

CONTROL OF SARCOPTIC MANGE IN SHEEP FARMS

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SUMMARY

Forty four sheep of Egyptian native breed were used to assess the effect of some available acaricides in eradicating sarcoptic mange in naturally infested sheep. Animals were randomly allocated into 4 groups (11 animals each); the first group was treated with doramectin®, the second group was treated with ivomec® pour-on and third group was treated with permethrin®, while fourth group was left as control. Skin scrapings were taken from the affected lesions and counted per field using light microscopy at 0, 7, 14, 21, 28, 35 and 42 days after treatment. The results revealed that doramectin® was 100% effective in eliminating sarcoptic mites from infested animals 14 days after treatment, ivomec® was 92.53% effective, while permethrin® was 74.33% effective after the same period. The mean total RBCs, total & differential WBCs counts, PCV, MCV, Hb levels were significantly lower in infested sheep. At the same time, the biochemical parameters were significantly lower in infested

animals and all the haematological and biochemical parameters were considerably improved after treatment.

INTRODUCTION

Sarcoptic mange is a significant production-limiting skin disease of sheep all over the world (Wilson et al., 1977, Losson et al., 1988, Khalaf-Allah, 1988, Sargison et al., 1995 & El-Sherif and Eissa, 1996).

Infections with the mite *Sarcoptes scabiei* var *ovis* often cause intense pruritis which may lead to decrease in growth rate and reduce the efficiency of food conversion (Elgart, 1990).

Economic losses in the sheep industry due to sarcoptic mange are significant. Such losses are associated not only with the extra costs of feed and the extended time for fattening lambs to reach the market weight, but also with the costs of the often inadequate control measures.

Despite the use of effective acaricides in modern sheep breeding and fattening enterprises, acute sarcoptic mange is common. Inadequate use of acaricides may keep the infestation at low levels within animals, retaining the infestation unnoticed.

Good knowledge of the epizootology of the disease is very important for adoption of effective control programs of the disease. Such programs that aim to decrease the incidence of sarcoptic mange or eradicating the infestation must be based on a correct diagnosis of the disease (Khalaf-Allah, 1988).

Although a range of acaricidal products is available in the market for the treatment of mange, most of them are applied topically by either spraying or dipping that require frequent and careful application. The development of acaricides with new and much easier modes of applications such as injection or pour-on methods has provided a new approach to the control of mange in sheep. Systemic acaricides offer a quicker, safer alternative to dipping, with less stress to sheep, little waste of the chemical and no potential environmental hazards (Bates, 1993).

This paper estimated that the effect of the application of a new formulation of ivermectin (ivomec® pour-on), injectable doramectin® acaricides for control of sarcoptic mange in sheep in farms.

MATERIALS AND METHODS

Animals

Forty four sheep of native breeds were used to

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evaluate the acaricidal efficacy of ivomec® and permethrin acaricides to control sarcoptic mange in naturally infested sheep. All sheep used in this study were infested with variable degrees of infestation levels. Animals were randomly allocated into 4 groups (11 animals each); the first group was treated with doramectin®, the second was treated with ivomec® and the third was treated with permethrin®, while the fourth group was untreated as control. Sheep were sheared before acaricide treatment and wool was disinfested with diazinon 0.1% and burned. The animals were identified individually with ear tags. Routine quarantine procedures for infectious diseases were instituted to minimize the likelihood of cross-infestation between the groups and outside the infested farm to other localities.

Acaricides

Three acaricides were tested against sarcoptic mange in sheep:

- 1- pour-on (ivermectin), Merk Sharp & Dohme, USA. It was applied to animals at a dose of 500 mg / kg body weight along the mid dorsal line of the animal.
- 2- Doramectin, Pfizer, Agricare, Germany. It was applied with a single injection at a dose of 300 g / kg body weight.
- 3- Permethrin % cream, Misr pPharmaceutical Co., Egypt. It was applied as a topical dressing to the affected area of the animal body for seven days.

