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ASSESSMENT OF HONEY PRODUCTION CONSTRAINT IN LEMU AND BILBILO DISTRICT, ARSI ZONE OF OROMIA REGIONAL STATE, ETHIOPIA

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ABSTRACT
The study was initiated to assess honey production constraint in Lemu and Bilblo District, Arsi Zone of Oromia Region. Despite the available potentials and opportunities for honey production, there was no adequate and reliable research information on the honey production constraint in the district. The focus of the study was: identifying quantity of honey produced in the study area and assessing major honey production constraints in the study area. A two stage sampling procedure was employed and in first stage, four representative potential honey producer kebeles were selected purposively. In the second stage, using the population list of households from sample farmer, the representative honey producer and traders was randomly selected using simple random sampling technique. Both primary and secondary data were utilized, selected farm households and actors involved in the market chain were used as a primary source through structured interview, focused group discussion and key informant interviews were employed. Secondary data was collected from different published and unpublished sources,. Major constraints of the honey production and marketing, identified and prioritized by beekeepers and traders in the study area were: poisoning effects of agrochemicals, high price of improved hive, lack of Knowledge and skills, pest and predator, lack of organized marketing channels, and unavailability of improved beehive were the majors.
Keywords:, Honey, Production, Beehives, Beekeeping

1. INTRODUCTION

1.1. Background of the study

Beekeeping refers to a management of honey bee colonies for honey production, pollination of crops and other products (Taye, 2013). Bees produce honey that is the sweetest food in the world. Honey can be used as a natural healing agent, good for the heart, skin, destroys bacteria, helps in the digestion, safe than sugar and lowers cholesterol.

China is the first world's largest producer of honey, largest bee keeping country, largest exporter and also the highest in domestic consumption of honey from the world (Abayomi, 2018). The country produces more than 650,000 tons of honey annually.

From Africa, Ethiopia stands first and one of the top 10 (ten) of the world in honey production (Legesse, 2014 and Gemechis, 2015). In different parts of Ethiopia beekeeping is practiced for an income-generating and honey consumption

activities because there is a concept of honey production and marketing are fit well for the small scale agricultural development (MoA and ILRI, 2013).

In Ethiopia it is estimated that approximately 1.4 million farm households are keeping bees using traditional beehives. Tarekegn *et al*. (2017), identified that beekeeping activities should be operated side by side with other agricultural activities to support rural economy. According to Chala, *et al.* (2013), though the national honey production satisfies the local demand, it could not compete in the international market, because it is so crude.

Our country has a wonderful dissimilarity of agro-climatic environments and biodiversity which favored the existence of diversified honeybee flora and huge number of honeybee colonies and has larger bee population in Africa which is estimated to be over 10 million bee colonies. From the colonies about 5 to 7.5 million are estimated to be live in hive and the left over exist in the wild (MoA and ILRI, 2013). Though of all countries of the world, no country has a long tradition of beekeeping than Ethiopia, the knowledge and skill gap of honey product ion Ethiopian farmers is still very traditional and 95% of beekeepers follow traditional method of beekeeping practice (Teklu and Dinku, 2016).

Taye and Marco (2014), identified that, Ethiopia has the potential to produce 500,000 tons of honey per year and 50,000 tons of beeswax per annual, but due to the utilization of traditional hives the current production is limited to 43,000 tons of honey and 3,000 tons of beeswax.

Traditional way of beekeeping is experienced in Oromia region which covers about 41% of total country's honey production. Traditional way of beekeeping is characterized in low productivity and in addition by hanging over the long tree is very difficult for supervision and harvesting and also not convenient for female farmers (CSA, 2015).

Arsi zone is one of the Oromia regional state's zones with high potential of honey production and Lemu and bilbilo district has a diversified type of vegetation and cultivated crops as potential for beekeeping activities (Gebiso.T. 2015). According to information gained from Arsi Zone Livestock Resource Development office (AZLRDO, 2018), Lemu and Bilbilo, Lode Hetosa and Tiyo districts stand 1st, 2nd and 3rd in honey production and marketing potentials respectively. This data also shows that the maximum amount of honey produced per traditional hive 8.5kgs, per transitional hive 12kgs and that harvested from modern beehive 22.5kgs.

