Original Article

Economic Damage Caused by Scabies Itch Mite, Sarcoptes Scabiei (Acariformes: Sarcoptidae) to the Wool Production of Sheep

Gappar Y. Babonazarov[1], Nafisa R. Omonova[2], Yaqutoy M. Orziyeva[3], Guzal A. Khosilova[4]

[1]Ph.D, Associate Professor, Head of Zoology Department, Karshi State University, Karshi, Uzbekistan.

[2]Lecturer, Department of Zoology, Karshi State University, Karshi, Uzbekistan.

[3]Lecturer, Department of Zoology, Karshi State University, Karshi, Uzbekistan.

[4]Lecturer, Department of Zoology, Karshi State University, Karshi, Uzbekistan.

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Abstract

The article is about ***Sarcoptes scabiei*** or the itch mite is a parasitic mite that burrows into skin and causes scabies, which brings economic damage to wool production of sheep. The causative agent of sarcoptic mange (scabies) in sheep is the itch mite, *Sarcoptes scabiei*. *Sarcoptes scabiei* mites can parasitize humans; this disease is called scabiosis in medicine. In Uzbekistan, itch mite, *S. scabiei* parasitizes karakul sheep, causing a serious disease, characterized by itching. The disease is of a natural focal phenomenon, causing enormous economic damage in animal husbandry.

Keywords: Sarcoptes Scabiei, Ticks, Spread, Diseases, Scabies, Sarcoptic Mange, Scabiosis, Karakul Sheep, Wool Production, Economic Damage, Effective Means of Control, Methods of Control.

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INTRODUCTION

Sarcoptoses in sheep is widespread throughout the world. According to many authors from New Zealand, Great Britain, Switzerland, Italy, the damage of sarcoptoses in animals reaches about 30-35% (Keller et al. 1972). The onset of invasion and subsequent development of the disease are associated with many circumstances: temperature, humidity of the external environment, the general condition of animals, the condition of the skin and hair cover, the conditions for keeping animals, contributing to the activation of the population of claws and the rate of spread of the disease. Usually the itchy scab of domestic animals develops intensively in autumn, winter and early spring, when the humidity of the external environment is increased, favorable conditions are created for the reproduction of ticks.

MATERIALS AND METHODS

Sick animals were identified by the method of clinical examination and examination of scrapings obtained from **Ovis aries (**Karakul sheep). The **Ovis aries (**Karakul sheep) is a multi-purpose breed of domestic sheep originated from Central Asia. According some archaeological evidence, this breed is being raised there continuously since 1400 BC. Scrapings were examined according to the methods of O.D. Priselkova (1949), V.B. Dubinin (1954), and dead ones according to the Weid method (according to S.N. Moskvin 1973) and A.A. Vodyanov's method (1978).

During the research period, more than 300 copies were made of permanent preparations (in the Fora-Berlese reagent), in each preparation from 2 to 12 different individuals of sarcoptes mites.

Economic damage was determined by taking into account the loss of live weight, wool shearing, difference in monthly growth in live weight, and the seasonal weight of wool shearing. In addition, labor and material - monetary costs of treatment and isolation of patients were taken into account. Statistical processing of the data obtained was carried out by the method of V.N. Kvyatkovskaya and L.A. Zamkova (1985). The economic efficiency of combating sarcoptoses in sheep was determined according to the "Methodology for determining the economic efficiency of veterinary measures" (Tishenkova 2005).

RESULTS AND DISCUSSION

V.B. Dubinin associates (1954) the cyclical nature in the development of itch pruritus with the biological rhythm is observed in the skin of animals: a change in the period of relative physiological dormancy of the skin (October- April); and the period of regeneration, revival of all skin tissues (May-September). An increase of itching and an increase in their numbers are observed again in autumn, and finally reaches a maximum in winter (Dubinin 1954).

The damage consists of the loss of all types of productivity, slow growth of young animals, overconsumption of feed, as well as the death of animals. According to the literature, it is known that the invasion causes significant economic damage to livestock. In the United States, losses from *Sarcoptoidea* consists of about 3 billion dollars annually (Tishenkova 2005, Larsen & Storin 1980).

Economic damage can also occur because of a decrease in the quality of the skin due to scratching and damage to it (Kutzer 1969).

According to observations of a number of authors (Dubinin 1954, Priselkov 1943, Klochko 1983, Abu-Samra, Ibrahim & Aziz 1984, Sokolova, Fedorovskaya & Lange 1989, Ilyashenko 1993, Saparova 2002, Frantsuzov 2003), it was established that sarcoptoses in animals proceeds as follows: the mites, penetrating into the thickness of the skin, making moves in it, then laying eggs. Mechanical irritation arising from these activities, as well as the intake of toxic saliva from ticks, cause an allergic reaction of the animal's body. In response to the arrival of allergens in the body of sick animals, antibodies are produced. From the laid eggs (after completing the full development cycle), adults grow, which make new moves, in connection with which the re-introduction of allergens occurs. Because of the interaction of allergens with antibodies, histamine is released, which, by disrupting the permeability of capillaries, promotes the release of plasma into tissues, tissue damage and inflammatory reactions occur. The latter affects the nerve receptors of the skin, resulting in itching and other clinical signs of sarcoptoses.

