

MANGE: A DISEASE OF GROWING THREAT FOR THE PRODUCTION OF SMALL RUMINANTS IN THE AMHARA NATIONAL REGIONAL STATE

Amsalu Demissie¹, Bewket Siraw², Kassa Teferi², Tefera Tsertse², Gezahegn Mammo³, Dagne Mekonnen⁴, Shihun Shimelis⁴

¹Livestock Marketing Authority, P. O. Box 24492 Code 1000, Addis Ababa, Ethiopia

²Bureau of Agriculture, P. O. Box 437, Bahar Dar, Ethiopia

³Addis Ababa University, Faculty of Veterinary Medicine, P.O. Box 34, Debrezeit, Ethiopia

⁴Amhara National Regional State, Department of Agriculture for North Shoa Administrative Zone, P. O. Box 12, Debre Berhan, Ethiopia

Abstract

From April to June 1999 a preliminary survey was conducted in 33 *Woredas* and 144 peasant associations of the Amhara National Regional State to determine the extent of mange problems in sheep and goats so as to propose a disease control option. In about 48.5% of the regional *woredas*, awareness of the small ruminant mange problem was found in more than 51% of the small ruminant holder rural population or by about 48.8% of the respondents, of which about 92% were found to know the real mode of the disease transmission. Though different mange mite species belonging to different genera prevail in the region, the present findings showed that 87% of sheep and goat mange cases are associated with *Sarcoptes scabies*. The disease has been observed to have seasonal occurrence, with the peak incidence being after the main rainy season of the region (September to January). It was also determined that although the disease has been known in the rural areas for a long period of time, its unusual severity and rapid spread was a phenomenon of the past 7 to 10 years. In spite of the huge economic losses that mange is causing, about 25% of affected peasants use neither modern nor traditional veterinary therapeutic practices for the treatment of diseased animals. Apart from the losses incurred through lowered performance and skin quality deterioration of affected animals, mange of sheep and goats is estimated to have killed about 60% of the diseased small ruminant stock (69.3% of sheep and 57.3% of goats) in one year's time. Moreover, it was also found that the disease affects humans in 18.5% of the cases and other species of animals in 37.6% of the cases. Among small ruminants, goats were found to be more susceptible to the disease than sheep (59.6 and 11.8% of cases, respectively). However, once they are infested, sheep are known to suffer more seriously than goats. At present, mange of sheep and goats is found to spread in the low and medium altitude areas of about 60% of the *Woredas* of the region; the extent of the problem has increased continuously during the past few years.

Introduction

The majority of farming communities in the Amhara National Regional State raise small ruminants and there are approximately 5.7 million sheep and 4 million goats in the region (BOA, 1999). Sheep and goats are kept for meat and milk production, as sources of cash income and for other socio-economic and cultural reasons. Skins and manure are valuable byproducts of sheep and goat production. In addition to their ability to thrive and reproduce in harsh environmental conditions, sheep and goats are considered as an insurance or investment against crop failure (Devendra, 1978).

In some drought prone areas of the *Amhara National Regional State*, such as the *Yeku* watershed area of the *Waghimera Administrative Zone*, small ruminants, particularly goats, are known to be the dominant livestock species. They comprise over half of the livestock population, which may reflect the high dependency of farmers on the income generated from sale of these animals (Mekonnen et al., 1999). Although small ruminants are known to adapt to harsh environments, the cumulative effects of overcrowding, poor nutrition and diseases can result in serious production losses (Tilahun, et al. 1995). Among the diseases of small ruminants, *mange*, a parasitic skin disease that affects all species of animals (Blood et al., 1983), has become an important disease problem causing the loss of up to 93% of small ruminants in severely affected areas of the region (Mekonnen et al., 1999). For this reason, mange disease and lack of small ruminant stock have been identified as the top ranking problems of these areas

demanding immediate interventions (Mekonnen et al., 1999).

The incidence of mange has increased during the past 10 years to a level preventing many farmers from keeping sheep and goats, particularly in those areas of the region bordering Afar, Tigray and the Sudan. Mange not only causes direct economic loss to the farmer through animal mortality and poor growth and reproduction, the skin of mange-infested animals often must be down graded or rejected at the tannery. This leads to economic losses to the tannery industry and ultimately the country through reduced foreign earnings.

The increasing severity and periodic rapid spread of the disease in the region demanded that the Regional Agricultural Bureau conduct a survey to characterize the true status of the disease problem and institute possible control measures. To accomplish this task, the Bureau of Agriculture organized two teams of veterinarians to undertake the disease investigation survey.

The objectives of this survey were to:

- Determine the distribution and status of the disease in the region.
- Know the level of awareness of sheep and goat owners about the disease and its control.
- Identify main species of mites that are causing mange in the region.
- Recommend possible control measures.

Materials and Methods

Study Areas, Participants and Duration

The study was conducted from April to June 1999 in 33 *Woredas* of the region. The *Woredas* were selected on the basis of purposive sampling from ten zones of the region based on their accessibility, different agro-ecological representation and their distribution. Within each region, an average of four Peasant Associations (PA) were selected. The PA were selected based on: representativeness of the *Woreda* agro-climate and relative ease of accessibility. Individual sheep and goat owners in each PA were selected because of their comparative better knowledge of diseases affecting their animals than the rest of the community members.

