Apiculture commodity development in Goma District: Experiences from IPMS

Yisehak Baredo, Dirk Hoekstra and Kahsay Berhe

Canadian International Development Agency
Agence canadienne de développement international

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Federal Democratic Republic of Ethiopia
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Table of contents

Abbreviations

ETB	Ethiopian Birr
HBRC	Holeta Bee Research Center
HH	Household
JU	Jima University
IPMS	Improving Productivity and Market Success of Ethiopian Farmers
LDPA	Livestock Development and Production Agency
Masl	Meters above sea level
OoARD	Office of Agriculture and Rural Development
OCSSCo	Oromia Credit and Saving Share Company
PA	Peasant Association
PLW	Pilot Learning Woreda
UNDP	United Nations Development Programme
WALC	Woreda Advisory and Learning Committee

Acknowledgements

This paper documents interventions, results and lessons learned for apiculture commodity development in Goma PLW, based on a participatory market oriented value chain approach. The approach was introduced by the IPMS project, who not only facilitated the introduction of the approach (technically and financially), but also played an important role as partner in the development process. The credit for the development results obtained go however to all the partners involved in this endeavor especially Goma Woreda bee farmers, staff of the Goma LDPA (Livestock Development and production Agency Office), Holeta Bee Research Center.

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Abstract

Goma is endowed with different flora and adequate moisture which favors honey production. As a result, bee farmers started producing honey since time immemorial using traditional hives, mostly made of bamboo. Improved hive production in the Woreda started in 1987 among cooperatives formed during the military regime. In 2007, apiculture was identified as one of the priority commodity for Goma PLW through participatory priority commodities identification. Major constraints identified were shortage and/or substandard inputs supply, poor quality honey, lack of market, skill and knowledge limitations of bee farmers and technical staff. To address the challenges, value-chain development approach was exercised and in this regard the following developments were recorded.

One interested honey shop was upgraded to become an apiculture input shop in Agaro town with financial assistance from OCSSCo/IPMS and technical assistance from the District Livestock Development and Production Agency (LDPA) and IPMS. This input shop supplied considerable inputs to bee farmers who also provide commercial services for their neighbours. One of the important inputs delivered to bee farmers was imported honey extractor but less demand was observed due to its high price.

Moreover, one interested honey producers association named Wojin Gudina Honey Producers Association was formed and got legal identity. The association is expected to play market regulatory role, quality assurance, do bulking of member produce as well as non members to maintain bargaining power. About 44 interested farmers and 12 technical staff received skill and knowledge upgrading training and in this regard Jima University (JU) played a big role.

More focus was given to transforming traditional to transitional hives (Kenya Top Bar), which was a change for the frame hives (modern hives) which had been introduced before. Twenty interested farmers received 123 transitional hives in Acha Afeta PA through credit and also transitional hive use has shown significant increase within and outside interested farmers in the last two years. To address market constraints, an effort was made to link honey producer with honey processing and export enterprises and in this regard Beza Mar honey processing and exporting enterprise has already started the process to buy Goma honey.

Prior to this, an attempt was also made with another commercial processor but was not successful. The effects of various interventions are just emerging and are expected to come to full fruition over time. A household (HH) survey conducted by the project indicated however that adopters of improved apiculture technologies produced in 2008, on average, about ETB 3,400 of honey per year compared to ETB 225 by traditional bee keepers.

Major lessons learned include that the intervention stimulated increased demand for improved hives and better use of existing hives. As compared to other Districts, involvement of private sector in the sale of accessories for improved bee hives and honey processing is emerging.

Most of the honey produced from framed hives is extracted using locally made crude extractors with less or no food graded approval and also less quality honey. These extractors are operated commercially by private individuals, but require further technical support to improve quality. The development of a quality honey market is just emerging, however as indicated in the prices, no clear price incentive for quality honey is observed yet, probably because of the still relatively small volume entering into this market segment. Another indication of the still limited demand for clear honey is the increase in the numbers of traditional hives in the last two to three years.

Key words: Extension, honey, impact, smallholder, innovation systems

1. Introduction

The IPMS project, funded by the Canadian International Development Agency, was established to assist the Ministry of Agriculture and Rural Development in the transformation of small holder farmers from a predominantly subsistence oriented agriculture to a more market oriented (commercial) oriented agriculture. The project adopted a "participatory market oriented commodity value chain" approach which is based on innovation systems and value chain concepts. Crucial elements in the approach are the value chain instead of a production focus, the linking and capacitating of value chain partners and the assessment, synthesis and sharing of knowledge among the partners.

The project introduced this approach in 10 Pilot Learning Woredas (PLW) in Ethiopia with the objective of testing/adopting the approach so that it can be promoted nation wide. An integral part of the approach is the identification of marketable commodities and value chain interventions. This was accomplished through a participatory process in all PLWs, i.e. in Goma in 2007.

This case study focuses on the development of apiculture development in Goma District, with the objective of documenting diagnostic results and value chain interventions, providing proof of results (proof of concept), challenges and lessons learned to be considered for scaling out.

Following the introductory section, the remaining sections are structured as follows. Section two deals with methods and approaches used in the study, while section three presents background information, including description of the PLW and the history and diagnosis of apiculture development. In section four, value chain interventions - extension, production, input supply, marketing, and credit issues - are presented. Section five dwells on results and discussion on production/income, input supply/marketing, gender/environment/labour use, organizational and institutional aspects, while sections six and seven deal with challenges and lessons learned, respectively.

