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INVESTIGATION OF SPECIES DIVERSITY OF TICKS PREVALENCE AMONG SHEEP IN SISTAN COUNTY, IRAN

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ABSTRACT

Sheep breeding is of high economic importance in Iran because of the existence of millions of sheep and goats. Ticks are one of the most important pests in livestock industry and can transmit different diseases. Therefore, detecting the diseases of livestock population, being aware of its prevalence rate and prevention and treatment methods are crucial. In this study we have collected samples of 400 sheep in Sistan (Zabol, Zahak, Hamoun, Hirmand and Nimrouz) County herds. 20 sheep were randomly selected and sampled from 20 herds. The outer surface of the animals was examined after they were bound up. Parasites were collected and transported to laboratory. The results showed that tick infestation was found in 23% of the sheep in Sistan County. The infestation rate among adult and young ruminants was 68.75% and 31.25%, respectively. They were physically in good condition (53.65% weak), (32.94% average), (13.41% good) and the infestation was observed in animals with bad physical condition. The most seasonal infestations were observed in summer, which from a statistical point of view was significantly different ($p < 0.05$) from those of other seasons. Infestation was reported to be 48.74% in males and 51.26% in females. Statistically there was no significant difference ($p > 0.05$) between males and females. The results of the current research present *Rhipicephalus*, *Buphilus* and *Hyalomma* diversities of tick population infesting sheep as follows: *Rhipicephalus* species include 34.8% *Rhipicephalus Sanguineus*, 2.17% *Rhipicephalus Bursa* and 45.65% *Rhipicephalus Turanicus*, 4.3% *Hyalomma Anatolicum* and 13.04% *Buphilus Anulatus*.

Keywords: Tick, Ectoparasite, Sheep, Sistan

INTRODUCTION

Ticks are medically and veterinarily important and can transmit dangerous human and animal diseases. By conducting research on different ticks, their epidemiological aspects will be detected and the importance and position of struggling and controlling ticks in different regions will become apparent. By being aware of transporter tick distribution and their position and presence in each region, the epidemiological status of the tick-borne disease can be evaluated. Since different tick species can transmit diseases, recognizing them in each region and being aware of their frequency and distribution is very effective in controlling diseases. On the other hand, according to the fact that today numerous studies focus on anti-tick vaccines, recognition of tick species in each region is also important from that point of view. Tick infestation on ruminants is one the important reasons of the reduction of their production. Ectoparasites (arthropods) such as ticks, mites, lice, etc. transmit pathogens to different livestock. Many parasitic protozoa such as different species of *Babesia* and *Theileria* are transmitted via ticks. Parasitic diseases (blood protozoa) are the most important diseases in tropical climates, which cause economic losses in small ruminants (sheep and goats) each year, such as: death, weakened immune system, growth retardation and reduction in livestock production. Blood-sucking Ectoparasites cause anemia in animals and lead to stress. Livestock with ectoparasites do not grow up properly and a reduction in their production is also observed. Since sheep farming is mostly done using traditional methods and also because of the problems regarding the use of vaccines (the necessity to keep vaccines at 70 degree centigrade), absence of non-tick bathrooms and wrong and untimely use of acaricide treatments, as well as the high price of medicines against blood protozoan diseases (*Theilerius*, *Babzius*, *Anaplasma*), these

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diseases are still considered as one of the main problems of sheep farming in endemic areas of Iran. In the present research, Sistan sheep were examined for ectoparasites. Ectoparasites' genera and species were determined so that by detecting different kinds of parasites, appropriate solutions will be devised to control and prevent them and increase livestock health level.

MATERIALS AND METHODS

This study was a cross sectional one conducted by visiting yard stocks in Sistan in 2013. 400 sheep were randomly selected from 20 different yard stocks (from 5 different regions in Sistan). 20 sheep were selected and sampled from each yard stock. In order to start sampling, first the sheep was caught, then the whole body of the animal was examined and all ticks were collected, and then the number of the ticks was written down. In order to separate ticks, first the alcohol-soaked cotton was put on the tick and kept there for a few seconds, and then it was detached from the skin by a pincers in the direction it had attached to skin. In sample containers, a mixture of one proportion of glycerin and nine proportions of alcohol was added to the ticks collected so as to prevent samples from probable dryness and breaking. When ectoparasites were collected, they were transported to the laboratory of parasitology. The ticks were placed in a Petri Dish when they were taken out of the sample container. Then the alcohol was dried using filter papers. When they are clarified with 10% KOH, the ticks are examined under loop. Then slides are provided from samples and their genera and species is determined using optical microscope and diagnosis key (Wall and Shearer, 2001). Also the infestation rate and its relationship with age, genera and body condition were investigated and the results were studied statistically.