Methodology

The study was carried out by prepared questionnaires and parasitological examinations of samples taken from clinical cases encountered during field visits.

Questionnaire Survey: Questionnaires were administered to:

1. Sheep and goat owners: Five sheep and goat owners from each PA were interviewed. This resulted in a total of 729 farmer interviews from 144 PAs. Those respondents who reported the existence of skin diseases in their locality were asked to list the diseases by their vernacular names and clinical signs associated with them. The vernacular (local) names were given their scientific equivalent names based on:

- Clinical signs mentioned by the owners that were indicative of mange, such as: a disease showing crusts and scales; intense itching which caused scratching and biting; loss of hair; thickening, wrinkling and cracking of the skin; and nodular lesions with pus.
- Personal observation of clinical cases.

- Asking animal health personnel working in the area the local names of the diseases listed.

2. Animal health personnel: Animal health personnel in the study *woredas* were asked about the presence of mange and the number of sheep and goats treated for mange from April 1998 to March 1999.

3. Tanneries: Mersa, Dessie Haik and Combolcha tanneries were visited and information on major causes of skin rejection and the associated economic losses were gathered.

B. *Parasitological Examination:* Skin scrapings from 7 sheep and 54 goats that exhibited clinical signs of mange were collected from the margin of skin lesions and put into universal bottles. The collected samples were examined for the presence of mites under a microscope using 40X and 100X magnifications after treatment with kerosene or 10% KOH. Any sample not showing the intact parasite or whole egg was considered to be negative. Identification of parasite species was performed according to the method described by Masharet and Russel (1978).

The present study has shown that mange is a widely distributed disease throughout the surveyed areas of the region except for the East and West Gojjam Administrative Zones as indicated below. Out of 729 respondents, 356 (48.8%) were found to recognize mange in their animals.

Table 1: Categorization of *Woredas* based on the % of the respondents recognizing mange in their areas.

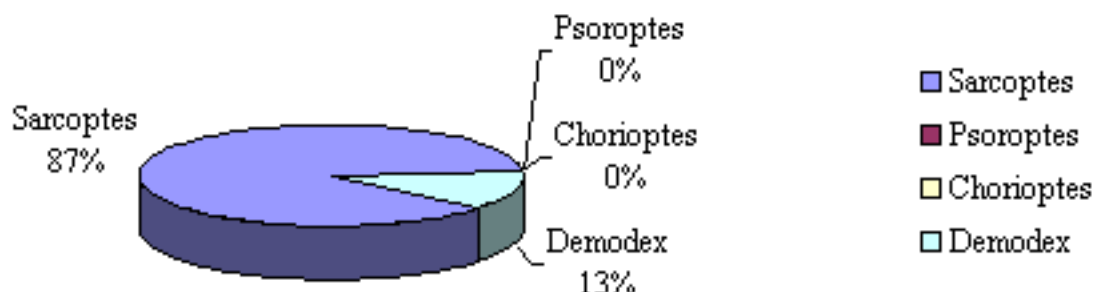
Zone	No. of surveyed <i>Woredas</i>	No. of <i>Woredas</i> categorized by % of respondents for knowing mange			
		<10%	11-30%	31-50%	>51%
S. Wollo	5	1	0	1	3
N. Shoa	4	1	1	0	2
E. Gojjam	4	3	1	0	0
Awi	2	0	1	1	
Oromyia	1	0	0	0	1
S. Gondar	3	0	1	1	1
W. Gojjam	3	3	0	0	0
Waghimera	2	0	0	0	2
N. Gondar	5	0	0	1	3
N. Wollo	4	0	1	0	4
Total	33	8	5	4	16

Although the survey result has indicated that mange has become a well-known important disease by more than half of the respondents in many of the region's rural areas by *Woreda*, this knowledge is not found uniformly throughout the region. It was also found that only 22 of the 33 surveyed *Woredas* (66.7%) had reported mange of small ruminants to be a disease of importance. This shows that mange infestation has localized itself in some parts of the region and not in others. The proper identification of the affected areas will have a practical importance in instituting a control program.

In some areas it was noted that although farmers considered mange a serious problem, its importance was underestimated by field veterinary personnel. This shows that there is still a need to create awareness of the extent of the problem even for the regional professional and subprofessional staff.

Of the mange mites affecting sheep and goats, *Sarcoptes* is known to be the most prevalent species in Ethiopia (Sherman, 1998). The finding of the present study (Fig. 1) that about 87% (27 out of 31) of the positive identified samples were caused by *Sarcoptes* species has proven this fact.

