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THE RELEVANCE OF PARASITIC DISEASES OF ANIMALS IN TURKEY

Nevzat Güralp[1]

Türkiye'de hayvanlarda paraziter hastalıklar problemi

Özet: *Yurdumuzda protozoa, helmint ve artropodaların oluşturduğu paraziter hastalıkların geniş bir yayılış alanı vardır.*

Protozoer hastalıkları arasında coccidiosis, babesiosis ve özellikle yurdumuz sığırlarında çok görülen ve tüm araştırma ve deneylere rağmen henüz kesin ve etkili bir sağıtma olanağı bulunamayan theileriosis etkenleri ile sarcosporidiosis ve toxoplasmosis en önemli grubu oluşturmaktadırlar.

Helmintlerden trematodların meydana getirdiği hastalıklar arasında Fasciola hepatica ve F. gigantica'nın oluşturduğu fasciolose; dicrocoeliose ile paramphistomiasis, cestodların neden olduğu ve halk sağlığı ile ekonomik açıdan birinci derecede önemli olan şerit invazyonları ve özellikle echinococcose, nematod hastalıklarından koyun ve keçi metastrongylose'u, trichostrongylose ve tüm evcil hayvanların değişik askarit enfeksiyonları, yurdumuz hayvancılık ekonomisine önemli ölçüde zararlara neden olmaktadırlar.

Artropodalardan meydana gelen paraziter hastalıklar arasında keçi ve özellikle sığır hypodermosisi, kene enfeksiyonları, uyuz etkenleri, bitler ve kan emici sinekler, yurdumuz hayvancılık endüstrisinde önemli sorunların başlıcalarını oluşturmaktadırlar.

Bu yayında, yukarıda adı geçen paraziter hastalıkların etkenleri, bunların ekolojileri ile arakonakcıları ve bu hastalıklardan korunma ile sağıtım olanakları üzerinde durulmuş, hayvancılığımızın kuşkusuz en önemli varlığını oluşturan gevişenlerin paraziter hastalıklarına özel bir yer verilmiştir.

Summary: *Parasitic diseases of animals have a wide range of distribution in Turkey. A detailed information of the parasitic invasions and currently*

1 Prof. Dr., Department of Parasitology, Veterinary Faculty, Ankara, Turkey.

applied both preventive and therapeutic measures against the common parasitic diseases, particularly those of in livestock are presented in this article.

Turkey has a vast potential for livestock production. According to the latest statistics, the total number of livestock is around 80 million. When poultry is included this number reaches to 130 million.

Despite of high number of animals in this country, production per animal is not satisfactory. A number of factors do affect the low level of production. One of the main factors is genetic inferiority of the animals. However various parasitic and infectious diseases also play a major role in this respect.

To clarify the general distribution of the parasitic diseases, they may be classified under three headings as protozoan, helminthic infections and arthropod infestations.

The most common pathogenic protozoan diseases in Turkey are coccidiosis, piroplasmosis, theileriosis, and toxoplasmosis. Coccidiosis is widespread particularly in younger animals.

The most prevalent and pathogenic Eimeria species in chickens are E. tenella, E. necatrix and. E. acervulina.

For the treatment of chicken and Turkey coccidiosis in Turkey, liquid amprol as Amprolsol, sulfadimethoxine as Agribon, a sulfa and tetracycline combination under trade name Tetramezathine; and sulfaquinoxaline as Coxidin are main drugs available in the market.

For the prevention of chicken coccidiosis, Amprol-plus, Arpocox, Avatec, Coxistac and Elancoban are commercially available coccidiostatic compounds for prolonged or continuous use as premix.

In Angora goat kids *E. arloingi*, *E. christenseni*, and *E. ninakohlyakimovae*, and in sheep *E. ovina*, *E. ahsata* and *E. ninakohlyakimovae* are the most prevalent and pathogenic Eimeria species. In calves *E. bovis* and *E. zürnii* are more prevalent and destructive species. Against ruminant coccidiosis Amprolsol, Agribon, sulphamezathine and sulfaquinoxaline are the main coccidiostatis drugs.