Gatenby method was used to determine the age of the livestock, such that 6 month old livestock or the younger ones were considered young and those older than 6 months were considered adult ones. Their body condition was divided into three levels of weak, average and good, and then they were investigated.

Weak: Their body cover was inappropriate, covered with unordered, tumultuous and unvarnished wool and they were emaciated and lethargic (less than 40 kg).

Average: They had more ordered, clear and varnished body cover compared to the weak and their weight was more (between 40-50 kg).

Good: They had completely appropriate body covers with ordered, smooth and shinny wools and their weight was good (more than 50 kg).

Chi-square test was used to compare infestation prevalence in different seasons and infestation rate in different parts of body.

RESULTS AND DISCUSSION

Results

In this study 92 ticks were detected and collected from all the sheep during a year. Tick diversity includes: 34.8% *Rhipicephalus Sanguineus*, 2.7% *Rhipicephalus Bursa*, 45.65% *Rhipicephalus Turanicus*, 4.34% *Hyalomma Anatolicum* and 13.04% *Buphilus Analatus*. The livestock in this study includes 195 males and 205 females. It was observed that 35 males (38%) and 57 females (62%) were infested. Statistical studies showed that there is no significant relationship between their genera and the infestation rate ($p>0.05$). Body condition in ruminants was divided into three groups of weak, average and good. In the present study 49 sheep (53.26%) out of 215 weak sheep, 26 sheep (28.94%) out of 131 average sheep and 17 sheep (10.53%) out of 54 good sheep were infested. As can be seen the infestation is higher among weak sheep ($p<0.05$). Statistical studies showed that there is a significant relationship between body condition and infestation rate ($p<0.05$). Regarding the statistical studies we concluded that there is no significant relationship between genera and infestation rate but there is a significant relationship between age and body condition and infestation. The highest (45.65%) and lowest (2.7%) rates of infestation frequency are related to *Rhipicephalus Turanicus* and *Rhipicephalus Bursa*, respectively. From among the sampled sheep, 275 sheep were adult and 125 sheep were young. Infestation rate among them were 70 (76.32%) for adult and 22 (23.68%) for young sheep. Statistical studies have shown that there is

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a significant relationship between the age of the sheep and infestation rate ($p < 0.05$). From the viewpoint of seasonal infestation prevalence, out of the whole 19 ticks found in spring, 10 (52.63%) ticks were *Rhipicephalus Sanguineus*, 7 (36.84%) were *Rhipicephalus Turanicus*, 1 (5.26%) was *Rhipicephalus Bursa* and 1 (5.26%) was *Buphilus Anulatus* (diagram 1). Out of the whole 40 ticks found in summer, 23 (57.50%) ticks were *Cephalus Turanicus*, 7 (17.5%) were *Rhipicephalus Sanguineus*, 2 (5%) were *Hyalomma Anatolicum* and 1 (2.5%) was *Rhipicephalus Bursa* (diagram 2). Out of the whole 25 ticks found in autumn, 11 (44%) ticks were *Rhipicephalus Turanicus*, 9 (36%) were *Rhipicephalus Sanguineus*, 3 (12%) were *Buphilus Analatus* and 2 (8%) were *Hyalomma Anatolicum* (diagram 3). Out of the whole 8 ticks found in winter, 6 (75%) ticks were *Rhipicephalus Sanguineus*, 1 (12.5%) was *Rhipicephalus Turanicus* and 1 (12.5%) was *Buphilus Analatus* (diagram 4).

