

## Assessment of Farmers Knowledge and Attitude on Vaccination of Livestock and its Implications in Ejere District of West Shewa Zone, Oromia, Ethiopia

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### Abstract

Vaccine is one of the major ways of preventing and controlling infectious diseases of humans and animals including birds. The questioner survey was conducted purposively in three selected kebeles, namely Kimmoye, Damotu, and Amaro of Ejere district West Shewa Zone of Oromia Region, Ethiopia from July 2021 to September 2021 in order to assess the knowledge and attitudes of the farmers on the livestock vaccination. A total of 120 respondents were interviewed for this study and face-to-face semi-structured questionnaire survey was employed to collect required data on the livestock vaccination. Descriptive statistics and Chi-square ( $\chi^2$ ) were used for the data analyses. In present study, the highest numbers of the farmers (79%) were found to use antibiotics as primary choice to prevent and control livestock diseases. Whereas 21% of the farmers replied on the use of vaccines. Large numbers (45%) of the farmers reared animals both for income and cultural purpose. However, 12% and 43% of the farmers were holding the animals only for culture and income issues, respectively. Additionally, 79% of the farmers in the study area did not take any training on the animal diseases and vaccinations. More than 50% of the farmers did not have good knowledge and positive attitudes toward animal vaccination. Finally, this study revealed, there was lack of awareness among the community about animal diseases and vaccination. Therefore, creating awareness concerning animal diseases and vaccination in the study area is imperative.

**Keywords:** Attitude; Control; Disease; Farmers; Knowledge; Livestock; Prevention; Vaccines

### Introduction

#### Background

The livestock sector globally is highly dynamic, contributes 40% of the global value of agricultural output, and support the livelihoods and food security of almost a billion people [1]. The largest population of livestock in Africa is found in Ethiopia; comprising of 61.5 million heads of cattle, 33.0 million sheep, 39.0 goats, 59.4 million poultry, 11.96 million equines, 1.76 million

camels and 7.1 million beehives. A production of 3.3 billion liters of cow milk, 282.2 million liters of camel milk, 151.47 million eggs, and 58.6 million kg honey are being recorded per annum [2]. The economy of Ethiopia is mostly depending on the livestock next to the crop production. Ethiopia is crucial for guaranteeing food security, traction power, rural income production, household employment, and national economic growth through foreign exchange revenues, but it is also significant culturally [3].

The livestock sector is irreplaceable in the livelihood of the population as a source of meat, milk, drought power, and income. The number of people in the world is increasing exponentially and is projected to reach 9.8 billion by the year 2050, and there has been a corresponding, unprecedented expansion and growth of food animal production to meet the increasing protein demand to support human nutrition requirements [4]. This increased demand has driven the trend towards high volume, animal dense systems that provide many opportunities for the rapid spread of disease in both developed and developing countries of the world [5].

Despite having this massive amount of resource, the Ethiopia is unable to exploit the sector entirely because of highly prevalent infectious diseases and lack of appropriate disease control policy [6]. Diseases have many negative impacts on the production and productivity of farm animals including imposing significant economic losses due to mortality, morbidity, loss of weight, poor growth rate, and poor fertility, and reduced animal draft power [7]. Among the most common diseases affecting cattle production and productivity in Ethiopia are anthrax, blackleg, brucellosis, foot-and-mouth disease (FMD), trypanosomiasis, and internal and external parasites [8-13]. In addition, reproductive health problems are widely distributed in different regions of the country, and are major constraints to the livestock production [8].

Farm animals are susceptible to different diseases caused by bacteria, viruses, fungi and parasites. Wherever possible, it makes sense to safeguard animals against these dangers. Reducing diseases and the sufferings, will improve the health and welfare of animals as well as the availability of healthy food for customers. To overcome such drawbacks the immunization of the livestock is the dramatic ways in developing animal industry. In addition, there is an emerging and re-emerging of various bacterial, viral, fungal, and parasitic pathogens that has been threatening the world [14].