Figure 1: Species of mange mites identified in the surveyed Woredas



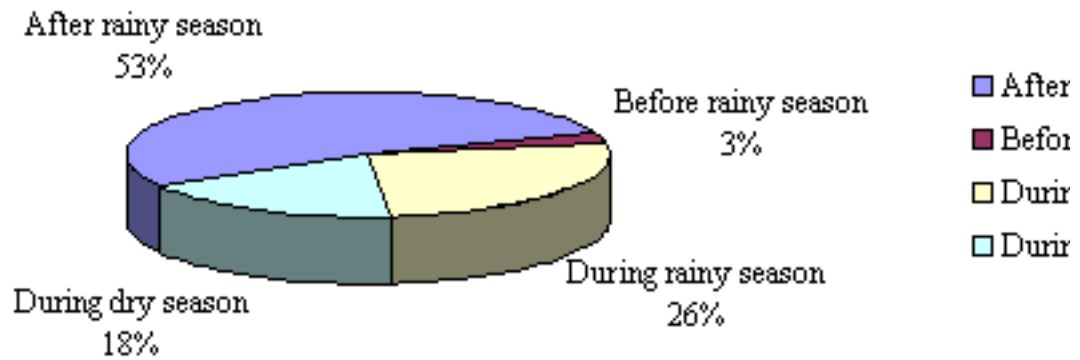
Mange mites are transmitted through contact with affected animals and(or) contaminated materials (Blood et al., 1983). The understanding of this mode of disease transmission by the majority (91.9%) of the rural population (respondents) (Table 2) will have a positive impact in the implementation of future control programs.

Table 2: Categorization of respondents on their knowledge of the mode of transmission of mange in small ruminants

Mode of transmission	Respondents	% of respondents
Contact with sick animals and contaminated environment	329	91.9
Through breathing	3	0.81
Biting flies (from camels and dogs)	4	1.1
No information	22	6.2
Total	358	100

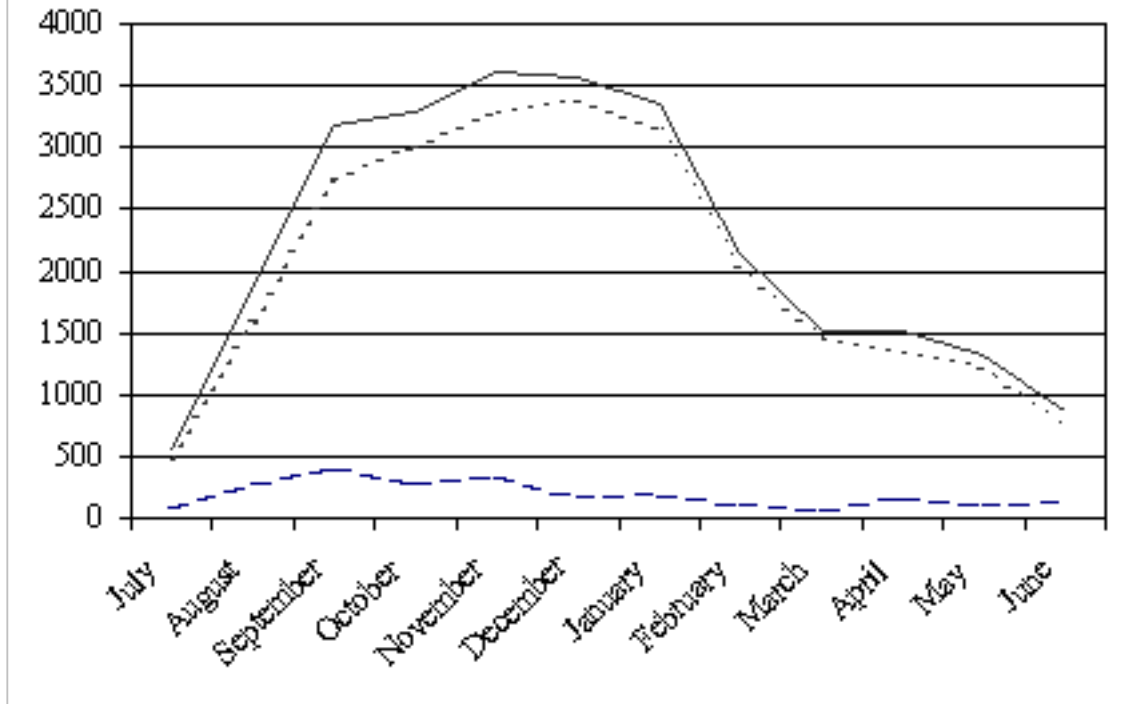
Sarcoptic mange is said to have seasonal occurrence, being active mainly during cold and wet weather (Blood, et al., 1983). Out of the 356 respondents, 256 (71.6%) recognized the occurrence of seasonal variation in mange infestation of small ruminants. However, in variance with the above observation, the majority of respondents (53%) considered that the rate of prevalence increases after the main rainy season (Fig. 2).

Figure 2. Seasonal pattern of mange infestation of small ruminant, observed by farmers.



This is also supported by the result of data analysis from clinical case records of different *Woreda* veterinary clinics during the year from April 1998 to March 1999, which has shown that more mange cases were recorded (treated) after the rainy seasons (Fig. 3) than during the rainy seasons of the year in the region. In agreement with these findings, Banner (1996) also reported the occurrence of Psoroptic mange during the three months following the rainy season.

Figure 3. Seasonal distribution of mange affected cases presented to veterinary clinics (April 1998-March 1999)



In cases of *Sarcoptic mange*, host specificity is not complete and transference from one host species to another can occur, resulting in some cases of temporary infections that may last for several months (Arlian, 1989a, cited by Bornstein, 1995). The finding of the survey (Fig. 4), which showed the presence of human and animal cross-infections suggests the need to consider this fact in designing disease control programs (Blood, et al., 1983).

