD, IPMS-TA
(300) Encourage and support private sector to involve in input supply	Traders in and around 3 FTCs	Woreda in put supply office, IPMS
(300) Facilitate credit for input supply and organize farmers' credit and saving group at PA/Service cooperative/FTC level;	Farmers around 3 FTCs	DCSI, Co-ops desk, IPMS - TA

Production

The Raya Valley is one the areas considered suitable for cotton production in the country. The central government is intending to develop 4 million ha to be planted under cotton and Raya Valley is one of these potential areas selected for cotton production. There is a potential to grow cotton on about 16,000-23,000 ha of land using supplemental or spate irrigation in Alamata. A series of ponds and distribution canals are already built in some areas. This is expected to boost cotton production in the area. Some of the cotton varieties introduced like Akala SJ-2 variety are doing well. Introductions need to be made based on the need of the end user and at the same time considering the market value of the varieties.

Table 22. Project support for improving cotton production

Activity	Target	Responsibilities/tasks
(200) Training on the agronomic practices of cotton (crop production and protection aspects)	Woreda crop production team (1 office head, 1 team leader, 3 experts) and staff from 3 FTC.	Melka Werer /EARO, TARI OoA – extension IPMS - TA
(200) Training on cotton irrigation (appropriate irrigation methods, impacts of low/excessive irrigation on cotton production and NRM (salinity), time and frequency of irrigation, etc.)	Wordea crop production experts	Werer /EARO, TARI OoA – extension IPMS - TA
(300) Farmers' training on the	Farmers in and around 3	OoA-Rural Technology

handling and care of irrigation equipments and maintenance	FTCs	IPMS-TA
(200) Supply of demonstration materials on diseases, pests, quality control,	3 FTCs	Werer /EARO, TARI OoA – extension IPMS - TA
(400) Study and popularise better performing sesame varieties	Farmers around 3 FTCs	MRC, Werer/EARO Project staff, TAMSA,
(200) Training on chemical handling, impact of chemicals on health and the environment	Woreda crop production and protection experts (3 experts)	Federal Plant Production and Protection Dep., Melka Werer/MRC, IPMS - TA
(300) Provide credit fund for cotton production	Farmers around 3 FTCs	DECSI with project funds

5.4.2 Sesame: (Teff, sorghum, maize/livestock system)

Marketing

Currently, few hectares are under sesame as is the case for cotton, hence production is small. As a result issues on marketing may not be of major concern. The two well known sesame producing areas in Ethiopia are Humera and Metema, and both are far away from the central market. Alamata will have an added advantage because it is much closer than any one of these areas to the central market. However, the marketing links need to consider in helping attain maximum benefit by farmers. Hence, they need to be linked with exporters.

Table 23. Project support for improving sesame marketing

Activity	Target	Responsibility
(400) Conduct profitability study on sesame production	In and around 3 FTCs	MRC, project staff, students, Melka Werer/EARO
(400) Study on sesame marketing, including market chain	In and around 3 FTCs	MRC, Project staff, TAMSA, students
(200) Training on group marketing (importance and organization)	Woreda cooperative office staff (5) and staff of 3 FTCs	Project staff, consultants, TAMSA
(400) Establish marketing information system at woreda level	Farmers near 3 FTCs and DA posts	IPMS staff, woreda experts, cooperatives
(300) Training and follow up of program (in FTCs) in marketing group formation	Farmers in and around 3 FTCs	FTC staff guided by Woreda/project staff
(400) Study the effectiveness of contract farming on sesame	Farmers in and around 3 FTCs	IPMS staff, woreda cooperatives experts,

Input supply

Currently the OoA is supplying sesame seeds. The seeds were brought from Humera and Melka Werer. Once farmers are accustomed to producing sesame extensively, the supply of improved seeds has to be well organized. Following the input supply privatisation strategy, emphasis will be put on farm seed production. This will require training of farmers in development of these schemes so that dependence on the government will be minimised.

Table 24. Project support for input supply of sesame

Activity	Target	Responsibility
(400) Study the existing input supply system with regards to sesame	Woreda office of agriculture, regional bureau of agriculture, farmers in and around FTCs	Melka Werer Research Centre, IPMS staff
(400) Study farmer to farmer seed in put supply system	Farmers around 3 FTCs	Woreda in put supply Office, IPMS staff
(300) Facilitate credit for farmer to farmer seed supply system and post harvest chemicals	Farmers around 3 FTCs	Woreda in put supply Office, IPMS staff

Production

The Raya Valley has a great potential for sesame production in the lowlands. Two improved varieties, Adi from Melka Werer and Hirhir from Humera are already introduced. The growth performance of these varieties is encouraging, but results were not ready yet. Additional new varieties need to be introduced taking into in to consideration the rainfall patterns of the area. There are varieties that are short seasoned which could be planted when rainfall is delayed. The vice versa is also true. Experiences from Metema and Humera could easily be drawn.

Table 25. Project support for improving sesame production

Activity	Target	Responsibilities/tasks
(200) Training on the agronomic practices of sesame (crop production and protection aspects)	Woreda crop production team (1 office head, 1 team leader, 3 experts) and staff from 3 FTC.	Werer /EARO, TARI OoA – extension IPMS - TA
(200) Supply of demonstration materials on diseases, pests, quality control of sesame	Around 3 FTCs	Werer /EARO, TARI OoA – extension IPMS - TA
(400) Study and popularise better performing sesame varieties	Around 3 FTCs	MRC, Werer/EARO Project staff, TAMSA, IPMS - TA

(200) Training on chemical use and handling, impact of chemicals on health and the environment and timing of chemical application, etc.	Woreda crop production and protection experts (3 experts)	Federal Plant Production and Protection Department, Werer/MRC, IPMS - TA
(300) Provide credit fund for sesame production	Farmers around 3 FTCs	DCSI with project funds

5.4.3 Fruits (Tropical fruits: mango, papaya, avocado and orange, in the teff, sorghum, maize/livestock system)

Marketing

Fruit production is a new venture in the area, except for papaya. Hence, there is not much activity in the marketing of fruits currently. Before pursuing the commercialisation of fruits, feasibility study is needed. Organization and strengthening of marketing groups will also be essential. On the other hand, strengthening farmer cooperatives will also be accorded due attention. Once these initiatives have started, training will have to be provided on quality improvement (to start in the second year). The fact that Alamata is close to Mekelle and other northern towns, where fruit production is not common, marketability of the commodities may not be a problem.

