

Study on Identification of the Prevalent Livestock Diseases and their Copping Mechanisms in Eastern Zone Of Tigray, the Case of GantaAfeshum

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Abstract - A study was conducted to identify the major health constraints of livestock development, giving emphasis to cattle, sheep, goats and poultry in Eastern Zone of Tigray from January 2013 to June 2013. Questionnaire survey and case observational study methods were carried out for the data collection. In the questionnaire survey, 120 livestock owners were interviewed and the response indicated that the most important diseases affecting cattle's were FMD(17.7%), Pneumonic Pasteurelosis (15.5%), Ectoparasitic/tick infection(14.9%), Anthrax and GIT Parasitism(each with equal response of 11.5%). In the case of sheep and goats GIT-Parasitism (16.1%), pneumonic-pasteurelosis(15.9%),coenurus(15.8%) and Ectoparasite infection(15.4%) were regarded as the most important diseases. Furthermore, Newcastle disease (79.1%) followed by fowl pox (11.6 %) and Coccidiosis(6.7%) were considered as the most important diseases in poultry. Case observational studies were also conducted at the district veterinary clinics (Bizat and Adigrat) and a total of 465 diseased animals were tentatively diagnosed based on history and clinical signs. Among the diseases which were diagnosed, Ectoparasitism(35.55%), endoparasitic problems(25.4%), Mastitis(8.6 %), Pneumonic Pasteurelosis(7%), and FMD(6.64%) were the most frequently observed diseases(cases) in cattle. In sheep and goats, Pneumonic Pasteurelosis (28.85%), endoparasitic problems (22.8%), Ectoparasitism(16.78%), FMD(7.4%), Bloat(4.7%) and sheep and Goat pox(4.7%) were commonly encountered diseases. In Poultry, Newcastle Disease (60%) was found to be most commonly encountered health problem. Hence to reduce mortality and increase productivity of the areas livestock, there is a need to expand the veterinary services in terms of quality and quantity and parallely awareness improvement of the livestock producers of the community on disease prevention and control mechanisms should also be given equal priority.

Key words - Livestock Diseases, Identification, Prevalence. Cattle, Sheep and goat, Poultry, Eastern Zone, Gantaafeshum

I. INTRODUCTION

Animal production has been considered as the main component of agricultural development in most parts of Sub-Saharan Africa. Like in many developing countries, domestic animals play a crucial role in Ethiopia. They provide food in the form of meat and milk, and non-food items such as draft power, manure and transport services as inputs into food crop production and fuel for cooking. Livestock are also a source of cash income through sales of the above items, animal hides and skins. Furthermore, they act as a store of wealth and determine social status within the community. Ethiopia is known for its high livestock population, being the first in Africa and tenth in the world [8, 5]. The recent livestock population estimates that the country has about 52.1 million heads of cattle, 24.2 million sheep, 22.6 million goats and 44.9 million poultry [10]. The population of these animals in Tigray region is 4,201,501 cattle, 4, 506, 64 shoats (sheep and goat) and 155,434 chickens of which wereda Ganta Afeshum have the proportion of 51, 514 cattle, 60, 040 sheep, and 30, 050 goats respectively and 67, 769 chickens [5].

Despite the large number of livestock in the region the sector is characterized by low productivity and, hence, income derived from this sector of agriculture could not impart significant role in the development of the region's economy [9]. The low productivity is attributed to high disease incidence and parasite burden, low genetic potential of indigenous breeds, inadequate management, poor nutrition and reproductive performance. Among these constraints, diseases have numerous influences on productivity and fertility of herds. The effect of livestock diseases could be expressed in terms of losses due to mortality and morbidity, loss of weight, slow down growth, poor fertility performance and decrease physical power.

