

# Participatory disease surveillance in Fentale & Adama Districts of East Shewa Zone, Oromia Regional State

## Abstract

Livestock play a major role in the livelihoods of over 70% of the population. Small ruminants provide with a vast range of products and services, including milk, meat, skins, and wool throughout the year. Diseases of small ruminants are one of the common problems that hinder production. One is Peste des petits ruminants (PPR), or small ruminant plague, is a viral disease primarily affecting goats and sheep. The objectives of the study were to prioritize the major diseases of sheep and goat in selected districts of oromia Regional state based on producer's perception in participatory manner and to understand the status of PPR through PDS technique to enlighten further epidemiological study and future control endeavor. Two districts were selected from the zone (Fentale and Adama) and the selection of the PAs (the lowest administrative level in Ethiopia) in each district was determined in discussion with the district livestock offices.

A PDS team from Asella Regional Veterinary Laboratory was deployed to field and collected, reviewed of secondary data and participatory disease search at the zone. Participatory epidemiology techniques like Semi structured interviewing, Ranking and scoring, participatory mapping, proportional pilling and semi-structured interview and seasonal disease calendars were utilized. The major livestock species raised in Fentale are cattle, Sheep, goats, horses, donkeys, camels and poultry and whereas, major livestock species rose in Adama are cattle, Goat, Sheep, donkeys, Horse, mules and poultry. In all district, disease is mentioned the major challenge to the production of small ruminant. A disease like PPR, Fasciolosis, Pasterolosis, footrot, Sheep and Goat pox were the main small ruminant disease mentioned.

**Keywords:** peste des petits ruminants, fentale, adama, asella, small ruminants

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## Introduction

Livestock play a major role in the livelihoods of over 70% of the population. Small ruminants provide with a vast range of products and services, including milk, meat, skins, and wool throughout the year.<sup>1</sup> They are cheaper to buy compared to larger animals, they reproduce rapidly and are easily sold for cash or exchanged for other staples. Diseases of small ruminants are one of the common problems that hinder production.<sup>2</sup> One is Peste des petits ruminants (PPR), or small ruminant plague, is a viral disease primarily affecting goats and sheep. A Peste des petits ruminant (PPR) is a highly contagious viral disease that mainly affects sheep and goats. Heavy losses can be seen, especially in goats, with morbidity and mortality rates sometimes approaching 80-100%. And a disease of major economic importance.<sup>3</sup> PPR was selected as the next target for global eradication party because of its severe economic and social impact but also because eradication is considered within a short time frame of less than 15 years in total, using lessons learnt from RP eradication.<sup>4</sup> Although there are significant difference in epidemiology between PPR and RP the condition favored the eradication of RP are also largely present for PPR. Therefore the objectives of the study were to prioritize the major diseases of sheep and goat in selected districts of oromia Regional state based on producer's perception in participatory manner and to understand the status of PPR through PDS technique to enlighten further epidemiological study and future control endeavor.<sup>5</sup>

The objectives of the participatory disease search (PDS) for pneumo-enteritis syndrome and PPR:

1) To map livestock resources and movements,

2) To assess the presence of pneumo-enteritis syndrome and PPR, and the history of these diseases in the area, using local knowledge of disease.

3) Defining PPR epidemiological areas and linkages to other areas, in order to have a focused PPR control intervention.

## Selection of the study districts and PAs

The selection of the study districts was carried out in discussion with ARVL, Zonal and Districts Livestock Development and Resource teams with the knowledge of high sheep and goats population, where high movements of the animals within and between the districts, fear of high risk area in pneumo-enteritis syndrome the districts and of course some consideration was given for representativeness of the districts in their geographical location for the other parts of the zone and districts.<sup>6</sup> Two districts were selected from the zone (Fentale and Adama) and the selection of the PAs (the lowest administrative level in Ethiopia) in each district was determined in discussion with the district livestock offices. Two PAs per the study District were selected purposively based on the risk of pneumo-enteritis syndrome and a total of four PAs was selected for study. The selection of elite community key-informants and informants were purposive which was essential to collect in depth information on a number of issues.<sup>1</sup>

## Description of study area

**East Shewa zone:** is one of the Oromia National Regional states. The Zone capital town is Adama is located at 100km from Addis Ababa. It has 10 Districts. From 10 districts 2 (two) of them namely Fentale and Adama were selected for PDS.