Vaccination of the livestock are a key component of disease prevention and control strategies in the universe. Therefore, vaccinations are an effective way in which to promote both good animal health, good animal welfare, and economic stability for the farmers and the communities [15]. The better communication between farmers and veterinary could play an important role in achieving optimization of vaccination strategies. With an improved understanding of farmers' perceptions of the veterinarian and animal vaccination might be used to overcome the drawback of

antimicrobial resistance (AMR) of the infectious diseases of the animals by implementing proper vaccination programme [16].

In contrast to human immunizations, livestock vaccines have various uses. Specifically, the core advantages of veterinary vaccines are for safe and efficient food production, control of zoonotic diseases, control of emerging and exotic diseases of animals and people, reduction of the need for antibiotics, food safety vaccines, and control of diseases of companion animals and horses [17]. Currently, many studies have demonstrated that the use of various bacterial as well as viral vaccines in animal populations can result in a significant reduction in antibiotic consumption [18]. However, veterinary vaccines have also a lot of disadvantages including the potential financial returns are much less than for human vaccines and it have lower sales prices and smaller potential market value. Additionally, there is a lower investment in research and development for animal vaccines than human vaccines, although the range of hosts and pathogens are greater [14]. The critical challenges of veterinary vaccines are also lack of developing new vaccines due cost and licensing the product [19]. For instance, mismatch between the various strain circulating in the field and the vaccines, lack of adequate infrastructure for the transportation vaccines from woreda to rural site, the distance between the rural clinics and woredas, lack of cooling material, lack of awareness in the community toward vaccine and vaccinating their animals as schedule, limitation in genetic potential of the indigenous animals' resources, and marginal production environments are some of the crucial factors [20]. Additionally, in Ethiopia there is scarce of data on the knowledge and attitudes of the farmers on animals' disease and vaccinations. Moreover, the farmers are not voluntary to vaccinate their animals, which may be the major obstacle for not to prevent and control the diseases that have both public health and economic impacts in the country [21].

### Statement of problem

Livestock diseases is one of the core issues in recent decade with the public health and economic importance both in industrialized and non-industrialized world. Even though, Ethiopia is harboring huge numbers of livestock in Africa and leading country in eradication of some diseases with the help of vaccination like rinderpest, the adequate research had been not done on the factors causing of vaccine failure against different diseases in the country. For instance, dearth of suitable infrastructure to transport vaccines

from woreda to rural areas, the distance between the rural clinics and woredas, lack on the availability of the cooling material, and poor awareness in the community toward vaccination of their animals. Moreover, there is a paucity of information on the knowledge and attitudes of the farmers toward animal diseases and vaccinations.

## Objectives

### General objective

The general objective of this study was to generate data on the knowledge and attitudes of the farmers on the livestock diseases and vaccination in selected kebeles of Ejere district (Kimmoye, Amaro, Damotu), West Shewa zone, Oromia, Ethiopia.

### Specific objective

- To assess the knowledge and attitudes of the farmers on animal vaccination and its implication
- To assess the awareness of the farmers on the livestock diseases

## Materials and Methods

### Study area

The study was conducted in purposively selected three kebeles (Kimmoye, Damotu and Amaro) of the Ejere district, West Shewa Zone of Oromia Region, Ethiopia from July 2021 to August 2021. Ejere district is located 40 km west of Addis Ababa along Ambo Road with a latitude and longitude of 9°2 'N and 38°24'E, respectively. The altitude of the area ranged from 2060 to 3185 meters above sea level (masl) with an average rainfall of 1100 mm. The average annual temperature of the district was 26.5°C, respectively [22]. The total numbers of livestock in this district were cattle (11685), horses (15, 502), sheep (63, 588), goats (32, 896), donkeys (18,787), mules (360), and poultry (107,780); and the human population was estimated as 114,714 [23].

### Study Type and design

Pre-structured questionnaire survey was used in this study. Questionary survey study was conducted from July 2021 to September 2021 to assess the farmers' knowledge and attitudes on the vaccination of the livestock and its implication. The samples were collected from a purposively selected three kebeles of Ejere districts based on the numbers of livestock population. A pre-

structured questionnaire survey was conducted to determine the knowledge and attitudes of the farmers, when and why to vaccinate their animals as well as their general views on animal diseases and vaccinations.

