

# Study on the Prevalence of Monezia Expansa in Debre Birhan Sheep Breeding and Multiplication Farm, Debre Birhan Town, Central Ethiopia

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## Abstract

A cross sectional study was conducted on 384 sheep at Debre birhan sheep breeding and multiplication farm from November 2018 to April 2019 to determine the prevalence of Monezia expansa infection. Fecal sample from a total of 384 randomly selected sheep of both sexes; different age, different breeds and body conditioned sheep were examined for cestode parasite (Monezia expansa) by using floatation technique. Of the total 384 sheep examined, the prevalence of Monezia expansa infection was found 59.4% (288 of 384). There was statistically significant difference ( $P < 0.05$ ) in the prevalence of infection between the two sexes with prevalence higher in female (66%) than male (51%). Statistically significant difference in the level of prevalence of infection was also recorded among the three breeds of the sheep (awassi, menz and cross-breed sheep) and the highest prevalence (66.7%) was observed in exotic Awassi sheep breed. Different level of prevalence of M. expansa was recorded among sheep of different age groups, and the highest prevalence (70.43%) was observed in sheep greater than or equal to three years. Finally, the result of present study indicated that moneziasis is prevalent disease of sheep in the present study area so that strategic deworming, changing the type of farming system from semi-intensive to intensive to decrease the intimate host (oribatid mite) accessibility in the grazing land, proper husbandary and management practices were recommended for the farm.

## Introduction

Moneziasis is an infection due to cestodes of genus monezia. The taxonomic classification of organism that causes moneziasis is presented in phylum plathyhelmenths, class cestoda, order cyclophyllidea, family anoplocephalidae, genus Monezia and species M. expansa and M. burdeni. Moneziasis is a chronic debilitating infection affecting mostly sheep and goats by different species of monezia, other names give to moneziasis is called sheep tape worm or double pored tape worm [1].

M. expansa is a large tapeworm inhabiting the small intestines of ruminants such as sheep, goats and cattle. It is characterized by unarmed scolex (i.e., hooks and rostellum are absent), presence of two sets of reproductive systems in each proglottid, and each proglottid being very short but very broad [2]. The complete life cycle of Monezia requires two hosts, ruminants as definitive hosts, and oribatid mites as intermediate hosts. Eggs are passed out from the intestine of the ruminant host along the gravid proglottids in the feces into the soil and the eggs are eaten by soil mites [3].

Moneziasis is common parasitic infection in young animals including: calves, lambs and kids and during their first life of year and less common in older animals. Seasonal variation of infection is associated with active period of the intermediate host oribatid mite. Moneziasis has little impact but in heavy infection it causes diarrhea and intestinal obstruction [4]. M. expansa does not directly affect humans but the impact is associated with the stockbreeding loss through diarrhea and flesh loss [5].

The diagnosis of moneziasis is based on fecal flotation technique, clinical sign and showing movable proglottids in the faces. It could be treated by using broad spectrum anthelmintic including praziquantel but control of the infection requires a comprehensive knowledge of the epidemiologic and ecologic factors that govern pasture larval populations and the role of host immunity in combating infection [6].

Thought Ethiopia is recognized for its vast wealth of livestock, the economic benefit derived from the livestock center does not commensurate with the potential (FAO, 1993). Development of small animal is constrained among other important factors, by wide spectrum of the disease like moneziasis. In our country, moneziasis appear in the high land area like Deberbirhan (Shirbu, 1986).

The study was conducted on ovine moneziasis in Debre birhan sheep breeding and multiplication farm with the following objectives:

- To provide detail information of ovine moneziasis in Debre birhan sheep farm
- To determine the prevalence of ovine moneziasis in the farm and
- To identify and quantify risk factors involved in the epidemiology of moneziasis

## Materials and Methods

### Study Area

The study was conducted at Debre brihan sheep breeding and multiplication farm. Debre birhan is a town found in North Shewa administrative zone of Amhara national regional state situated at 130 km northeast of Addis Ababa. The study area is geographically located between 090 31' N latitude and long 390 28' E longitude with an altitude of 2780m.a.s.l. This area is mountainous with large plane grazing lands and dissected by two rivers, namely Dalicha and Beriesa.