East Shewa Zone is found in the central part of the Oromia National Regional State. The zone astronomically lies between 6° 45" N to 8° 58" N and 38° 32 E to 40° 50" E. It shares borderlines with West Arsi, Arsi, West/Hararghe, southwest shewa, OSPZ, Minjar District of Amara regional state and Afar regional state. It has 10 administrative districts including one especial district. Adama is the capital town of the zone. It is located at 100 km from Addis Ababa on Addis Ababa-Adama-Bale Robe main road. Climate is divided into three agro-climatical zones mainly due to variation in altitude. This great variation of temperature provides wide opportunities for the production of different types of crops. It is dominantly characterized by moderately cool (about 40 percent) annual temperature. Cool/cold type of thermal Zone is found in the highland areas Mountains. The category of moderately warm temperature is found in the low land areas of districts.

The mean annual temperature of the Zone is found between 20-40 c in the low land and 15-20 c in the central high land. However, there is a slight variation of temperature by months. February to May is the hottest months while October to January is the coldest months.

Mean Annual Rain fall-For most of the areas, the rainy season starts in March and extends to October with the highest concentration in June, July and August.

**Wildlife:** The diverse climate and topographic phenomenon have provided a wide range of natural environments, which form favorable habitat for a formation of wide variety of fauna and flora in Oromia Region in general and East Shewa zone in particular.

At present, some of the wildlife that remains in the zone is Mountain Nyala, leopard and Menelike's bush back (endemic to the country), lion, monkey and appes. These wild animals are restricted to awash national park. These are the potential areas for wildlife development of the zone. According to the 2021 animal population data of the Zonal Livestock Development show that Arsi zone holds about 3,675,008 cattle, 2,250,271 sheep, 1,199,360 goats, 381,776 horses, 77,288 mules, 520,851 donkeys, 45,570 camels and 2,598,267 poultry .

**Fentale district:** Fentale located in the Great Rift Valley in east shewa zone of oromia regional state of Ethiopia.the administrative center for Fentale distict is Metahara Town.it is 193 km east of Addis Ababa on the main high ways joins Ethiopia with Djibouti. The district is bordered on the southeast by Arsi zone, on the southwest by Boset district, on the northwest by Amhara region,and northeast by Afar region.the district has 20 Administrative kebeles. Out these kebeles 18 are rural and 2 are urban kebeles. The district is located 8.42 N

and 39.40 E. The total area of the district is 1339.65km2.most parts of this woreda ranges from 900- 1000 m above sea level. Mountain fentale (2400) meter above sea level is the highest point. Rivers Awash and lake Baseka are the main water body of this woreda. point of interest Awash national park at north, metahara suger factory and Boset-fentale skim of irrigation found in the district. According to 2009 E.C an estimated total population of the district is 82,494 and of which 23,265 (50.13%) were females and 180,068(88.56%) rural populations. Based on 2021 the Zonal Livestock Development and resource, the livestock population of the district comprises about 53,682 cattle, 106,931 sheep, 129,424 goats, 20,298 camel, and 13,005 equine and 6,446 poultry.

The main livestock markets found in Fentale is (Metehara towns) from different PAs and neighboring districts. The main water point found in the district is Awash River and Lake Baseka Main common grazing area of the District is also in the valleys of rivers especially small ruminants are contact with the neighboring districts, zone and regions and also awash national park.

**Adama district:** is one of the East Shewa zone districts and located 99 KM from Addis Ababa on the direction of east and Adama, the capital town of the zone is also the capital town for the woreda. Adama is bordered on the east by Boset, on the south by Arsi zone, on the west by Lume district, on the North by Lume and Boset districts.

The altitude of this woreda ranges from 1400 to 2300 meters above sea level;and located 7.129 N and 38.57E. It has three Climatic zones, which is 32% Kola, 20% Dega and the rest 48% is Weyina dega. It has on average annual temperature 12 0C -33 oC and in addition it has Annual rain fall on average 600 - 1150mm and the rainy season is beginning from June to October. A survey of the land in this woreda shows that there are two kind of climatic condition, weyna dega and kola.