2. Methods and approaches

To start the development of a commodity, IPMS used a District level participatory market oriented value chain planning approach, aimed at identifying i) main farming systems, ii) potential marketable crop and livestock commodities by farming system, iii) problems, potentials and interventions for each value chain component iv) value chain stakeholder assessment with potential (new) roles and linkages. Different value chain stakeholders were involved and consulted in this planning exercise. Secondary biophysical and socio economic data were collected, followed by open ended interviews with focus groups and key stakeholders. The results were presented in a stakeholder workshop in which priority marketable commodities were decided upon as well as key interventions and partners.

This initial rapid assessment was followed by some more detailed studies on selected commodities. Such studies were conducted by partner institutions and/or students and or IPMS staff using formal surveys, interviews and observations.

To implement the program at Woreda, Peasant Association (PA) and community level the project facilitated different knowledge management and capacity development approaches and methods to stimulate the introduction of the value chain interventions by the actors concerned. The various value chain interventions are documented by the project staff in the six monthly progress reports and the annual M& E reports.

To quantify the results from individual and/or combination of interventions, the project established a baseline and measured/documented changes. Several data sources were used to establish the baseline and to measure change.

2.1. Baseline information

To establish a baseline, data from a formal baseline study and data from some special diagnostic studies were used. The initial Participatory Rapid Appraisal (PRA) study also contributed to the quantitative and qualitative baseline information.

Amongst others, the formal baseline study used PA level interviews and records to collect information on irrigated area coverage and the number of households involved in irrigated agriculture. This information was used to compile district level information on irrigated acreage by crop and households. The HH survey randomly selected households in each of the PAs (average 3 to 4 hh/PA). Whenever a household was involved in a commodity, the following information was collected: number of hives, productivity, production data and price received. This information enabled us to calculate production per unit, and gross production values. The PA/District level data enabled us to calculate District level production data and gross production values as well.

Several sources were used for regular documentation of change processes and results, including six-monthly progress reports, annual M&E reports, MSc thesis research, records kept by the OoARD, personal observations and diaries. In some PLWs, staff also monitored changes in production/productivity for a few selected farmers on a regular basis, including farmers who grew onion bulbs and onion seeds and farmers who tested a new tomato variety.

In 2009, the project also developed a set of guidelines for the PLW staff to systematically collect relevant information for the case studies including history, changes in extension services, value chain interventions (production, input supply, marketing and credit), results, challenges and lessons learned. Part of the information was obtained from the previously mentioned baseline and other sources and specially arranged key informant interviews, a commodity stakeholder workshop and a household level survey.

The stakeholder meeting was organized to establish the evolution of the roles and linkages of the value chain actors.

In Goma, 8 PAs (Omo Guride, Yach Urache, Kilole Kirkir, Daye Kechene, Bulbuloo, Choche lemi, Qota and Bashasha) targeted by IPMS for market development were included in the formal household survey conducted in 2009. These representative

PAs were selected purposively to include both PAs targeted and non targeted by IPMS for market development.

The survey data consists of relevant production and marketing information on fruits including area allocation, production costs and inputs use, level of production, and marketed surplus. In selecting the sample households, with the aim of getting some idea about the effect of the different interventions, a distinction was made between households who had adopted/benefited from the various interventions and households who did not. In both sample groups, both wealth and gender criteria were considered to get a representative distribution of sample households.

Following the collection of all relevant information, a write-shop was organized to present information in a systematic manner. Drafts of the PLW specific commodity case studies were then reviewed by experts at IPMS Head Quarter.

3. Commodity background

3.1. PLW description

Goma is particularly representing cash crop in Oromia region. It is located about 389 km Southwest of Addis Ababa in Oromia region Jima Zone (Figure 1). It has a total population of about 247,326 people distributed in 36 peasant associations (PAs) of which more than 49 % are women. The farming households of Goma PLW are about 45,567 out of which 10,035 are female households (OoARD 2007).

Goma PLW has a total area of 96.4 km^2 with mid altitude covering 96% of the total area and it has also small proportion of extreme lowland stretching along Didesa river basin in its North East border and extreme high lands in West bordering with Gera Woreda. Goma has an altitude ranging between 1387 and 2870 meters above sea level (masl) and also has a hot and humid weather with maximum and minimum temperature, 13° and 29° C respectively (IPMS 2007). The Woreda is also one of these areas in the country which enjoys well distributed high annual rainfall. Based on 15 years (1992-2006) weather data obtained from Goma Woreda, it indicates that the average annual rainfall is 1524 mm (Table 1). Annual rainfall variability is very low and is bimodally distributed. The small rains are from March to April and the main rainy season from June to October. All in all, there are about 7 rainfall months in the Woreda. However, rainfall is sometimes received even during the other months because dry spell months are few. Hence, crop and livestock production is not constrained by the amount and distribution of rainfall as in other parts of the country.

Table 1. Long term rainfall (15 years) and temperature data for Goma Woreda

Months	Rainfall (mm)	Temperature	
		Minimum	Maximum
January	30.3	11.5	29.6
February	45.7	12.5	30.6
March	39.3	13.1	30.5
April	104.6	13.6	29.6
May	179.3	13.7	29.6
June	258.2	13.3	28.7
July	248.6	13.2	26.8
August	214.6	13.0	27.3
September	184.7	12.5	28.1
October	114.0	12.3	29.3
November	53.2	11.8	29.1
December	51.2	11.5	29.1
Total	**1523.7**	**152.0**	**348.1**
Mean monthly		**12.67**	**29.01**

Source: Goma Woreda OoARD, 2007.