Table 26. Project support for improving fruit marketing

Activity	Target	Responsibility
(400) Conduct feasibility/profitability study of fruit production	Farmer in and around 3 FTCs	MRC, project staff, students, Melkassa Research Centre
(400) Study on fruit marketing, including market chain	Farmers in and around 3 FTCs, surrounding markets including Mekelle	MRC, ICRAF, project staff, TAMSA, students
(200) Training on group marketing (importance and organization)	Woreda cooperative office staff (5) and staff of 3 FTCs	Project staff, TAMSA, Regional Cooperatives Office
(300) Training and follow up of program (in FTCs) in marketing group formation	Farmers in and around 3 FTCs	FTC staff guided by Woreda/project staff

Input supply

Once market demand for the various fruits is known, the supply of improved planting material has to be organized. Currently, the supply of planting materials is much lower than the demand. Nurseries of both the woreda and the regional Bureau of Agriculture and Rural Development will be used during the first year as sources of for raising planting materials. However, following the input supply privatisation strategy,

emphasis will be put on farmer seedling production. This will require training of farmers in nursery management and propagation techniques.

Table 27. Project support for input supply of fruits

Activity	Target	Responsibility
(400) Study existing fruit related input supply system	Woreda office of agriculture, regional bureau of agriculture, farmers in and around FTCs	Students, Melkassa Research Centre, IPMS – TA
(300) Supply demonstration materials for input supply – nursery management (grafting equipment, watering cans, posters, leaflets)	3 FTCs	Melkassa Research Centre/MRC, OoA/RBoARD, IPMS - TA
(300) Facilitate supply of improved materials from various partners	Farmer nurseries around 3 FTCs	Woreda input supply desk and Melkassa Research Centre, IPMS - TA
(300) Training and program follow up at the FTCs in improved nursery management, grafting and other new propagation methods	Farmers around 3 FTCs	Woreda nursery expert under supervision and guidance of by Woreda, and MRC/ICRAF/EARO staff
(300) Provide credit fund for on farm nursery, if required	Farmer nurseries around 3 FTCs	Input Supply Desk, DCSI, IPMS - TA
(300) Training of individual farmers on market oriented fruit seedling supply	Farmers around 3 FTCs	Input Supply Desk, IPMS - TA

Production

As a new introduction to the area, appropriate types (varieties) need to be selected. For example fibreless mango varieties need to be introduced. On the other hand, when the commercialisation of fruit production progresses, issues of produce quality will become more important. These would relate to pest and disease control, and quality of planting materials and their varieties.

Table 28. Project support for improving fruit production

Activity	Target	Responsibility
(400) Study existing fruit production system	Farmers in and around 3 FTCs	Project staff, students, Melkassa Research Centre
(200) Training on improved fruit production (e.g. pest and disease control, tree management, etc.)	Crop protection specialist (2) and fruit tree specialist (3) and staff of FTCs	MRC, EARO
(200) Training on improved nursery management,	Woreda agronomy/horticulture	Mekelle Research Centre (MRC), Regional Bureau

grafting and other new propagation methods	experts (3) and staff of 3 FTCs	of Agriculture (RBoARD), Melkassa Research Centre, IPMS - TA
(300) Training of farmers and program follow up at FTCs for improved fruit management	Farmers in and around FTCs	FTC staff guided by woreda experts and project staff

5.4.4 Irrigated vegetables (Onion, Tomato, Pepper)

Marketing

The limited expansion of vegetables in the woreda has a lot to do with problems related to the development of water harvesting technologies (ponds and wells) and small scale irrigation schemes (river diversion, streams from the swampy area). Currently the marketing of vegetables is done on individual basis. Since farmers harvest vegetables at about the same time, prices fall significantly at harvest. The project will help conduct feasibility study of the commercial production of vegetables. If feasible, project support for production, input supply and marketing will be provided, as needed. Service cooperatives will need to be strengthened to market own produces. On the other hand, links with appropriate markets (local, international) will also be made. Contract farming will also be encouraged with this regard.

Table 29. Project support to improve marketing vegetables

Activity	Target	Responsibility
(400) Conduct feasibility study of commercial production and marketing of vegetables	Farmers around 3 FTCs, nearby market towns including Mekelle	Melkassa research Centre, MRC, students, Project staff ,
(200) Training on marketing group formation, and vegetable marketing	Woreda cooperative staff (4) and staff of 3 FTCs	Project staff, consultants
(300) Farmer training and program follow up (in FTCs) on marketing group formation and vegetable marketing	Groups, cooperatives to be formed	FTCs staff and cooperative promotion desk with the help of project staff
(200) Training on value adding of priority vegetable commodities	Woreda horticulturist/agronomist, 3 FTCs staff	Consultants, Resin factories, Melkassa Research Centre, IPMS - TA

Input supply

Currently, there is no regular supply of improved varieties of vegetable seeds. Hence farmers grow own seeds or seeds bought from town, which are either poor in quality

or very expensive or a combination. Establishing a regular on farm supply system will be one of the primary tasks of the project. Supply of irrigation equipments is also limited in the area. Therefore, appropriate small scale irrigation equipments will need to be available locally. For this purpose, small scale private entrepreneurs will also be supported.

Table 30. Project support to improve input supply of vegetables

Activity	Target	Responsibility
(400) Conduct study of input supply (seed, irrigation equipment) system to develop innovative methods	Farmers around FTCs, cooperatives, woreda input supply desk,	Project staff, Melkass research Centre, IWMI, students
(300) Facilitate the supply of inputs (different vegetable seeds, small scale irrigation equipments, etc)	Farmers in and around FTCs, cooperatives	Woreda input supply, project staff, EARO-NSL
(200) Training on the introduction of improved input supply system. (Enabling farmers to produce vegetable seeds for sale to farmers).	Woreda vegetable production experts (3), staff of FTCs	MRC, EARO, IPMS - TA
(300) Training and program follow up (in FTCs) in farmer seed production	Farmers in and around FTCs and cooperatives	FTC staff under guidance and supervision from MRC, EARO, project staff
(200) Supply of demonstration/training materials on post harvest handling	3 FTCs	MRC, Melkassa Research Centre, IPMS - TA
(300) Training on on-farm vegetable seed production	Farmers in and around FTCs	Melkassa Research Centre, IPMS - TA
(300) Credit facilities to small scale irrigation equipments' producing entrepreneurs	Interested metal workshop owners in Alamata town	DCSI with IPMS credit funds
(300) Training of farmers on repairing of different small scale irrigation equipments	Farmers/other groups of societies around 3 FTCs	IWMI, RBoARD, IPMS - TA

Production and NRM

Since vegetable crop production is relatively new, except for pepper production in the area, capacity of staff and farmers on vegetable production will have to be improved. Before starting a program on capacity building, a study will be conducted

to know the existing production system. This study will help identify gaps in vegetable production and will enable make appropriate plans to correct the gaps.