### Sample size determination

The sample size was determined according to formula described by Arsham [24]

$$n = \frac{0.25}{(SE)^2}$$

Where, n = Sample size

SE = Standard error.

100 farmers were included in this study as SE of 0.05 was taken. But, to increase the precisions of the data, twenty samples were added. In total, 120 samples were considered for this study. The selection of the farmers was done by simple random sampling technique.

### Data analysis

Data collected by questionnaire survey were entered into the Microsoft Excel spreadsheet, then entering into the STATA Data Editor View (Version 14.2) for statistical analysis. Descriptive statistics were used to summarize data in tables and graphs. The Chi-square test was used to test the association of the farmers knowledge and attitudes on the livestock vaccinations. The differences were statistically significant if the P- value was less than 0.05.

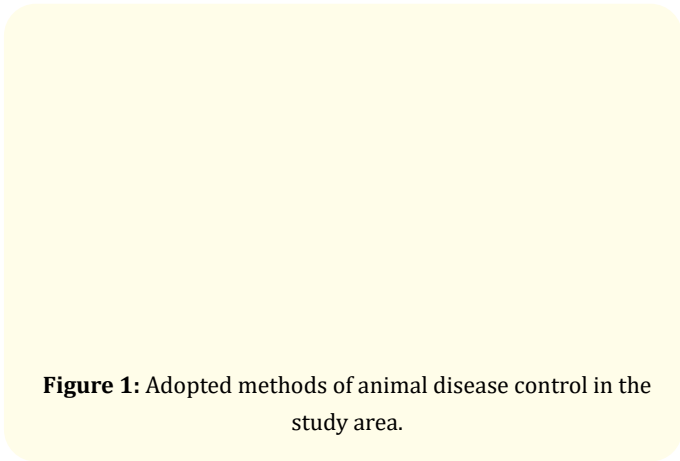
### Ethics statement

This study does not require formal ethical approval, according to Ethiopia's National Research Ethics Review Guideline. Participants, on the other hand, gave verbal permission to the confidentiality of the information they provided.

## Results

### Response of the farmers on methods adopted for prevention and control of Diseases in the study areas

As shown in the following figure 1, the highest numbers of the farmers (79%) in the study areas used antibiotics as primary choice to prevent and control the livestock diseases.

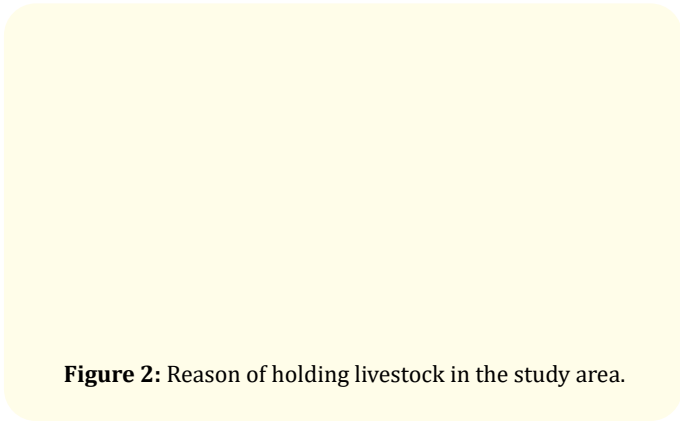


**Figure 1:** Adopted methods of animal disease control in the study area.

Whereas only 21% of the farmers replied on the use of vaccines to prevent the diseases.