Figure 4. Categorization of respondents on their observation of the presence or at small ruminant mange transmission to other animals and man

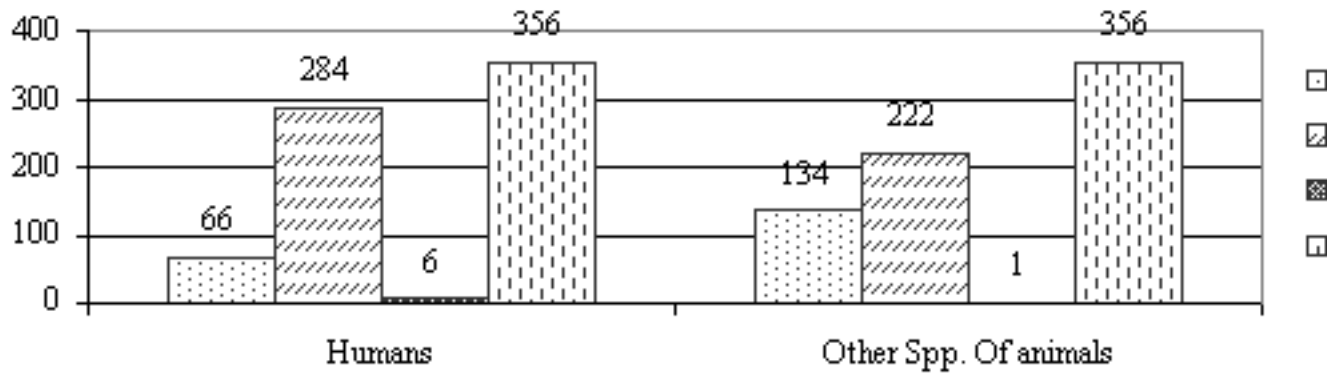
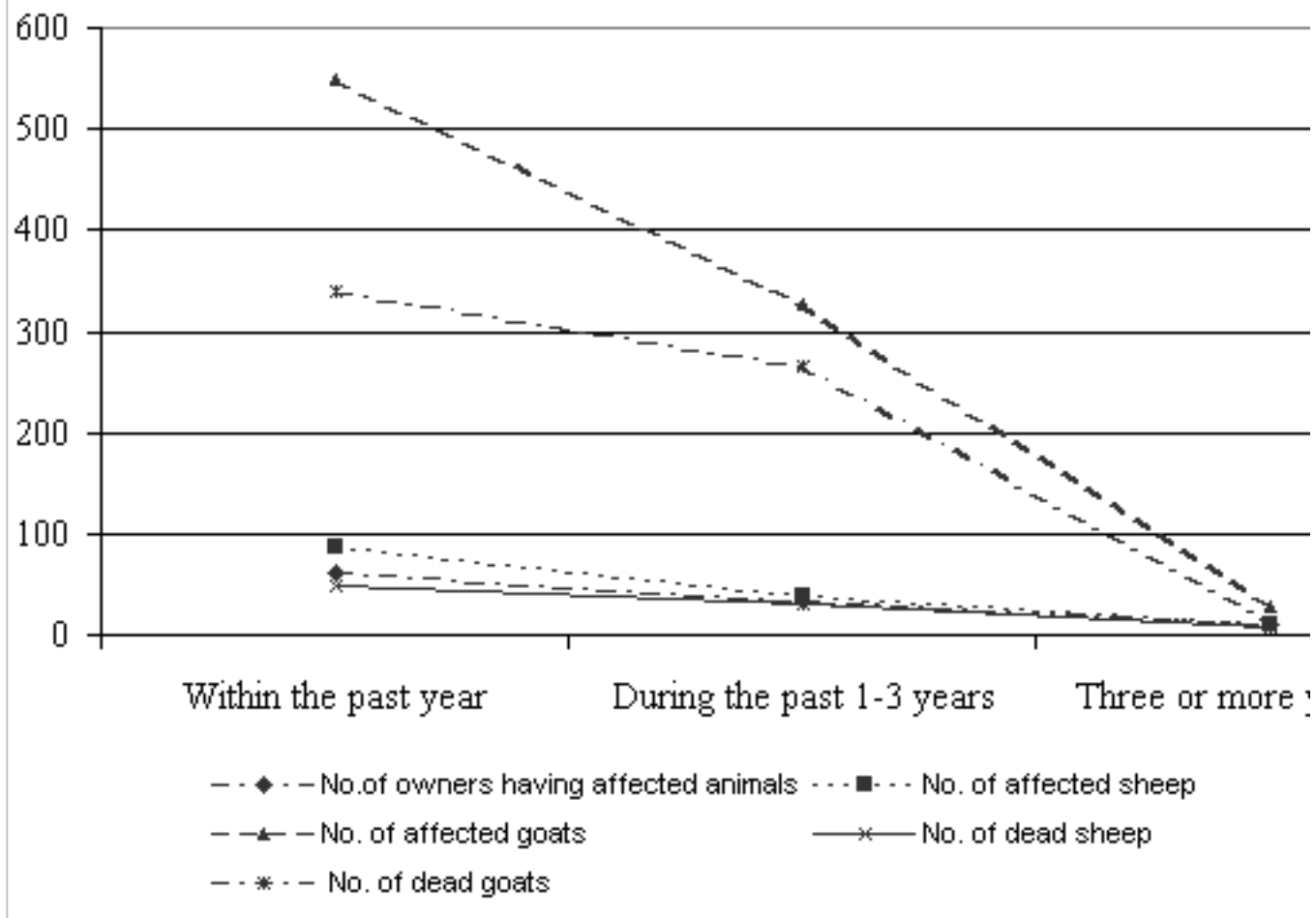