Even though great potential of honey production exists in the study area there is lack of adequate research on amount of honey produced and assessing major honey production constraints in the study area. Therefore, this study was conducted to asses' determinants of honey production in Lemu and Bilbilo district with the following the specific objectives.

- Identifying quantity of honey produced in the study area
- Assessing major honey production constraints.

1.2. Description of the Study Area

The study was conducted in Lemu and Bilbilo district, Arsi zone of Oromia Regional State. There are 25 Kebeles available in the district. The district is characterized as bimodal rainfall pattern with yearly average rainfall of 940 mm. The average annual temperature ranges from 6°c to 26°c, (Mesay, *et al*., 2017). The district is characterized by crop-livestock mixed farming system where crop production is dominant. The major crops grown are annual crops such as cereals, pulses, oilseed and vegetables (Samuel, *et al*., 2017).

1.3. Sample Size and Method of Sampling

The sampling frame of the study was the list of honey producer and traders households in selected kebeles, which are found in the district. A two stage sampling procedure has been employed to select the specific respondents. In first stage, four representative potential honey producer kebeles from the district have been selected purposively based on honey producing potentials. In the second stage, using the population list of honey producer farmers from sampled kebeles, the representative honey producer households were randomly selected

using simple random sampling technique. The intended sample size had been determined by employing probability proportional to population size using formula given by (Yamane, 1967), at 5% level of precision: As a result, the survey was administered and data were collected and analyzed on 311 respondents of honey producers and traders.

$$n = \frac{N}{1+N(e)^2} \quad \text{...} \quad (1)$$

Where: n = is the sample size,

N = is total size of honey producer households of selected kebeles, and

e = the level of precision it is 5%

n = 1406/1+1406(0.05)^2 = 1406/1+1406(0.0025) = 311 respondents.

1.4. Data types, sources and methods of data collection

The study was used both primary and secondary data and selected honey producer households and actors involved in honey production and marketing were used as a source for collecting primary data through structured interviews.

2. RESULTS AND DISCUSSIONS

2.1. Honey production characteristics

2.1.1. Types and numbers of hive utilized by sample respondents

From total numbers of respondent about 276 (88.75%) utilized only traditional hive, 1(0.32%) and 9(2.89%) of the respondents utilized transitional and modern hive respectively. Out of total respondent 5(1.61%), 13(4.18%) and 7(2.25%) of the respondents utilized Traditional and Transitional, Traditional and Modern and Traditional, Transitional and Modern beehive respectively (Table 2.1). The total amounts of beehive used by the sampled respondents were 940. The average numbers of beehive used by respondents were 3.02hives, ranges from 1 to 33 hives, and for each 1 to 18 for traditional, 3 to 3 for transitional and 1 to 8 for modern, 2 to 6 for traditional and transitional, 2 to 33 for traditional and modern and 6 to 31 for Traditional, Transitional and Modern hive. Poor management and mixing different types of bee hives were observed in the study areas.

Table 2.1: Types of hive utilized by sampled respondents

	Frequency	Min	Max	Sum	mean	St. dev.	Percent
Traditional	276	1	18	680	2.46	1.77	88.75
Transitional	1	3	3	3	3.00		0.32
Modern	9	1	8	24	2.67	2.18	2.89
Traditional and Transitional	5	2	6	21	4.20	1.48	1.61
Traditional and Modern	13	2	33	100	7.69	8.37	4.18
Traditional, Transitional and Modern	7	6	31	110	15.71	11.15	2.25
Total	311	1	33	940	3.02	3.59	100

Source: Survey result, 2019

From the total 940 hives utilized by sample respondents, 779 (82.87%) are traditional 34 (3.62%) are transitional and 127(13.51%) are modern hives (Table 2.2.). From this table one can conclude that the majority of respondents82.87% utilized traditional beehives.

