

Assessments of beekeeping production systems in Jambalul, Afgoi district, lower Shabelle region, Somalia

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Abstract

Introduction. This article has two primary goals to establish the impact of beehive type on honey output at certain Jambalul beekeeping farms and the methods of honeybee production harvesting in Jambalul, Afgoi district, Lower Shabelle.

Materials and Methods. This study examines the assessments of bee productivity in Jambalul, Afgoi district. The research was descriptive studies to assess the study's factors. The primary data collection via surveys and questionnaires was used. The formal

approach for choosing the right sample size is to use Slovan's statistical formula; the sample size is 42 respondents with purposive sampling. Questionnaires were used by the researchers to gather primary data; the choice of this instrument was influenced by the time allotted for doing this research. The statistical package for social sciences (SPSS) was used to gather, organize, summarize, and statistically analyze the data (SPSS 16.0). Frequency tables and descriptive statistics were utilized by the researchers to examine the data and characterize the study's variables.

Results. Traditional beehive production systems were used by the majority of respondents (66.7%), whilst semi-traditional beehive production systems were used by 33.3% of respondents. 54.8% of the farmers used traditional hives, followed by semi-traditional hives used by 28.6% of the respondents and semi-traditional hives used by 16.7% of the remaining farmers. 66.7% of those surveyed said they used beekeeping for business purposes. 61.9% of respondents collect honeybees in the winter, whereas 33.3% of respondents were instructed to harvest honeybees in the fall. When the procedure was taking place, 85.7% of them were wearing protective gear.

Conclusions. The study determined that beekeepers use traditional methods mostly but lack skills, knowledge, and materials. The researchers suggested increasing the productivity, production and quality of honey by improving the management of the traditional hives and introducing improved beehives, increasing the productiveness of bee colonies by improving bee forage and providing feed, and water, and introducing bee plants which is very important.

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Introduction

1.2 million tons of honey are produced with the approximately 56 million beehives that are currently present in the world. Around 20 countries that produce honey account for 90% of all exports, and a fourth of global honey production is exported. The biggest beehive population and honey output are found in China. Additionally, honey exports from these countries lead the world. The main importers of honey globally include Germany, the United States, Japan, the United Kingdom, Italy, Switzerland, France, Austria, and other countries in Europe. Turkey imports more honey than it produces domestically, just from Germany.^{1,2}

There are many different species of wild honeybees in Africa.³ One of the nations on the continent with a significant capacity for producing honey is Ethiopia.⁴ In Somalia, more than 80% of the population is employed in agriculture, which generates around 65% of the country's gross domestic product.⁵ Beekeeping provides a number of advantages that can help farmers improve their livelihoods and provide for their families. Honeybees are crucial to agriculture; they promote independence and require very little land or money. Beekeeping conserves natural resources and enriches the planet through environmental conservation because it and agroforestry are related activities.⁵ Despite the fact that commercial

beekeeping was not yet common, the yearly production of honey was thought to be in the range of 225,000 liters, or roughly \$6,750,000 to \$5,625,000 USD. There were an estimated 71,000 log hives near the Juba and Shebelle rivers, where the majority of beekeepers (more than 3,000) were situated. The environment in this region was ideal for beekeeping.⁶

This article's two primary goals are to establish the impact of beehive type on honey output at certain Jambalul beekeeping farms and the methods of honeybee production harvesting in Jambalul, Afgoi district, lower Shabelle. The study will be helpful to everyone interested in learning more about bee production and how to increase it, including academics, agencies interested in beekeeping production, beekeepers, students, and other interested individuals in our country.

Literature review

According to Bommarco *et al.* and Kulhanek *et al.*, honeybee pollination is necessary for the growth of fruits, seeds, and vegetables as well as for the conservation of biodiversity and wild plant communities.⁷⁻⁹ The diverse properties and characteristics of bees around the world make it important to comprehend the kind of bee that is typical of Somalia. In general, honeybees in Africa are thought to be more aggressive, more prone to excessive swarming, more inclined to abscond, and considered opportunistic foragers.⁶ The stingless bee, a kinder kind of bee found at high altitudes, can be found in other places. In Somalia, there are both sorts of bees, with the more subdued bee being more common in the north. The protective traits of honeybees explain why they are aggressive.⁶

The main issues included the presence of pests and predators, recurrent droughts, the indiscriminate use of pesticides and herbicides, a lack of forage for bees due to deforestation, a lack of credit services for the beekeeping industry, the absconding and migration of bee colonies, the high cost and limited availability of modern beekeeping equipment and accessories, a lack of water, and a lack of management expertise.¹⁰