Parasitological examination

Parasitological examination of infested sheep was carried out following the technique described

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by Scheffer (1995). Skin scrapings were taken from an area of 2 cm² of the affected lesions on day 0 before treatment and days 7, 14, 21, 35 and 42 after treatment. The number of mites was counted in the skin scrapings. The acaricidal efficacy of each acaricide was evaluated by comparing the mean number of mites in the skin scrapings collected from treated and control groups.

Haematological and biochemical analysis

Blood samples were collected from each animal in two tubes, one tube was heparinized and the other was not heparinized. The blood in the heparinized tubes was used for estimation of the total erythrocytes (RBCs), leukocyte counts and packed cell volume (PCV), Hemoglobin (Hb) and the mean corpuscular volume (MCV) following the techniques described by Schalm, (1979). Blood smears were made, stained with Wright-Giemsa stain to record the differential WBCs count. Serum was collected and used to estimate the total protein, albumin, globulin, total lipids, calcium, inorganic phosphorus, magnesium and potassium levels in treated and control groups.

Statistical analysis of the data obtained was performed according to the methods described by Snedecor and Cochran (1967).

Disinfestation of sheep pens :

Sheep pens were disinfested concurrently with

the treatment of infested animals by spraying with diazinon 0.1% (Ciba Giengy, Switzerland) Diazinon was applied by a motor sprayer , taking care that the acaricide solution should reach to every part of sheep pens especially the cracks and crevices of the buildings. Farm implements such as pails, shovels , forks , as well as shearing, dehorning and docking instruments were included in the disinfestation process as these implements can serve as foci aiding in mite transmission and reinfestation to healthy animals

RESULTS AND DISCUSSION

The results recorded in Table (1) show that the lesions in the sheep group treated with doramectin had improved considerably by day 7 and completely by day 14. The mean number of mites present in the skin scrapings was 13.85 on day 0. On day 7, the mean number of mites was 7.20, but no mites were detected in the skin scrapings subsequently. There was a slight variation in the progression of lesions in the control group. On day 0, the mean number of mites present in the skin scrapings in control animals was 14.40, progressed to be 15, 15.55 and 16.65 on days 14, 28 and 42, respectively.

Doramectin® was highly effective in eliminating sarcoptic mange in sheep without any observed reactions . The lesions were completely improved 14 days post-treatment and remained so till 42 days .Doramectin ® also reduced the intensity of the clinical signs associated with the mite hypersensitivity. These findings were

Table (1): Efficacy of doramectin®, ivermectin® pour-on, and permethrin® for control of sarcoptic mange in sheep.

Acaricide	Mean number of mites						
	Day 0	Period after treatment (days)					
		7	14	21	28	35	42
Doramectin®	No.	13.85	7.20	0	0	0	0
	Ef	---	48.01	100	100	100	100
Ivomec®	No.	15.55	7.66	1.12	0	0	0
	Ef	---	44.69	92.53	100	100	100
Permethrin®	No.	15.00	9.55	3.85	1.65	0	0
	Ef	---	31.04	74.33	88.21	100	100
Contrl	No.	14.40	13.85	15.00	14.40	15.5 5	16.1 0

No.: Average number of mites in 2cm² area of skin lesion
 Ef.: Efficacy % of acaricide

consistent with the results of similar studies in which doramectin was reported to be safe and highly effective (Bates et al., 1995, Hendricky et al., 1995, Sheffer, 1995 and Cargill et al., 1996).

The development of the lesions and clinical signs in the naturally infested sheep followed similar pattern to those described by (Chakrabarti and Chaudhury, 1984 & El-Sherif and Eissa, (1996). the progress of the disease in the control sheep was also consistent with the reports reviewed by Jensen and Swift, (1982), Elgart, (1990) and Gabaj et al., (1992).

Treatment of sheep with the new formulation of ivermectin (ivomec® pour-on) proved that the acaricide was effective in elimination of sarcoptic

mites in infested sheep. The lesions considerably resolved by day 7 and completely improved by day 14. Rubbing and scratching signs of affected animals nearly disappeared by day 14 and no mites could be detected in the examined skin scrapings of infested sheep collected on day 21. There was an obvious improvement of the affected areas with reappearance of wool. These results agree with the field studies conducted by (Gill et al., 1989, Manurung et al., 1990, Soil et al., 1992, and El-Sherif and Eissa, 1996). Ivermectin was also highly effective against psoroptic mange in sheep (Soll, 1992 and Umer et al., 1993).