Zonal Livestock Development and resource, the livestock population of the district comprises about 102,092 cattle, 42,425 sheep, 51,432 goats, 474 camel, 721 horses, 383 mules, 43,293 donkeys and 70,393 poultry.

The main livestock markets center found in districts is Adama towns. Animal Movement routes are from neighboring districts. Common grazing of the District is during winter season after crop is removing from cultivated area.

**Date of PDS**

The PDS was carried out from December 26, 2021- January 02, 2021.

**Study and target areas**

**Table 1** Study and target areas of PDS selected Sites in East Shewa zone

Zone	District	Date	PA	Villages	GPS Location		Small ruminant population (District)	Ethnic group	Key informants number			Distance from Wereda Town
					N	E			M	F	Total	
East Shewa	Fentale	28-12-2021	Fete leedi	Feteledi	7034'4.91	39053'33.25	127,285	Itu	12	2	14	20km(From Metahara)
		28-12-2021			7031'57.26	39059'23.35			12	1	13	16km(From Metahara)
	Adama	29-12-2021	Dibi kelo	Kelo	7046'26.74	39018'38.11	93,857	Tulama	16	5	21	32km( from Adma)
		31-12-2021	Humo Fechasa	Humo					Tulma	15	2	17

## Personnel in PDS team

**Table 2** The PDS team composed of the following personnel

No.	Name of PDS team	Position	Responsibility	Organization
1	Dr Abdissa Lemma	Expert	Facilitator	ARVL
2	Dereje Fufa	Expert	Data Recorder	ARVL
3	Kedir washi	driver	Driver	ARVL
4	Dr. Belete Abdo	District Expert	Translator	Fentale District
5	Mr. Debele Dinku	District expert	Translator	Adama District

## Materials and methods

A PDS team from Asella Regional Veterinary Laboratory was deployed to field and collected, reviewed of secondary data and participatory disease search at the zone. Participatory epidemiology techniques like Semi structured interviewing, Ranking and scoring, participatory mapping, proportional pilling and semi-structured interview and seasonal disease calendars were utilized.

## Results

### Main livestock species kept

The major livestock species raised in Fentale are cattle, Sheep, goats, horses, donkeys, camels and poultry. The relative numbers were simply ranked by the key informants for each targeted districts and kebeles. In each PAs they ranked animal species based on their perception of abundance and their economic value for their livelihood. Although slight variation exists in the perception of the informants across the PAs, they ranked the highest population size as cattle, goats, sheep, poultry (chicken), donkeys, Horses, camels and Mules. However, the priority ranking on the economic value from the highest to the least was Goat, sheep, cattle, donkeys, poultry (chicken), camels, horse and mule in descending order. Accordingly, the following table summarizes are ranking as per district visited and overall ranked (Table 3) (Table 4), seen as below.

**Table 3** Rank of Livestock species based on estimated number of population in Fentale

No.	Livestock kept	PAs		Overall ranks
		Fete leedi	Benti	
1	Goats	2	2	3
2	Sheep	1	3	2
3	Cattle	3	1	1
4	Horse	7	6	7
5	Donkey	5	4	4
6	Camels	6	7	6
7	Poultry	4	5	5

The major livestock species raised in Adama are cattle, Goat, Sheep, donkeys, Horse, mules and poultry. The relative numbers were simply ranked by the key informants for each targeted districts and kebeles. In each kebele they ranked animal species based on their perception of abundance and their economic value for their livelihood. Although slight variation exists in the perception of the informants across the PAs, they ranked the highest population size as cattle, Goat, sheep, donkeys, poultry, Horses and Mules. However, the priority ranking on the economic value from the highest to the least

was cattle, Goat, sheep, poultry (chicken), donkey horse and mule in order. Accordingly, the following table summarizes are ranking as per district visited and overall ranked (Table 5) (Table 6), seen as below.