The climatic condition is characterized by the presence of biannual rainfall (short and long) and the dry season which is relatively cool temperature. The rainy season of this area extend from November to January. The mean annual temperature of Debre birhan is 12.9 where the minimum and maximum temperature is 6.10c and 19.90c respectively. The average annual rain fall is 905.4mm and relative humidity is 62.3%. The minimum (1.70c) and maximum (21.60c) temperature are registered in November and July respectively.

### Study population

The study was conducted on both local and exotic breeds of sheep which are kept under semi-intensive management condition in Debre birhan sheep breeding and multiplication farm in baso worda. Sheep population in the wereda is estimated to be 5912 (local=3800, cross breed=1312, exotic breed (Awassi sheep=800) (BWADPO,

**Table 1:** Prevalence of M. expansa on the basis of

| Sex    | Number of animals examined |              | Odds ratio | P value       |
|--------|----------------------------|--------------|------------|---------------|
|        | Animals examined           | Positive (%) |            |               |
| Female | 212                        | 140(66%)     | 1          | 0.003         |
| Male   | 172                        | 88(51.2%)    | 0.5        | (0.37 to0.81) |
| Total  | 384                        | 228(59.4%)   |            |               |

**Table 2:** Prevalence of Moneziaexpansa infection on the basis of breed difference

| Breed  | Number of animals examined |              | Odds ratio | P value |
|--------|----------------------------|--------------|------------|---------|
|        | Animals examined           | Positive (%) |            |         |
| Awassi | 132                        | 88(67%)      | 1          | 0.003   |
| Menz   | 148                        | 72(48.6%)    | 0.47       |         |
| Cross  | 104                        | 68(65%)      | 0.94       |         |
| breed  |                            |              |            |         |
| Total  | 384                        | 228(59.4%)   |            |         |

**Table 3:** Prevalence of Moneziaexpansa infection on the basis of age group

| Age group | Number of animals examined |              |
|-----------|----------------------------|--------------|
|           | Animals examined           | Positive (%) |
| ≤1 year   | 255                        | 140(54.9%)   |
| 1-3 years | 102                        | 69(67.5%)    |
| ≥3 year   | 27                         | 19(70.37%)   |
| Total     | 384                        | 228(59.4%)   |

X<sup>2</sup>=12.45, p=0.04

The highest prevalence of the M. expansa 95% (95% CI: 92.3, 98.6) was observed in poor body conditioned sheep (Table 4).

**Table 4:** Prevalence of M. expansa in sheep in relation to body condition

| Body condition | Number of animals |              | Odds ratio | P value |
|----------------|-------------------|--------------|------------|---------|
|                | Animals examined  | Positive (%) |            |         |
| Poor           | 176               | 168(95%)     | 336.5      | 0       |
| Medium         | 88                | 54(61.36%)   | 6.5        |         |
| Good           | 120               | 66(55%)      | 1          |         |
| Total          | 384               | 228(59.4%)   |            |         |

2014). Animals are composed of different age and body conditions group. Animals are managed in semi-intensive feeding system which depends mostly on barn feeding with good health intervention like deworming and vaccination.

### Study design

Across sectional study was conducted from November 2018 to April 2019 to determine the prevalence of moneziasis in Deber birhan sheep farm.

### Sample Size Determination

The sample size is calculated according to the formula given by [7] using 95% confidence interval and 0.05 absolute precision. Since there is no any similar study performed in the study area, an expected prevalence of 50% was used.

$$n = 1.962 \times P \exp(1 - P \exp) / d^2$$

Where n= required sample size

P exp= Expected prevalence

d2= Desired absolute precision (0.05)

1.962 = z- value for 95% confidence interval

As a result, 384 study populations were selected

### Fecal sample and data collection

Fecal samples were collected per rectum of individuals' animals using gloved fingers and put in to sampling bottles containing 10% formalin and labeled. Information like breed, sex group, body condition and age of the sheep were registered during sample collection. Flotation technique was employed to assess presence of monezia eggs [8].