Discussion

According to the results of the study, 23% of the sheep in Sistan County are infested by ticks. The species diversity of ticks found include: *Rhipicephalus turanicus*, *Rhipicephalus sanguineus*, *Rhipicephalus bursa*, *Buphilus analatus* and *Hyalomma anatolicum*. From among the total number of sampled ticks, *Rhipicephalus turanicus* and *Rhipicephalus bursa* had the most and the least infestation rate, respectively. According to the results of a study that Mazlum *et al.*, (1971) conducted, *Hyalomma anatolicum*, *Rhipicephalus bursa* and *Rhipicephalus sanguineus* were found to be the most prevalent species of ticks in Iran, which had spread throughout the country. Sohrabi *et al.*, (2013) conducted a research to investigate the identification of species diversity of hard ticks on domestic ruminant habitats of Kermanshah, Iran. Their sampling was conducted on a total number of 203 cattle, 215 sheep and 182 goats from 150 herds of 31 villages in Kermanshah County. Sampling was done randomly from different parts of the animal body in the season of hard ticks' activity from May to August. The results showed that the frequency of Ixodid tick infestation on cattle, sheep and goats were 63.24%, 25.12% and 25.27, respectively. Maximum infestation was recorded for 3-4 years old female cattle and 1-2 years old female goats. Out of 1031 hard ticks collected in this study, 3 genera were identified including *Hyalomma*, *Rhipicephalus* and *Buphilus*. The dominant species were found in *Rhipicephalus turanicus* sheep (53.1%) and goats (40.55%). The results are consistent with the results of the current research. Rokni *et al.*, (2013) research showed that 19% of Garmsar sheep were infested. Infestation rate was 44.74% in males and 55.26% in females and statistically there was no significant difference between male and female sheep. *Rhipicephalus* genera such as *Rhipicephalus turanicus*, *Rhipicephalus sanguineus*, *Rhipicephalus bursa*, *Buphilus analatus*, *Buphilus micropolus* and *Hyalomma anatolicum* were identified, which were consistent with results of this study. Moradi *et al.*, (2009) conducted a research in Hamadan titled "*Investigation of Tick Infestation Rate of Sheep and Their Distribution in Bahar County, Hamadan Province*". It showed that 9.37% of the sheep were infested by ticks and the maximum infestation rate was observed in spring. The genera and species of the ticks were *Rhipicephalus*, *Hyalomma*, *Hemaphysalis* and *Orni todorus*. The maximum rate of infestation was reported in *Rhipicephalus bursa* (33.9%) followed by *Cephalus turanicus* (23%). The maximum rate of infestation in Hashem Zadeh Farhang's investigation (2008) was 28.5% related to *Hyalomma anatolicum anatolicum* tick. In the investigation of species diversity of ticks in Garmsar County which was conducted by Bahadori *et al.*, (2003), the dominant tick of Garmsar region of Iran was *Rhipicephalus* with 71.93% of infestation, which was consistent with the results of the current research. *Rhipicephalus bursa* and *Rhipicephalus sanguineus* are two very important ticks in Iran and they play a crucial role in transferring pathogens between sheep. *Babesia canis*, *Babesia equi*, *Babesia cabali*, *Theileria oweis*, *Anaplasma marginale* and *Rickettsia evina* are some of the important diseases that these ticks transmit. Abbuna *et al.*, (2012) conducted a similar study in Ethiopia in which tick infestation was significant. The ticks under investigation were mainly *Buphilus*, *Amblioma* and *Rhipicephalus*. Tick infestation of sheep in this study was estimated to be 89.9%. Bayisa *et al.*, (2013) conducted another research on prevalence rate of ectoparasites infestation in Ambo, Ethiopia which showed that lice infestation rate in this region is higher than other ectoparasites and they infested 24% of the sheep. *Damalina ovis* was observed in 18% of the sheep, 5.8% of which were infested by blood-sucking

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Linognathus lice. 4.7% of the sheep were observed to be infested by both lice. The maximum and minimum infestation rates of the sheep based on seasonal prevalence infestation in this study were observed in summer, autumn, spring and winter, respectively.

In the study that Razmi *et al.*, (2003) conducted in Khorasan-Iran, the highest rate of seasonal prevalence of tick infestation was reported in summer (July) and the lowest rate was observed in autumn (October). In the study that Nouri *et al.*, (2011) conducted in Tabriz-Iran, the highest rate of seasonal prevalence of ticks was observed in summer and the lowest rate was reported in autumn.

Also in the investigation conducted by Bayisa *et al.*, (2013) it was determined that 19.1% of sheep are tick infested and the tick genera included: Ambliuma, Hyalomma and Rhipicephalus. The tick infestation rate was consistent with the current research. In the study Kebede conducted in Ethiopia in 2013, it was shown that infestation of small ruminants with ectoparasites is one of the most important problems and that it can influence them in different ages.

According to the facts stated so far and according to the ectoparasites infestation rate in Sistan County, which was 23%, it is identified that more accurate and regular measures should be taken to control infestation with ectoparasites. Tick infestation among sheep in Sistan County was not very strong in terms of number. However, in terms of species diversity of ticks it was found that the species were very important in transferring diseases and that they needed to be controlled strictly.