**Table 4** Rank of Livestock species based on economic importance in Fentale

No.	Livestock kept	PAs		Overall ranks
		Fete leedi	Benti	
1	Goats	4	2	2
2	Sheep	3	3	3
3	Cattle	1	1	1
4	Horse	7	7	7
5	Donkey	2	4	4
6	Camels	6	6	6
7	Poultry	5	5	5

**Table 5** Rank of Livestock species based on estimated number of population in Adama

No.	Livestock kept	PAs		Overall ranks
		Dibi Kelo	Humo Fechasa	
1	Goats	4	4	4
2	sheep	3	5	5
3	cattle	2	1	1
4	Horses	6	6	6
5	Donkeys	5	2	3
6	Mules	7	7	7
7	Poultry	1	3	2

**Table 6** Rank of Livestock species based on economic importance in Adama

No.	Livestock kept	Pas		Overall ranks
		Dibi Kelo	Humo Fechasa	
1	Goats	6	5	5
2	Sheep	3	4	4
3	Cattle	1	1	1
4	Horses	5	6	6
5	Donkeys	4	2	3
6	Mules	7	7	7
7	Poultry	2	3	2

In summarizing major livestock species raised and their economic importance in PDS districts of East Shewa zone were ranked for each targeted districts. According to the ranks the highest population size as cattle, goat, sheep, Camel, donkeys, Horses, poultry (chicken) and Mules. However, the priority ranking on the economic value from the highest to the least was cattle, Goat, sheep, Camel, poultry (chicken), donkey, horse, and mule in descending order and overall zonally ranked (Table 7) (Table 8), seen as below.

### Major livestock production constraints

The main constraints in livestock production discussed in respective districts were as follows: Diseases of animals, Shortage of grazing land (feed) and Water, poor coverage of animal health service, lack of improved/productive breeds, and sometimes drought were the problems listed by informants that hindering their livestock productions (Table 9).

### Major diseases of small ruminants

Of which main small ruminant constraints listed by key informant’s at target districts were small ruminant diseases where our focus. The major listed small ruminant diseases were Albate/bitile / bote (PPR/Diarrhea), CCPP (Furro/Somba), Marto(Coenororus cerebral), Dod(Fasciolosis),Shokoto(footrot), Hargensu/gororsa/kufa/sirido (Ovine Pasteurellosis), Fanxaaxa/chittoo/dola/Angudula (Skin disease/Sheep and goats pox), Abdera (orf), and chini/chito(Mange mites/ External parasites), laboba (copper deficiency) were discussed as a major problem of small ruminants production the Districts (Tables 10–12).

**Table 7** Rank of Livestock species based on estimated number of population in East Shewa Zone

No.	Livestock kept	Districts		Overall zonal ranks
		Fentale	Adama	
1	Goats	1	3	3
2	Sheep	3	2	2
3	Cattle	2	1	1
4	Camel			
5	Horses	0	5	5
6	Donkeys	5	4	4
7	Mules	7	7	7
8	poultry	4	6	6

**Table 8** Rank of Livestock species based on economic importance in East Shewa zone

No.	Livestock kept	Districts		Overall zonal ranks
		Fentale	Adama	
1	Goats	2	5	3
2	sheep	3	2	2
3	cattle	1	1	1
4	Catel			
5	Horses	7	3	6
6	Donkeys	4	6	5
7	Mules	6	7	7
8	poultry	5	4	4

**Table 9** Major challenges of livestock production ranked by Target informants

No.	Major livestock production constraints	Fentale	Adama
1	Diseases of livestock	1	3
2	Shortage of grazing land (feed)	2	1
3	Lack of improved breed	4	4
4	Poor coverage of Veterinary services	5	6
5	Shortage of water	3	2
6	Drought	6	5

**Table 10** Community prioritized small ruminants of Diseases ranked in Fentale and Adama districts of East Shewazone

No	Local name of diseases	Scientific name of diseases	Summary of disease ranking in districts	
			Fentale	Adama
1	laboba	Copper deficiency	2	2
2	Masa	Foot and mouth ( FMD)	8	9
3	Albate/bitile / bote	PPR	1	1
4	Hargensu/gororsa/kufa/sirido	Pasterolosis	3	3
5	Fanxaaxa/chittoo/Fino/	Sheep and goat pox	4	2
6	Martoo	C. cerebralis	7	6
7	Wan-adu	Anthrax	6	5
9	Furro/somba	CCPP	-	4
10	Chini/chito/shilmi	External parasites	9	7