**Response of the farmers on the reason of holding livestock in the study areas**

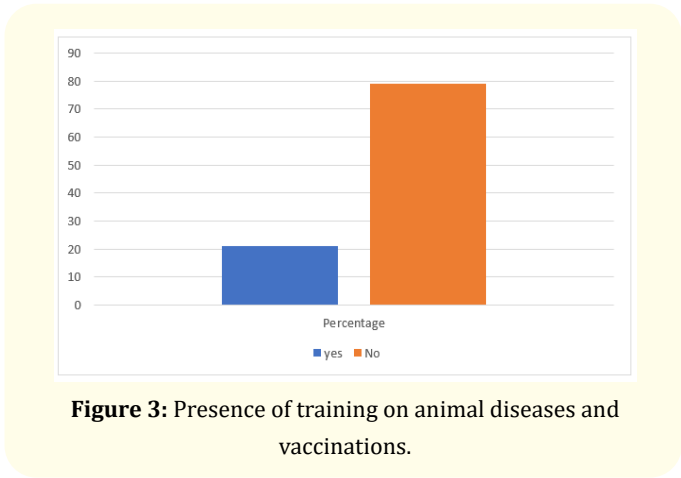
As shown in the figure 2, the large numbers (45%) of the farmers in the study kept animals for both income and cultural purpose. However, 12% and 43% of the farmers holding the animals only for culture and income issues, respectively.



**Figure 2:** Reason of holding livestock in the study area.

**Response of the farmers on the awareness of the animal diseases and vaccinations**

As shown in the following figure 3, the majority of the farmers (79%) in the study area did not take training on the animal diseases and vaccinations.



**Figure 3:** Presence of training on animal diseases and vaccinations.

**Response of the farmers on the related questions of animal diseases and vaccinations in the study areas**

More than half numbers (52.5%) of the farmers did not get enough access of animal health facility and near to half numbers (44.17%) of the farmers also didn't voluntary to vaccinate their animals as scheduled. Additionally, 50% of the farmers did also not contact veterinarian (animal health practitioners) when the animals got disease (Table 1).

Variable	Study areas			Overall N = 120
	Kim-moye	Damotu	Amaro	
Is there enough access of animal health facility in your area?				
Yes	23	16	18	57(47.5%)
No	17	24	22	63(52.5%)
Did you always contact veterinarian when your animals got sick?				
Yes	27	21	12	60(50.00%)
No	13	19	28	60 (50.00%)
Did you voluntary to vaccinate your animals as scheduled?				

Yes	26	21	20	67(55.83%)
No	14	19	20	53(44.17%)
Did you vaccinate your animals when the vaccines have a fee?				
Yes	23	14	9	46(38.33%)
No	17	26	31	74(61.70%)

**Table 1:** General question on animal health and vaccination.

Where N = Number.

### The knowledge of the farmers on the livestock vaccinations

Large percentages (42.5%) of the farmers, agreed that vaccines can cause harm to the animals. However, 37.5% of the farmers disagreed that the vaccination can cause damage to the livestock. Further, 37.5% of the farmers also agreed that vaccination of the animals was not necessary. Additionally, 48.33% of the farmers disagreed that vaccinations were used to prevent the animal diseases, and 50% of the farmers also approved that antibiotics were better than vaccines in the prevention and control of diseases (Table 2).

Variable	Study areas			Overall N = 120
	Kimmoye	Damotu	Amaro	
Vaccines can cause harm to animals				
Agree	12	19	20	51(42.50)
Uncertain	6	8	10	24(20.00)
Disagree	22	13	10	45(37.50)
Vaccines are not necessarily required				
Agree	11	14	20	45(37.50)
Uncertain	10	12	13	35(29.17)
Disagree	19	14	7	40(33.33)
Vaccines are used for the prevention of diseases				
Agree	22	11	8	41(40.00)
Uncertain	4	7	10	21(17.50)

Disagree	14	22	22	58(48.33)
Antibiotics are better than vaccines in the prevention and control of diseases				
Agree	18	20	22	60(50.00)
Uncertain	3	5	6	14(11.67)
Disagree	19	15	12	46(38.33)
Vaccines are not necessary for this area, as there was no outbreak of diseases				
Agree	17	25	30	72(60.00)
Uncertain	7	10	9	26(21.67)
Disagree	16	5	1	22(18.33)

**Table 2:** Knowledge of the farmers on livestock vaccinations.

N = Numbers.