Ejigu *et al.* suggested that pests and predators, frequent droughts, the indiscriminate use of pesticides and herbicides, a lack of forage for bees due to deforestation, a lack of credit services for the beekeeping industry, the absconding and migration of bee colonies, the high cost and limited availability of modern beekeeping equipment and accessories, a lack of water, and a lack of management expertise were the main problems.¹¹

Beekeepers typically raise bees for their own use and to generate cash. There are three types of beekeeping production systems: the traditional, transitional, and movable frame hive.¹² Afgoye and the surrounding villages face several challenges, including weather fluctuations, water scarcity, pest infestations, inadequate transportation, and minor obstacles like limited access to farming supplies, insufficient funds for purchases, and insufficient investment, which leaves farmers extremely susceptible to drought.¹³

Materials and Methods

Research design

This study examines the assessments of bee productivity in the Jambalul, Afgoi district. The researchers believed that a structured survey would be the most effective method for their investigation. The research used descriptive studies to assess the study's factors. The primary data collection via surveys and questionnaires was used.

Target population

The number of beekeepers in Jambalul was 47 bee farmers. The target population is crucial to this research because the researcher believes they will gain relevant data from them that will enable the research to yield the desired results.

Table 1. Demographic data.

Gender of respondents	Frequency	Percent	Valid percent	Cumulative percent
Gender of respondents				
Male	31	73.8	73.8	73.8
Female	11	26.2	26.2	100.0
Total	42	100.0	100.0	
Age of respondents				
15-30	14	33.3	33.3	33.3
30-45	13	31.0	31.0	64.3
45-60	8	19.0	19.0	83.3
60 and above	7	16.7	16.7	100.0
Total	42	100.0	100.0	
Marital status				
Single	13	31.0	31.0	31.0
Married	29	69.0	69.0	100.0
Total	42	100.0	100.0	
Educational level				
No schooling/illiteracy	21	50.0	50.0	50.0
Primary education	12	28.6	28.6	78.6
Secondary education	9	21.4	21.4	100.0
Total	42	100.0	100.0	
Employment status				
Employed for wage	17	40.5	40.5	40.5
Self-employed	25	59.5	59.5	100.0
Total	42	100.0	100.0	

Source: Primary Data, 2021.

Research area

Jambalul village, which lies 8 kilometers to the north of Afgoi district, is the focus of this study.

Sample size

The formal approach for choosing the right sample size is to use Slovan's statistical formula. The sample size is 42 respondents. The sampling procedure was purposefully using a non-probability sample technique called purposive sampling.

Data collection techniques

Questionnaires were used by the researchers to gather primary data; the choice of this instrument was influenced by the time allotted for doing this research, the research questions, and the

study's objectives. The researcher politely but firmly sought the following from the respondents during administration: i) to sign the informed consent; ii) to complete all questions; iii) to prevent biases and to be objective in responding to the questionnaires. Within two weeks of the administration, the researcher retrieved the questionnaires, examined the retrieved letters' completeness, and analyzed the data.

Data analysis

The statistical package for social sciences (SPSS) was used to gather, organize, summarize, and statistically analyze the data (SPSS 16.0). Frequency tables and descriptive statistics were utilized by the researchers to examine the data and characterize the study's variables.

Table 2. Beehive production system.

Is Jambalul good for the keeping of honeybees?				
	Frequency	Percent	Valid percent	Cumulative percent
Valid				
Yes	37	88.1	88.1	88.1
No	5	11.9	11.9	100.0
Total	42	100.0	100.0	
What type of beehive production system is in Jambalul area?				
Valid				
Traditional system	28	66.7	66.7	66.7
Semi-traditional system	14	33.3	33.3	100.0
Total	42	100.0	100.0	
Type of hive using in Jambalul area?				
Valid				
Traditional hive	23	54.8	54.8	54.8
Semi-traditional hive	12	28.6	28.6	83.3
Modern hive	7	16.7	16.7	100.0
Total	42	100.0	100.0	
Type of plant forage of the bee?				
Valid				
Grass/flora	10	23.8	23.8	23.8
Acacia	13	31.0	31.0	54.8
Fruits flower	19	45.2	45.2	100.0
Total	42	100.0	100.0	
Purpose of beekeeping production system in Jambalul				
Valid				
Subsistence	14	33.3	33.3	33.3
Commercial	28	66.7	66.7	100.0
Total	42	100.0	100.0	
Knowledge about beekeeping production				
Valid				
Yes	38	90.5	90.5	90.5
No	4	9.5	9.5	100.0
Total	42	100.0	100.0	
Main factors that cause to decline for honey production				
Valid				
Seasonal change	16	38.1	38.1	38.1
Insects	8	19.0	19.0	57.1
Outbreak of disease	5	11.9	11.9	69.0
Swarming	10	23.8	23.8	92.9
Pesticides	3	7.1	7.1	100.0
Total	42	100.0	100.0	

Source: Primary Data, 2021.