**Table 11** Community perception of local diseases and their clinical signs

Local name	Scientific Name	Clinical signs Morbidity, mortality	Post mortem signs	Species and age groups	Cause	Occurrence – seasonal, annual, sporadic	Treatment, prevention	Possible differential diagnosis*
Aodo	Fasiolosis	Swelling under jaws/odema	Liver Damaged	Both species and all age	Grazing land	seasonal	Deworming/pasture management	Actinobacillosis
Shokoto	Foot root	Inter digital lesion, lameness		Both species and all age	Wet housing/pen	Seasonal, during summer season		FMD
Albasaa	PPR	Coughing, diarrhoea, nasal and ocular discharge	Damage intastanine and internal organs	Both species and all age	countagious	seasonal	No treatmet	Sheep and goat pox,CCPP
Siridoo	Pasterolosis	Salivation, coughing	Lung damage	Both species and all age	contagious	Dry season	antibiotics	CCPP,PPR
Fanxaaxa/citto	sheep and goat pox	Skin nodules	Nodule and damage internal organs	Both species and all age	contagious	Dry seasen	No treatment	PPR, Ectoparasites
Martoo	c.cerebrilis	Circling of the animal	-	Both specie and adult age	unknown	Throughout the year	No treatment	-
Abderraa	Orf	Wound around the mouth		Both species and young age group		Wet seasonal	Tobacco and solt	SGP
Chini	Extoparastes	Existence of parasites, hair lose		All species and all age		Dry season		SGP



**Table 12** Timelines of diseases outbreak last five years in the districts

No.	Timelines	Rank in districts	
		Arsi Robe	Hetosa
1	2021	SGP	SGP, LSD
2	2020	FMD, locust	FMD, locust
3	2019	LSD, Anthrax, Covid-19	SGP, Covid-19
4	2018	SGP	PPR, LSD
	2017	PPR	PPR

### Seasonal calendars

The participants have presented that there are four seasonal calendars they use in their livelihoods basis these include Arfasa/Badhessa (spring season), Bona (winter season), Ganna (summer season) and Birra (Autumn season). In Ganna and Arfasa seasons they get rains and fattens their livestock this time they receive rain where pasture and shrubs becomes bloom and shiny.

### Conclusion

The main small ruminant constraints listed by key informant's target districts were small ruminant disease, shortage of the feed, shortage of drinking water; poor animal health service coverage lack of market place and drought were listed in all districts. In all district, disease is mentioned the major challenge to the production of small ruminant. A disease like PPR, Fasciolosis, Pasterolosis, footrot, Sheep and Goat pox were the main small ruminant disease mentioned. Even though key informants of all district was not reported diseases that case definition fits the clinical sign of pneumo-enteritis syndrome during PDS performance time. But in all districts they prioritized PPR disease as the main disease of small ruminants in their district by PDS team during the field using PDS tools. Therefore, based on this conclusion the current assessed information obtain in the districts, namely; Fentale, and Adama districts are high risk ones for PPR because of the history of the endemic of the disease, they are a known animal market centers of the region and high flock movement in all districts. These observations of PDS lead to the following recommendations:

Since high flock movements and market center of the districts the disease might come from high risk area especially Bale Zone by market routes so that emphasis should be given to control by market surveillance to get active case and in the neighboring districts PDS should perform in Boset and Dodota. In Fentale district Awash valley might be a pocket for PPR because there are large number of goats in the gorge which reared by "Itu" ethnic groups. This area bordered by Arsi zone, West Harergeh zone and Afar and Amhara regions districts where there are large populations of small ruminants. Therefore, PPR vaccination campaign should recommendable for these districts. Other concurrent diseases like Sheep and goat pox and ovine pastuerollosis are also problem of small ruminant production for the districts, so control measure should be advisable. Active and regular follow up surveillance should perform to know the epidemiological link of the disease for East Shewa zone to handover the occurrence. And also the campaign must be given to Adama district which has 36 Pas and among these only ring vaccinations are given to 18 Pas. Adama has also great market rout from even east bale zone and many other districts of other places.<sup>7-17</sup>

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### Conflict of Interest

Author declares there is no conflict of interest in publishing the article.

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