Babesia ovis and *Piroplasma ovis* are more prevalent and destructive species in sheep and goats, whereas in cattle *B. bigemina* and *B. bovis* and in horses *B. caballi* and *Nuttalia* (Babesia) *equi* are the most pathogenic species.

Against piroplasmosis in sheep, cattle and horse the most commonly used drugs are Acaprin and Berenil (22).

In this country, *Boophilus calcaratus* and *B. annulatus* are two main vectors of cattle babesiosis, whereas *Rhipicephalus bursa is* the vector of sheep babesiosis. In horses, *Dermacentor reticulatus (marginatus)* is the vector of *P. caballi*, and *Babesia equi* and *Rhipicephalus sanguineus* is the carrier of *Babesia canis* in dogs (20, 21, 24).

Concerning tropical theileriosis, *Theileria annulata* is the main pathogenic theileria species in cattle in this country. The principal vectors of *T. annulata* are *Hyalomma excavatum* and / or *H. detritum*. Berenil, Babenil, Acaprin and tetracycline are four common drugs in use against tropical theileriosis without any definite effect (23). Recently Halofuginone was tested on naturally infected Brown Swiss and Friesian cattle with somewhat satisfactory results. When the drug is used at the dose level of 2 mg. / kg. orally as early as 1–13 days after the first appearance of fever, all animals were recovered. Whereas by using the same drug in cross breed of Brown Swiss and native cattle 14–16 days after the first appearance of the fever, 20 % of the animals died from the infection. According to the records, the mortality rate of 2084 T. annulata infected cattle was as high as 53 % (6).

Recently a tissue culture vaccine which is prepared with attenuated schizonts is available in Turkey and has been used in small experimental areas with satisfactory results.

Sarcosporidiosis is widespread in goats, sheep and cattle. According to a survey study, the distribution rate of *S. capracanis* microscopic cysts in goats is % 100, while macroscopic forms are found around 8 % in the same species of animals. Mortality rate due to *S. capracanis* infections in experimentally infected goats was found as high as 80 %.

By Sabin-Feldmann-Tests the distribution rate of toxoplasmosis in cattle, sheep and goats was found to be around 31 % (1).

Concerning the distribution of helminth parasites of animals in Turkey, liver trematodes represent an economically important group of parasites, (9, 10, 11, 18).

According to an investigation made in 1960, 65 % and 81 % respectively of the cattle and sheep slaughtered in the Ankara abattoir were found to harbour Fasciola hepatica and / or Dicrocoelium dent-

riticum. Hence approximately 25 % of bovine and 27 % of ovine livers had to be condemned by veterinary inspectors. In 99 % of the cases, both species of parasites were present. The current situation is virtually unchanged (25).

In addition to the common liver fluke and lancet fluke, the prevalence of *Fasciola gigantica* has been reported regularly from many areas in Turkey, particularly from the western and southern parts of the country. The villages around Lake Apolyont at Marmara sea region in Turkey, and many districts belonging to Adana, Mersin and Antakya provinces of southern parts of the country are considered the infected areas.

A fourth fluke species, *Fascioloides magna* believed to be of American origin is known to be present in Europe and is suspected of spreading into Turkey (11, 16).

Although *F. hepatica* and *D. dendriticum* are more widely distributed than *F. gigantica* in this country, local veterinarians and livestock owners claim that the latter parasite is considerably more destructive than the other species and that the frequency of fascioliasis caused by the giant liver fluke is gaining importance. Severe outbreaks of the latter have been encountered frequently. In one case a mix flock containing sheep and goats, 85 % of the animals died from giant fluke infection during the period of four months (3, 16).

The intermediate host of *F. hepatica* in this country is *Lymnea truncatula*. This snail was found to be widespread on the Anatolian Plateau. In all instances these snails were found either in shallow, clear, still or slow-moving waters that contained vegetation, or near such water on every moist soil.

Four species of the snail genus Lymnea were collected in Turkey. Among these snails only *Lymnea auricularia* has been found to be the only suitable intermediate host for *F. gigantica*.

