Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.6, No.11, 2016 

# Assessment of Production System and Constraints of Bee Keeping Practices in Damot Gale Woreda, Wolaita Zone, Southern Ethiopia

A Abera[1] H Yakob[2] G Yasin[2]
1. College of Agriculture, Wolaita Sodo University, Ethiopia
2. Damot Gale Woreda Agricultural Office

**Abstract**
The study was conducted in Damot Gale Woreda, Wolaita Zone, southern Ethiopia to assess the production system and constraints of bee keeping practices and its management. Data were collected from 60 households using formal survey. The majority of the respondents (70%) were found in the age of lower than 40 and only 20% of the respondents age was more than 40 years. Among the total respondents 75% were educated, whereas 25% were uneducated. Most of the respondents (70%) in the study area practiced traditional beekeeping whereas 22 and 8 percent of the respondents practiced transitional and modern bee keeping system respectively. Sixty two percent of respondents (bee keepers) visit their bees' everyday while 18% of bee keepers visit and inspect their bees every three days and 20% of the respondents visit their bees. About 75% of the respondents put their hives on the branch of trees where as 17% and 8% of the respondents kept their hives at the backyard and inside the house respectively. The major constraints of beekeeping in the study area were lack of bee equipment (like modern hives, casting mold, honey storage tank, honey extractor), lack of skilled man power. Therefore, the farmers should be trained about handling of modern beekeeping practice and get access of credit service to purchase beekeeping equipment and materials.
**Keywords:** keeping practices, traditional, transitional, modern hives,

## Introduction

Agriculture is the livelihood of the overwhelming majority of Ethiopians. It is the source of food and cash for those who are engaged in the sector and others (CSA 2014). Beekeeping is an important income-generating agricultural activity. The practice of beekeeping is deeply rooted within the Ethiopian farming community (Woldewahid et al 2012). The use of honey as wax for candle lighting in churches has a long history in Ethiopia (Ayalew 2006). Addis and Malede (2014) stated that the traditional ways of keeping and the value of its products have been unchanged. Owing to its varied ecological and climatic conditions, Ethiopia is home to some of the most diverse flora and fauna in Africa. Beekeeping is an inherited tradition in Ethiopia and estimated 1 farmer in 10 smallholders keep bees (MoARD 2007).

Beekeeping is an environmentally friendly activity that has enormous contribution to the economy of the country as a whole. Ethiopia has a huge natural resource base for honey production and other hive products, and beekeeping is traditionally a well-established household activity in almost all parts of the country. However, the benefit from the sub sector to the nation as well as to the farmers, traders, processors and exporter is not satisfactory (Beyene and David 2007).

In spite of the favorable climatic condition and well distributed vegetation in the country, the production of honey bees product and the way of honey bee keeping and its management is traditional. This bee keeping system is most practiced in most farmers still now in Ethiopia. Its productivity is very low due to lack of knowledge, lack of capital, low market, poor infrastructure, honey bee enemies, and chemical poison (Ayenew 2001). Ethiopia is the leader country in both bee population and bee product business development in Africa. In addition, exceeds African countries in terms of volumes of honey and bees wax harvested and traded, and level of investment in the formal sector (Aby 2005).

Beekeeping is crucial in Ethiopia as honey and hive products are important source of food and income. Despite the huge potential of beekeeping and honey bee flora, beekeeping has not been fully exploited and promoted in the Woreda. Although bee keeping practices are widely undertaken and have great economic value in Wolaita Zone in general and *Damot-Gale* Woreda in particular, its potential and constraints is not well identified and researched out so far. There is also no well documented with regard to the bee keeping practice and challenges in *Damot-Gale* Woreda. As a result, this study will assess the general points concerning the potential and constraints of bee keeping practice in *Damot-Gale* Woreda, southern Ethiopia. Investigating the potential and constraints for beekeeping and availing pertinent information is believed to help development experts and researchers use the information generated for intervention purpose or make informed decisions.