Table 2:2 Numbers of hives utilized by sample respondents

	Traditional hive	Transitional hive	Modern hive	Total hives
Sum	779	34	127	940

Percent	82.87	3.62	13.51	100

Source: Survey result, 2019

2.1.2. Quantity of honey produced in a year

From 311 honeys producer respondents 301 farmers were utilized traditional hive. The average quantities of honey produced by respondent in 2017/2018 budget year were 24.40kgs, ranges from 3 to 350kgs. The production for traditional hives ranges from 3kg to 16kg and the average harvested per hive was 6.67kgs. The total amount of honey harvested from traditional hive in a year was 5,246kgs.

Table 2.3: Quantity of honey produced in 2017/2018 production year in kgs

	n	Min	Max	Sum	Mean	Std. D
Quantity of honey produced in a year	311	3	350	7589	24.40	40.176
From single traditional hive	301	3	16		6.67	2.654
From total traditional hive	301	3	160	5246	17.43	16.234
From single transitional hive	13	9	14		11.08	1.441
From total transitional hive	13	20	72	376	28.92	14.157
From single modern hive	29	10	28		16.97	5.025
From total modern hive	29	12	312	1967	67.83	88.768

Source: Survey result, 2019

From total respondents, only 13 farmers' utilized transitional hive and the average amount of honey harvested per one hive was 11.08kgs ranges from 9kgs to 14kgs. The total amount of honey harvested from transitional hive in a year was 376kgs (table4.4). Finally out of 311 respondents, about 29 respondents utilized modern hive and the average amount of honey harvested from single hive was 16.97kgs ranges from 10kgs to 28kgs. The total amount of honey harvested from modern hives in a year was 1967kgs.

From this result one can conclude that promotion of modern bee hive is very important in order to increase quantity produced as it indicated on table 2.3, the amount of traditional hives utilized was 779 hives, if it replaced by modern hive they can get 13,219.63kgs (multiplying 779 by average yield from modern hive16.97). From the same amount of hives by shifting from traditional hives to modern, one can get a difference of (13,219.63kgs – 5246kgs =7973.63kgs), due to high yield earning from modern bee hive.

2.1.3. Number of contact with extension services

Access and number of contact with extension services is very crucial to honey producers and providing the extension services helps honey producer farmers to produces the required amount of honey with its quality parameters. Regarding number of contact with extension services in year, about 15(4.8%) of respondents have 4 contacts concerning honey production with extension providers in year, 82(26.4%) of respondents has only 1 contacts with extension providers in year, 38(12.2%) of respondents has 2 contacts with extension providers in a year, 1(.3%) of respondents has 3 contacts with extension providers in year and 175 (56.3%) of respondents have no contact with extension providers in a year (table2.4).

From this finding one can concluded that the majority of honey producers (more than 56 percent of the respondents) have no contact with extension service providers and this implies that more than half of honey producers engaged in honey production without basic skill and knowledge. In addition during focus group discussion access and number of contact with extension services is underlined by the groups as it is very crucial

Table 2.4: Number of contact with extension services in a year

Number of contact	0	1	2	3	4	Total
Frequency	175	82	38	1	15	311
Percent	56.3	26.4	12.2	.3	4.8	100

Source: Survey result, 2019

2.2. Honey production constraints

In order to utilize the existing potential of beekeeping sub sector, identifying the existing constraints and opportunities are of paramount importance. An interview questionnaire was designed as part of the study with the objective of identifying major honey production constraints in the study area. As the result showed on table 4.20, the interviewed honey producers and traders prioritized the major constraints in degree of importance as:

Poisoning effect of Agro-chemicals: Such as pesticides and herbicides causes serious damages on bee colonies. As it indicated on table 4.19, from total respondent more than 99% of the respondents replied agro-chemicals were serious problem (the most important constraint). The respondents highlighted that a number of bee colonies died due to the application of agro-chemicals. It was proved with full vote during focused Group discussion and Key Informant Interviews.