Table 31. Project support to improve production of vegetables

Activity	Target	Responsibility
(400) Study of existing vegetable production system	Farmers around 3 FTCs	Project staff with MRC staff, students
(200) Training on improved vegetables production, including pest, disease control	Woreda vegetable experts (3) and staff of FTCs	MRC, EARO, project staff
(200) Training on improved water/irrigation management (ponds, wells, river diversions, dams)	Woreda NRM experts (3), and staff of 3 FTCs	ILRI (theme 5), IWMI, project staff
(300) Training of farmers and program follow up (in FTCs) in improved vegetable production, and water management	Farmers in and around 3 FTCs	FTC staff under the guidance and supervision of Woreda and MRC staff, IWMI

5.4.5 Cattle (dairy and beef): Teff, sorghum, maize/livestock system

Marketing

Cattle fattening and milk production in rural areas of Alamata is not very well practiced. There is however, a potential for the commercialisation of meat, milk and milk products in and around the capital of the woreda. Local cows are used for milk production. Limited effort has been made to introduce better yielding dairy cows. Potential to develop dairy goat production also exists in the Woreda. Project will make contributions to improve the marketing of meat, milk and milk products in the woreda.

Table 32. Project support for dairy and beef marketing

Activity	Target	Responsibility
(400) Feasibility study on meat and milk supply and demand and milk processing, including possible market mechanisms and structures	Farmers/cooperatives in and around 3 FTCs,	ILRI-Theme 3/students and IPMS - TA

(200) TOT on milk collection, processing, and handling.	Woreda livestock experts (5)	ILRI DZ Research Centre, IPMS - TA
(300) Facilitate loans for purchasing milk collection and processing equipments (Year 2)	Farmers in and around 3 FTCs/cooperatives	Cooperative Promotion Office/DCSI/IPMS - TA

Input supply/credit

The supply of inputs and services for the dairy system are mainly in the hands of the government and the project will aim at introducing/strengthening innovative systems for input and service supply. Since production is based on local cows, milk yield is very low. The supply of improved dairy breeds or crossbred cows is very limited. Innovative ways of input supply, including breed supply, feed supply and availability of AI service are critical to improve dairy production in the woreda.

To improve the supply of drugs and veterinary services for dairy and other animals, the existing input supply system will need to be studied during the first year. Innovative approaches will be introduced/supported in the second year, which would include the sale of drugs and veterinary services by private (licensed) shops or cooperatives. The project may also support these innovative activities (if required) through capacity building of staff from cooperatives and/or the private sector.

Feed is one of the major problems of beef and dairy production in the woreda. In order to improve the supply of (protein rich) feed for dairy animals, the project will support innovations in forage seed multiplication system. The supply of concentrates for livestock is also very limited; project will attempt to facilitate the supply of concentrates by strengthening the private sector, through either credit facilities or training.

Table 33. Project support to improve input supply for dairy and beef system

Activity	Target	Responsibility
(400) Assess the existing supply of dairy cows (both local and crossbred) in order to develop innovative ways of input supply	Farmers in and around 3 FTCs, cooperatives	ILRI/ students and project staff
(200) TOT the establishment of improved supply of dairy breeds (AI service and/or bull stations)	Woreda input supply experts, Cooperatives	Woreda office of agriculture, cooperatives office, project staff
(300) Provide credit funds for expansion of AI service or bull station, if required (year 2)	Future private bull station owners, farmers or cooperatives in and around the 3 FTCs	DCSI with project funds

(400) Study the potential for supporting private veterinary drug supply and services based on potential demand	Private veterinary related traders in Alamata and farms in and around 3 FTCs	ILRI/ students and project staff
(300) Facilitate the establishment of private/cooperative vet. drug and services, if required	Private entrepreneurs, cooperatives	Cooperative office, project staff, woreda administration
(400) Study the existing fodder seed multiplication system with the aim of developing an innovative system involving farmers and cooperatives and or private enterprises	Farmers involved in the multiplication of fodder seeds and planting materials	ILRI/CIAT/students project staff
(200) Training in on farm production of fodder species	Woreda Livestock experts (5) and staff of 3 FTCs	ILRI/CIAT project staff
(200) Supply of fodder species for demonstration	3 FTCs	ILRI/CIAT with project funds
(300) Training of farmers and cooperatives (in FTCs) in the development of a farm based fodder seed multiplication scheme	Farmers in and around 3 FTCs, cooperatives	FTC staff, guided by Woreda/project staff
(300) Provide credit funds for the purchase of forage seeds by cooperatives (if required)	Dairy cooperative	Dedebit microfinance with project funds
(300) Provide credit for starting small business in fattening cattle	Farmers in and around 3 FTCs,	FTC staff, guided by Woreda/project staff
(200) Supply of demonstration materials including posters and leaflets on dairy production	3 FTCs	Regional BoARD, ILRI (Debre Zeit), Project staff
(300) Facilitate loans for purchase of collection and processing equipments for dairy (year 2)	Farmers in and around FTCs/Cooperative structures in and around 3 FTCs	Cooperative Promotion Office, DCSI through Project funds

Production

To commercialise beef and dairy production, attention will have to be paid to pest and disease control (also important for the quality of hides), feeding, housing and post harvest processing and storage. The project will support this activity through capacity building program. Capacity will also be built for the integration of fodder species into the existing farming system. A study will be conducted to assess the present practices. However, the dairy industry is adversely affected by the spread of the weed called Parthenium which is affecting the test of the milk around Alamata. Therefore, the effects of the weed on both the quality of milk and meat need to be assessed. As the weed is now present in many areas, it is a vicious plant that easily propagates itself. Any research and development made here will contribute to other PLSs and also to other woredas, out side of the project. The weed is currently spread into 53 woredas in the country.