Assessing the potential and constraints of beekeeping practice is believed to improve the honey and hive products. It is believed that these will also improve their income, secure household food. Ultimately, the study can address these issues in order to generate baseline information for government policy makers,

development investors, researchers and stakeholders. The overall objective of the study is to assess potential and constraints of bee keeping practices and its management in *Damot-Gale* Woreda, Wolaita zone, southern Ethiopia. The Specific Objectives

- To assess the honey bee production and its management in the study area
- To identify the major constraints of honey bee production practices of the study

## MATERIALS AND METHODOLOGY

### Description of the Study Area

The study was conducted in *Damot Gale* Woreda, Wolaita Zone which is situated at a distance of 312km away from Addis Ababa. *Damot Gale* is bordered on the southwest by *Sodo Zuria*, on the North west by Bolosso Sore and Damot Pullasa, on the north by Hadiya Zone, on the east by Duguna Fango and on the south east by *Damot Woyde*. The altitude of *Damot Gale* Woreda ranges from 1200 to 2950 m.a.s.l. The woreda has 31 Kebeles, which are located in between $6^0$51'' and $7^0$35'' of the north longitude. The average temperature of the area varies from minimum 13.$6^0$c to maximum 25.$1^0$c. Agro ecology of the area is 60% highland (*Dega*), 28% midland (*Woina-Dega*) and 12% lowland (*Kola*). The annual average rainfall in *Damot-Gale* woreda is 1175mm. It has a bimodal pattern with three district seasons; dry (November to February), small rain from March to June and big rain from July to October in both districts (WZFEDD 2012).

### Sampling Techniques and Sample Size

A multi stage sampling was employed for the study to select households. First, six representative kebeles were selected purposively based on their bee keeping potentials and agro ecology (three kebeles from *Dega*, two kebeles from *Weina Dega* and one Kebele from *Kola*). Then, a random sampling technique was used in each Kebele to select 10 households for the study. Thus, the total number of households to be sampled were 60 (6 kebeles X 10 households) from the three agro-ecologies for the study.

### Methods of Data Collection

In this study, both primary and secondary data were used. Primary data was obtained by preparing semi-structured questionnaires, through interview of the respondents and personal observation. The data were generated using conventional survey method, which include the following major data groups.

**Household socio-economic characteristics:** sex, age, education level, land size.

**Potential and constraints of beekeeping in the area:** potential honeybee plants, honeybee pests and predators. Secondary data were obtained from reports of woreda Agricultural Development Office and other published and unpublished materials.

### Data Analysis

The collected data was analyzed by using descriptive statistics using SPSS version 16.0 (SPSS, 2007).

## RESULT AND DISCUSSION

### Socio-Economic Characteristics of the Respondents

### Household characteristics

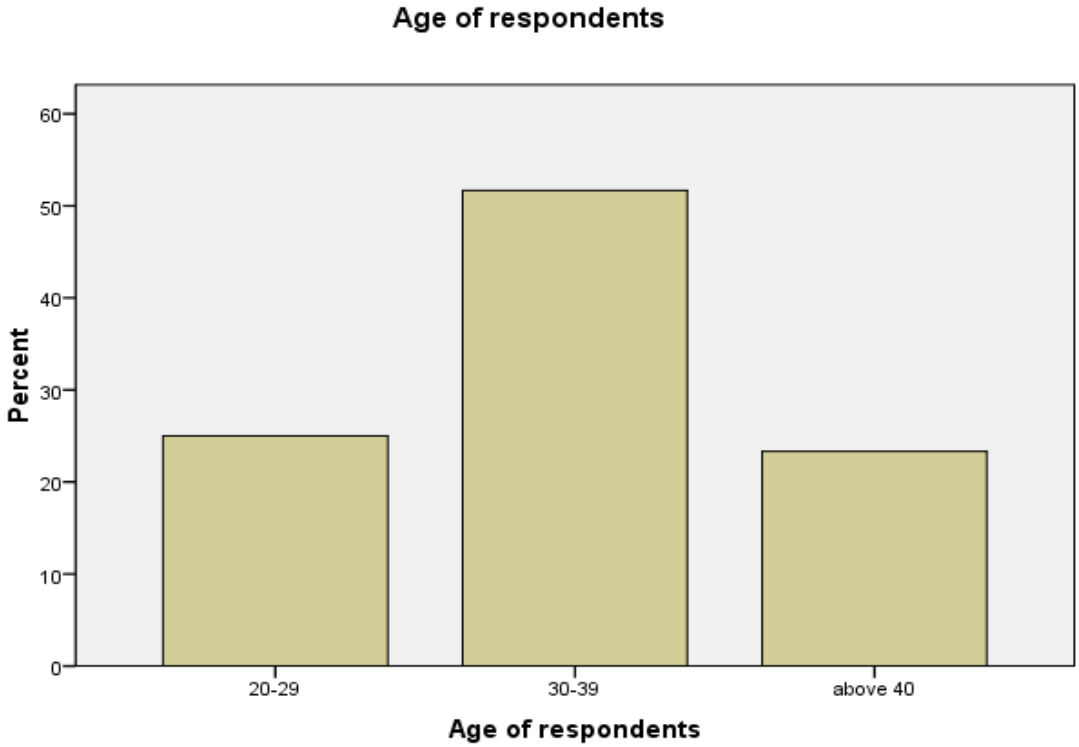
From the total of 60 sample households interviewed about 80% were male and the rest 20% were female headed. This very limited number of female participation agrees with Adebabay (2008). This might be due to the fact that even though parts or all of the beekeeping activities were performed by women these are reported as the work of men (head of the household). The majority of the respondents (50%) were found in the age 30-39. Only 20% of the respondents age was more than 40 years (fig. 1). This result showed that bee keeping can be practiced by economically active age groups and in most cases people at younger and old age is actively engaged in beekeeping activities. This finding is in line with Tessega (2009) that indicated the mean age of the respondents were 41.46 years (with standard deviation of 11.25 years) ranging from 20 to 66 years in Bure district of Amhara region of Ethiopia. According to the survey result the majority of the respondents (85%) were married whereas the percent of divorced, single and widowed was 6.7, 5.0 and 3.3 respectively (table 1).