As seasonal and area wise variability of rains is low in the Woreda, one can make plans of crop/livestock production based on the existing rainfall amount and patter (IPMS 2007). This has also made Goma a suitable area for apiculture development. Livelihood of Goma community is predominantly dependent on coffee, but contribution of apiculture is also significant to many households.

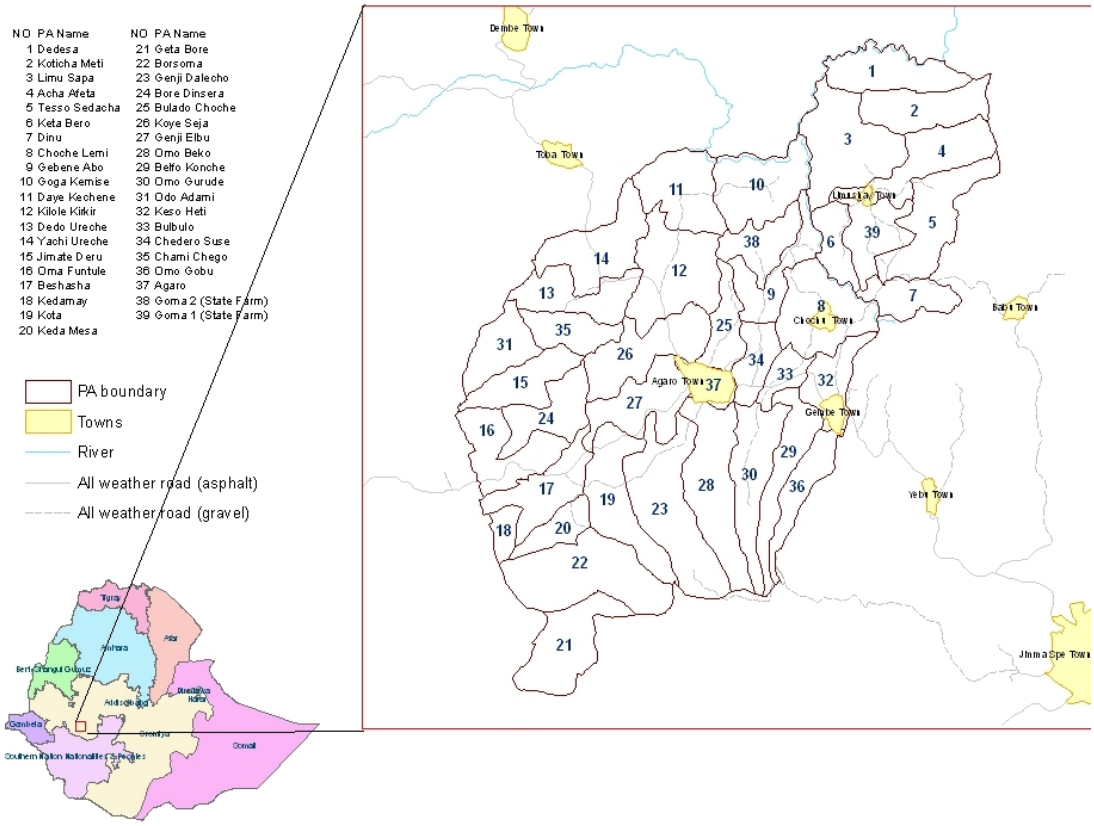

Figure 1. Map of Goma District

3.2. History and diagnosis of apiculture development in Goma

Bee farming is not a new practice for the community in Goma PLW. People used to produce honey using various traditional mechanisms since time immemorial and bamboo is most used for local hive preparation. Some farmers also use log of some tree by splitting, removing the inner part and rejoining it and such types of traditional hives are still common in high land part of the PLW. In all cases plastering the inner part with cow dung and smoking it with dry dung to attract bees is practiced by all farmers.

Traditional hive is used only for one harvest if care is not taken while taking it down from the tree in which it hangs for harvesting. But many farmers practice careful handling of hives during harvest. In this case, one traditional hive could be used for more than one time. However, it is not possible to get more than one harvest per year from traditional hives because of time required for bee colony to set foundation. Farmers produce crude honey only from traditional hives which is mixed with wax and the largest buyers are local “Tej” makers.

The introduction of modern hives was made in 1987 during the Derg regime among producer cooperatives established at different locations in the Woreda. Since then, the use has increased considerably and many village level carpenters were engaged in producing all types of hives. Despite this however, very few farmers could afford to

buy frame hives because they were expensive, given the prevailing honey prices.. Currently, a single frame hive costs ETB 600 and more in Goma. Apiculture expansion was paralyzed with the fall of the Derg regime and restarted in 1997 and continued until the end of 1998, when farmers were supported with trainings at different times with support from UNDP. In 2004 and 2005, the government supplied about 3,380 frame hives to farmers on credit and this was far beyond the annual plan of the Woreda OoARD which at that time was 385 hives only. This made delivering technical support very difficult. Moreover, accessories were of very low quality and this has been complained by the farmers but unanswered until today and as a result many of the farmers abandoned their hives.

Even though, honey production in Goma is very high, the attention given to the commodity is quite low. Until 2004, only one unofficially assigned technical staff at Woreda level was looking after apiculture but soon after the dumping of these hives in 2004/05, the only technician was transferred to work on big and small ruminants. Therefore, until 2008 there was no structure in the OoARD which accommodated apiculture production. Hence, there was no staff officially assigned to undertake the technical support to farmers in honey production. However, some staff in OoARD were involved on personal initiatives and were giving technical support to bee farmers.