Table 34. Project support for beef and dairy production

Activity	Target	Responsibility
(400) Study on the existing beef and dairy production system	Farmers in 3 FTCs, dairy cooperative	ILRI, project staff
(200) Training on improved beef and dairy production including pest and disease management	Woreda livestock experts (5) and staff of 3 FTCs	MoARD/ ILRI, project staff
(300) Farmer training and program follow up (in FTCs) for improved beef and dairy husbandry, including pests and diseases	Farmers in and around 3 FTCs	FTC staff guided by Woreda/project staff and MoARD /ILRI staff
(400) Study of existing farm fodder production system	Farmers in and around 3 FTCs	MRC/woreda livestock experts, students and project staff
(200) Training in improved on farm fodder production	Woreda livestock experts (5) and staff of 3 FTCs	RBoARD/MRC, ILRI
(300) Farmer training and program follow up (in FTCs) for improved on farm fodder production	Farmers in and around 3 FTCs	FTC staff, guided by Woreda livestock experts/project staff and MoARD, MRC, and ILRI.
(300) Training (in FTCs) on feeding management of dairy and beef cattle	Farmers in and around 3 FTCs	FTC staff guided by Woreda and project staff
(200) Training on market oriented collection, processing, handling and transporting of milk	Woreda livestock experts (5) and staff of 3 FTCs	ILRI, IPMS - TA
(300) Training on market	Farmers around 3 FTCs	Woreda livestock experts

oriented collection, processing, handling and transporting of milk		and 3 FTCs staff, IPMS - TA
(400) Study the effect of Parthenium on the chemistry of milk and effects on meat quality	Farmers around 3 FTCs	ILRI Debre Zeit Research Centre, National Animal Health Research Centre (Sebeta), IPMS - TA

5.4.6 Fattening of Sheep and Goats

Fat-tailed sheep (Eille) is the most dominant in Alamata Woreda. Some highland sheep and the crosses of these two breeds are also available. Recently introduced dual purpose highland goats showed encouraging performance in the Woreda. However, the supply of sheep and goat for meat from the woreda is facing important marketing, input supply and production constraints. The project will attempt to provide support to contribute to the alleviation of these constraints.

Marketing

Sheep and goats are marketed in the local market. Private traders buy these animals from the woreda for sale in nearby towns, including Mekelle. However, the production system can not be described as adequately market oriented. The project will provide support for the improvement of sheep and goat marketing from a commercial orientation point of view. There have also been previous attempts aimed at exporting sheep and goats and need to study why the scheme has failed. This will help to draw lessons from this previous project and start something that will be sustainable.

Table: 35. Project support for improved marketing of sheep and goats

Activity	Target	Responsibility
(400) Conduct study on sheep and goats marketing system, including export potential	Farmers in and around 3 FTCs, Cooperatives	ILRI, TAMSA, students, Project staff
(200) Training on market oriented sheep and goat production	Woreda livestock experts (5), staff of 3 FTCs	ILRI, RBoARD,
(300) Farmer training and program follow up (in FTCs) on market oriented production of sheep and goats	Farmers in and around 3 FTCs, cooperatives	FTC staff supervised and guided by woreda experts, and staff of RBoARD, ILRI
(300) Develop linkages with traders and potential exporters	Farmers in and around FTCs, cooperatives	TAMSA, Project staff
(200) Training on group formation for sheep and goat marketing, if required	Woreda livestock experts (3), Cooperative office	Consultants, project staff
(300) Farmer training and program follow up (in FTCs) in group marketing of sheep and goat	Farmers in and around FTCs, cooperatives	FTC staff supervised and guided by woreda experts and project staff

Input supply/credit

The sheep and goat fattening is based on local breeds. There is inadequate supply of inputs such as veterinary services and drugs, fodder seeds, and improved breeds. The project will attempt to provide support to the alleviation of these constraints.

Table 36. Project support for input supply/credit sheep and goat production

Activity	Target	Responsibility
(400) Study the input supply system in order to develop innovative improvements	Farmers in and around 3 FTCs	Project staff, woreda input supply
(300) Facilitate improved input supply, including improved breeds	Farmers in and around 3 FTCs	Woreda input supply unit, cooperative office, project staff
(200) Training on community based livestock health services	Woreda livestock experts (5), staff of 3 FTCs	ILRI, RBoARD, Project staff
(300) Farmer training and program follow up (in FTCs) on community based livestock health services	Farmers in and around 3 FTCs	FTC staff supervised and guided by ILRI, staff of RBoARD, and project staff

Production

Production constraints of the sheep and goat production in the woreda include poor genetic base, diseases and parasites, and feed shortage. Project will attempt to intervene in these areas in order to help establish an improved and market oriented production system.

Table 37. Project support for sheep and Goat production

Activity	Target	Responsibility
(400) Conduct study on the current production system	Farmers in and around 3 FTCs	ILRI, RBoARD, Project staff
(200) Training on improved sheep and goat production, including disease and pest management, and feed production	Woreda livestock experts (5), Staff of 3 FTCs	ILRI, RBoARD, Project staff
(300) Farmer training and program follow up (in FTCs) on improved sheep and goat production	Farmers in and around 3 FTCs	FTC staff under supervision and guidance of ILRI and project staff and staff of RBoARD
(300) Farmer training and program follow up (in FTCs) on on farm fodder	Farmers in and around 3 FTCs	FTC staff supervised and guided by ILRI and project staff, and staff of

production		RBoARD
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5.4.7 Skin and hides (Sheep/goats and cattle)

Marketing

In order to improve the income generated from the sale of skins, the quality of the skins need to be improved (see production) and the negotiating power of the farmers need to be improved. At present all skins and hides are sold through private traders who sell them to traders in Mekelle or Sheba Tannery. Currently, involvement of cooperatives in the purchase and sale of skins does not exist. However, it is believed that it could help farmers strengthen their negotiating power if this was put in place. This can be done first by organizing hides and skin marketing groups, and then help them link up with buyers, including the tanneries. To do this market study needs to be conducted.

Table 38. Project support for hides and skins marketing

Activity	Target	Responsibility
(400) Conduct study on the hides and skins marketing, including quality requirements by local abattoirs and export market and tanneries	Farmers in and around 3 FTCs, traders, abattoirs	ILRI, TAMSA, Project staff
(200) Training on group formation/cooperatives for hides and skins marketing,	Cooperative office staff, and staff of 3 FTCs	Consultants and project staff
(300) Encourage farmers to establish cooperatives to get access to credit and construct store, purchase equipments and expand skin and hide business	20 handicrafts and farmers near 3 FTCs	Bureau of agriculture /project staff
(300) Farmer training and program follow up on group formation and group marketing	Farmers in and around 3 FTCs, cooperatives	FTC staff under supervision by project staff, cooperative staff
(300) Facilitate establishment of marketing groups, if required	Farmers in and around 3 FTCs	Cooperative office, project staff

Input supply/credit, and preservation and processing of hides and skins

Input supply for hides and skins relates mostly to the preservation activities. Most of the hides and skins are sun-dried, and wet processing is almost non-existent. Quality

problems are reported with dry processing methods. Depending on the quality requirements of the markets, which will be known through the market study, improved input supply system and training are essential inputs. Hence, project will provide support in input supply based on the outcomes of the market study.