Table. 1 Marital status of the respondents

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Married | 51 | 85.0 | 85.0 | 85.0 |
| Single | 3 | 5.0 | 5.0 | 90.0 |
| Widowed | 2 | 3.3 | 3.3 | 93.3 |
| Divorced | 4 | 6.7 | 6.7 | 100.0 |
| Total | 60 | 100.0 | 100.0 | |

**Figure. 1 Age of the respondents**




**Educational Status of the Respondents**

Among the total respondents 75% were educated, whereas 25% of the respondents were uneducated on different level (table 2). This result is higher than the findings of Tesega (2009) among the sample respondents 15.1% had not received any education. Therefore, according to the result of this study the high level of illiteracy (25%) in the district limits the effectiveness of formal training programs and requires more emphasis to be placed on practical demonstration of essential concepts especially in improved beekeeping.

*Table 2:* Educational Level of Respondents

| Kebele | Number of respondents | Number of Educational status | | Percentage (%) | |
|---|---|---|---|---|---|
| | | Literate | Illiterate | Literate | Illiterate |
| *Ade-Aro* | 10 | 5 | 5 | 50% | 50% |
| *Ade-Koysha* | 10 | 8 | 2 | 80% | 20% |
| *Mokonisa Woyse* | 10 | 8 | 2 | 80% | 20% |
| *Shasha-Gale* | 10 | 9 | 1 | 90% | 10% |
| *Wandara- Gale* | 10 | 8 | 2 | 80% | 20% |
| *Wandara- Bolosso* | 10 | 7 | 3 | 70% | 30% |
| Average | | | | 75% | 25% |

**Bee Keeping Practice in the Study Area**

Most of the respondents (70%) in the study area practiced traditional beekeeping whereas 22 and 8 percent of the respondents practiced transitional and modern bee keeping system respectively. The traditional beekeeping system in the study area practiced using traditional hive made of locally available materials like mud, bamboo and clay pot. The farmers use traditional hive due to the high cost of purchasing of modern and transitional hive and due to lack of harvesting and processing equipment to use modern and improved hives. In the same manner, Nebiyu and Mesele (2013) stated that in Gamo Gofa Zone southern Ethiopia, most of (74.4%) beekeeper preferred traditional hive over transitional and modern hive because modern beekeeping production requires more expensive establishment cost, accessories, and skill training although yield better quality and quantity of honey. The majority of the respondents (93.3%) keep beekeeping by catching swarms whereas only 6.7% gained the honey bee from their parents as a gift (table 3).