This snail was found in clear water lakes containing much vegetation, in permanent running water, in rice irrigation ditches, in ponds with mud bottom and in small, clear, sluggish, shallow streams (9, 10, 11).

Concerning the treatment of Fasciola infections in Turkey, the widely used drugs have been niclofolan, oxyclozanide and rafoxanide

under trade names Bilevon-M (R), Zanil/or Nilzan and Ranide respectively. Recently diamphenetide, under trade name Fascol, and albendazole under trade name Valbazen entered local veterinary drug market.

Against *D. dendriticum* infections, Hetolin was the most popular drug in this country. Lately in some areas Thiabendazole was used against lancet fluke infections in higher doses. Recently the trend in use of Valbazen is rising. (16).

Despite of outbreaks of paramphistomiasis among ruminants in Turkey are not common, and serious disease signs and losses due to these parasites were not recorded, some slaughterhouse examinations which were conducted recently, revealed that the distribution of rumen flukes in the ruminants were at a rate that one should not overlook. For instance, in some parts of this country the prevalence of *P. cervi* in sheep is 58–100 %. Recently *P. ichikawai* and *Calicophoron daubneyi* also were found in Anatolian sheep, (2, 18).

The distribution of *P. cervi and C. daubneyi* in cattle and water buffaloes are up to 44 % and 67 % respectively, while, 11 % of Angora goats were found infected with *P. clavula* (16).

According to a recent investigation carried out in an area around Eskishehir, the intermediate host of *P. cervi* is found to be a fresh water snail, *Planorbis planorbis*. This snail was found naturally infected in pastures between April and November with a maximum infection (2 %) in October. Infection rate of *P. planorbis* which were infected with 5, 10 and 15 *P. cervi* miracidia was found to be 37, 53 and 58 % respectively.

The infected snails continued to shed cercariae in the laboratory more than 13 months and some snails were found free from the infection after 11 months (2).

The use of niclosamide has been recommended against the more pathogenic phase- the immature forms- of rumen flukes which is available in Turkish veterinary drug market under trade names of Mansonil and Sheridif at the dose level of 50 mg./kg (16).

Beside liver and rumen flukes, a blood fluke, *Orientobilharzia turkestanicum* has been recorded recently in sheep in Turkey with a distribution rate of 22 % .A total of 29 parasites were collected from portal and mesenteric veins of these animals (17).

Adult tapeworms of sheep and goats belonging to the family of Anoplocephalidae are widespracad specially in young animals in this country. According to our investigation conducted in 1971 in Central Anatolia, the distribution rate of these parasites in 2.5 – 3 months old lambs was found nearly 100 %. 92 % of these animals were found carrying *Moniezia expansa* and 8 % *M. benedeni*. In an another survey 50 % of Angora goats were found carrying *M. expansa*, *M. benedeni* and *Avitellina centripunctata*. Niclosamide at 75 mg./ kg., bunamidine hydroxynaphthoate at 50 mg./ kg. and resorantel at 100 mg./ kg. were found 100 % effective against sheep tapeworms. At present, albendazole, another effective drug against these parasites at 7.5 mg./ kg. is in the market under trade name Valbazen (12, 13, 14, 16).

The distribution of dog tapeworms varies according to the different localities in this country. According to an investigation conducted recently on 50 stray dogs in Ankara city, 98 % of them were found infected with different helminth parasites. 16 % of these animals were carrying trematodes, 76 % nematodes and 86 % tapeworms. (5).

Dipylidium caninum was the most prevalent Cestode in tapeworm infected dogs with a 50 % distribution rate, while *Toxascaris leonina* was found the most prevalent in nematode infected dogs with a rate of 62 %, and as trematode *Echinochasmus perfoliatus* with 12 % distribution rate. In the eastern part of Turkey, the distribution of helminths in rural dogs was found to be 95 %. In these animals *D. caninum* was again the most prevalent tapeworm and *T. leonina* the most widely distributed nematode (5. 15).