Table 39. Project support for hides and skins input supply

Activity	Target	Responsibility
(400) Study the current preservation and processing system of hides and skins, in relation to market requirements	Farmers in and around 3 FTCs	NAHRC (National Animal Health Research Centre) ILRI/students, Project staff
(200) Training on improved preservation and processing techniques	Woreda livestock experts (5), and staff of 3 FTCs	Project staff/consultants
(300) Farmer training and follow up (in FTCs) on improved preservation and processing techniques	Farmers in and around 3 FTCs	FTC staff guided by Woreda/ project staff
(300) Encourage farmers to establish cooperatives to get access to credit and construct store, purchase equipments and expand hide business	20 handicrafts and farmers near 3 FTCs	Bureau of agriculture Project staff
(300) Encourage private/cooperatives and facilitate supply of preservation and processing inputs	Farmers/traders in and around 3 FTCs, and Cooperatives	Cooperative office and project staff
(200) Demonstration materials for preservation and processing, and external parasite control	3 FTCs	Project staff
(300) Facilitate input supply against external parasites that damage hides and skins on live animals	Farmers in and around 3 FTCs	Woreda input supply, cooperative office, project staff
(300) Organise hide day as a promotional event	Farmers in and around 3 FTCs	OoA/NAHRC, Project staff

Production of skins and hides

Knowledge in hide processing and preservation need to be emphasized. In spite of several attempts in the improvement of the production of hide, most farmers are still practicing traditional diagnosis of sick animals and spoil the quality of skin using knives, whip lash, brand with hot metals etc. Innovative method of treating sick animals for the sake of protecting the hide will be given more attention.

Table 40. Project support for skin and hides production improvement system

Activities	Target	Responsibility
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(200) TOT on improved techniques of skin and hides production and processing systems	Woreda skin and hides experts, 3 FTC staff, DA posts	NAHRC (National Animal Health Research Centre), Sheba Tannery (if possible) Regional Bureau of Agriculture, Project staff
(300) Farmers' training and follow up in FTCs on improved techniques of processing and preservation system	Farmers around 3 FTCs and DA posts	FTC staff guided by woreda/project staff
(400) Study the economic impact of poor management of livestock before slaughter on skin and hides	Farmers around 3 FTCs and DA posts	NAHRC IPMS - TA
(200) TOT in animal health and management.	Skin and hides experts, 3 FTC staff, DA posts	NAHRC /Regional Bureau of Agriculture/Project staff

5.4.8 Poultry

Marketing

Poultry is marketed within the nearby villages, woreda and regional town in Mekelle. There is no problem of market demand for the products. However, supply and demand for chicken and eggs need to be studied in more detail for large scale marketing.

Table 41. Project Support for poultry marketing

Activities	Target	Responsibility
(400) Conduct poultry marketing feasibility study	Farmers near 3 FTCs and DA posts	Cooperative desk students, project staff
(200) TOT in getting basic knowledge in marketing and advantages of group formation	Livestock experts (5), staff from 3 FTCs, DA posts	Cooperative desk/Regional Bureau of Agriculture, Project staff
(300) Training farmers in getting basic knowledge in marketing and advantages of group formation	Farmers near 3 FTCs, DA posts	FTC staff guided by woreda/project staff

Input Supply

The closest poultry breeding centre to Alamata is Kombolcha. There is a need that for this PLS to work closely with this breeding centre. In order to encourage farmers to be engaged in poultry production, inputs like day old chicks, cocks, hay boxes, chick run and other equipments need to be available in sufficient quantity. Private small scale or cooperatives level poultry production could be encouraged, provided there is sufficient market for the produces. Other alternative innovative ways of

poultry input supply will be essential. Studies in other PLSs will also benefit Alamata, as it will be easy.

Table 42. Project Support for poultry input supply system

Activities	Target	Responsibility
(200) Supply demonstration materials like hay box, feeding, watering trough, small improved incubator, battery cage, egg tray, pamphlets, posters, training manuals	300 copies of each manuals at 3 FTCs	Regional Bureau of agriculture/IPMS project/ EARO Debre Zeit Research Centre
(300) Organize poultry day and radio program as promotional events	Farmers near 6 FTCs and DA posts	Bureau of agriculture/IPMS project/ Debre Zeit Research Centre, EARO
(200) TOT in general poultry production and management	5 supervisors, 2 experts (include women expert or supervisor if possible), staff from 3 FTCs	Bureau of agriculture/IPMS project/ EARO Debre Zeit Research Centre
(300) Training farmers in general poultry production and management	Farmers near 3 FTCs (include women)	FTC staff guided by woreda/project staff
(300) Link producers with a marketing chain possibly with traders and big hotels in big towns	Farmers near 3 FTCs and DA posts	Cooperative desk/Bureau of agriculture/project staff
(300) Encourage farmers to establish cooperatives to get access to credit and expand poultry business	Farmers near 3 FTCs and DA posts	Cooperative desk/Bureau of agriculture/project staff

Production

Poultry production is not geared towards market. As a result it is not considered as a major farm or household activity by many farmers. Hence, its management is often neglected (scavenge around homestead, no follow up of vaccine, housing, etc). In the coming one year, the project will focus on innovative system of production and improve knowledge on the management practices. The project will also focus in training and involve women in poultry operations. Poultry is usually considered to be women's activity.

Table 43. Project support to improve poultry production

Activities	Target	Responsibility
(400) Study existing production system, role of poultry on household livelihood and management with the objective of possible improvements	Farmers near 3 FTCs and DA posts	TARI/project staff/ Debre Zeit Research Center, EARO, IPMS - TA
(200) TOT on improved poultry production and management (housing, feeding, watering) and disease control	5 supervisors, 2 experts, 3 FTC staff (include women expert or supervisor if possible)	TARI/project staff/ Debre Zeit Research Centre, EARO, IPMS - TA
(300) Training farmers on improved poultry production and management (housing, feeding, watering) and disease control	Farmers near 3 FTCs (include women if possible), DA posts	FTC staff guided by woreda/ project staff, IPMS - TA

5.5 Recommendations on innovative technology (practices) and institutional innovations (400 series)

A number of studies have been proposed (see RBM code 400) to assess technologies, and input output marketing aspects of priority commodities. During the project life the introduction of these innovations will be closely monitored (see 300 activities) to enable the project and its partners to draw up recommendations on technologies and public and private institutional innovations.