The International Livestock Research Institute (ILRI) in collaboration with the Ministry of Agriculture and Rural Development (MoARD) have initiated a 5 year project entitled "Improving Productivity and Market Success" (IPMS) of Ethiopian farmers. The project aims at contributing to a reduction in poverty of the rural poor through market oriented agricultural development [1]. In line with this the Tigray regional state government has set a GTP (growth and transformation plan) on economic development of the region (especially the rural farmer) and one of the sectors that have given due attention in this plan is agriculture focusing on improving the production of livestock's and crops. Livestock productivity of the region is planned to improve by providing research aided extension to increase market oriented livestock in quality and quantity. According to this vision, milk production of the region is planned to increase from 302,108-367503 tones, egg production from 6,132-9,569 tones, honey production from 4,264-6,132 tones and to aid 30,375 crossbreed calf's every year to the existing number 11, 674 so as to reach 151,875 based on manmade hybrid system. The plan also gives special emphasis to improve the health status of the regions livestock by increasing

vaccination, veterinary services and reducing communicable diseases by 50-70% and hence increase total productivity by 15% [13].

In tropical high land areas including Tigray, livestock health problems is high due to environmental factors like high temperature and humidity, topography structure of sloppy area exposed to flood so easy to infect soil born diseases and stress factors. The second major factor for the high prevalence and incidence of diseases in these areas is related with weak animal health services [1]. Despite the wide spread of different animal health problems in the tropical countries, experiences has shown that information on animal health was never a significant focus of research [4]. However, knowing the type and extent of the common and major health problems is very important so that Veterinarians, researchers and other responsible governmental and non governmental bodies can assist in the development of herd health strategies and the selections of possible interventions that will ultimately assist in poverty alleviation, by improving the productivity of the animals as it is already set by the regional governments plan. This particular study was therefore, carried out to

- Asses the major health constraints of livestock development in Ganta Afeshum.
- Evaluate the diseases prevention and control mechanisms being practiced
- Evaluate the awareness of livestock producers of the community on livestock diseases and their effects

II. MATERIALS AND METHODS

2.1. Description of the Study Area

The study was conducted in 5 selected peasant associations (PAs) locally called “tabias of Ganta Afeshum, which is one of the 7 woredas of the eastern zone of Tigray (excluding Adigrat and Wukro towns) from March 2013- June 2013. The area is located at 115km North of Mekelle and 960 North of capital city of Ethiopia, Addis Ababa. The district share boundaries with Hawzen in the south, Enticho in the west, Gulomahda in the north, and Saesi Tsaedaemba in the East parts [14] and is situated at an elevation of 2457 meters above sea level. It has three agro climatic zones: low lands, mid land and high land with a bimodal rain fall pattern, in which the long rain season starts from end of June to beginning of September and short rain season stays from January to March. The average annual rainfall of the area varies between 300 and 400 mm [2].

2.2. Study Animals

A total of 465 diseased animals (256 cattle, 63 goats, 86 sheep and 60 chickens) presented to Bizet and Adigrat veterinary clinics plus total number of cattle, sheep, goats and poultry owned by the farmers involved in the interview were considered as study animals.

2.3. Study Design

A cross sectional study in the form of clinical follow up and questionnaire survey methods were used to collect the data needed for the study.

Questionnaire survey- A semi structured questionnaire of both type (open and close ended type) were prepared for this purpose focusing on type of disease existing in the area and the method of prevention and control strategies being practiced in the locality.

Observational (clinical follow up) study- an observational study were carried out in the veterinary clinics of the woreda (Bizet and Adigrat) from March 2013 to July 2013 to examine the major and frequently occurring clinical cases (diseases) of livestock in the study area.

2.3.1. Sample size and sampling Procedure

In the present survey, 5 peasant associations (Pas) namely Hagereselam, Mugulat, Adekney, Kita, and Semret were selected purposively based on transport accessibility, degree of livestock production practices and agro ecological differences. From each PAs, 24 households were randomly selected for the interview and hence a total of 120 households were included in the study. The sample size needed for the survey part of this research was determined using the formula developed by [7].

$$n_0 = \frac{z^2 pq}{d^2} \text{ -----(1)}$$

Where: n_0 = desired sample size when the population is greater than 10,000

Z =95 % confidence limit (Z-value at 0.05 is 1.96)

P =0.05 (proportion of the population (HHs) included in the sample i.e. 5 %)

q =1-0.05 i.e. (0.95)

d =margin of error or degree of accuracy (0.05).

