

## IVERMECTIN TREATMENT OF PSOROPTIC MANGE IN SHEEP<sup>1</sup>

Metin Alabay<sup>2</sup>

Harun Çerçi<sup>3</sup>

Ali Düzgün<sup>4</sup>

### Koyunlarda Psoroptik Uyuzun İvermektin ile Tedavisi

**Özet:** *Avermektinler, Streptomyces avermitilis adlı bir aktinomiset tarafından üretilen makrosiklik laktonlardır. İvermektin (22, 23-dihidroavermektin B<sub>1</sub>), kimyasal olarak modifiye edilmiş bir derivat olup koyunlarda görülen psoroptik uyuzun kontrol ve tedavisinde etkili olmuştur. Doğal olarak Psoroptes ovis ile enfekte 14 Akkaraman koyunu 200 mcg/kg dozda tek bir deri altı ivermektin enjeksiyonu ile tedavi edilmiştir. Hayvanlar, tedaviden önce ve ivermektin inokülasyonundan sonra birer hafta aralarla 4 hafta boyunca klinik olarak izlenmiş ve bu süre içinde de uyuz etkenlerinin bulunup bulunmayışı deri kazımları alınarak belirlenmiştir. İlk alınan deri kazımlarında tüm hayvanlarda hareketli uyuz etkenleri görülmüştür. Koyunlarda tedaviden 3 hafta sonra hiçbir hareketli parazite rastlanmamıştır. Ancak, psoroptik uyuz etkenlerinin tam olarak sağıtımı ivermektin inokülasyonundan sonra 4. haftada görülmüştür.*

**Summary:** *The avermectins are macrocyclic lactones produced by the actinomycete, Streptomyces avermitilis. Ivermectin (22, 23-dihydroavermectin B<sub>1</sub>), a chemically modified derivative, was effective in the treatment and control of psoroptic mange in sheep. Fourteen Akkaraman sheep naturally infected with Psoroptes ovis were treated with a single subcutaneous injection of ivermectin at 200 mcg/kg of body weight. Animals were clinically examined before treatment and then on a weekly basis up to four weeks after ivermectin inoculation. Also, skin scrapings were collected from each sheep at weekly intervals*

1. This study was supported by the Turkish Atomic Energy Authority, Ankara - Turkey.

2. DVM, PhD, Lalahan Nuclear Research Institute of Animal Health, Department of Parasitology, Lalahan-Ankara.

3. BS, Lalahan Nuclear Research Institute of Animal Health, Department of Parasitology, Lalahan-Ankara

4. DVM, Lalahan Nuclear Research Institute of Animal Health, Department of Parasitology, Lalahan - Ankara.

*to determine the presence or absence of the psoroptic mites. All of the sheep showed motile mites on the initial skin scrapings. There was no motile mites in sheep three weeks after treatment. Complete elimination of psoroptic mange mites occurred in the fourth week after inoculation of ivermectin.*

### Introduction

Although the exact figures are not known, psoroptic mange is widespread in Turkey (7). The disease causes severe irritation and restlessness, thus severely hampering productivity of affected animals. Generally, mange treatment is performed by spraying or dipping affected animals with standard acaricides. Although the drugs themselves are effective, treatment often fails owing to the difficulties associated with the dipping or spraying of large numbers of animals especially during the winter season (2).

The second reason being the breeds of sheep have thick, long or curly hair which prevents the sprayed drugs from reaching the infected areas (16). A parenterally administered acaricide would facilitate treatment of infested herds, particularly under the winter conditions.

Ivermectin is a new antiparasitic compound with a broad spectrum of activity. It has been reported to be parenterally effective against a number of gastrointestinal and lungworms (3, 8, 10, 11, 17). The compound also demonstrated the efficacy against a wide range of arthropod parasites (1, 4, 18). The activity of ivermectin against two major mites, *Sarcoptes ovis* and *Psoroptes ovis* was shown by various researchers (1, 9, 13, 16).

The present study was planned to test the efficacy of ivermectin in sheep naturally infected with psoroptic mange in Turkey.

### Materials and Methods

Sixteen Akkaraman sheep naturally infected with psoroptic mange mites were used in this study. Fourteen animals were subcutaneously inoculated with 1 % solution of ivermectin (Ivomec, Topkim-MSD Agvet) at the side of the chest behind the elbow joint at the rate of 200 mcg/kg. Two sheep infected with psoroptic mange were left

untreated as controls. Animals were housed in concrete pens and had hay and water ad libitum, and were offered concentrate twice daily.

Animals were clinically examined before treatment and then on a weekly basis up to four weeks after the ivermectin inoculation. Clinical examination included observation of sheep for restlessness, scratching and other side effects of the drug.