Most of the studies on technologies and institutional innovations cut across several PLS and the findings of the studies will be synthesized across these sites. These will be used to draw lessons on the uptake and impact of technology innovations as well as institutional innovations for marketing (in particular marketing studies and clustering of small farmers with linkages to the larger trade bodies) and the supply of inputs for crops and livestock. Particular attention will be paid to the impact of these innovations on gender and environment. The synthesized findings will contribute to policy recommendations at the federal and regional level.

The project will furthermore conduct some focussed studies and workshops in gender, HIV/AIDS and environment in order to develop a strategy for mainstreaming these cross cutting themes in the technology and institution program. (A detailed description of this program is provided in a separate document).

Besides the studies already indicated, the project will undertake a baseline and follow up study on some key indicators. Such base line data will be gender disaggregated and also include environmental indicators.

Annex 1. Summary of knowledge gaps in relation to priority commodities

Commodity	Knowledge gap	Commodity	Knowledge gap	Commodity	Knowledge gap
Sheep and goat fattening	Market information* Potential for wool production Potential of indigenous breeds for fattening Availability, type and variation of feed supply New introduction of feed resources Innovative animal husbandry practices Control of internal and external parasites	Dairy and beef	Market information* Potential of indigenous breeds Availability and type of feed resources Appropriate Processing equipment Animal health and disease control	Bee keeping	Market information* Availability and type of bee forages (both new and indigenous) Processing technology for honey Queen rearing methods Adoption of improved beehives and constraints Types of bees and ecological requirements Pests and disease control
Poultry	Market information* Potential of indigenous breeds for egg production Availability, type and variation of feed supply New introduction of feed resources Animal health and disease control	Vegetables	Market information* Management techniques New varieties Seed production and supply Post harvest handling Feasibility of new introduction Pest and disease control Propagation methods	Hides and skins	Market information* Quality control
Fruits	New introduction, so whole package of new knowledge required	Cotton and sesame	Agronomic practices Improved varieties Seed production and supply Pest and disease control		

* Market information refers to information about the functioning of markets in general. It includes market potential, quality requirements, marketing channels, price behaviour etc.

Annex 2: Summary of demonstration materials identified as required for the priority commodities

Commodity	Demonstration material	Commodity	Demonstration material
Fruits	<ul style="list-style-type: none"> • Varieties • Nursery practices • Tree management practices • Post harvest handling 	Vegetables	<ul style="list-style-type: none"> • Seed and propagation materials • Improved varieties • IPM • Seed bed preparation and management • Propagation methods (fruits) • On farm water management • Fertility management • Post-harvest handling
Sheep and goat fattening	<ul style="list-style-type: none"> • Feed types • Fattening practices 	Dairy	<ul style="list-style-type: none"> • Husbandry practices • Processing equipment (eg. Churner) • Cooling equipment • Containers • Milk preservation methods
Hides and skins	<ul style="list-style-type: none"> • Poster supported branding techniques • Preservation stands and frames • Samples of skins and hides • Preservation techniques • Pest management of skins and live animals 	Apiculture	<ul style="list-style-type: none"> • Improved beehives and accessories • Bee-forages and management • Queen rearing techniques • Bee predators and controlling techniques • Pest management and control • Diversified bee products and by-products • Honey storage and handling
Poultry	<ul style="list-style-type: none"> • 		

Annex 3. Alamata Peasant associations and their total area (km²)*

Name of PA	Area (km²)**
Gerjale	77.79
Tao	41.73
Lalay Dayu	45.82
Kulu Gize Lemlem	32.74
Selam Bekalsi	51.36
Alamata Town	5.76
Meriwa	155.72
Tsetsera	127.56
Limaat	49.17
Selen Wuha	76.43
Tumuga	59.86
Waja	1.45
Total area	725.39

Source: IPMS GIS Unit, 2005.

*The total area includes area of the small towns, Alamata and Waja

**There is a difference in total area between this table and Table 1.

Annex 4 Program of Visit to PLS

Annex 5.1 Methodology of PLS plan development

The first step in the PLS planning was the creation of a Woreda Advisory Learning Committee (WALC) (Annex 5.2), followed by an introduction of the project to the WALC members. The next step was the identification of the major farming systems in the PLS and the potential market commodities within them, together with the WALC members and based on the commodities identified in the strategic plans prepared by the regional and *woreda* agricultural staff. Farming systems and potential commodities were then discussed with the various *Woreda* agricultural service institutions (crop, livestock, natural resources, cooperative department, women affairs and HIV/AIDS officials)¹. This was followed by field visits to the selected farming systems by teams (two to three) consisting of project staff, project research partners and *Woreda* staff. During these field visits, semi-structured interviews were conducted with field staff (DAs and supervisors) and community members (male as well as female) to explore the nature of the farming system, to identify the major marketable commodities and their production methods/problems (including natural resource management), input supply and marketing arrangements. Problems associated with the production to marketing continuum of the identified commodities were also discussed. Triangulation technique was used in order to validate information. The suitability and possibility of introduction of new commodities was also explored and discussed². The findings of this initial PRA were then summarized, presented and discussed in a 2-day PLS planning workshops (one in each PLS) which were attended by representatives from the RALC, WALC, *Woreda* experts, DAs, community representatives, male and female farmers, NGOs, and national and international research partners (Annex 4).

¹ To facilitate this process the project staff had collected/prepared secondary data on the PLS, including GIS referenced maps with bio physical and socio economic data.

² The project team prepared guidelines for these PRA of institutions and community members as well as some notes on the different methods to be used for the PRA.

Annex 4.2. List of Alamata WALC members and their address

Sr. No.	Name	Sex	Institution (Post)	Telephone
1	Sadat Hassen	M	Water & Road	04-740052
2	Aynekulu Teklay (Chair)	M	OoARD	04-740217
3	Kassahun Seyoum	M	Agriculture & Natural Resource Devt.	04-740463/740296
4	Gidey Redae	M	Natural Resources	04-740463
5	Seleshi Asfaw	M	Input	04-740002
6	Abeba Sisay	F	Women's Affair	04-740520
7	Amha Hadush	M	Dedebit Credit	04-740601
8	Tesfay Hagos	M	EARO	04-740596/46
9	Gebreyohannes Berhane (Secretary)	M	PLS Research & Development Officer	04-408725/09-700383
10	Adugna Gesese	M	Cooperatives	04-740002

Annex 4.3. Trip report to Atsbi Wonberta and Alamata Woredas, Tigray Regional State

Period of trip:	November 28 – December13, 2005
Travelers:	Dr. Berhanu Gebremedhin Kahsay Berhe Tilahun Moges (driver)
Purpose of trip:	Establishment of IPMs office at Alamata, Liason Office at Mekelle and PRA at Alamata Woreda

The team departed from Addis Ababa on November 28, stayed at Alamata overnight and arrived in Mekelle on November 29. Dr. Berhanu took leave November 30–December 3. Kahsay Berhe collected secondary information about Alamata from various regional offices in Mekelle while Dr. Berhanu was on leave. Several documents of the feasibility study of the Raya Valley Agricultural Development project were collected and photocopied.