Case Observational Study - in addition to questionnaire survey, an observational study had been carried out in selected veterinary clinics of the woreda (Bizet and Adigrat) from March 2013 to June 2013 to asses and address the most frequently appearing clinical cases (diseases that affect livestock development in the study area).

Accordingly a total of 465 cases (256 in bovines, 149 in shoats and 60 in poultry) have observed particularly in the target study species during this clinical follow up period. The cases were tentatively diagnosed based on History and clinical findings.

2.3.2. Data collection

A detailed and organized semi structured questionnaire was designed in an attempt to generate base line information related to livestock production with particular emphasis on major livestock health and production problems. The questionnaire was framed in such a way that farmers could give information that are recent and easy to recall and it was filled directly by interviewing randomly selected livestock owners from different villages of the 5 PAs. Informal group discussion with animal health staffs had also been held to generate relevant information about livestock health and production problems in the study area. On top of the above a direct clinical observational study were also conducted at the woreda’s veterinary clinics to appreciate and strengthen the questionnaire survey finding.

2.4. Data Analysis

The data, obtained in this study were analyzed using descriptive statistics and the ranking of the different types of diseases obtained in the study were done by using the rank index formula as described by [11]. Rank index= sum of (3 X number of household

ranked first + 2 X number of household ranked second + 1 X number of household ranked third) for an individual preference, reason or criteria divided by the sum of (3 X number of household ranked first + 2 X number of household ranked second + 1 X number of household ranked third) for overall reasons, criteria or preferences.

III. RESULT AND DISCUSSION

3.1. Questionnaire Survey Analysis Results

Demographic features of Respondents: Majority of the respondents included in the study were male (86%) and the rest female (14 %). The maximum and minimum ages were 64 and 25 years respectively. Regarding educational status, 73% of the respondents' were illiterate. Respondents' family size proportion showed that 41% and 59% have family members less or equal to 15 years of age and greater than 15 years of age respectively.

Health Care system (Treatment and Prevention)

Farmers were interviewed for the kind of measures they take to maintain their livestock health as productivity can't be achieved without proper health maintenance, and accordingly they responded that they did nothing other than vaccination (68.3 %) of their animals at times of campaign and concerning treatment at times of illness, (56.6 %) of the breeders responded that they use modern treatment while (43.4 %) them said traditional (table 1).

Table 1. Livestock Health Care System of the Area According to the View of Respondents

| Points raised for the interviewees | | Number of respondents (N=120) | | | |
|--|-------------|-------------------------------|-------|----|-------|
| | | Yes | % | NO | % |
| Concern given by the producers for their animals health | | 101 | 84.2 | 19 | 15.8 |
| Practice of proper management in order to maintain health of the animals | | 43 | 35.8 | 77 | 64.2 |
| Practice of Vaccination | | 82 | 68.33 | 38 | 31.77 |
| Type of treatment used during illness | Modern | 68 | 56.6 | 52 | 43.4 |
| | traditional | 52 | 43.3 | 68 | 56.6 |

Veterinary clinic availability and service provision - the livestock owners were also asked about the availability of clinics near to their residence and the degree of services they get from these clinics and (75%) of the respondents claimed that there is shortage of animal health centers in the woreda because for one thing the available clinics are too far from their residence and for the other thing even the available clinics are not well equipped with facilities to provide adequate veterinary service (table 2).