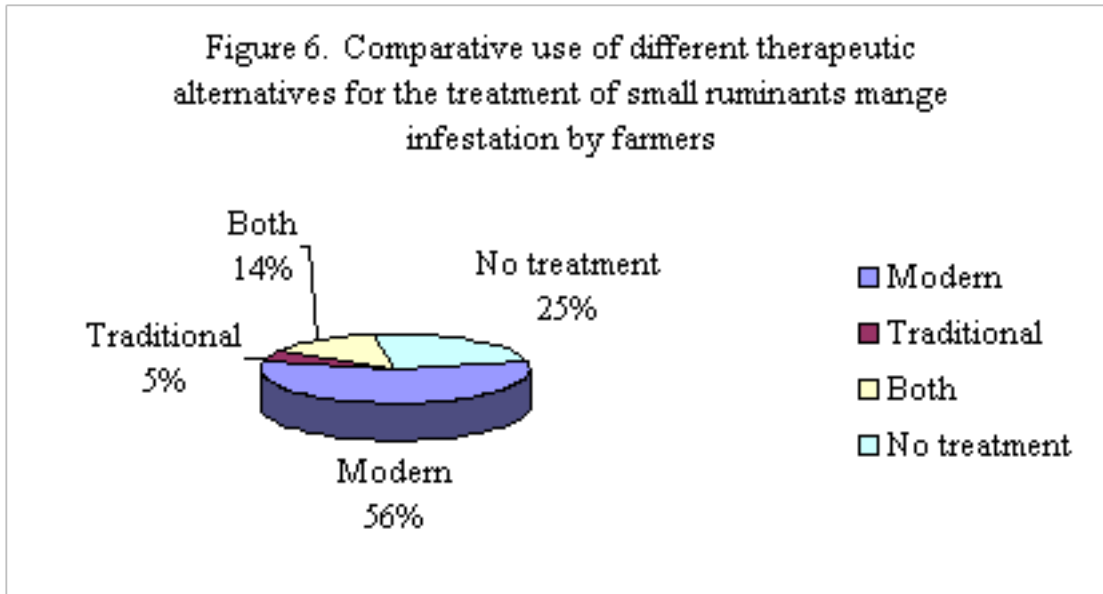
Figure 5. The progress of mange infestation and its resultant effect over the few years as observed by farmers



Sarcoptes mange of sheep and goats is known to have become a major problem in the region in the past 7 to 10 years starting mainly in the eastern and north eastern parts of the region and increasing its geographical coverage and extent of damage as time goes on (Fig. 5). This shows the importance of instituting a swift and efficient intervention in arresting the problem before its complete devastation of the small ruminant stock.

The fact that about a quarter of rural peasants having mange-infected animals do not use either traditional nor modern therapeutic services (Fig. 6), coupled with the uncontrolled regional & interregional livestock movement, could have played a major role for the rapid spread of the disease and resultant damages inflicted by it.

Figure 6. Comparative use of different therapeutic alternatives for the treatment of small ruminants mange infestation by farmers



Besides a lack of awareness concerning the possible use of modern therapeutic drugs for treating mange, the poor economic background of the rural population together with the relative difficult accessibility of some veterinary clinics, have likely contributed to the increased percentage of farmers not using modern veterinary services. In this regard, it is crucial to carefully consider the actual field problems and then design an appropriate strategy that ensures equal access to modern drugs and veterinary services for all of the affected population.