IPMS supported honey production development using value chain approach since 2007 with the identification of constraints and analysis using PRA lead to stakeholder consultation at different levels. The stakeholder workshop following the diagnostic survey during IPMS project launching identified the following major constraints, possible interventions and potential stakeholders (Table 2).

Table 2. Constraints identified and role players

No	Components in the value chain and identified constraints	Proposed interventions	Responsible stakeholders
	a) Production		
	▪ Lack of skill and knowledge, lack of understanding on honey production system, low productivity of hives, etc	▪ Focused training, conducting study on the existing systems, introduction of transitional hives	▪ JU, HBRC, OoARD, IPMS
	b) Inputs supply system		
	▪ Substandard bee hives and accessories, lack of apiculture inputs supply system and nearby input supply sources	• Encouraging purchase of standard equipments, facilitating innovative inputs supply system and supply of standard demonstration materials	JU, HBRC, OoARD, IPMS
	c) Marketing		
	▪ Less bargaining power by farmers due to individual marketing because of low volume ▪ Lack of information on honey marketing and less linkage ▪ Poor quality	▪ Organizing honey marketing group and honey producers forum and developing information sharing and linkage mechanism. ▪ Training	▪ OoARD, IPMS ▪ OoARD, IPMS ▪ JU, HBRC, OoARD, IPMS
	▪ d) Credit		
	▪ Lack of credit	▪ Facilitating credit	▪ OoARD, OCSSCo, IPMS

4. Commodity value chain intervention

4.1. Extension

Until the start of the project in the PLW, bee keeping was given little emphasis and activities were undertaken by a voluntary staff who was an apiculture technician. As indicated before, extension was mostly driven by supply of inputs with limited attention to skills development and learning. However, after thorough discussion with OoARD and also in Woreda Advisory and Learning Committee (WALC) meetings, one advanced diploma level livestock professional was assigned. An experience sharing tour was organized for interested farmers and technical staff to Bonga where apiculture is advanced due to intervention made by Apinec, a private enterprise and SOS Sahel. The tour assisted farmers to understand more on the importance of direction and design of hive placing, shade construction, etc. As a result, almost all interested farmers, particularly, in Bulbulo and Keso Hiti PAs implemented shade construction and appropriate hive placement.

The project intervention on apiculture development in Goma PLW started in three PAs (Bulbulo, Keso Hiti and Acha Afeta) to demonstrate and increase the interest of other bee farmers in the PLW for better production, marketing and input supply practices. A baseline survey on 24 interested bee keepers (1 female) was conducted in order to assess farmer's bee keeping practices to understand good and bad side of bee keeping and to fine tune the training based on base line survey result. The interested farmers, three supervisors and nine DAs (working with the interested farmers) received training on improved bee keeping practice (Table 3). The training was facilitated by senior bee experts from JU and all important quality bee farming inputs were collected from JU and displayed and their function demonstrated by experts.

Table 3. Capacity building

No	Target PA	Participants			Responsible stakeholders
		Male	Female	Total	
1	Bulbulo	11	1	12	JU, OoARD, IPMS
2	Keso Hiti	12	-	12	JU, OoARD, IPMS
3	Acha Afeta	20	-	20	JU, OoARD, IPMS
4	Supervisors	3	-	3	JU, OoARD, IPMS
5	DA	8	1	9	JU, OoARD, IPMS
	Total	54	2	56	

Source: Goma PLW progress report 2008/2009

4.2. Production intervention

Majority of target farmers reported that productivity of traditional hive is declining because of feed shortage and diseases such as wax moth and they are also unable to buy modern hive because of high cost. Significant number of farmers also reported malfunctioning of framed hives constructed by local carpenters. Thus, major emphasis of the training was improving the quality of locally made frame bee hives, introduction of standard transitional bee hive to improve production and overall management of honey production. Also a honey producers platform which accommodated farmers, honey traders, Tej makers, researchers, and other government and non-government institutions involved in apiculture was formed. Ideas on vision and mission of the forum were shared, which was to improve honey production and marketing, by addressing major constraints.

Different flowers are used as bee forage in Goma where the dominant flower types, time of flowering and percent of annual honey production by flower type is shown on Table 4. More than 70% of the annual honey production in Goma PLW comes from "Bisana" *(Croton macrostachys)* which usually flowers between Febuary and March. Some farmers explain that honey produced in February-March is usually mixed with honey from coffee flower, particularly in areas near to the large state coffee farms. Some farmers say that when hives are placed very near to a coffee farm, honey from that hive could totally be from coffee flower. This has distinct color and thickness compared to honey from "girawa" (*Vernonia* spp.) and this could be an area to look for specialty honey.