Skin scrapings from the lesions were collected in Petri dishes prior to treatment and weekly thereafter up to the fourth week after treatment. Each sample was gently heated by exposure to a 75 watt lamp for 15 minutes. Then, a piece of scraping from each sample was placed on a microscope slide, mixed with saline and covered with a cover glass. Slides were examined under the microscope with magnifications of 5x and 10x. Negative samples were treated with 10 % KOH solution with shaking until the scabs dissolved. The samples were then centrifuged at 1500 rpm for 5 minutes and the sediments examined. Samples showing no intact parasites were considered to be negative. Identification of parasites was performed according to Mimioglu (14) and Weybridge workers (15).

### Results

Clinical signs were still persistent one week after treatment with ivermectin in sheep affected with psoroptic mange mites. At this time, the number of animals with motile psoroptes mites was reduced from 100 % to 7.1 % and 71.5 % of sheep were positive for immotile mites. Meanwhile, three animals became negative at the end of the 1st week after treatment (Table 1).

Table 1. Parasitological findings of fourteen sheep naturally infected with psoroptic mange before and after treatment with ivermectin.

Weeks after inoculation	Akkaraman Sheep		
	Positive with motile mites	Positive with immotile mites	Negative
Before inoculation	14 (100)	0 (0)	0 (0)
1 st week	1 (7.1)	10 (71.5)	3 (21.4)
2 cd week	1 (7.1)	7 (50.0)	6 (42.9)
3 rd week	0 (0)	3 (21.5)	11 (78.5)
4 th week	0 (0)	0 (0)	14 (100)

Note: Numbers in parantheses are percentages

Clinical improvement was quite apparent in all animals two weeks after the inoculation of ivermectin by which time 7.1 % of infected sheep were positive for motile mites, 50 % were positive for immotile mites and 42.9 % were negative.

In subsequent weeks, there was continuous progress in clinical symptoms and parasitological findings (Fig. 1 and Fig. 2). Three weeks after the treatment, there was no motile mites in sheep but three animals were positive for immotile mites (21.5 %). Complete elimination of psoroptic mange mites occurred in the fourth week after inoculation. Four weeks after treatment the scabs in infected animals either shedded naturally or could easily be removed, leaving healthy skin with growing hair.

### Discussion and Conclusions

In this study, it has been demonstrated that ivermectin is highly effective against psoroptic mange in local breeds of sheep in Turkey.



Figure 1. An Akkaraman sheep showing psoroptic mange lesions before treatment with ivermectin. (Avermektin sağıtımdan önce psoroptik uyuz lezyonları gösteren bir Akkaraman koyun)

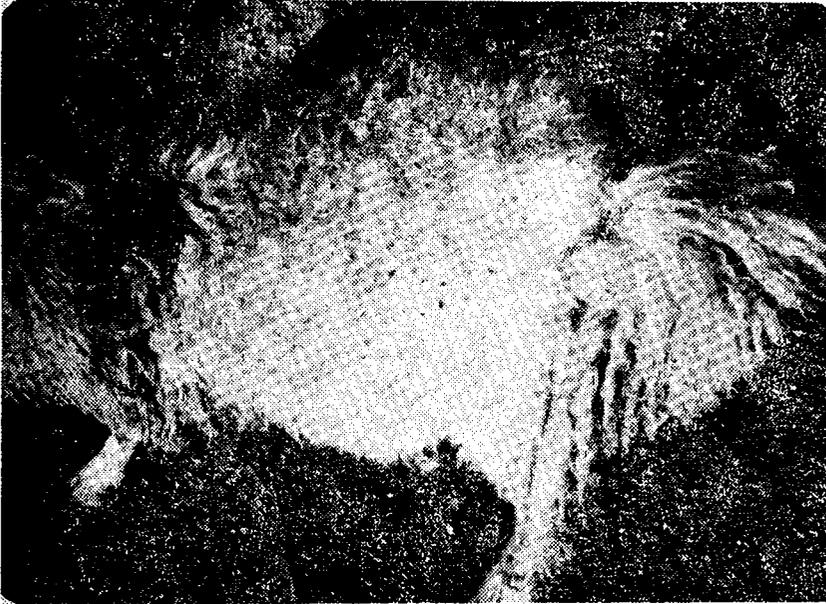


Figure 2. The same animal five weeks after inoculation with ivermectin.  
(Avermektin inokülasyonundan beş hafta sonra aynı hayvan)

Our findings in sheep agree with those reported by several workers in sheep (9, 13, 16, 19) and cattle (1, 2, 5, 6, 10, 12). Using dose regimens of 0.5 or 1 mg / kg, Meloney et al. (13) were able to recover live psoroptes mites in sheep 6 or 30 days after treatment. Kinzer et al. (9) have reported that on the 14th and 35th days after treatment there were no live mites found in the sheep treated with 5 or 1 mg / kg respectively. Wasfi and Hashim (16) and Yeruham et al. (19), using two injections of 200 mcg / kg of ivermectin 7-13 days apart, reported successful treatment of psoroptic mange in sheep. In our study, complete elimination of mange occurred in sheep four weeks after the single subcutaneous inoculation of ivermectin at a dose rate of 200 mcg / kg.