**Table 3: Honey bee source**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Parents | 4 | 6.7 | 6.7 | 6.7 |
| Catching swarms | 56 | 93.3 | 93.3 | 100.0 |
| Total | 60 | 100.0 | 100.0 | |

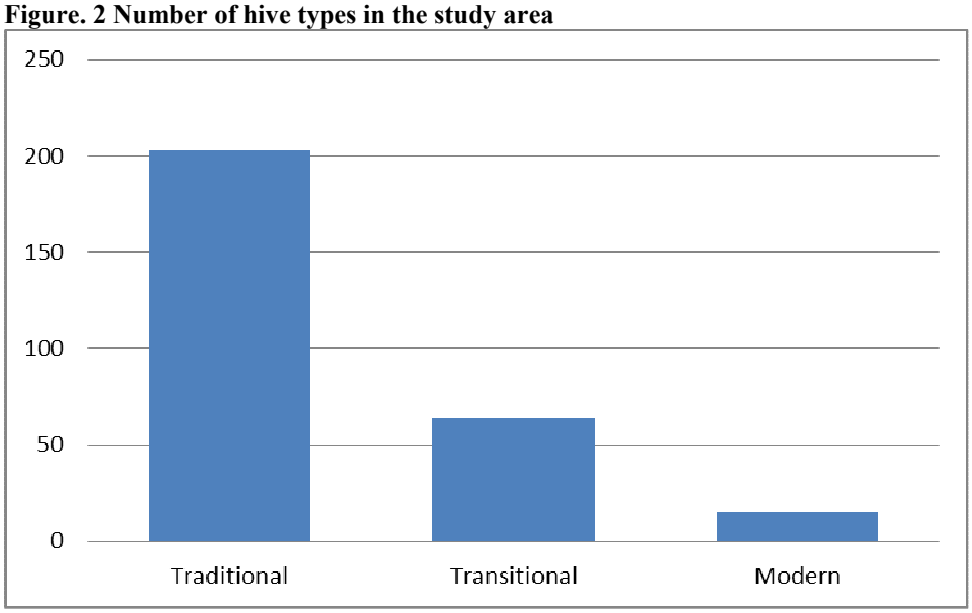
 

The farmers were also asked about their experience of rearing honey bees. Based on the result of the study the higher proportion about 46.7% had more than three years of experience in beekeeping activity (table 4). This would enable to gain valuable information from their experience. According to the survey result conducted the number of traditional, transitional and modern hive in the area was 203, 64 and 15 respectively (fig. 2).

**Table 4: Experience of beekeepers in activity**

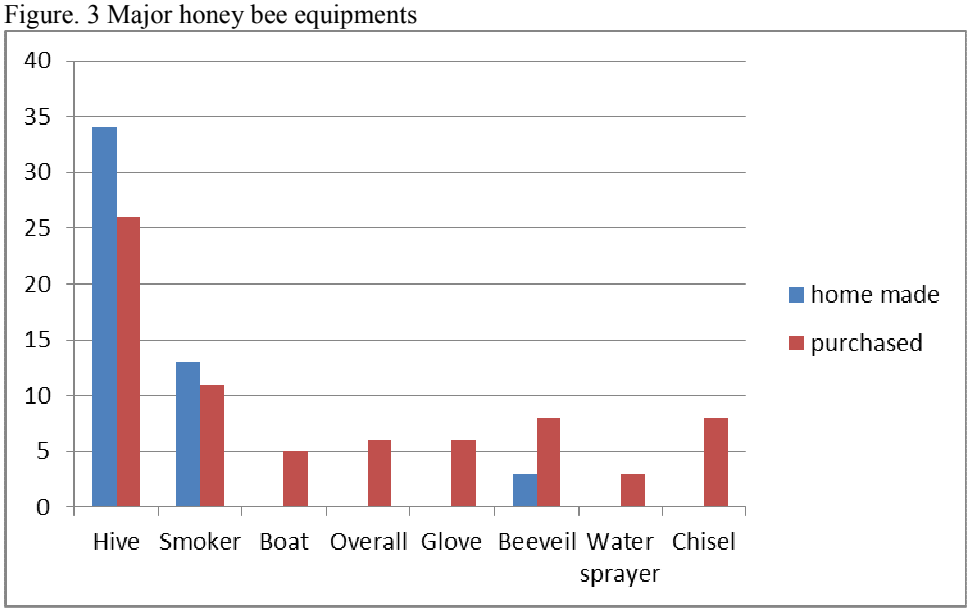
| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 2 years ago | 7 | 11.7 | 11.7 | 11.7 |
| 3 years ago | 25 | 41.7 | 41.7 | 53.3 |
| more than 3 years | 28 | 46.7 | 46.7 | 100.0 |
| Total | 60 | 100.0 | 100.0 | |