### The attitudes of the farmers on the livestock vaccinations

Near to half number (42.5%) the farmers in the study area agreed that vaccines are readily available, and 38.33% of the farmers were also not sure about easily availability of the vaccines. Moreover, half (50%) of the farmers believed that vaccines were for rare diseases, and did not use for our own animals (Table 3).

Variables	Study areas			Overall N = 120
	Kimmoye	Damotu	Amaro	
Vaccines are readily available				
Agree	15	19	17	51(42.5)
Uncertain	12	12	22	46 (38.33)
Disagree	13	9	1	23 (19.17)
Vaccines are too expensive				
Agree	13	12	11	36(30)
Uncertain	18	22	26	66(55)
Disagree	9	6	3	18(15)
Government must cover fee of vaccines				

Agree	12	14	15	41(34.17)
Uncertain	22	18	16	56(46.67)
Disagree	6	8	9	23(19.17)
Vaccines are for rare diseases and did not use for our animals				
Agree	18	20	22	60(50.00)
Uncertain	9	12	14	35(29.17)
Disagree	13	8	4	25(20.83)

**Table 3:** Attitude of the farmers on livestock vaccinations.

**The association of the farmers socio-demographic factors with the knowledge and attitudes of livestock vaccinations**

The socio-demographic factors of the farmers were tested to see the association they might have with the knowledge and attitude on the livestock vaccinations. Table 4 indicated statistically significant associations between education level with knowledge and attitudes of the farmers in the study area.

Socio demographic factors	Knowledge			Attitudes		
	df	χ <sup>2</sup>	P	df	χ <sup>2</sup>	P
Sex	1	1.9	0.388	2	3.6	0.166
Age	4	12.5	0.15	4	9.5	0.351
Level of education	6	33.4	0.001	6	24.3	0.001

**Table 4:** Association of socio-demographic factors of the farmers with knowledge and attitudes on livestock vaccinations.

Where, df (degree of freedom), χ<sup>2</sup> (Chi-square).

**Discussion**

Vaccinations of livestock is the only promising ways of diseases prevention and control in the both in industrialized and non-industrialized world. In developing country particularly, Ethiopia is the home of huge numbers of livestock as well infectious and noninfectious diseases. Therefore, the veterinary vaccine is used primarily to promote animal health by preventing disease outbreaks that can have a devastating effect on animal production, as well as on human and animal health [6,19].

In present study, the highest numbers of the farmers (79%) used antibiotics as primary choice to prevent and control the

livestock diseases. This observation was in contrast with the report of the Food and Agriculture Organization (FAO) in which vaccination of the livestock were the 1<sup>st</sup> rank in the prevention and control of infectious and non-infectious diseases [25]. The most probable reasons for the difference of this study might be that due the lack of the awareness of the farmers on the livestock diseases and vaccination. In recent study, 45% of the farmers were rears animal for both income and cultural purpose. This was slightly comparable with report of international research of the livestock in the developing country specifically in Ethiopia where the livestock are the sub sectors of agriculture in which the main source of income and livelihood of the farmers both live in pastoralist and mixed crop production. On other hand, some part of the country some ethnic group (Oromo, afar and other) rears animals for culture purpose in addition to source of income and food [26].

The result of the respondent in this investigation indicated that the majority of the farmers (79%) in the study area did not take any training on the animal diseases and vaccinations. This finding was in agreement with study conducted in five provinces of South Africa in which 85.3% of the farmers did not take any training were reported [27]. Similarly, this study goes in line with study conducted in South Africa in which 68% of the farmers indicated that they did not know enough about vaccines and their roles in the livestock productivity [28]. Therefore, lack or inadequate training of the farmers is one major challenge to prevent and control of the livestock.