The new formulation of ivermectin (ivomec® pour-on) is considered to be a new effective line

for control of mange as the acaricide has low toxicity problems with minimum residues (Benz et al., 1989 and Hostoson et al., 1989). Its more easily mode of application has added a new advantage to the acaricide which does not require special skills and labour as in case of injections or dipping.

Permethrin® proved to be moderately effective for control of sarcoptic mange in sheep as it eliminated 74.33% of the number of mites detected in skin scrapings on day 28. The mean number of mites on day 0 was 15 and decreased to be 9.55, 3.85 and 1.65 on days 7, 14 and 21, respectively. No mites could be detected in skin scrapings on day 28 that remained so up to 42 days post-treatment. These results were substantiated by those reported by Khalaf-Allah, (1988) and El-Sherif and Eissa, (1996).

The results recorded in Table (2) revealed that there was a significant decrease in the mean total RBCs, PCV, MCV, Hb, total and differential WBCs in infested sheep treated with acaricides. This decrease was highly significant ($P < 0.01$) in sheep treated with doramectin® and ivomec® pour-on, while the decrease was significant ($P < 0.05$) in animals treated with permethrin. These results agreed with those reported by El-Sherif and Eissa (1996) who attributed the drop in RBCs, Hb and PCV to the decrease in iron and copper together with anorexia of affected animals leading to anaemia which is common in severe mange infestation. The significant increase in the total WBCs might be explained by the

inflammatory reactions in affected animals due to pruritis and itching common in mange. El-Gwady et al., (1991) reported a similar results in the haematological picture in buffalo calves affected with mixed sarcoptic and psoroptic mange infestation. They reported that there was a highly significant ($P < 0.01$) decrease in RBCs, Hb and PCV, while there was a highly significant increase in the total WBCs and lymphocytes in affected animals.

The results presented in Table (3) showed that all of the estimated biochemical parameters were significantly lower in sheep infested with sarcoptic mange in comparison to that of clinically normal sheep. This decrease was highly significant ($P < 0.01$) in sheep treated with doramectin® and ivomec® pour-on, while the decrease was significant ($P < 0.05$) in animals treated with permethrin®. There was a significant hypoproteinaemia associated with hypoalbuminaemia as well as hypoglobulinaemia in mangy sheep. These results agreed with those reported by Abdel-Aziz (1979) and El-Sherif & Eissa (1996) who demonstrated that animals affected with mange exhibited a significant decrease in the serum total protein, albumin and globulin levels. At the same time, the levels of calcium, magnesium, inorganic phosphorus and potassium were significantly lower in affected sheep than those in controls. These findings were substantiated by that mentioned by El-Sherif & Eissa. They attributed that decrease to the desquamation of skin epidermis and disposition of these minerals. Continuous irritation induced by

Table (2): Haematological picture of control and sarcoptic mange infested sheep before and after treatment.