Sarcoptoid mites most often affect sheep in Uzbekistan.

In order to study infestation of **Ovis aries (**Karakul sheep) (Figure 1) with *Sarcoptes scabiei*, the claws of the parasite embedded within skin scrapings from 8440 heads of sheep were examined for two years of which 1675 were sick, that is about 19.85%. Laboratory studies of scrapings taken from these animals, found ticks in 1582 animals – 94.45%. We should note that permanent preparations were prepared from about two thousand claws.

Figure 1: Ovis Aries

Picture by https://ovcevod.com/porody/karakulskaja-poroda-ovec.html

Observations showed that the disease with sarcoptoids begins in sheep with scratching, then by peeling. Over time, skin moisture increases at the lesion sites and soft crusts appears. After a while, the affected area expands and new foci appear. In the affected areas, the skin thickens, loses its elasticity, baldness appears, covered with dense cortical folds and the skin

cracks. If there is no treatment, then the disease becomes generalized, that the process spreads many places of the skin. Lambs lose weight and disappear in growth and development. In adult animals, the disease is much easier: ticks can be found on certain parts of the head, neck and tail of the body.

Studying the clinical process of sarcoptoses, an asymptomatic, acute and chronic course of invasion was noted. The intensity of invasion was conditionally classified into mild, middle and severe, from the generalized form.

With a mild form of invasion, individual foci are found on the skin, easily detected by the moisture of the wool. With a middle degree, large foci are noted in the region of the muzzle, ears, neck, back and elsewhere. A severe form of sarcoptoses is characterized by the presence of extensive sarcoptoid lesions on the skin, that is, the affected area occupies almost the entire surface of the body. Sick sheep lag behind in growth and development during the period of invasion, lose a significant amount of live weight and cover of wool, and do not develop well.

To study the effect of sarcoptoses on changes in the live weight of animals, special experiments were conducted to determine the productivity. Two groups of six-month-old lambs – sick and healthy lambs were chosen. Each group consisted of 10 lambs. The average weight of one sick lamb was 15.8 kg, and that of a healthy one was 15.6 kg. A group of healthy lambs served as a control. The animals were kept in isolation, under conditions excluding overcharged, the lambs of both groups received the same food. The lambs were weighed monthly and subjected to clinical examination in the laboratory. Animal observations were discontinued at the end of the sixth month.

During the experiment, the sick lambs were underweight in comparison with the control lambs, the former weighing an average of 5 kg in live weight, that is, the sick lambs weighed only 15.3% of that of the control for the entire experimental period of six months. If the current market - purchase price of 1 kg for the live weight of sheep is US$ 1.5, then the damage from the loss of not collected live weight from one head is US$ 6 in monetary terms.

To study the influence of sarcoptoses to sheep wool production, at the beginning of March 2006, we selected two groups of one-year-old sheep. One group was healthy, the second was sick. There were 10 sheeps in each group; the amount of wool they produced was measured for two months. A group of healthy animals served as a control. The conditions of keeping and feeding in both groups were the same. At the end of April 2006, the wool of the experimental and control groups of sheep was sheared. The amount of wool sheared in a group of sick sheep is 9.0 kg (on average 0.9), in healthy ones – 11.5 kg (on average, 1.15) (see Table 1).

Table 1. Influence of sarcoptoses on wool production of Ovis aries (Karakul sheep)

	Number of sheep											
	1	2	3	4	5	6	7	8	9	10	Total	Average
Weight of clipped wool in sick sheep, kg	0,85	0,95	0,94	0,86	0,78	0,92	0,88	1,02	0,97	0,83	9.0	0,900
Weight of clipped wool in healthy sheep, kg	1,2	1,1	1,0	1,05	1,3	1,05	1,3	1,05	1,25	1,2	11,5	1,150

The difference in weight of clipped wool for the spring season between sick and healthy sheep averaged 0.250 kg. If the purchase price of 1 kg of wool is US $1, then the damage from the loss in the shearing of wool from one sheep is US$ 2,5 cents in monetary terms.

In the experiments, the total economic damage caused by *Sarcoptes scabiei* on wool productivity of **Ovis aries (**Karakul sheep), resulted in the loss of live weight and shearing of wool which translated in monetary terms to US$ 6.2 per sheep within one year.

CONCLUSION

The results of studying the sarcoptoses and influence of invasion to weight gain, shearing of the wool of karakul sheep showed that the disease causes great economic damage. Scientists are faced with the task of developing effective means and methods of combating this disease – based on an integrated system of measures, which includes agro-technical, veterinary, and sanitary with the use of modern acaricides of chemical and biological origin.

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