Cats are more popular pet animal than dogs in Turkey. Concerning their helminth parasites, 86 % of Ankara cats were found infected with different helminths. 62 % and 66 % of these animals were found carrying nematodes and cestodes respectively. With 47 % *D. caninum*, and with 46 % *Toxocara mystax* were the most prevalent helminth species in cats in Ankara, (16) while in Elazığ city, 89 % of the stray cats were found infected with different parasites (4). The most widely used drugs against dog tapeworms in this country are arecoline hydrobromide, arecoline acetarsol (Under trade name Nemural), and for both dog and cat tapeworms niclosamide.

Against of dog and cat roundworm infections, piperazine compounds as P. citrate; and P. hexahydrate under trade names of Anthel-

min; and Piperoxin sol. or Piperan respectively are the most common drugs used by veterinarians (16).

Unfortunately Turkey is one of the heavily infected country with *Echinococcus granulosus* in the Near East and Mediterranean areas. Ac cording to a recent publication, 44 % of stray dogs in Ankara were found infected with this tapeworm. In one animal, around 100.000 *E. granulosus* were counted, while the distribution of the same parasite in dogs in İstanbul was found to be 23 % (5, 16). Hence the hydatid forms of *E. granulosus* is widespread among ruminants. According to slaughterhouse statistics, hydatid infection rate of the liver and lungs of ruminants varies between 20–50 % . As a result, many of these carcasses are condemned by veterinary inspectors.

There are scattered cases of *Coenurus cerebralis* in sheep and goats in this country. Specially younger animals are more susceptible to this infection. But one has to distinguish this infection from Oestrus ovis infestations, louping-ill, listeriosis and cerebrospinal nematodiasis (16).

According to 1983 statistics, sheep population of different breeds in Turkey is around 45 million. Turkish people generally prefer mutton over beef. So as a meat producing animal, sheep had always a priority to the other ruminants. As a result, parasitic diseases of sheep have had a special interest and attention. Among these diseases, lungworm infections carry one of the most economic importance. According to an investigation, the distribution rate of these worms was found to be 86 % in sheep slaughtered in Ankara abattoir. Five different lungworm species occur in the lungs of sheep in Anatolia. The most prevalent species are *Cystocaulus ocreatus* and *Dictyocaulus filaria* respectively. While in Angora goats the distribution of the same parasites was found to be 100 % . In these animals the most widespread lungworms were *Muellerius capillaris* and *D. filaria* respectively (7, 12).

Many lungworn infection outbreaks have been recorded from different areas in Turkey. In one of them 45 % of the animals died from this infection. According to some reports, in heavy lungworm infections if the animals are not treated, the mortality rates become as high as 60–85 % .

In heavy winters when lungworm and gastro-intestinal worms occur together as a mix infection, the mortality rates sharply increase in sheep flocks. In such a case which occured in two provinces in Central Anatolia, the mortality rate reached to 98 %.

Against lungworm infections in sheep, drugs such as thiabendazole, tetramisole, levamisole, febantel and albendazole are available in Turkish market under trade names of Thibenzole, (Nilverm, Poliverm), Wormex, Rintal and Valbazen respectively.

In spite of the distribution of lungworms is wide in sheep, prevalence of the same infection in cattle is very small with a percentage of 0.3. Until now a few and scattered epidemics were reported in Brown Swiss and Friesian calves (16).

The distribution of gastro-intestinal worms in sheep and goats is 100 %. 14 and 13 different trichostrongylid worms has been recorded from sheep and goats respectively (8, 12).

However in cattle only slight infections of gastro-intestinal worms occur mainly with Ostertagia species.

Against sheep and goat gastro-intestinal worms the drugs mentioned for lungworn therapy are also effective in this infection.

The distribution of large roundworms *((Parascaris equorum)* in horses is 10–80 % . Young animals are severely affeceted by this parasite. Most common drugs used against these worms are piperazine compounds and trichlorfon, under trade names of Antelmin, Piperan, Piperaxine sol; and Neguvon respectively.

Information on the distribution of *Toxocara vitulorum* in cattle in this country is limited. Recently we examined the faecal samples of 1150 animals both from private and state farms and found the infection rate 0.8 %.