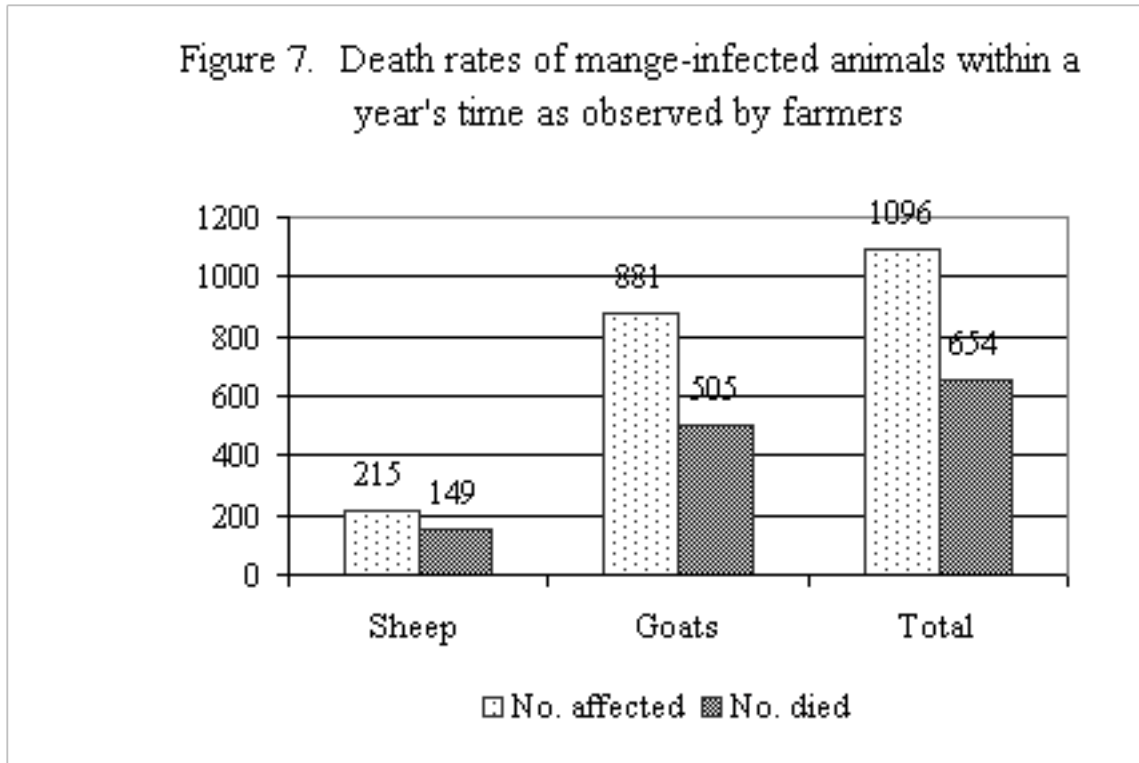
In this study it was shown that 63.5% of the respondents were unable to trace the possible source of mange disease introduced into their localities (Table 3). This may indicate that the disease might have established itself for a long period of time in some areas, as a long period of latency and sudden increase in vigor and pathogenicity has been observed in some Psoroptic mite strains (Roberts et al., 1971). This latent period may also play a role in the current *Sarcoptic mange* problem and would accounts for the inability of the majority of the respondents to trace back the origin of infection.

Table 3: Categorization of respondents based on the assumptions they had on the possible sources of mange disease to be introduced in to their community.

Source of disease	No. of respondents	% of respondents
Marketing places	48	13.48
Feeding and watering sites and animals wandering for mating	74	20.75
Not aware of	226	63.48
Other	8	2.23
Total	356	100

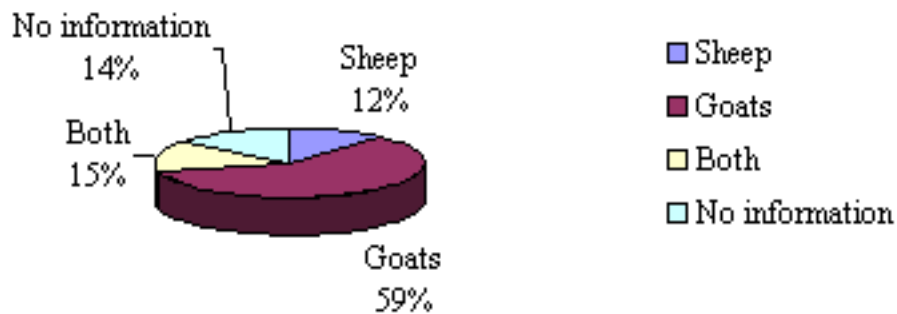
Sarcoptes associated mange cases of sheep and goats are often fatal (Sherman, 1998). In one watershed development study conducted in the Waghimera Administrative Zone of the region, it was found that mange has caused a loss of about 93% of the small ruminant population (Mekonnen et al., 1999). Considering the availability of sufficient and effective veterinary drugs in the region's veterinary clinics, and the fact that about 55.9% of the peasant population is aware of the possible use of modern and

as additional 14% has knowledge of traditional medicines (Fig. 6), the finding of the loss of 59.7% of the disease affected population (69.3% sheep and 57.3% goats) in a year's time (Fig.7) illustrates the very high extent of the problem. Moreover, the above fatality rates indicate only the percentage of the affected small ruminants that died in a 1-year period of time and did not include those that may have possibly died afterwards. This shows that the actual death rates may be higher than the figures indicated above. In this regard, the present finding is in agreement with the above cited statements.



It is important to note, however, that a great majority of the peasant population considered to be aware of the advantages of using modern veterinary services in treating affected stock, is also believed in most cases to be reluctant to adhere to the professional advice given to him to cover the full course of treatment required to bring complete recovery to his animals. This may necessitate the delivery of an appropriate animal health extension service to upgrade the level of understanding of the rural peasant population. Moreover, it is also very likely that treated animals will become reinfested by the disease, as there is every opportunity of contact with other sick animals and a contaminated environment. This stresses the importance of launching a mass treatment campaign to minimize the problem to the lowest possible level.