Table 2. Response of respondents' on health care, service and distance of the vet clinic

| Question | Respondents' response by percentage | | |
|--|-------------------------------------|------------|-----------------|
| | Yes % | No % | Not that much % |
| ➤ Is there any vet.clinic near to your residence? | 30 (25%) | 90 (75%) | -- |
| ➤ Are you getting adequate veterinary services from the existing vet.clinic? | 35 (29.2%) | 75 (62.5%) | 10(8.33%) |
| ➤ Do you think the distance of the vet.clinic from your residence is a real factor for maintaining your animal health? | 78 (65%) | 15(12.5%) | 27(22.5 %) |

Major Diseases identified

Respondents complained that many infectious, parasitic and miscellaneous diseases were the major health problems of their livestock, which cause deaths and production loss. They also indicated that the disease dynamic was aggravated by many factors like feed shortage and inadequate Veterinary service. They confirmed that diseases were the main constraints of their livestock production together with shortage of feed. The most prevailing diseases affecting their cattle's were FMD (17.7 %), Bovine pasteurelosis (15.5 %), Ectoparasitic/tick infection (14.9%), Anthrax and GIT- parasitic infestation (each with equal response percentage of 11.5%) respectively (table 3). The importance of FMD, Pasteurelosis and Anthrax as major cattle diseases was also reported by [6] in Astbiwomberta and [3] in fogera areas. Others like Mengemite infection, Fasciolosis as well as Fleas and lice infestation were also the other problems in cattle with relatively lower prevalence mentioned by the respondents. The finding of this study is almost in line with that of the reports of [7, 12, and 6] which were conducted in different areas of the country particularly Metema, Lay-Armacheho and Atsebiwenberta woreda's respectively.

In shoats the most commonly existing problems were GIT parasitism (16.1%), pneumonic pasteurelosis (15.9 %), Coenurus (15.8 %), and tick infestation (15.4 %) respectively (table 4). This finding is in agreement with that of the finding of [12] which

was conducted in Lay-Armacheho but slightly different with that of [6] which reported Coenuruses as the most prevailing problem of sheep and goat in AtsebiWonberta area. However, the current finding is different with that of the report of [7] which claims ORF as the main problems of small ruminants in his study site and this could probably be related with the agro ecological difference of the two areas. The other diseases with relatively lower distribution mentioned by the farmers were Fasciolosis, Mengemite infestation and Anthrax with prevalence of 8.9, 7.8 and 7.3 % respectively.

In Chickens the most prevalent diseases according to the respondents view was new castle disease (79.1%) (table5). In addition Foul Pox and Coccidiosis were found to occur at relatively lower prevalence according to the respondent's view. This finding is a reflection of the reports on poultry diseases in different corners of the country as well as the region by [15,12, 9] and [6] passing the message that it is an endemic disease (problem) of the country.

Table 3. Common Diseases/Disease Causing Agents of Cattle as Ranked by Respondents

| Disease/ disease causing agent | Local (vernacular name) | Relative degree of importance according to respondents | | | Index | Percentage (%) | Over all rank |
|--------------------------------------|-------------------------------|--|-----------------|-----------------|-------|-------------------|------------------|
| | | 1 st | 2 nd | 3 rd | | | |
| Infectious | | | | | | | |
| Anthrax | Taffia | 15 | 9 | 18 | 0.115 | 11.5 | 4 |
| Black leg | Wekie | - | 14 | 13 | 0.058 | 5.8 | 7 |
| Pasteurelosis | Mieta | 25 | 12 | 10 | 0.155 | 15.5 | 2 |
| FMD | Eichlam | 27 | 14 | 16 | 0.177 | 17.7 | 1 |
| Parasitic | | | | | | | |
| Ticks | Kuridid | 23 | 13 | 10 | 0.149 | 14.9 | 3 |
| Menges | Ekeke | 7 | 10 | 14 | 0.078 | 7.8 | 6 |
| Git-parasitism | W/tesietagan | 11 | 19 | 10 | 0.115 | 11.5 | 5 |
| Fasciolosis | Effel | 8 | 7 | 11 | 0.069 | 6.9 | 7 |
| Fleas and lice | KunciKumal | - | 12 | 9 | 0.047 | 4.7 | 8 |
| Miscellaneous | | | | | | | |
| Reproductive problems | | - | 2 | 2 | 0.007 | 0.7 | 11 |
| Bloat | Nefihi | - | 2 | 3 | 0.009 | 0.9 | 10 |
| Colic | Kuriset | - | 3 | 4 | 0.014 | 1.4 | 9 |
| Lamness | Sinkale | - | 1 | - | 0.003 | 0.2 | 12 |