**Figure. 2 Number of hive types in the study area**




As indicated in the figure 3, the majority of hive and smoker in the study area were made of locally available materials at home. In the other way, some of the respondents used purchased equipment like smoker, boat, overall, glove, bee veil, water sprayer and chisel, however, some materials like honey storage and honey extractor were absent in the sampled respondents. Generally, to obtain quality hive products beekeeping equipment should be available for honey bee producers.

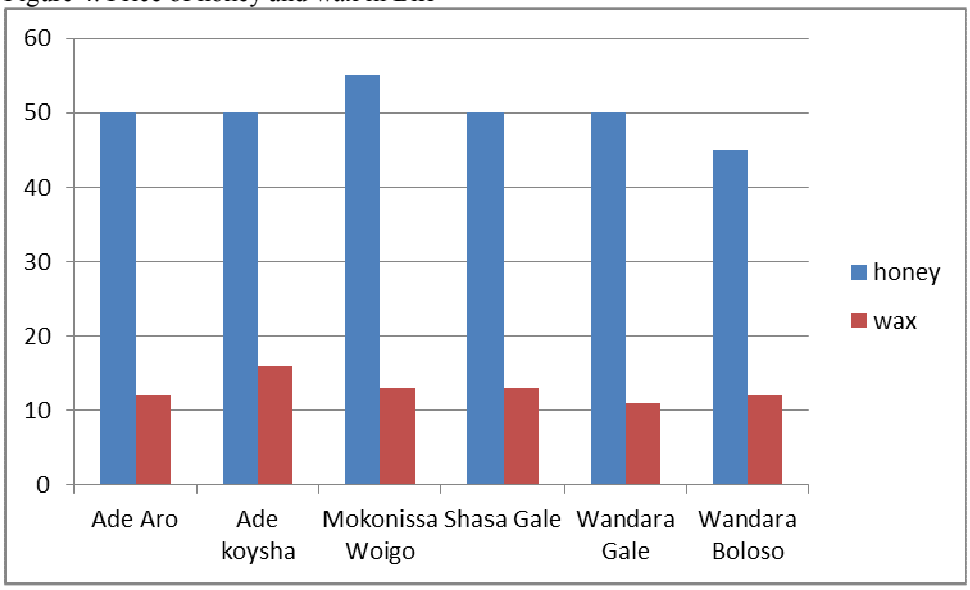
Figure. 3 Major honey bee equipments



The price of honey and wax in the study area was nearly similar value among different kebele. The average price of honey and was 50 and 12 birr respectively (figure 4). The price of crude honey in the present study is higher than of Nebiyu and Mesele (2013) who indicated that one kilogram of crude honey costs an average of 35.67 birr at *Chencha Woreda, Gamo Gofa Zone* southern Ethiopia.

Figure 4. Price of honey and wax in Birr




**Honey Bee Forages and supplementary feeding of honey bees**

The existence of diversified species in the study area has resulted in the existence of large colony population in the study area. According to the respondents various honey bee plants exist in the area which comprises trees, shrubs, herbs, cultivated crops and fruits (table 5)

*Table5:* Honey Bee Forages Reported by the Respondents in the Study Area

| No. | Scientific Name | Local name | Plant type |
|---|---|---|---|
| 1 | *Maytenus obscura* | Injury | Shrub |
| 2 | *Acacia sibirana* | Grare | |
| 3 | *Arabica coffiana* | Buna | Tree |
| 4 | *Vernonion amydalina* | Grawa | Shrub |
| 5 | *Eucalyptus ssp* | Baher zafe | Tree |
| 6 | *Syzgium guineense* | Wanza | Tree |

Supplementary feeding is applied to overcome the feed shortage at the dry season. Majority of the beekeepers provides mainly honey and water and shiro (roasted spiced pulses flour), sugar syrup and honey with water.