Figure 8. Degree of species susceptibility for mange infestation as observed by farmers



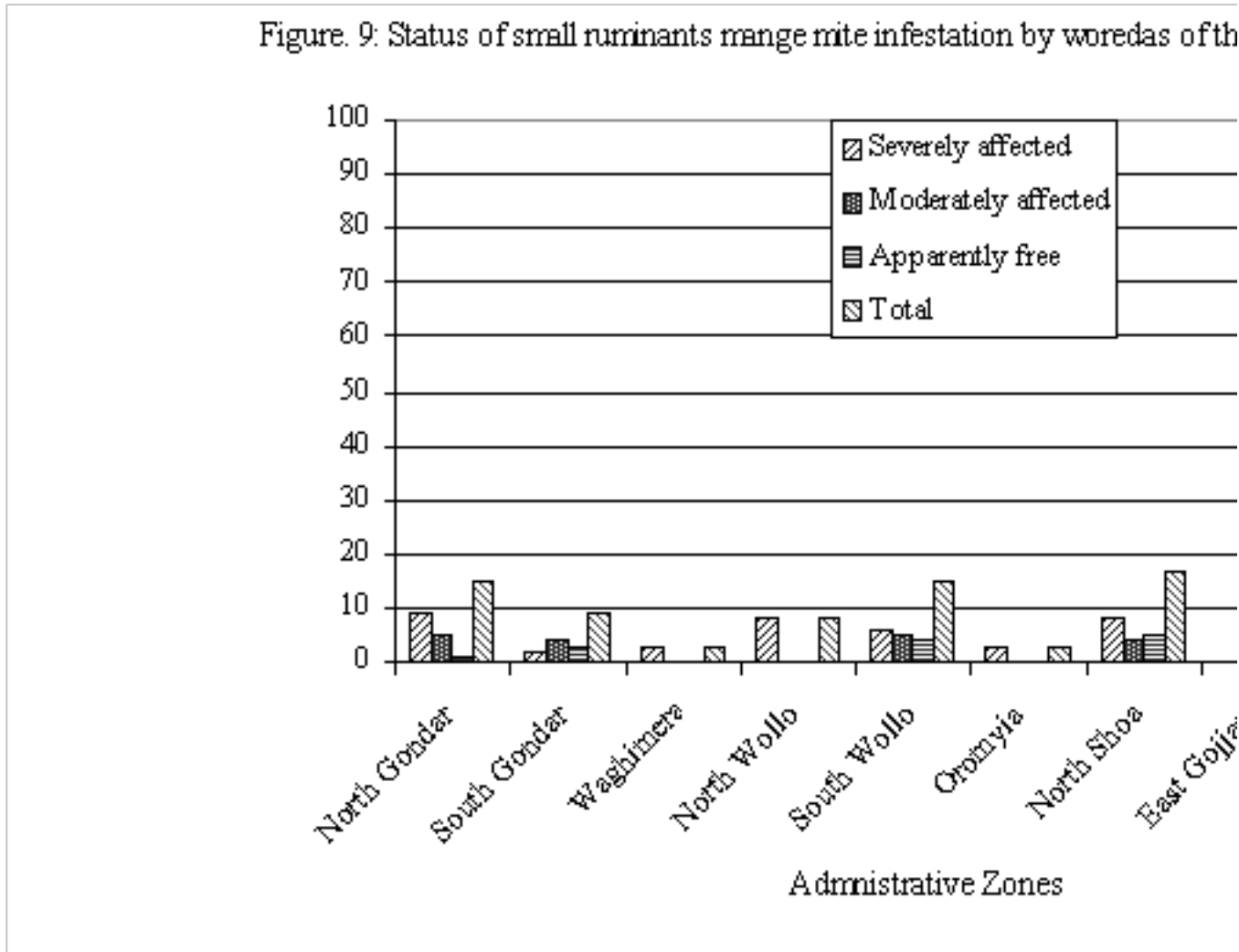
In comparing with relative susceptibility of sheep and goats to *Sarcoptic mange*, the general understanding among the rural population is that sheep are less commonly affected than goats (Fig. 8). However, sheep may be more seriously affected than goats once they contract the disease (69.3 and 57.3% case fatality rates within one year for sheep and goats, respectively) (Fig.7).

Besides the huge losses that mange is causing due to mortality and poor productive and reproductive performances, mange is also one of the main causes of skin rejection and down grading in the tannery industry (Tanneries Report, 1999). Of the skins rejected annually in Ethiopia, 35% of sheep and 56% of goat skin rejection is due to damage caused by external parasites (Bayou, 1998), of which mange infestation accounts for 33% of sheep and 21% of goat skins rejected (Zelege, 1998). Although most skins (mainly goat) are disposed of or utilized by farmers; some do reach local markets where, based upon visual inspection, they are likely rejected by the hide and skin traders before ever reaching a tannery.

People may occasionally become infected with *Sarcoptes scabiei* of animal origin (Arlian, 1989a, as cited by Bornstein, 1995), which is in agreement with the survey result showing about 18.5% of the respondents were aware of the zoonotic importance of the disease (Fig. 4). This shows that mange of small ruminants in the region, in addition to huge economic losses caused by death, production loss, skin rejection and down grading, is also a problem of public health significance that needs multi-sectoral awareness and urgent coordinated intervention.

Based on the information available from the field veterinary personnel and the rural peasant population, together with the personal observations made by the members of the survey team, it was possible to classify the region into three different categories indicating the status of mange infestation (Fig.9). From this categorization, it is evident that only 39.2% of the region by *Woreda* is considered to be apparently free from the disease and the rest is either severely or moderately affected. This shows how quickly mange is spreading across the region. It should be noted, however, that even in those severely and(or) moderately affected areas, mange is found only in the low and medium altitudes, which might slightly raise the relative proportion of the apparently free areas of the region from the above cited figure.