Results

Demographic data

Table 1 shows that, in terms of gender, there were 31 respondents, or 73.8%, who were male, and 11 respondents, or 26.2%, who were female. This shows that male beekeepers outnumber female beekeepers in terms of total respondents. The majority of the participants in this study were aged between 15 and 30 years, represented by 14 participants (33.3%), followed by participants aged between 30 and 45, represented by 13 participants (31.0%), participants aged between 45 and 60, represented by 8 participants (19.0%), and participants aged 60 and over, represented by 7 participants (16.7%). According to Table 1, there were 29 respondents in this survey who were married (69.0%), while there were 13 respondents who were single (31.0%).

The bulk of the respondents to this thesis were illiterate, with 21 respondents (equal to 50%), 12 respondents (equivalent to 28.6%), primary educators, and 9 respondents (similar to 21.4%), secondary educators. According to Table 1, 25 respondents, or 59.5% of those who participated in the study, were self-employed, whereas 17 respondents, or 40.5% of those who participated, were paid employees.

Beehive production systems

Table 2 indicates that the majority of the respondents (37 respondents, 88.1%) agreed that Jambalu is good for beekeeping and said yes while the remaining 5 respondents (11.9%) said no. The majority of the respondents of this thesis were using a traditional beehive production system, which was 28 respondents that equivalent (66.7%) while 14 respondents used for semi-traditional beehive production system (33.3%). As indicated in Table 2, most of the respondents used traditional hives (23 respondents, 54.8%), 12 respondents used semi-traditional hives (28.6%) while the remaining 7 respondents used non-traditional hives (16.7%). As shown in Table 2, the respondents in this study were 19 (45.2%), chose fruit flowers, 13 respondents (31.0%) chose Acacia while the remaining 10 respondents chose flora (23.8%). The majority of the respondents of this research used beekeeping production for subsistence which was 14 respondents (33.3%) while 28 respondents used beekeeping production for commercial use (66.7%). Table 3 indicates that the majority of the respondents of this thesis (38 respondents, 90.5%) had knowledge about beekeeping production while the remaining 4 respondents that equivalent (9.5%) did

not. Results in Table 3 indicate that the respondents were asked about this thesis and 16 (38.14%) clarified that the seasonal change has more effect on honey production, and 10 (23.8%) said that the swarming has an effect on honey production, 8 (19.0%) in which the insects have an effect on honey production, 5 (11.9%) in which the outbreak of disease has an effect on honey production while 3 (7.1%) of pesticides have an effect on honey production. The finding showed that most of the respondents agreed that seasonal change has the highest effect on honey production.

Harvesting of honeybee production in Jambalul, Afgoi

The majority of the respondents of this study were told to harvest honeybees in the winter season which was 26 respondents (61.9%), 14 respondents (33.3%) told to harvest honeybees in the fall season, 1 respondent (2.4%) told to harvest honeybees in summer while 1 respondent told to harvest honeybee in spring. The study showed that most of the respondents agreed to harvest honeybees at the beginning of winter.

Table 4 indicates that the majority of the respondents of this research (16, 38.1%) decided to harvest honeybees 9-12 times in a year, 15 respondents (35.7%) arranged to harvest honeybees 6-9 times in the year, 10 respondents (23.8%) settled to harvest honeybees 3-6 times in the year while the remaining 1 respondent (2.4%) told us to harvest honeybee 1-3 times in the year. As shown in Table 4, the respondents in this study were 22 respondents (52.4%) and agreed to harvest honeybees in the afternoon time, 14 respondents (33.3%) agreed to harvest honeybees in the morning while remaining 6 respondents (14.3%) agreed to harvest honeybee in the night time. As indicated in Table 4, most of the respondents used protective equipment at the time of the operation (36 respondents, 85.7%); the remaining 6 respondents (14.3%) did not. The study showed that most of the respondents used protective equipment at the time of the operation. The majority of the respondents accepted to use a smoker at the time of the operation which was 38 respondents (90.5%) while 4 respondents (9.5%) agreed not to use a smoker at the time of the operation.

Descriptive statistics

Results in Table 5 indicate a total mean average of 1.789, the highest rated aspect is how much experience do you have (mean=2.95), and the lowest rated is Jambalul are good for keeping honeybee (mean=1.00). Results in Table 5 indicate a total mean average of 2.258, the highest rated aspect is when respondents were questioned number of harvesting per year (mean=3.81), and the lowest rated which is "Do you use smoke at the time of harvesting" (mean=1.00).

Table 3. Measured dimensions of beehive production systems.