December 3:

1. Trip to Astbi Wonberta Woreda

- Team was joined by Dr. Gebremedhin Woldewahid.
- Dr. Gebremedhin was officially introduced as an IPMS staff.
- Team met with Atsbi Wonberta administrator, the WALC chairman, and head of the agricultural development sector.
- Several alternatives were investigated as office spaces for IPMS project.
- Finally an agreement was reached with the WALC chairman to free two rooms for IPMS project in the office premises where the cooperatives and in put supply desk is located.
- IPMS will pay a monthly rent of Birr 600.00 plus utilities. A third room may be freed in the future.
- Direct telephone connection will be made upon request by IPMS.

2. Meeting with RALC Chairperson

- Team met with RALC chairman and updated him on progress to date
- Possibility of a liaison office at the BoARD was discussed
- No possibility for office space was identified

- RALC chairperson wrote letter to Alamata woreda administration about IPMS
- RALC chairperson called Alamata woreda admin and set up appointment for Monday (December 5).
- RACL chairperson agreed to join team for PRA at Alamata using bureau vehicle.
- Team introduced Dr. Gebremedhin officially to RALC chairperson as IPMS staff.

3. Meeting with Manager of Mekelle Research Center

- Manager agreed to allocate current office of Dr. Gebremedhin as a liaison office for IPMS.
- A second room may be allocated in future upon request by IPMS.
- Direct telephone connection may be installed to the liaison office upon request by IPMS.

4. Meeting with TARI DG

- DG agreed to provide vehicle for PRA at Alamata.
- Team thanked DG for seconding Dr. Gebemedhin to IPMS.

5. Meeting with Dr. Gebreyohannes Berhane

- Dr. Gebreyohannes agreed to join team for PRA at Alamata

December 5:

- Team (joined by Drs Gebremedhin and Gebeyohannes) traveled to Alamata

December 6:

1. Meeting with woreda administrator, head of OoARD and head of agricultural development sector

- Team introduced project
- Woreda agreed to set up WALC

2. Meeting with agricultural development experts

- Discussed agricultural conditions and current efforts
- Obtained woreda SPM

3. Establishment of WALC, identification of farming system and priority commodities

- Team made presentation to WALC members

- Two farming systems identified
- Priority crop and livestock commodities by farming systems identified

December 7:

- Team split into three groups (crop, livestock and institutions)
- Team conducted PRA deliberations with experts and heads

December 8:

- Team split in two groups and traveled to PAs and conducted PRA deliberations with farmers
- Visited several irrigation , serious ponds and water wells sites

December 9:

1. Field visit

- Field visits continued until noon

2. Meeting with head of agricultural development sector of OoARD

- Head identified and allocated 3 office rooms for IPMS within the premises of OoARD.
- Some renovation of the rooms and installation of direct telephone line to be done upon request by IPMS

December 10:

- Team wrote PRA reports

December 11:

- PRA report writing continued
- Team departed for Addis (PM)

Annex 4.4. Peasant associations visited and farmers held discussions with

After completing meetings in the different offices at woreda level, the team was divided into two. The crops and socio-economics group went and visited five peasant associations in the both farming systems.

No.	Name of PA	Farming system	Farmers contacted
1	Tumuga	teff, sorghum, maize/livestock	Molla Asefie, Abera Berihun, Abraham Tukie
2	Limaat	“ “ “	
3	Gerjele	“ “ “	
4	Selam Bekalsi	“ “ “	Yigzaw Ambaw, Belay Berihun, W/o Enanu Tegegne
5	Tsetsera	Pulse/livestock	

Annex 4.5 Alamata PLS Workshop Participants, February 15-16, 2005

No.	Name	Sex	Institution
1	Abadi Asfaw	M	Farmer
2	Abadi Girmay	M	TARI – Mekelle
3	Abera Gebreamlak	M	BoARD
4	Abera Gesesse	M	Farmer
5	Adugna Gessese	M	OoA, Expert
6	Ale Mekonnen	M	PA Chairman
7	Alema Woldemariam	M	Expert
8	Alemayehu Ambaye	M	REST
9	Amare Belay	M	TARI – Mekelle
10	Ametemariam Gebremichael	F	TWAB
11	Anguach Zegeye	M	Farmer
12	Arbse Wayu	M	Farmer
13	Asnake Mekonnen	M	Farmer
14	Assefa Abreha	M	Farmer
15	Assefa Baye	M	Farmer
16	Aynekulu Teklay	M	Head, OoARD
17	Azmera Teshome	F	Farmer
18	Belay Berihun	M	Farmer
19	Berhe Fiseha	M	BoARD
20	Beyene Dimtsu	M	TARI – Mekelle
21	Dagnaw Menan	M	REST
22	Demoz Teka	M	BoARD
23	Dirk Hoekstra	M	ILRI – IPMS
24	Dr. Azage Tegegne	M	ILRI – IPMS
25	Dr. Berhanu Gebremedhin	M	ILRI – IPMS
26	Dr. Eyasu Ashenafi	M	ICRAF
27	Dr. Frank	M	ICRAF
28	Dr. Gebremedhin Woldewahid	M	ILRI – IPMS
29	Dr. Gebreyohannes Berhane	M	ILRI – IPMS
30	Dr. Solomon	M	OoA, Expert
31	Fekadu Tilahun	M	MOA
32	Gashaw Ayalew	M	Farmer
33	Gebreaweria Gebrekirstos	M	WES
34	Gebresadik Meresa	M	Farmer
35	Gebreyesus Melles	M	MOA
36	Gebreyohannes Girmay	M	BoARD
37	Gebrezgiabher Gebreyohannes	M	TARI – Mekelle
38	Giday Redae	M	OoARD
39	Gimega Mohammed	M	Farmer
40	Kahsay Gebregiorgis	M	OoRD
41	Kassa Tegegne	M	Farmer
42	Kebede Derbew	M	Farmer
43	Kilel Alemu	M	Farmer
44	Krishina Paradi	M	IWMI
45	Lemlem Negussie	M	Farmer