Ranking of the diseases was calculated using rank index formula as described by Musa *et al.* (2006);

Index = sum of (3 for rank 1st + 2 for rank 2nd + 1 for rank 3rd) given for a given diseases divided by the sum of (3 for rank 1st + 2 for rank 2nd + 1 for rank 3rd) for overall diseases.

Table 4. Major Diseases/Disease Causing Agents of Shoats As Ranked by Respondents

| Disease/Disease Causing Agents | Local name | Relative degree of importance according to respondents | | | Index (I) | Percentage (%) | Over all rank |
|--------------------------------------|---------------|--|-----------------|-----------------|--------------|-------------------|---------------------|
| | | 1 st | 2 nd | 3 rd | | | |
| Infectious | | | | | | | |
| Anthrax | Taffia | 8 | 7 | 11 | 0.068 | 6.8 | 7 |
| Black leg | Wekie | 7 | 6 | 9 | 0.058 | 5.8 | 8 |
| Pneumonic Pasteurelosis | Mieta | 18 | 17 | 23 | 0.159 | 15.9 | 2 |
| Parasitic | | | | | | | |
| Ticks | Kuridid | 27 | 9 | 12 | 0.154 | 15.4 | 4 |
| Menges | Ekeke | 11 | 9 | 8 | 0.081 | 8.1 | 6 |
| Git-parasitism | w/tesietagan | 17 | 23 | 19 | 0.161 | 16.1 | 1 |
| Coenuruses | Zarti | 20 | 19 | 16 | 0.158 | 15.8 | 3 |
| Fasciolosis | Effel | 9 | 17 | 6 | 0.093 | 9.3 | 5 |
| Fleas and lice | KunciKumal | - | 8 | 6 | 0.030 | 3 | 9 |
| Miscellaneous | | | | | | | |
| Reproductive problems | | 1 | 2 | 4 | 0.015 | 1.5 | 10 |

| | | | | | | | |
|----------|---------|---|---|---|-------|-----|----|
| Bloat | Nefihi | 1 | 1 | 2 | 0.009 | 0.9 | 11 |
| Colic | Kuriset | - | 1 | 3 | 0.004 | 0.4 | 11 |
| Lameness | Sinkale | 1 | 1 | 1 | 0.005 | 0.5 | 12 |

Table 5. Major Disease of Chickens (Poultry) Mentioned by Respondents

| Disease | Local Name | Frequency | Percentage | Overall rank |
|-------------------|------------|-----------|------------|--------------|
| Newcastle disease | “Kudem” | 95 | 79.1 % | 1 |
| Foul pox | - | 14 | 11.6% | 2 |
| coccidiosis | - | 8 | 6.7 % | 3 |
| Others | | 3 | 2.5 % | 4 |

3.2. Clinical/Observational Study Results

A total of 465 diseased animals (256 cattle, 149 sheep and goats as well as 60 poultry) were diagnosed based on their history and clinical sign observed at the district veterinary clinics namely Bizet and Adigrat. Among the diseases which were diagnosed, (24.95%) Ectoparasitic infestation, (21.3%), Gastrointestinal parasitism, Pneumonic Pasteurelosis (13.12%), FMD (6%), Mastitis (5.8 %), and Anthrax (3%), were the most frequently observed diseases/disease causing agents in cattle (table 10). In Shoats (Sheep and goats); Pneumonic pasteurelosis (28.85%), GIT parasitism (22.8 %), Ectoparasitic infestation (16.78 %) and FMD (7.4 %), were the commonly observed cases (Table 13). Among the diseases which were diagnosed in Poultry New castle diseases (60%), Foul pox (18.3%) and Coccidiosis (11.7%) were the most commonly observed ones (table 6).