High Price of improved hives: Even though the availability of improved hives is one of the constraint replied by respondents, the price of improved hives was one of the second most important constraint as shown on table 4.19. Among the respondents about 298 (95.82%) replied that high price of improved hive is serious problem.

Lack of knowledge and skill on beekeeping: During the survey, as it is shown on table 4.19, lack of knowledge and skill on beekeeping was the third constraint that identified by 297 (95.50%) respondents. Some beekeepers have been engaged in the sector for long years, but their knowledge and skill of how to keep them is very low which results in lack of proper management of beehives. Some of the problems observed during the survey were, poor/ no shades for hives, poor sanitation in the process of production, harvesting, storing and transporting of honey.

Low access to improved beekeeping technologies: The majority of honey producer farmers in the study area utilized traditional hives. As shown on table 4.19 about 268(86.17%) of the respondent replied that low access to improved beekeeping technologies were the most important constraint identified. Those honey producers which utilized modern hives in the study area lacks protective cloth, smokers, wax stamper and honey extractors.

Table 2.5: Constraints of honey production and marketing

Challenges	Less important	Important	Most important	Total	Rank
Posing of Agrochemicals	0	3	308	311	1
High Price of improved hives	0	13	298	311	2
Lack of Knowledge and Skill	0	14	297	311	3
Pest and predators	0	22	289	311	4
Lack of quality	0	29	282	311	5
Low access to improved beekeeping technologies	0	43	268	311	6
Low price of honey	98	110	103	311	7
Lack of bee forage	122	112	77	311	8
Migration of bee colonies	90	175	46	311	9

Source: Survey result, 2019

Lack of quality: According to the information collected from District, Zone and Oromia Livestock resource development bureau, in the study area as well as in the region there is no lab to check honey

quality. Lack of standard packaging materials and containers, lack of branding and leveling, lack of traceability are some production and marketing constraints replied by sampled respondents during Focus Group Discussion and Key Informant Interviews.

Besides the above constraints there is potential to increase honey production and improve the livelihood of the beekeepers in the district. In GTP II government has put in its agenda the need to develop apiculture as one of the strategies to reduce poverty and to diversify national exports. The researcher observed in the district there is a diversified type of vegetation and cultivated crops as potential for beekeeping activities and also another opportunity to access improved technologies and capacity building from Asella Agricultural engineering research center and Arsi University.

3. CONCLUSIONS AND RECOMMENDATION

3.1. Conclusions

There were about 940 honey bee colonies (hives) in the hands of sampled respondents out of which 779 traditional, 34 traditional and 127 are modern beehives. From this one can conclude that the majority of respondents 82.87% utilized traditional beehives.

The average honeybee colony /hives holding size per household during the survey time were about 3 hives, the average honey productivity of 6.67 kgs per traditional, 11.08 kgs per transitional and 16.97kgs per modern hive. The average honey harvested from single modern hive was by far (254.42%) higher than that of traditional hive.

The majority of honey producers (more than 56 percent of the respondents) have no contact with extension service providers and this implies that more than half of honey producers engaged in honey production and marketing without basic skill and knowledge.

The amount of honey produced by sampled respondent was 7589kgs per a year.

The main highlighted constraints were Agro-chemicals, Price of improved hives, lack of knowledge and skill, Low Access to Improved Beekeeping equipment's, Lack of Organized Marketing Channel, Lack of quality, Pest and predators, unavailability of improved hives and Low price of honey were among the highlighted constraints of honey production and marketing.

3.2. Recommendations

Based on the above conclusion the following recommendations are forwarded

1. The majority of the respondents engaged in honey production and marketing, without basic skill and knowledge, so district and Arsi zone livestock resource development office should have to provide training and extension services.

2. Poisoning effects of agro chemicals: it caused serious damages on bee colonies. It needs attention from the government side to balance between each commodity. It needs some sort of rules and regulation on how to apply, when to apply. In addition agricultural research centers have to work on it.

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