Table 4. Different flora and honey types known in Goma PLW

No	Major flora	Flowering period	Share from annual yield (%)	Colour of honey
1	*Coreopsis Bornia* ("Aday abeba")	Nov-Dec.	20	Golden yellow
2	*Vernonia amygadalina* (Girawa)	Feb-March	10	Dark red
3	*Croton macrostachys* (Bisana)	May-June	70	Bright red
4	*Coffea arabica* (Coffee)	Feb-March	NA	Very thin and bright red
5	Others(maize, mango, *Cordia africana* ("wanza"), *Malva verticillata* (dokma), Avocado, etc)	Varies	NA	Not known for honey production

Source: key informants

"Adey Abeba" (*Coreopsis boraniana*) is common in cereal production area, which is small in Goma. Therefore, honey from this source in Goma is low. However, feed problem is very common, particularly in the dry season of the year (December-February) when farmers are usually forced to give supplementary feed to bees, including maize flour and others. To address this challenge a new bee forage seed (*Lenorus* sp.) was introduced from Alaba PLW. One temporary bee forage nursery site was established in OoARD compound and 500 gm of *Lenorus* sp. seed was produced for distribution to bee farmers. Then, four farmers received 560 seedlings from the nursery and reported that it has performed well and bees liked it. Through this bee forage introduction process it was learnt that the forage species introduced could perform well in the PLW agroecology and also the seed harvested could serve as source of future planting material. As already mentioned in the extension section, bee keepers were also alerted to the use of shade in the apiary.

4.3. Input supply

Types of inputs needed for honey production are quite numerous and honey producers in Goma had difficulties in getting these inputs. While in the past, emphasis has been on frame hives, the project reemphasized the use of transitional or Kenya Top Bar (KTB) as an option because of its multiple advantages. This includes its affordability for resource poor farmers, increased production and better quality of honey compared to traditional hives. To this end, emphasis was given to training interested farmers, specifically in KTB management and providing them with credit to cover the purchase cost. Arrangement was also made to avail other inputs to bee farmers. In this regard, one apiculture input shop was opened in Agaro town with an innovative credit from IPMS disbursed through Oromia Credit and Saving Share Company (OCSSCO).

Wax is also becoming a limiting factor for modern hives as it is needed for making foundation sheet. Now Goma farmers who use framed hives are forced to buy wax produced from their own honey product at extremely high price (ETB 40/kg). Earlier, Tej makers produced pure wax from Tej byproduct which could be used for foundation sheet using traditional method. However, since recent times Tej makers in Agaro found out that selling crude wax to traders in Addis is more profitable than converting it into pure wax due to dramatic price change since 2006 for both pure and crude wax (Table 5).

Table 5. Wax production and marketing in Agaro since 2006

Year	Crude wax purchase price (ETB/kg)	Pure wax sale price (ETB/kg)	Crude to Pure ratio	Cost to produce 1 kg pure wax
2006	6-7	18	4:1	28
2006-2010	18	40	4:1	72

Source: key informant

4.4. Credit service intervention

Many of the farmers engaged in bee keeping have financial limitations and are usually unable to carry out innovative interventions. There was no credit service for the apiculture sub-sector before 2007 in Goma. This is most probably one of the major factors for less use of improved hives. As a result, many farmers are either not using improved hives or getting improved hives on product sharing basis. Half of the honey is shared with the person who bought the modern hive. To this end, IPMS in collaboration with LDPA initiated an innovative credit opportunity for resource poor farmers to enable them get Kenya Top Bar hives. Twenty farmers from Acha Afeta PA obtained a loan of about ETB 45,000 to buy hives. However, loan regulation of OCSSCo for agricultural products which allows only 9 to 10 months of repayment period had significantly affected the attraction of bee farmers. This is because return from sell of honey in this short period of time may not be able to repay their loan. However, one honey shop owner was given a loan of ETB 74,000 to also serve as an apiculture input shop for Goma.

4.5. Processing/marketing: Primary processing methods used in Goma and quality assurance challenges

As indicated before, the PLW now has a large number of framed hives, which need processing or honey extraction equipments. In the earlier years, Woreda OoARD used to give honey extraction service to farmers by lending the extractors usually free of charge. However, the service could not sustain because of number of reasons such as:

- Farmers failure to take proper care for the extractor because it is free
- Over usage
- Lack of follow up and proper maintenance

As the result, out of 7 extractors in the LDPA office at present, only one is functioning and this is giving service to very few farmers, usually to those near to the LPDA office. However, farmers have developed their own mechanisms to address the challenge. Some better off farmers bought imported extractors at high price and are using to purify their own honey. More importantly, more than 150 extractors are locally made and sold to some farmers at a relatively cheap price. A locally made honey exactor currently costs about ETB 1200 while the lowest price for an imported extractor is ETB 2500. As a result, many honey producers prefer to buy the locally made extractor. These locally made extractors are of two types based on the materials used to make them.

Materials used for making the local extractor include:

- Empty metal barrel or barrel made from aluminum sheet
- Angular or usually U-shape metal bar for stand
- Flat sheet shaped in to a cone as the bottom of the barrel

- Old mill grinder axels to rotate the frame holder (collected from Addis)
- About 2 cm wide metals shaped to hold the frames
- Thin metal roads welded on the frame holder to support the frame
- Central metal to fix the frame holder

Since the majority of farmers have less number of framed hives, they prefer to rent from their neighbors instead of buying the apparatus. Rate of renting or service charge paid to the extractor owner is more or less fixed through out the PLW. The widely practiced rent rate or service charge is:

- ETB 10.00 per framed hive
- ETB 50.00 per night (in this case the honey producer can use the extractor for more than one hive but has to bring back the extractor before the next night)

Some curious extractor owners go with their extractor at night and watch the number of hives from which honey extracted and charge accordingly. Even though, no inventory is taken on the number of both imported and locally made extractors available in the PLW, some key informants explain that shortage of extractor is still very common and cause two major problems:

- Some farmers harvest immature honey to exploit the rented extractors which is one of the causes for poor quality honey
- Some fail to harvest on time waiting for their turn to get extractor in which case bees consume the honey and result to low yield

The other important constraint is related to the use of locally made extractor. One can imagine that no matter what actions are taken to refurbish the items used to assemble the extractor; the extractor is not food grade. Since we are talking about engaging ourselves in international honey market, it is necessary to prove that our product is harvested, processed, packed, stored, transported and managed according to the internationally set of quality standards. Without these, we can not negotiate. Thus, this is a very critical issue that the bee farmers, concerned individuals, institutions and organization work to solve the problem.