Mean blood values (± S. E.)	Control sheep	Infested sheep					
		Before treatment			4 weeks after treatment		
		Doramectin	Ivomec	Permethrin	Doramectin**	Ivomec**	Permethrin*
Total RBCs	8.17±0.16	6.25±0.11	5.84±0.17	6.18±0.22	7.86±0.22	7.99±0.25	7.63±0.17
PCV%	32.49±1.52	25.08±1.19	28.53±1.29	26.18±1.07	31.09±2.15	30.84±1.99	29.87±1.68
MCV	39.67±1.74	6.78±0.15	6.78±0.15	6.54±0.22	5.61±0.30	5.13±0.25	5.30±0.19
Hg%	11.64±0.72	8.76±0.65	8.62±0.58	9.05±0.76	11.18±0.43	11.07±0.68	10.53±0.71
Total WBCs x10 ³	10.47±0.55	11.04±0.49	10.79±0.62	8.19±0.36	8.43±0.51	8.99±0.44	5.30±0.19
Neutrophils x10 ³	2.62±0.06	2.81±0.04	2.78±0.06	2.79±0.07	2.32±0.06	2.28±0.04	2.65±0.07
Eosinophils x10 ³	0.53±0.004	0.68±0.003	0.51±0.004	0.66±0.002	0.41±0.007	0.46±0.005	0.52±0.002
Basophils x10 ³	0.36±0.004	0.59±0.007	0.47±0.006	0.51±0.005	0.33±0.005	0.32±0.004	0.34±0.007
Monocytes x10 ³	0.19±0.002	0.27±0.005	0.31±0.003	0.25±0.008	0.12±0.006	0.14±0.002	0.18±0.004
Lymphocytes x10 ³	5.26±0.15	6.14±0.09	6.78±0.15	6.54±0.22	5.61±0.30	5.13±0.25	5.30±0.19

* : Significant at P < 0.05
 ** : Significant at P < 0.01

Table (3): Biochemical parameters in serum of control and sarcoptic mange infested sheep before and four weeks after treatment.

Mean serum values (\pm S. E.)	Control sheep	Infested sheep					
		Before treatment			4 weeks after treatment		
		Doramectin	Ivomec	Permethrin	Doramectin**	Ivomec**	Permethrin*
Total protein gm%	7.43 \pm 0.12	5.78 \pm 0.17	5.83 \pm 0.14	5.64 \pm 0.27	7.26 \pm 0.22	6.97 \pm 0.13	6.56 \pm 0.29
Albumin gm%	3.67 \pm 0.11	2.46 \pm 0.35	2.53 \pm 0.41	2.61 \pm 0.39	3.47 \pm 0.28	3.23 \pm 0.36	3.06 \pm 0.19
Globulin gm%	3.84 \pm 0.10	2.73 \pm 0.17	2.66 \pm 0.23	2.58 \pm 0.13	3.54 \pm 0.16	3.37 \pm 0.11	3.19 \pm 0.25
Total lipids mg%	236.7 \pm 7.82	187.3 \pm 5.43	172.9 \pm 6.87	165.0 \pm 6.27	225.6 \pm 4.81	216.2 \pm 5.74	211.8 \pm 6.10
Calcium mg%	11.46 \pm 0.32	9.42 \pm 0.41	8.67 \pm 0.35	8.95 \pm 0.50	10.77 \pm 0.34	10.90 \pm 0.43	10.66 \pm 0.32
Inorganic phosphorus mg%	5.67 \pm 0.18	4.07 \pm 0.42	3.98 \pm 0.32	3.62 \pm 0.29	5.13 \pm 0.37	5.35 \pm 0.46	5.01 \pm 0.35
Magnesium mg%	2.97 \pm 0.06	2.13 \pm 0.17	2.36 \pm 0.22	2.08 \pm 0.31	2.71 \pm 0.18	2.59 \pm 0.13	2.60 \pm 0.16
	6.64 \pm 0.15	4.73 \pm 0.62	4.98 \pm 0.36	5.02 \pm 0.59	6.03 \pm 0.48	5.97 \pm 0.64	5.79 \pm 0.51

* : Significant at P < 0.05
 ** : Significant at P < 0.01

the parasite together with loss of appetite of affected animals might be another cause of such drop in serum mineral contents. El-Gwady et al., (1991) demonstrated that the serum total proteins, albumin and calcium levels revealed highly significant ($P < 0.001$) decrease, while globulin, inorganic phosphorus and magnesium slight ($P < 0.05$) significant decrease in buffalo calves suffered from mixed sarcoptic and psoroptic mange. Four weeks after treatment of affected animals, all of these parameters nearly returned to its normal values.

It was concluded from this study that doramectin and ivomec pour - on were highly effective acaricides in controlling sarcoptic mange in infested sheep. Disinfestation of sheep pens concurrently with treatment of infested animals could be effective means to control mange in sheep. In addition, of quarantine measures could minimize transmission of mite infestation to other districts outside the infested area .

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