The clinical finding obtained in this study is not in agreement with the finding from the questionnaire survey. This might be due to the perception of farmers towards parasitic problems (i.e. parasites are considered by the animal breeder as minor and insignificant ones as most of them are less pathogenic). The other probable reason could be the Vaccination practices that are currently being under taken against the common bacterial and viral diseases (FMD, Anthrax and Black leg) following outbreak of these diseases in the region in the past two or three years. The occurrence of some of the infectious diseases can be minimized through regular vaccination of the susceptible livestock species and the relatively lower prevalence clinical finding in this study could be attributed to this. Thirdly, the period (season) at which this study was conducted could also be the other factor that can support the clinical finding.

Table 6.Result of the Cases Tentatively Diagnosed at Bizet and Adigrat Veterinary Clinics

| Frequently Encountered Diseases/ Disease causing agents | Frequency (percentage) | Bovine, N= 256 | Caprine and Ovine (Shoats) N= 149 | Poultry N= 60 |
|---|------------------------|----------------|-----------------------------------|---------------|
| Ecto parasitism | 116(24.95%) | 91(35.55%) | 25 (16.78%) | - |
| Endoparasitism | 99 (21.3 %) | 65(25.4 %) | 34 (22.8 %) | - |
| Pneumonic Pasteurelosis | 61(13.12%) | 18 (7%) | 43(28.85%) | - |
| Anthrax | 14 (3%) | 8 (3.1%) | 6 (4%) | - |
| Mastitis | 27 (5.8 %) | 22(8.6%) | 5 (3.35%) | - |
| Black leg | 4 (0.86 %) | 4(1.56%) | | |
| Newcastle disease | 36 (7.7 %) | - | - | 36(60.0%) |
| Foul pox | 11(2.4 %) | - | - | 11(18.3) |
| Coccidiosis | 7(1.5%) | - | - | 7(11.7%) |
| FMD | 28 (6%) | 17(6.64%) | 11 (7.4) | - |
| Bloat | 15(3.2%) | 8 (3.1%) | 7 (4.7%) | - |
| Sheep and goat pox | 5 (1.1 %) | - | 5 (3.35%) | - |
| Dermatophilosis | 7 (1.5%) | - | 7 (4.7) | - |
| Reproductive Problems | 13 (2.8%) | 8 (3.1%) | 5 (3.35%) | |
| Unidentified cases | 22 (4.73 %) | 12 (4.68%) | 4 (2.68%) | 6(10%) |
| Total | 465 (100%) | 256(55.6%) | 149 (32 %) | 60(12.9%) |

N= Number of case

IV. CONCLUSION

This study revealed that, the major livestock diseases/disease causing agents identified in the case of cattle were Parasitic problems (endo and ecto parasite caused problems) ,mastitis, pneumonicpasteurelosis and FMD respectively in their respective degree of prevalence while in case of sheep and goat the major health problems identified were Pneumonic Pasteurelosis, endoparasitic infestation, ectoparasite infection, bloat and dermatophilosis respectively. The most frequently found diseases in case of poultry were newcastle disease followed by fowl pox. RECOMMENDATIONS

Based on the conclusions obtained from the present study the following recommendations are forwarded:

- Short and long term trainings should be given to livestock producers of the community focusing on mechanisms of animal health maintenance
- The veterinary service provision of the woreda should be improved both in quantity and quality
- Routine vaccination programs should be done in the area in more inclusive manner for those endemic diseases in order to prevent the production loss and death of the animal.

- The perception of the farmers towards believing in quantity rather than quality should be changed through gradual education of the livestock producers.

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