As indicated earlier, honey product from Goma PLW has a strong market limitation owing to quality, volume, poor linkage, etc. Regardless of any intervention, various reports indicate that in the last few years price of honey has shown more than 50% increment (Table 6).

Table 6. Price honey from 2005 to 2010

No	Year	Semi pure honey	Crude honey
1	2005	11	8
2	2006	11	6
3	2007	13	8
5	2008	16	10
6	2009	18	18
7	2010	25	18

Source: Key informants

However, in a peak harvesting season the price falls sharply because of high volume, limited local demand and less outside market access. External honey traders are not attracted by small amount supplied by individual bee farmers and there was no strategy devised to bulk in order to attract external traders.

5. Results and discussions

5.1. Production/productivity and income

The effect of various interventions at production, productivity and income can be measured at household and district level

Household level data

The household level survey conducted in 2009 provided the following information on hive ownership (Table 7), household production and hive productivity for adopters and non adopters of improved hives

Table 7. Average number of beehives owned per household in 2008

Farmer type	Traditional			Transitional			Modern		
	Obs	Av.No	Occupied (%)	Obs	Av.No	Occupied (%)	Obs	Av.No	Occupied (%)
Adopters	28	4.5	54.8	4	0.3	25.0	47	7.3	83.0
Non-adopters	14	7.1	80.0						

Source: Household survey data (2009)

The average number of modern hives for beekeeping households is 7.3, which is considerably higher than in other Districts and reflects the high potential for beekeeping in Goma.

Table 8. Average honey productivity per hive type

Farmer type	**Hive type**					
	Traditional		**Transitional**		**Modern**	
	Obs	kg/hive	Obs	kg/hive	Obs	kg/hive
Adopters	*20*	6.9*	*1*	20	*46*	37.3
Non-adopters	*14*	4.3	*0*		*0*	

Source: Household survey data (2009)

* Significantly higher at 10% significance level.

As can be seen from Table 8, honey production from modern hives is much higher than from traditional hives. On average, farmers harvest 1,83 times/year from the modern hives. Many informants and also experts attribute less volume of honey from framed hive due to failure to harvest on time among other problems. As a result, the total annual volume of honey from the PLW is relatively high. Experts believe that this could have improved further if these problems were addressed. However, there are few farmers who get between 40-60 kg/hive.

The average honey production and production value from adopter households (those having transitional/modern hives) is considerably significantly higher as can be seen from Table 9.

Table 9. Average honey production and value (per household)

Farmer type	Average honey production per hive type								Total production value (Birr/HH)	
	Traditional		Transitional		Modern		Total			
	Obs	kg/HH	Obs	kg/HH	Obs	kg/HH	Obs	kg/HH	Obs	Value
Adopters	18	51.9**	1	40.0	46	210.3	46	231.5***	46	3401.42***
Non-adopters	14	28.1	0		0		14	28.1	14	224.57

Source: Household survey data (2009)
Note : *** and ** are significantly higher at 1% and 5% significance level, respectively.

District level

The baseline survey conducted in 2007 shows that there were over 35,000 traditional hives (Table 10) and about 5,800 improved hives (Table 11) in the District. The total estimated production from traditional hives was about 282 tons with an estimated value of over ETB 2.1 million (Table 10), while the estimated production from the improved hives was approximately 215 tons with an estimated value of about ETB 2.3 million (Table 11).

Table 10. Goma baseline data for traditional hives 2007

Traditional hive	**No of HH/PA**	**Mean**
Average yield per harvest/hive(kg)	14 HH	8
Number of hives producing honey/hh	43 HH	5.74
Frequency of harvest/year	43 HH	1
Estimated honey yield per household (kg)	Computed	45.9
Number of hives per household	43 HH	7.84
Occupancy rate per household	Computed	0.73
Number of hives in the Woreda	36 PA	48,226
Estimated number of hives producing honey in the Woreda	Computed	35,308
Estimated number of households producing honey	Computed	6,151
Estimated production in the Woreda (kg)	36 PA	282,464
Average price per kg (birr)	43 HH	7.58
Total value per hive/year(birr)	Computed	60.6
Total value per household (birr)	Computed	348
Estimated value in the woreda(birr)	Computed	2,141,077

Source: IPMS baseline survey 2007

Table 11. Goma baseline data for improved hives 2007

Frame beehive	No of HH/PA	Mean
Average yield per harvest/hive (kg)	6 HH	20.17
Frequency of harvest/year	6 HH	1.83
Total yield per hive/year	Computed	37
Number of hives producing honey/hh	6 HH	2.5
Total yield per household (kg)	6 HH	92.5
Occupancy rate per household	Computed	0.61
Number of hives in the Woreda	36 PA	9517
Estimated number of hives producing honey in the Woreda	Computed	5805
Estimated number of households producing honey	Computed	2322
Estimated production in the Woreda (kg)	Computed	214,785
Average price per kg (birr)	6 HH	10.83
Total value per hive/year (birr)	6 HH	401
Total value per household (birr)	6 HH	1001
Estimated value in the Woreda (birr)	36 PA	2,326,122

Source: IPMS baseline survey 2007

Based on these data, the total production quantity in the District at the start of the Project was estimated at about 500 tons, valued at about ETB 4.5 million (Tables 10 and 11). It should be noted however that hive production data are based on only a few observations as seen from the tables above.