According to observation of this study, 52.5% farmers did not get enough access of animal health facility, which was in line with study conducted in pastoral part of Ethiopia in which only 19.3% of the farmers got the veterinary services [3]. This study is also comparable with investigation done in Namibia in which farmers far from the town were not get enough veterinary service they offered [29]. Because in this area, there was only one veterinary clinics in each kebeles, which was not comparable with population of the livestock. In current investigation, large percentages (42.5%) of the farmers, agreed that vaccines can cause harm to the animals. Inconsistent with study conducted in Kenya and Uganda in which the farmers agreed that at the vaccination points, the possibility of their animals being infected with diseases from the use of the same needle were seen. Additionally, comparable study was conducted in Kenya and Uganda, in which the farmers disagreed to vaccinate



their animals as they hesitated on the transmission of the diseases to their animals during massive vaccination [30].

In current study, 37.5% of the farmers also agreed that vaccinations of the animals were not necessary, which was in accordance with investigation conducted in Kenya and Uganda in which farmers were disinterested in animal vaccination due to lack of or limited vaccination information [30]. In addition, 48.33% of the farmers disagreed that vaccinations were used to prevent the animal diseases and 40% of the farmers agreed that vaccination are important for the prevention and control of diseases. Our observation is in agreement with study conducted in five provinces of South Africa in which 95% of the farmers agreed with importance of livestock vaccination [27]. This might be that the shortage of continuous training on the animal diseases and vaccination. Similarly, according to the report from South Africa, 41% of the farmers in the North West agreed that vaccines are for the prevention of diseases while 84% of the farmers in the Eastern Cape responded in the affirmative on the same statement [28]. On the other hand, 50% of the farmers in our study areas also agreed that antibiotics are better than vaccines in the prevention and control of diseases, which was contraindicated with study, conducted in five provinces of South Africa [27]. The most probable reason for these differences were also lack of awareness and control on the private animal antibiotic sellers those order the farmers misinformation as if antibiotic only cure their animals.

The result of the present interview on the attitudes showed that that 50% of the farmers believed that vaccines are only used for rare diseases. This was comparable with from selected districts of Sidama Zone Southern Region, Ethiopia in which 71.1% of the farmers believed that animal diseases can occur after vaccinations were seen [15]. In present study, 51% of the farmers are believed that vaccines are readily available as well as 61.7% of the farmers in this study weren't voluntary to vaccinate their animals when the vaccines have fee; which was comparable with study carried out in Amhara region, Ethiopia, in which farmers unwillingness to pay for FMD vaccines were seen [31]. In present study, 30% of the farmers agreed that vaccines are too expensive and this was in contrast with study conducted in KwaZulu-Natal south Africa in which 16% of the farmers disagreed with this statement were observed [27]. The most likelihood reason of this difference also might be that lack of training or awareness concerning animal diseases and vaccination.

The results of socio-demographic factors of the farmers showed that the level of education of the farmers was significantly ( $\chi^2 = 33.4$ ;  $P = 0.001$ ) associated with the knowledge. Similarly, the level educations of the farmers were also significantly related ( $\chi^2 = 24.3$ ;  $P = 0.001$ ) with the attitudes of the farmers on the livestock vaccination. The probable reasons for the increases of the knowledge and attitudes with the education level is that, as that as they educated, they can read, follow versatile mass media, and they can also compete with globalized world.

## Conclusion and Recommendations

The majority of the farmers were not taking any training concerning the livestock diseases and vaccination. There was also a poor vaccination compliance by the farmers; and communication between farmers and veterinary could play an important role in achieving optimization of vaccination strategies. The output of the current study showed that most of the farmers had not good knowledge, and positive attitude toward livestock vaccinations. Because, an improved understanding of the farmers' perceptions of the veterinarian and animal vaccination might be used to overcome the drawback of antimicrobial resistance of the infectious and non-infectious diseases of the animals by proper vaccinations. Furthermore, maximum numbers of the farmers had not adequate information and training on the animal diseases, economic and public health effect. There was also not enough veterinary facility available in the study area.

Based on the above conclusion the following recommendations were forwarded:

- Collaborative training should be given to the farmers concerning livestock diseases and vaccination.
- Government should give enough veterinary facility to all community.
- The veterinary practioners should teach its community rather than selling them antibiotic at home.

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### Contribution of Authors

All the authors contributed equally.

### Ethical Clearance

Not required.

### Conflict of Interest

There was no conflict of interest.

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