## Data management and analysis

Data collected were coded and entered into Microsoft excel spread sheet and analyzed using SPSS statistical software. Descriptive statistics such as % was used to calculate prevalence rate. Chi-square test is used to evaluate whether there is a significant difference between parameters. P-value less than 0.05 are considered significant.

## Results

### Coprological examination

Of the total of 384 sheep were examined in the farm 59.4 % (228 of 384) were positive for *M. expansa* infection. There was statically significant difference between the prevalence of *M. expansa* in sheep of different sexes ( $X^2=8.71$ ,  $p<0.05$ ). Females has significantly higher prevalence 66% (95% CI: 59.6, 72.5) when compared with male 51%

(95% CI: 43.6, 58.7) (Table 1).

When prevalence compared on the basis of breeds between Awassi, Menz and cross breeds, higher prevalence of *M. expansa* (67%) was observed in Awassi sheep breed (Table 2), and the result was statistically significant ( $X^2=11.49$ ,  $p<0.05$ ).

When the prevalence of *Moneziaexpansa* observed sheep less than or equal to one year of age ( $\leq 1$  year), between one and three year (1-3) and greater than or equal to 3 years, higher prevalence (70.37%) was observed in the age group greater than or equal to three years (Table 3). The difference of the prevalence of *Moneziaexpansa* in three age groups was statistically significant ( $x^2=12.45$ ,  $p<0.05$ ).

## Discussion

In this cross-sectional study of *M. expansa* infection of sheep in Debre birhan sheep breeding and multiplication farm, the overall prevalence of 59.4% (228 of 384) was observed. The prevalence of the infection in the farm (59.4%) was higher than the expected prevalence 50%. This level of prevalence is lower than report from eastern part of Ethiopia by Sisay (2008) with prevalence of 61%. The difference in the prevalence might be due to that the area was previously occupied by pastoralist and animals were very congested, which increase the transmission of parasites and the high prevalence of *M. expansa* during winter might be attributed to the availability of oribatid mites in pasture. In Argentina [9] reported that the increase in the number of oribatid mites coincided with the increase in mean temperature. Prevalence of *M. expansa* infection in relation to sex was compared; the higher prevalence (66%) was observed in female than male sheep (51.2%). The reason might be associated with the fact that resistance to infection is abrogated at the time of lactation and during early lactation period. So, during this time the immunity of sheep could weaken to over-come the infection. In short females are exposed to more stress than male sheep in different times such as pregnancy and lactation which could aggravate the infection and there by favors the egg output of parasites (Bashir et al., 2012).

Highest prevalence (70.37%) was observed in sheep of greater than or equal to three years of age than the prevalence (67.65%) and

(54.9%) in the age group of one and three year and greater than or equal to three years respectively. This might be associated with the transmission way of *Moneziaexpansa* this means that the infection life cycle has two hosts the final host sheep and the intermediate host mite so that the final host is infected by grazing or ingesting grass or herbage containing mites carrying infected stage of parasite [10]. So in the farm mostly adult sheep (>1year) are graze than young sheep (less than or equal to one year) (feed in the barn), due to this the accessibility of getting mite carrying out infected stage of the parasite is low, they feed in the barn agro industrial prepared feed. Sheep seem to develop an immunity to tapeworms relatively early in life (3-4 months of age) (Taylor, 2007).

Different level of prevalence was observed in sheep which have poor body condition (95%), medium body condition (61.36%) and in sheep of good body condition (55%). The reason for this could be due to the fact that poorly nourished animals appear to be less competent in getting ride off infection although it is not usual for well-fed animals to succumb disease provide the environmental conditions are made available, so that animal that have good body condition have the ability to over-come the diseases better than those animal that have poor body condition [11]. The higher parasitic infestation in sheep with poor body condition score is due to lack of well-fed feed so that the immunity of animals become lowered and this result increase the fecundity of the parasite [12].