As a result of interventions by various project partners, number of hives increased considerably over time as per information from the district LDPA. For example, the IPMS project introduced a credit scheme for the purchase of 123 KTB. According to OCSCO, all beekeepers repaid the loan, even though farmers complained about the short repayment period.

Occupancy rates of traditional hives is low (61%) compared to frame hives (73%) (Tables 10 and 11). Production could increase by even improving the occupancy rate. However, the project will verify the number of hives by type in the final project year and than make an estimate of the overall impact of the interventions over time.

5.2. Apiculture inputs supply system improvement

A considerable increase in different kinds of hives construction is observed since 2007. This is attributed mainly to different capacity building activities and demonstrations facilitated by IPMS in collaboration with, LPDA and other stakeholders like Jima University and HBRC.

The apiculture input shop supported by IPMS with advice and credit channeled through OCSCO is now functional and items made available to bee keepers are shown in Table 12. The sales record of apiculture shop shows that items like smokers, gloves, wire for frame making, etc are fast moving items. And also very high price of some widely needed equipment, like honey extractor, have limited bee keepers from buying it again. The quality of the honey production from modern hives could be hampered due to lack of these items. Overall, the apiculture input shop contributed much by supplying standard quality inputs to farmers.

The shop owner explained that major problems in getting bee keeping items are that materials are of poor quality, unaffordable in price and unavailable. He also explained that foundation sheet is needed by most of the farmers who could not find wax as well as wax stamp of their own or even from their neighbours. In this regard, the shop owner sold foundation sheet in small quantity but expanded it with financial assistance from LDPA/IPMS and many farmers started taking foundation sheet and other inputs and pay back in kind. The shop owner uses two methods for charging for the foundation sheet:

1. The farmer supplies the wax then is charged ETB 0.60 for the sheet by the shop owner.

2. The shop keeper supplies the wax himself and charges ETB 2.00 per sheet inclusive per printing

Farmers like this service (as compared to purchasing standard sheets, since they can decide the thickness and width of their foundation sheet. The shop owner further explained that he uses 20 kg of wax per day and produces 200 foundation sheets at peak harvest time, particularly in June- July, where honey from *Croton macrostachys* (“Bisana”) is harvested. His good market days in June-July usually extend for about 60 day in which he uses 200 kg of wax and sells 12,000 pieces of foundation sheet. He also explains that he has substantial foundation sheet market in October-November and February-March harvesting seasons.

Table 12. Materials supplied through apiculture input shop

No	Items	Total Number supplied	Total sold	Buying price	Selling price
1	Honey exactor	5	5	2300	2500
2	Smoker	700	700	73	90
3	Wire for frame	100kg	100kg	134	200
4	Duster	30	30	21	25
5	Queen excluders	30	30	50	60
6	Fork	100	50	40	50
7	Chisel	40	28	15	20
8	Queen cage	48	30	21	27
9	Glove	800	800	30	35
10	Vile	40	40		
11	Foundation Sheet	About 12,000 piece (for June -July harvest only)	All		3 birr/piece
12	Wax stamp	Not supplied	Not supplied	High price	

Source: Private apiculture inputs shop owner, 2010

5.3. Market improvement

LDPA in collaboration with IPMS devised a strategy of forming an interested marketing group to increase bargaining power by bulking of honey from members and non members. Twenty four interested farmers trained in improved honey production formed the marketing group called "Wojin Gudina Honey producers association". The association has got legal entity and has developed a capital of about ETB 20,000 through selling shares. During the harvest season in 2009, effort was made to build the financial capacity of the group so that they will be engaged in collecting honey. However, preliminary profit-loss assessment made showed that at that particular time the business was not worth because the cost benefit analysis did not compare favourably with the added costs for containers, transport and other expenses. Now effort is underway to solve some of these problems which could lead the group to be more profitable.

Also some efforts were made by IPMS HQ to link the PLW honey producers to honey processing and packing enterprise named Alem Mar based in Kombolcha-Wollo in Amhara Region to engage in buying and capacity building among Goma honey producers. However, the enterprise owner pulled out for unknown reasons. Since September 2009, the PLW again tried to link the PLW with Beza Mar honey processing and packing enterprise and provided samples of the three dominant Goma honey types for laboratory analysis.

After analyzing the samples Beza Mare has shown a strong interest to buy Goma Honey, starting from the June-July/2010 harvest from "Bisana" *(Croton macrostachys)* flower.

The household survey also provided household level data on prices for honey from different hive types in 2008. While prices from modern hives are higher than from traditional hives, they are considerably lower than what could be obtained suggesting that the market for clean honey is not yet developed. Based on information obtained from the household survey, 7 and 32 farmers owning traditional and frame hives, reported prices of honey to be ETB 11.28 and 15, respectively. It is noted that the price of honey has gone up significantly in 2009 and 2010.