**Bee Keeping Management in the Study Area**

Sixty two percent of respondents (bee keepers) visit their bees' everyday while 18% of bee keepers visit and inspect their bees every three days and 20% of the respondents visit their bees to check of the hive was occupied with bees and at least during honey harvesting seasons. Internal hive inspection is totally unknown by bee keepers. About 92% of the respondents cleaned their apiary and put ash (cinder) under their tree to prevent insect like ant and termites from climbing the tree.

About 67% interviewed bee keepers provide additional food and water for their bees in order to get better honey bee products/yields from the hive in the second honey fallow season 18% of the respondents did not control swarming while 15% were tried to control swarming by cutting and removing some part of brood combs in the hive which bees got enough space and developed the remaining parts of the colony and produce honey rather than again developing it into brood combs.

About 75% of the respondents put their hives on the branch of trees where as 17% and 8% of the respondents kept their hives at the backyard and inside the house respectively. this finding contradicts Nebiyu and Mesele (2013) that most (57.7%) of the beekeepers kept the traditional hives at the back of the house and only 5.1% kept on trees whereas 2.6% kept on trees on near homestead. During the survey period, it has been observed that farmers who have modern hive did not managed hives properly. This might be due to lack of training the lack of knowledge on improved bee keeping practice and awareness about keeping hives. In addition to this, the hives were surrounded by grasses and shrubs. This could affect bees from entering into and coming out from hives.

**Constraint of Bee Keeping Practice in the Study Area**

The result showed that the major constraints of beekeeping in the study area were lack of bee equipment (like modern hives, casting mold, honey storage tank, honey extractor), lack of skilled man power. In addition to these, bee pests and enemies like ants, birds, wax moth, and spiders were also mentioned. Lack of beekeeping equipment is considered to be the major constrains of beekeeping activity in the study area. As it is indicated in table 6, 37 % of the respondents concluded that lack of beekeeping equipment was the major constraints that influence beekeeping production. Shortage of bee colony was the second major problem in the present study. This findings is in line with Workneh et al 2008 who stated that shortage of honey bee colony is one of the existing constraints limiting development of beekeeping subsector in Tigray region, northern Ethiopia.

*Table5:* constraints of beekeeping in the study area

| No. | Constraints | Number of HH | % | Rank |
|---|---|---|---|---|
| 1 | Lack of beekeeping equipments | 22 | 37 | 1 |
| 2 | Shortage of bee colony | 15 | 25 | 2 |
| 3 | High cost of modern hives | 12 | 20 | 3 |
| 4 | Pests and predators | 9 | 15 | 4 |
| 5 | disease | 2 | 3 | 5 |
| | Total | 60 | 100 | |

## CONCLUSION

The most widely used type of beekeeping in the study area is traditional due to the high cost of the improved hives and their accessories. Most of (70%) of the respondents in the study area practiced beekeeping using both traditional and transitional hive whereas the only (8%) practice modern bee keeping system. The majority of the respondents (93.3%) keep beekeeping by catching swarms whereas only 6.7% gained the honey bee from their parents as a gift. About 46.7% respondents had more than three years of experience in beekeeping activity. The majority of the constraints of beekeeping in the study area are lack of bee equipment (like modern hives, casting mold, honey storage tank, honey extractor), lack of skilled man power, poor pre and post-harvest management of honey, honey bee pests and enemies. There should be a need of intervention in introducing modern beehives to enhance the production of hive and hive products to increase income of the respondents. Extension work should be addressed to create awareness to empower women in the beekeeping activity. Finally, there is a need of proper measure for prevention of the major problems to sustain the beekeeping activity.

Based on the result of the present study, the following points are assumed as recommendation:-

- The farmers should be trained about handling of modern beekeeping practice
- The farmers should get access of credit service to purchase beekeeping equipment and materials.