Higher infection prevalence (67%) was observed in sheep of exotic breeds of Awassi sheep breed compared to the local Menz (49%) and the cross breed (65%) sheep. The higher prevalence in exotic Awasi sheep breed might be associated with lack of environmental adaptability of the species. When we see the prevalence of *M. expansa* in cross-breed sheep than Awassi it has lower value. This might be associated with lack of adaptability to the environment, feed change and proper health management to those exotic awassi sheep breed in exception to local menz and cross breed sheep, those contributed as a stress factors to the susceptibility to the infection. The exotic sheep breed lack of local breed genotype so the immunity is new to any infection and easily susceptible [13]. In the farm the exotic sheep breed in exception to local breed menz sheep, awassi sheep mostly grazed in the field during spring season (October and November) this may lead more infection to *M. expansa* because during this time the grazing land is not well dried so that the availability or the number of intermidate host (oribatid mite) is high, but during rainy season those awassi sheep breed not leave their barn even in sunlight day.

## Conclusion and Recommendations

Moneziasis was found an important parasitic disease of sheep in present study area. In this cross-sectional study a prevalence of 59.4% was observed using fecal examination by flotation technique. Different risk factors namely sex, age, body condition and breed of the sheep are found to affect the prevalence of the disease in sheep. Higher level of prevalence recorded in Awassi breed sheep followed by cross-breeds and menz sheep. In sheep the year between two and thresher in animal which had poor body condition. Even though the parasitic

**Annex 1:** Estimation of the age's sheep from incisor teeth (Gatenby, 1991).

| Permanent incisors | Age of sheep                              |
|--------------------|---|
| None               | Less than 1 year and 3 month              |
| One pair           | 1 year and 3month to 1year and 10 month   |
| Two pair           | 1 year and 10 month to 2 year and 4 month |
| Three pair         | 2 year and 4 month to 3 year              |
| Four pair          | More than 3 year                          |

**Annex 2:** sample collection and result recording format for coprological examination. Sample collection and result recording format for coprological examination

Date of sampling.....

Study sites.....

| ID no | Sex |   | Breed  |      |             | Body condition |        |      |
|-------|-----|---|--------|------|-------------|----------------|--------|------|
|       | F   | M | Awassi | Menz | Cross breed | Poor           | Medium | Good |
| 4     |     |   |        |      |             |                |        |      |
| 5     |     |   |        |      |             |                |        |      |
| 6     |     |   |        |      |             |                |        |      |
| 7     |     |   |        |      |             |                |        |      |

infection is asymptomatic, the prevalence of *M. expansa* in the farm is higher than expected.

Having the above the above conclusive remark the following are forwarded as recommendation:

- The farm should aware of the proper control and prevention of the disease by application of strategic deworming with broad specturum antehelminthics to reduce the impact of the disease.
- An assessment should be performed to assess the iconomic impact of Moneziasis.
- Further studies should be performed to assess the local ecological requirement of Orbatid mite.

**Annex 3:** body condition determination [14].

Poor body condition: the spinous process is prominent and sharp, the transverse process are also sharp, the fingers pass easily under the ends, and it is possible to feel between each process. The eye muscle areas are shallow with no fat cover.

Moderate: the spinous process is detected only as a small elvation; it is smooth and rounded and individual bone can be felt only with pressure. The transeverse process is smooth and well covered, and firm pressure is required to feel over the ends. The eye muscle area is full, and has a moderate degree of fat cover.

Good: the spinous process can be just detected with pressure as a hard line between the fat covered eye muscle areas is full, and has a thick covering of fat.

**Annex 4:** breed identification in the farm [15].

Awassi breed: the head is long and narrow with a convex profile,

**List of Abbreviations**

|        |   |
|--------|---|
| BWADPO | Baso wereda Agricultural and Developmental Office |
| Cm     | Centi meter                                       |
| M      | Meter   |
| oc     | Degree centigrade                                 |
| '      | Minute  |
| %      | Percent   |
| X2     | Chi-square  |
| d      | Desired absolute precision                        |
| Pex    | Expected prevalence                               |

the ears are pendulous, the horn is long and strongly wrinkled, and the neck is fairly long and have medium length and thickness.

Menz breed: they have short fat tail, the necks is short, and have long horn. Have compact body mostly covered by hair, the head is straight and free of any wool cover.

Cross breed: neck and head is short with coarse hairy cover, medium sized body weight

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