Thelaziose (Eye worn) is widely (22 %) distributed in cattle in Turkey. The main causative agent is *T. rhodesii*. In a lesser degree *T. gulosa* is also found in cattle. Up to 20 worms were recovered from a single eye.

Because of Turkey is a moslem country, pork is not consumed by moslem people. So that trichinosis is not a public health problem in this country. However this infection has been recorded in wild boars at the rate of 1.31 % (16).

The most common arthropod infestations are hypodermosis and other myiasis agents, tick infections, mange, lice and blood sucking flies.

Concerning hypodermosis in cattle, both *H. bovis* and a lesser degree *H. lineatum* are found in these animals in Turkey. According to an investigation conducted in 1947, the distribution rate of *H. bovis* in Turkey is 67 %.

According to the estimations made in 1979, annual revenue loss due to hypodermosis in cattle industry was around 4 billion Turkish Lira.

The seosonal activities of hypoderma flies are between May and August, and grubs (warbles) are present under the skin of the back of cattle between February and May. The most common systemic insecticides available in this country are trichlorfon and ruelene under trade names Neguvon and Hipolen respectively (19, 24).

The distribution rate of *Przhevalskiana silenus* in Angora goats is up to 94 %. As high as 43 grubs were found on a goat around Ankara. In this area the seasonal activities of *P. silenus* flies are between April and July and grubs begin to appear under the skin of the goats between December and April (28).

According to investigations the most effective systemic insecticide against *P.silenus* was found to be trichlorfon (Neguvon). The best result is obtained when the drug was given orally at a dose level of 50 mg./kg. as 10 % aquous solution three times with one month intervals beginning in November (27).

Ticks are widespread all over Turkey. The most prevalent species are *Rhipicephalus bursa, R. sanguineus, Hyalomma savignyi, H. excavatum, H. detritum, Boophilus annulatus calcaratus, İxodes ricinus*, and as soft ticks *Ornithodorus lahorensis, Argas persicus* and *A. reflexus*. At present, solutions of trichlorfon (Neguvon), propetamphos (Blotic,) amitraz under trade name Kenaz, manaform (Opigal –5) and a gamma isomer of benzene hexachloride under trade name Corexan are used for dipping and as a spray against tick infestations (20, 21, 24, 29).

Oestrus ovis is widespread both in sheep and goats. The most common drug used against sheep nasal fly infections is trichlorfon (Neguvon) as a 10% aquous solution. This solution is used either orally or by intranasal applications.

Concerning gastrophilus (Bots) infections of horses *G. equi, G. nasalis* and *G. haemorrhoidalis* are the most common species in this country. However *G. pecorum, G. meridionalis* and *G. nigricornis* are also found

in equines. Trichlorfon (Neguvon) at a dose level of 35 mg./kg. as 10 % aquous solution is used by nasal tube, or at a rate of 5 % in the food with satisfactory results (26).

Sheep mange mites, *Sarcoptes scabiei* ovis and *Psoroptes ovis* are widespread specially in winter months. Organophosphorus compounds such as asuntol, trichlorfon; and propetamphos and amitraz under trade names of Bac-dip, Neguvon, Blotic and Kenaz respectively are used widely for dipping or as a spray in the infected animals (29).

Concerning lice infections, *Linognathus vituli* is the most common sucking lice of cattle in Turkey. However *Hepatopinus eurysternus* and *Solenopotes capillatus* also infect cattle; as biting lice, *Damalinia bovis* is common in cattle.

In buffaloes *Hepatopinus tuberculatus* is widespread, while in sheep *Linognathus ovillus* and in a lesser degree *L.pedalis* are also found. Against lice infections, trichlorfon, propetamphos, manaform and amitraz under trade names Neguvon, Blotic, Opigal-5 and Kenaz respectively are the main insecticides available.

As blood sucking flies, Tabanids, Simulids, Culicoides, Aedes, Anopheles and Culex spp. are common ectoparasites of livestock in this country (24).

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