Figure. 9: Status of small ruminants mange mite infestation by woredas of th



Conclusions

Mange of sheep and goats is currently a disease of considerable importance covering the largest part of the region and is quickly spreading. Considering the fact that the relative economic importance of small ruminants in sustaining life and ensuring food security for the rural community is so significant, the economic losses now being caused by the disease as a result of death and reduced productive and reproductive performances of the affected animals is of very serious concern. Moreover, the impact of the disease in causing skin damage is severely limiting the performance of the tanning industry, which in turn affects the country's foreign exchange earnings.

In spite of the heavy economic losses that the disease is now inflicting and its rapid spread, the presence of a considerable proportion of the rural population that do not use veterinary services provided by the government veterinary clinics is a paradox that requires careful consideration. Apart from the Amhara region, mange is very likely posing severe problems in the neighboring regional states as much of the affected areas border other regions and uncontrolled livestock movement across regional borders is a

common phenomenon. It is therefore recommended that sufficient emphasis be given to conduct an immediate regional control intervention of the disease that should give considerations to:

- The coverage of all the affected areas and population of small ruminants.
- The consideration of other species of animals affected with the disease that may act as possible sources of reinfestation.
- Designing a disease control strategy that will ensure the full participation of the rural affected population.
- The poor economic background of most of the rural peasant population that may prevent them from getting small ruminant stock treated in accordance with professional recommendations.
- The comparative disadvantage that may result as a result of getting a certain segment of the affected small ruminants population not being covered while launching any control program.
- The need of implementing stringent measures to halt uncontrolled livestock movement, which otherwise may enhance a continuous spread of the disease into other areas.
- The need to involve both federal and other regional state agencies in launching similar control interventions, which may assist in the prevention of reintroduction of the disease into the region.

References

- Arlian, L.G., cited by Bronstein S., 1995. *Sarcoptes scabiei* infections of the domestic dog, red fox and pig. Clinical and sero-diagnostic studies. Uppsala, Sweden, PP.22
- Bannersee, S. 1996. Defect in Indian goatskin and *Psorptes* mange. *Environment and ecology*. Vol. 14/1/, PP. 147-149.
- Bayou, K., 1998. Control of sheep and goat skin diseases. In: Ian, B. L., Kassa, B. (Ed.) *Proceedings of an in-service training exercise on hides and skins improvement*. FAO, Addis Ababa, PP. 13-20.
- Blood, D. C., Radostitis, D. M., and Henderson, J.A., 1983. *Veterinary medicine. A textbook of the disease of cattle, sheep, pigs, goats and horses*. Sixth edition. Bailleire Tindall, London, PP. 963-969.
- Bureau of Agriculture for the Amhara National Regional State, 1999. *An over view on the veterinary services delivery activities*. PP.1-23.
- Devendra, C, 1978. In: Williamson, G., and Payne, W.J.A. (Ed.) *An introduction to animal husbandry in the tropics*, 3rd edition.
- Masharet, W.S., Russel, L.K., 1978. Variations among strains of *Psoroptes ovis* (Acarina: psoroptidae) on sheep and cattle. *Ann. Entomol. Soc. Amer.* PP. 64.
- Mekonnen, K., Gizaw, S., Desta, L., 1999. *Yeku integrated watershed development project feasibility study report*. Bahir Dar, PP. 39-46.
- Roberts, I. H., Melengy, W. P., 1971. Variations among strains of *Psoroptes ovis* (Acarina: psoroptidae) on sheep and cattle. *Ann. Entomol. Soc. America*, PP. 64.
- Sherman, M.D., 1998. Diagnosis of major skin disease of sheep and goats. In: Ian, B. L., Kassa, B. (Ed.)

Proceedings of an in-service training exercise on hides and skins improvement. FAO, Addis Ababa, PP.54-56.

Soulsby, E.J.L., 1982. Helminthes, Arthropods and Protozoa of Domesticated Animals. Bailliere Tindall, London, PP. 475-495.

Tanneries Report, 1999. Data obtained from the three regional tanneries (personal communication).

Tilahun, G., 1995. In: Gray, G., Vilenberg, G. (Ed.) Parasitology research in Africa. Bobo Dioulasso, Burkinafaso. PP. 255.

Zelege, T., 1998. History of hides and skins improvement in Ethiopia. In: Ian, B. L., Kassa, B. (Ed.) Proceedings of an in-service training exercise on hides and skins improvement, FAO, Addis Ababa, PP. 8-12.

Citation:

Demissie, A., B. Siraw, K. Teferi, T. Tsertse, G. Mammo, D. Mekonnen and S. Shimelis. 2000. Mange: A disease of growing threat for the production of small ruminants in the Amhara National Regional State. In: R.C. Merkel, G. Abebe and A.L. Goetsch (eds.). The Opportunities and Challenges of Enhancing Goat Production in East Africa. Proceedings of a conference held at Debu University, Awassa, Ethiopia from November 10 to 12, 2000. E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK pp. 80-91.