Indicators	Mean	Std. deviation
Jambalul are good for the keeping of honeybees?	1.00	.000
What type of beehive production system is used in Jambalul area?	1.33	.477
Type of hive used in Jambalul area?	1.62	.764
Type of plant forage for bees?	2.21	.813
Purpose of beekeeping production system in Jambalul?	1.67	.477
Do you have any knowledge about beekeeping production?	1.10	.297
If yes, how much experience do you have?	2.95	1.075
What are the main factors that cause the decline of honey production?	2.43	1.399
Total average	1.789	

Std, standard. Source: Primary Data, 2021.

Discussion

Based on the first objective of the study most respondents agree with the researcher that there is a significant relationship between beehive type and honey production that shows the best keeping techniques to help the production increase. The results of

the structured questionnaire showed confidence in the fact that honey production is influenced by beehive type. The implication of this finding is that bee farmers should offer high levels of effort and skills to promote the provision of high-quality beekeeping techniques in order to achieve their goals.

Based on the second objective of the study, most of the respondents agree with the researcher that there is a relationship between

Table 4. Harvesting of honeybee production in Jambalul, Afgoi.

	Frequency	Percent	Valid percent	Cumulative percent
Which season do you harvest honeybee?				
Valid				
Spring	1	2.4	2.4	2.4
Summer	1	2.4	2.4	4.8
Autumn	14	33.3	33.3	38.1
Winter	26	61.9	61.9	100.0
Total	42	100.0	100.0	
Number of harvesting per year?				
Valid				
1-3	1	2.4	2.4	2.4
3-6	10	23.8	23.8	26.2
6-9	15	35.7	35.7	61.9
9 and above	16	38.1	38.1	100.0
Total	42	100.0	100.0	
When is the best time to harvest honey?				
Valid				
Morning	14	33.3	33.3	33.3
Afternoon	22	52.4	52.4	85.7
Night	6	14.3	14.3	100.0
Total	42	100.0	100.0	
Do you use protective equipment at the time of harvesting?				
Valid				
Yes	36	85.7	85.7	85.7
No	6	14.3	14.3	100.0
Total	42	100.0	100.0	
Do you use smoke at the time of harvesting?				
Valid				
Yes	38	90.5	90.5	90.5
No	4	9.5	9.5	100.0
Total	42	100.0	100.0	

Source: Primary Data, 2021.

Table 5. Harvesting of honeybee production.

Indicators	Mean	Std. deviation
Which seasons do you harvest honeybee?	3.55	.670
Number of harvesting per year?	3.81	4.692
When is the best time to harvest honey?	1.81	.671
Do you use protective equipment at the time of harvesting?	1.14	.354
Do you use smoke at the time of harvesting?	1.00	.000
If yes, which type of smoke use for?	2.24	1.100
Total average	2.258	

Std, standard. Source: Primary Data, 2021.

pesticides, which belong to the measuring aspects of independent variables and honey production which is a dependent variable. The results of the structured questionnaire showed confidence in the fact that honey production is influenced by pesticides. As the majority of respondents stated in the study, pesticides have a strong negative impact on honey production.

Generally, the findings imply that pesticides have a significantly negative impact on honey production and production systems, meanwhile, beekeepers in Afgoye need to deliver high-quality pest killers and the best quality and techniques for beekeeping to achieve the best production systems. Based on the objectives of the study, using descriptive statistics and correlation statistics was found that the level of honey production is very low, (with an average mean of 1.858). Also, the number of beekeepers in the country is lower than 0.5%. The level of production systems is generally very low and this is indicated by the total mean average of 1.165, and the result obtained indicated that there is a significant positive correlation among variables.

Conclusions

This study had two objectives: the first was to examine the beehive type on honey production; the second one was to find out the impact of pesticides on bee production in selected beekeeping farms in Jambalul, Afgoye district, lower Shabelle. Once data were collected, discussed, and closed up, the researcher of this study recommended the following: to increase the productivity, production, and quality of honey by improving the management of the traditional hives and introducing improved beehives, and to increase the productiveness of bee colonies by improving bee forage and providing feed and water; also, introducing bee plants is very important. Moreover, they recommended: i) improving and encouraging the use of transitional and introducing modern bee hives with full packages (sufficient training of the use and availing all the required accessories); ii) facilitating participatory research and extension with relevant organizations operating in the area such as field days; iii) enhancing farmers knowledge and skills about beekeeping management (including colony multiplication techniques) and pre- and post-harvest handling of hive products; iv) encouraging more farmers to participate in beekeeping; v) enhancing the capacity of the existing beekeepers to increase the sustainable and adequate supply of quality honey, which are important for rapid promotion of apiculture in the district.

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