The results showed that live psoroptes mites were recoverable from treated infected animals for at least two weeks after treatment. Therefore, treated animals could still be a source of infection during this period. Similar findings and conclusions have been reported by various workers as well (6, 16, 19).

With this study, it has been shown that ivermectin is highly effective against psoroptic mange mites in local breeds of sheep in Turkey.

An injectable acaricide such as ivermectin would be more appealing to livestock owners in Turkey than the methods of dipping and spraying.

#### References

1. Barth, D. and Sutherland I.H. (1980). *Investigations of the efficacy of ivermectin against ectoparasites in cattle*. Zentbl. Bakt. ParasitKde, 267: 314-320.
2. Barth, D. and Sutherland, I.H. (1983). *Ivermectin: Evaluation in bovine acariases*. Proc. MSD Agvet symp., Perth, Australia, August 25-26, pp. 109-117.
3. Benz, G.W. and Ernst, J.V. (1981). *Anthelmintic efficacy of ivermectin against immature gastrointestinal pulmonary nematodes of calves*. Am. J. vet. Res., 42: 2097-2098.
4. Campbell, W.C. and Leaning, W.H.D. (1983). *Introduction to ivermectin*. Proc. MSD Agvet symp., Perth, Australia, August 25-26, pp. 19-24.
5. Euzebey, J., Bussieras, J. and Hung, N.T. (1981). *Using the avermectin to treat bovine scabies*. Bull. Acad. vet. Fr., 54: 273-278.
6. Guillot, F.S. and Meloney, W.P. (1982). *The infectivity of surviving Psoroptes ovis on cattle treated with ivermectin*. Vet. Parasitol., 10: 73-78.
7. Güler, S. (1986). *Koyunlarda Psoroptes ovis, keçilerde Sarcoptes caprae'den ileri gelen uyuz vakalarında Sebacil'in etkisi üzerinde Türkiye, Elazığ ilinde yapılan çalışmalar*. (Unpublished).
8. Hotson, I.K. (1983). *The development of ivermectin as an antiparasitic agent in sheep*. Proc. MSD Agvet symp., Perth, Australia, August 25-26, pp. 42-48.
9. Kinzer, H.G., Meloney, W.P., Lange, R.E. and Houghton, W.E. (1983). *Preliminary evaluation of ivermectin for control of Psoroptes ovis in dessert bighorn sheep*. J. Wildl. Dis., 19: 52-54.
10. Leaning, W.H.D., Roncalli, R.A. and Brokken, E.S. (1983). *The efficacy and safety evaluation of ivermectin: A new injectable antiparasitic agent for cattle*. Proc. MSD Agvet symp., Perth, Australia, August 25-26, pp. 25-41.
11. Lyons, E.T., Tolliver, S.C., Drudge, J.H. and Labore, D.E. (1981). *Ivermectin: Controlled test of anthelmintic activity in dairy calves with emphasis on Dictyocaulus viviparus*. Am. J. vet. Res., 42: 1225-1227.
12. Meloney, W.P. (1982). *Control of psoroptic scabies on calves with ivermectin*. Am. J. vet. Res., 43: 329-331.
13. Meloney, W.P., Wright, F.C. and Guillot, F.S. (1980). *Identification and control of psoroptic scabies in bighorn sheep (Ovis canadensis mexicana)*. Proc. 84th Ann. Meet. US Anim. Hlth. Assoc., Louisville, Kentucky, pp. 403-407.
14. Mimioglu, M.M. (1959). "*Genel ve özel tıbbi artropodoloji*". Ankara Üniv. Vet. Fak. Yayın. No. 111.

15. **Ministry of Agriculture, fisheries and food, London.** (1979). *Manual of veterinary parasitological laboratory techniques*. Tech. Bull. No. 18.
16. **Wasfi, I.A. and Hashim, N.H.** (1986). *Ivermectin treatment of sarcoptic and psoroptic mange in sheep and goats*. Wld. Anim. Rev., 59: 29-33.
17. **Wescott, R.B. and Leamaster, B.R.** (1982). *Efficacy of ivermectin against naturally acquired and experimentally induced nematode infections in sheep*. Am. J. vet. Res., 43: 531-533.
18. **Wilkins, C.A., Conroy, J., Ho, P. and O'Shanny, W.** (1980). *Efficacy of ivermectin against ticks on cattle*. Proc. 25th Ann. Meet. Am. Assoc. Vet. Parasitol., Washington, July 20-22, p. 18.
19. **Yeruham, I., Rauchbach, K., Landau, M. and Hadani, A.** (1983). *Treatment of psoroptic mange in sheep with ivermectin*. Refuah vet., 39: 120-124.