5.4. Other indirect benefits

Labour/gender

So far, change in labour requirement in honey production due to improved hive introduction is not visible. However, regarding gender honey production in the Woreda, still continued as a male dominated activity though it became easy operation particularly with modern hives. One female headed household managed to involve in the training programme pulled out from the team, probably due to cultural pressure.

Environment/natural resources

Wanza (*Cordia africana*) is used for a number of household and office furniture making and production of improved bee hives is also dominantly based on Wanza. This is however contributing much to distinction of this precious indigenous tree specie in the Woreda. Now "Wanza" is becoming very rare in the Woreda and its preservation needs attention.

Goma is organic coffee growing area which means that there is no application of chemicals. This will help the bees to collect nectar easily from the widely available vegetation which will contribute to increased honey production. In addition, bees will also pollinate the coffee trees and hence contribute to increase coffee production.

5.5. Institutional/ organizational change

An overview of the stakeholders and their expected roles is shown in Table 13 .

Table 13. Actors and their roles in honey value chain development in Goma

Stakeholders	**Expected role**
LDPA	Developing awareness, selecting, organizing, training farmers, monitoring and data recording
JU, HARC	Training, providing facilities, and materials for demonstration, monitoring and evaluation
Input shop owners,	Providing inputs such as hive accessories, harvesting materials,
Local honey traders	Buy honey from farmers and sell it to consumers and processors
Tej makers	Buy crude honey from farmers produced using traditional hive and produce tej and crude wax, sell crude wax to traders who transport to Addis for processing, used to produce pure wax for local use but now stopped.
Honey processors, exporters (Alema Mar, Beza Mar)	Buy honey from farmers and local honey traders, process it and sell in local super markets and also export to abroad.
Village level carpenters	Produce different types of hives for sell, some times engaged in demand driven hive making, some times use timber from farmers and only demand service charge.
Foundation sheet sellers	Produce foundation sheet by buying wax from farmers, from Addis, from neighboring Woredas, etc and sell to bee farmers.
Village level skilled honey harvesters	Engaged in harvesting honey for those who have no skill of harvesting, and/or for those who have no protective, demand service charge in kind or cash (10 birr/hive).
Village level centrifuge service providers	Locally made centrifuges are rented out at 10 birr/hive/night
Community	The largest buyer of both crude and semi purified honey for home family consumption, social and cultural ceremonies, etc
Bee farmers	Engaged in managing bee farm and producing honey from different kinds of hives.
IPMS	Assessing available technologies & improved practices, linking, facilitating training, experience sharing events, demonstration

6. Challenges

A key constraint for honey development in Goma is still the marketing of better quality honey obtained from the improved hives, since prices are still very low during peak harvesting times.

Honey producers association could not access enough credit to play its role mainly because of OCSSCo's regulations. Also, linkages with commercial processing companies elsewhere have so far not been successful.

Post harvest handling of honey in Goma is very poor as a result of which moisture content is high. This is also aggravated by the fact that Goma is a humid and high rainfall area. The involvement of various processing plants was to help solve problems like this. This is however still not addressed and needs the attention of many stakeholders.

The traditionally made extractors operating in various PAs in the district may not be food grade materials which may impact the future marketability of honey from modern hives. A close attention at these equipments will be necessary as it may work against the efforts of various stakeholders involved in the honey value chain in Goma.

Wax is becoming very scarce element and as the result getting foundation sheet for improved hive is becoming a challenge for farmers. Wax could easily be available from huge volume of honey produced from traditional or transitional hives in the PLW through the introduction of honey presser and also easy wax extraction method. This strategy should be exercised to save bee farmers from buying their own wax at very high prices.

7. Lessons learned and recommendations

Goma is a very gifted and unique environment for honey production because of production of three distinctively different kinds of honey from three known tree flowers, its production of honey three times per year and quite considerable volume of honey production which could go up much higher if more attention is given. Thus, to efficiently exploit the honey production potential of the Woreda both in terms of quality and quantity:

It has been learned that sustainable apiculture inputs supply system is critical and in this regard strengthening the apiculture inputs supply system which is already established in terms of capital to widen the supply and increasing spatial distribution of input shops for easy access to bee farmer in different corners of the Woreda is very essential.

As compared to other Districts, Goma has been able to make progress in the privatization of the input supply system and services for apiculture development including the apiculture shop which includes the preparation of wax foundation sheets, making of hives and the private processing of honey (centrifuge). This development seems normal because of the economics of scale in the production of honey from improved hives (as compared to some other Districts the project is

operating. Linking these private operators with quality market actors may encourage such development.

Improved hive use by bee farmers is most needed to improve quality as well as quantity and in this regard observations showed that still traditional hives use is highest and its expansion from year to year is considerably exceeding improved hives signaling that quality and quantity improvement could not be a short time dream in the PLW. This is attributed dominantly to relatively high prices of frame bee hives price and also rural micro finance regulation which limits loan repayment to less than one year time which farmers are unable to do so. Thus, low cost modern hive option and negotiating with credit service provider institutions for longer loan repayment period should be considered

Addressing market challenge needs linkage with market potential areas such as processing and exporting organizations and devising bulk supply point in the PLW to attract traders. To this end strengthening interested honey producers association in financial and business management capacity and organizing such associations in different corners of the Woreda should be thought.

Human resource capacity building both for farmers and technical staff and also valuing apiculture in the Woreda structure is also very important area to focus.

8. References

IPMS 2007. Goma pilot learning Woreda diagnosis and program design, p. 85.

OoARD 2007. Annual report of Goma Woreda Agricultural and Rural Development Office