## REFERENCES

Abay B 2009 Process of Honey and Bee way for export data accessed September 30, 2009

Amsallu B 2000 Livestock Production and Environment Implication for Sustainable Livelihoods Proceedings of the 7th annual conference of Ethiopia society of animal production (ESAP) held in Addis Ababa, Ethiopia 26-27, May 1999

Amssalu D 2004 participator research lesson for livestock development. Asfay Yimagnuhal and Tamirat Degefu (editors), in proceedings of the 12th annual conference of the Ethiopia society of animal production (ESAP) held in Addis Ababa, Ethiopia, 12-14, August, 2004, ESAP Volume 2: technical papers

Arjare S 1990 Beekeeping in Africa food and agriculture organization of the United Nations, Rome, Italy

Ayalew Kassaye 2006 The loss of some natural plant species in Tigray and the concern to the living conditions of honeybees. Proceedings of the 5th Annual National Conference of Ethiopian Beekeepers Association, pp. 8–15.

Beyene T & David P 2007 Ensuring small scale producers in Ethiopia to achieve sustainable and fair access to honey markets. Paper prepared for international development enterprises (IDE) and Ethiopian society for appropriate technology (ESAT), Addis Ababa, Ethiopia.

Beyene T and Davide P 2007 Ensuring Small Scale Producer in Ethiopia to Achieve Sustainable and fair access to honey markets paper prepared for international development Enter prices (IDE),

CSA (Central Statistical Agency) 2007 Volume II report on livestock and livestock characteristics, Central Statistics Agency, Addis Ababa, Ethiopia

CSA (Central Statistics Authority) 2014 The Federal Republic of Ethiopia Agricultural Sample Survey. Report on Livestock and Livestock Characteristics. Statistical Bulletin 505 (II). Addis Ababa, Ethiopia. Pp. 23.

Girma Deffar (1998), Non-wood forest production in Ethiopia. Addis Ababa, Ethiopia http://www.fao. org/DOCREP/003/X6690E/X6690E00.htm.

Hortmann I 2004 The Management of Resources and Marginalization in beekeeping societies of southwest, Ethiopia

Kerelem E, Tilahun G and preston T 2009 Constraints and Prospects for a Picture Research and Development in Amhara Region, Ethiopia Data accessed September, 30, 2009

Mathewos B, Alganesh T and Gizaw K 2004 from animal biodiversity in Ethiopia Status and Proceedings of the 11th annual conference of the Ethiopian society of animal production (ESAP), held in Addis Ababa, Ethiopia August, 28-30, 2003.

Serda B, Zewudu T, Dereje M, Aman M 2015 Beekeeping Practices, Production Potential and Challenges of Bee Keeping among Beekeepers in Haramaya District, Eastern Ethiopia. *J Veterinar Sci Technol* 6:255. doi:10.4172/2157-7579.1000255

Tesfaye K and Tesfaye L 2007 Study of Honey Production System in Adaimi tulu jido Kombolcha district in mid rift valley of Ethiopia, livestock research for rural development volume, 19, article XX 162

Tessega B 2009 Honeybee Production and Marketing Systems, Constraints and Opportunities in Burie District of Amhara Region. M.Sc. Thesis, Bahir Dar University, Ethiopia.

Woldewahid G, Gebremedhin B, Hoekstra D, Tegegne A, Berhe K and Weldemariam D 2012 Market-oriented beekeeping development to improve smallholder income: Results of development experiences in Atsbi-Womberta district, northern Ethiopia. IPMS Case Study. Nairobi: International Livestock Research Institute.

Addis G and Malede B 2014 Chemical Analysis of Honey and Major Honey Production Challenges in and Around Gondar, Ethiopia Academic Journal of Nutrition 3 (1): 06-14, DOI: 10.5829/idosi.ajn.2014.3.1.84322

MoARD 2007 Livestock Development Master Plan Study. Phase I Report-Data Collection and Analysis, Volume N-Apiculture. Addis Ababa, Ethiopia: Ministry of Agriculture and Rural Development.

SPSS (Statistical Procedures for Social Sciences) 2007 SPSS User's guide version 16.0. SPSS Institute Inc., Cary NC.

Workneh A, Puskur R and Karippai R 2008 Adopting improved box hive in Atsbi Weberta distric of eastern zone, Tigray region: determinants and financial benefits IPMS(improving Productivity and Market Success) of Ethiopian farmers project working paper 10. ILRI (International Livestock research institute), Nairobi, Kenya. 30 Pp.

WZFEDD 2012 Wolaita Zone Socio-Economic information. Wolaita Zone Finance and Economic Development Department, May 2012.