46	Mamo Gebrezgiabher	M	Farmer
47	Mekonnen Assefa	M	Farmer
48	Mengesha Haile	M	TAMSA
49	Mengistu Gashaye	M	Farmer
50	Mohammed Nuradem	M	Farmer
51	Sadat Hassen	M	Rural Infrastructure
52	Sileshi Asfaw	M	Cooperative
53	Solomon Shiferaw	M	Alamata Credit & Supply
54	Tesfay Araya	M	TARI – Alamata
55	Tesfay Gebrezgiabher	M	OARD
56	Tesfay Hagos	M	TARI – Alamata
57	Tirfinesh Yainu	F	BoARD
58	Weldegebriel Weldehawariat	M	BoARD
59	Yirga Tegegn	M	Farmer
60	Zufan Abuye	F	Farmer

Livestock Production Working Group

1	Name	Sex	Position
2	Abera Gebreamlak	M	Expert
3	Anguach Zegeye	M	Farmer
4	Belay Berihun	M	Farmer
5	Dr Azage Tegegn	M	Expert
6	Dr Gebreyohannes Berhane	M	Expert
7	Dr. Solomon	M	Expert
8	Gidey Redae	M	Expert
9	Lemlem Negussie	F	Farmer
10	Mamo Gebrezgiabher	M	Farmer
11	Mohammed Nuradem	M	Farmer
12	Solomon Shiferaw	M	Expert
13	Tesfay Hagos	M	Expert
14	Tirfinesh Yainu	F	Expert

Crop Production Working Group

No.	Name	Sex	Position
1	Alemayehu Ambaye	M	Expert
2	Ametemariam Gebremichael	F	Women Affairs
3	Asefa Baye	M	Farmer
4	Asnake Mekonnen	M	Farmer
5	Aynekulu Teklay	M	Head, OoARD
6	Dirk Hoeckstra	M	Expert
7	Dr. Eyasu Ashenafi	M	Expert
8	Dr. Frank	M	Expert
9	Dr. Gebremedhin Woldewahid	M	Expert
10	Dr. Kristina Paradi	M	Expert
11	Kassa Tegegne	M	Farmer
12	Kebede Derbew	M	Farmer

13	Kilel Alemu	M	Farmer
14	Tesfay Araya	M	Expert
15	Tesfay Gebrezgiabher	M	Expert

Institutions Working Group

No.	Name	Sex	Position
1	Adujna Gesses	M	Expert
2	Ale Mekonnen	M	Farmer
3	Alema Woldemariam	M	Expert
4	Amare Belay	M	Expert
5	Asnake Mekonnen	M	Farmer
6	Azmera Teshome	F	Farmer
7	Berhe Fiseha	M	Expert
8	Dr. Berhanu Gebremedhin	M	Expert
9	Fekadu Tilahun	M	Expert
10	Gashaw Ayalew	M	Expert
11	Gebreaweria Gebrekiristos	M	Expert
12	Mekonnen Asfaw	M	Farmer
13	Mengistu Gashe	M	Farmer
14	Sadat Hassen	M	Expert
15	Sileshi Asefa	M	Expert
16	Yirga Tegegne	M	Farmer

Annex 4. 6 Alamata PLS Workshop Program, February 15-16, 2005
Alamata, Tigray

Date	Time	Activity	Presenter
February 15 (Tuesday)	8:30 – 9:00	Registration	Organizers
Chairperson: Dagne Menan, REST Rapporteur: Ametemariam Gebremichael , Bureau of Women's Affairs			
	9:00 – 9:10	Welcome Address	Ato Berhe Fisseha, BoARD and RALC Chairperson
	9:20 – 9:50	Project Background	Dirk Hoekstra, ILRI
	9:50 – 10:20	PRA process, farming systems and priority commodities	Dr Berhanu Gebremedhin, ILRI
	10:20 – 0:30	Questions/discussions	Participants
	10:30- 11:00	Coffee Break	Organizers
Chairperson: Tirfinesh Yaynu, BoARD/Rapporteur: Beyene Dimtsu, TARI			
	11:00–11:45	Crop Production	Dr. Gebremedhin Woldewahid, ILRI
	11:45 – 12:00	Questions/discussions	Participants
	12:00 – 1:30	Lunch	Organizers
Chairperson: Gebreegziabher Gebreyohannes, TARI/Rapporteur: Abera Gebreamlak			
	1:30 – 2:15	Livestock Production	Dr. Gebreyohannes Berhane, ILRI Dr. Azage Tegegne, ILRI
	2:15 – 2:30	Questions/discussions	Participants
	2:30 – 3:15	Institutions	Dr. Berhanu Gebremedhin, ILRI
	3:30 – 4:00	Coffee Break	Organizers
	4:00 – 4:15	Organization of break up sessions	Dr. Berhanu Gebremedhin, ILRI
Chairpersons / Rapporteurs of Break up Sessions: Crop: Dr Gebremedhin Woldewahid / Beyene Dimtsu Livestock: Dr. Gebreyohannes Berhane / Abera Gebreamlak Institutions: Dr. Berhanu Gebremedhin / Abadi Girmay			
	4:15 – 5:30	Break up sessions discussion	Participants
Date	Time	Activity	Presenter
February 16 (Wednesday)	8:30 – 10:30	Break up sessions cont....	Participants
	10:30 – 11:00	Coffee Break	Organizers
	11:00 – 12:00	Break up sessions cont....	Participants
	12:00 – 1:30	Lunch	Organizers
Chairperson: Amare Belay, TARI/Rapporteur: Dr. Gebremedhin Woldewahid, ILRI			
	1:30 – 1:50	Crop Production Group Report	Beyene Dimtsu, TARI
	1:50 – 2:00	Questions / discussions	Participants
	2:00 – 2:20	Livestock Production Group Report	Dr. Gebreyohannes Berhane, ILRI
	2:20 – 2:30	Questions/discussions	Participants
	2:30 – 2:50	Institutions Group Report	Abadi Girmay, TARI
	3:30 – 4:00	Coffee Break	Organizers
Chairperson: Dr. Berhanu Debremedhin/Rapporteur: Dr. Gebreyohannes Berhane			
	3:30 – 4:30	General discussion	Participants
	4:30 – 4:50	Participant observations	Participants
	4:50 – 5:10	Concluding remarks	Dirk Hoekstra, ILRI
	5:10 – 5:20	Closing speech	Redae Bezabih, Administration