REFERENCES

- Abunnu FF, Tura J and Regassa A (2012).** Status of Tick Ingestion in Small Ruminants of Bedelle District, Oromia Region, Ethiopia, *Global Veterinaria Journal* **8**(5) 459-462.
- Alani AJ and Konrad JH (1987).** Serodiagnosis of Babesia mutasi (wales), Theileria recondite (wales) & cytoecetes phagocytophila infection in sheep. *Research in Veterinary Science Journal* **43**(1) 104-108.
- Anwarim MH (1974).** Geographical distribution of blood protozoan parasites of ruminant in Iran. *Bulletin - International Office of Epizootics* **81**(9-10) 793-799.
- Baudet MH (1995).** Piroplasmosis in France. *Production Laitière Moderne* **243**(1) 42-45.
- Bayisa T, Ibrahim N and Dargie M (2013).** Prevalence of Ovine Ectoparasites in and Around Ambo Town, Ethiopia, *Middle- East Journal of Scientific Research* **16**(1) 62-67.
- Bose R and Peyman B (1994).** Diagnosis of Babesia cabali infection in horses by enzyme linked immunosorbant assay (ELISA) and western blot. *International Journal for Parasitology* **24**(3) 7-346.
- Delpy RLP (1936).** Agentsen Iran dansle sang des animaux domestiques. *Bulletin de la Société de Pathologie Exotique* **29** 157-161.
- Fekadu A, Hailu T and Yacob AH (2013).** Ectoparasites of small Ruminants in Three Agro-Ecological Districts of Southern Ethiopia, *African Journal of Basic & Applied Sciences* **5**(1) 47-54.
- Gnad DP and Mock DE (2001).** Ectoparasite control in small Ruminants.
- Hashem Zadeh Farhang H (2008).** A Survey of Different Species of Hard Ticks in Mohabad. M.S Thesis 690.
- Hawa NT, Latif BMA and Ali SR (1981).** Immunization of sheeo aganst theileria hirci infection with schizonts propagated in tissue culture. *Veterinary Parasitology Journal* **9** 91-97.
- Hildebrant PK (1981).** The organand vascular pathology of Babesiaiosis. *Veterinary Pharmacology and Veterinary Parasitology* 453-473.
- Kebede MC (2013).** Effect of Small Ruminant Ectoparasites in the Tanning Industry in Ethiopia: a Review, *Journal of Animal Science Advances* **3**(9) 424-430.
- Mazlum Z (1971).** Ticks of Domestic Animals in Iran: Geographical Distribution, Host Relation and Seasonal Activity. *Journal of Veterinary, Faculty of University of Tehran, Iran* **27**(1) 1-31.
- Moradi A and Telmadarraiy Z (2009).** Investigation of tick infestation rate of sheep and their distribution in bahar county. *Animal Sciences Journal of Pajouhesh and Sazandegi* **83** 28-45.

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Nouri M and Hashem Zadeh Farhang H (2011). Investigation of Species Diversity and Seasonal Changes of Hard Ticks on Sheep in Tabriz. *Journal of Veterinary*, Faculty of Islamic Azad University of Tabriz **5**(3) 1273-1279.

Rafiei A and Rak H (1978). *Arthropod Parasitology* (Tehran University Publication) (30-90) 121-152.

Ranjbar-Bahadori SH (2003). Study of Species Diversity of Animal Ticks in Garmsar. *Journal of Veterinary*, Faculty of University of Tehran, Iran **58**(1) 11-14.

Ranjbar-Bahadori SH, Pirali KH and Shemshadi B (2009). Arthropods and Diseases Produced by Them. Garmsar 60-80.

Razmi GR (2003). Identification of ovine Theileriosis in an endemic region of Iran. *Veterinary Parasitology Journal* **116** 1-6

Rokni A, Shemshadi B and Ranjbar-Bahadori SH (2013). Investigation of Prevalence and Determination of Genera and Species of Ectoparasites in Sheep in Garmsar County. M.S Thesis 1080.

Shaddel F (1998). *Veterinary Parasitology* (Shiraz University Press) Shiraz 473-490.

Shibeshi B, Bagale B and Chanie M (2013). Ectoparasite of small Ruminant in Guto-Gida District, East wollega, Wellega, Western Ethiopia, *Acta Parasitologica* **4**(3) 86-91.

Shojaei M, Changizi A and LotfollahZadeh S (1999). Investigation of Sheep, Goats, Cattle, Lice and Tick Infestation around Ahwaz in Cold Season. The Eleventh Congress of Veterinary, Tehran, Iran.

Wall R Shearer (2001). Veterinary ecto parasite; Biology, Pathology and control.