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BLOODSUCKING TICKS (*ARACHNIDA, ACARI, IXODIDA*), COLLECTED IN «BAYSERKE AGRO» LLP

Abstract. For the territory of the fields of forage crops of «Bayserke-Agro» LLP, 4 species of bloodsucking ticks (*Argas reflexus* (Fabricius, 1794), *Dermacentor marginatus* (Sulzer, 1776), *Rhipicephalus pumilio* (Schulze, 1935) and *Haemaphysalis punctata* (Canestrini et Fanzago, 1878) have been revieled, belonging to 4 genera from 2 families - Argasidae and Ixodidae. Ixodid ticks, represented by 3 genera and 3 species, predominate both in numbers and species diversity. *H. punctata* had the highest abundance and occurrence rate. Due to its prevalence and high abundance, this species also has the greatest sanitary and epidemiological significance. The limited and most restricted species - *A. reflexus*. Mass reproduction of bloodsucking ticks on the territory of «Bayserke-Agro» LLP in 2019 was caused, apparently, by a very mild and short winter of 2018-2019, which allowed hibernating individuals to survive it without loss from freezing. When working in the fields as an agent for protection against ticks, the «Reftamid» aerosol preparation, which has a deterrent effect not only for them, but also for mosquitoes, midges and other representatives of gnats, has proven itself well. In addition, Actarofit and Entolek from the group of avermectins proved to be good in laboratory tests on two species of ticks – *H. punctata* and *D. marginatus* – - individuals died 10 and 7 minutes after treatment, respectively. In the future, production testing of preparations of this group against bloodsucking ticks should be carried out and then used as a means of controlling their numbers.

Key words: blood sucking ticks, Acari, Argasidae, Ixodidae. *Argas reflexus, Dermacentor marginatus, Rhipicephalus pumilio, Haemaphysalis punctata*, «BayserkeAgro» LLP.

Introduction. Representatives of the tick subclass (Acari) are the most numerous group in the arachnid class (Arachnida): more than 54,000 species, including 144 fossils, are currently described. Most species are free-living saprophagous animals or predators. Feeding on decaying organic matter, they, like earthworms, play an important role in the formation of soil humus. Some ticks feed on sap of cultivated plants and are agricultural pests. In addition to them, ticks from the family Tyrogliphidae, Glyciphagidae and others, which are serious pests of stored agricultural products and raw materials, are detrimental to agriculture. They and pyroglyphide ticks have medical importance as sources of allergens. If ingested with food can cause acute gastrointestinal diseases, and if inhaled, catarrh of the respiratory tract and asthma can occur. Some species are predators that prey on other ticks and a variety of small arthropods. Representatives of separate families are insect parasites. Some ticks are secondary aquatic animals. There are parasites of warm-blooded animals - birds and mammals. Only a relatively small number of species belong to the parasites or vectors of human diseases, but non-parasitic forms often cause skin irritation.

The species of the latter groups are of the greatest practical importance for the agricultural sector as parasites of humans and domestic animals, and vectors of dangerous zoonotic and quarantine infections. In all countries of the near and far abroad, studies of the fauna of bloodsucking ticks, their biological characteristics and the development of measures to combat them, both locally and regionally, are conducted [1-14, 23, 24]. In Kazakhstan, this group is also economically important, as it is often present not only on agricultural land, but also in places that serve as a recreation area, specially protected natural areas, etc. [22]. This explains the relevance of this work.

Material and methods. The material was collected by the authors of the publication in 2018-2019 during the implementation of phytosanitary monitoring and other works in the framework of the project of the Ministry of Agriculture of the Republic of Kazakhstan BR 06249249 "Development of an complex system to increase productivity and improve the breeding qualities of farm animals, on example of «Bayserke-Agro» under subproject 2 "Improving the technology of cultivation and harvesting of forage crops". There was no specific goal to study bloodsucking ticks, but when collecting material on the harmful and useful invertebrate fauna of «Bayserke-Agro» LLP crops, on which several publications have already been made [19-21], ticks were repeatedly noted by us as a passing object, and even had to take precautions to avoid their bite.

When collecting the material, standard entomological and acarological techniques were used - mowing the sweep net, manual collection, inspection of vegetation, room walls, clothing of people working in the field, including authors of the article. The collected ticks were smeared in mordant with ethyl acetate and then placed in alcohol or laid out on cotton entomological mattresses.

Identification of bloodsucking ticks species collected on the territory of «Bayserke-Agro» LLP, the specifics of their distribution, bioecology, economic and sanitary-epidemiological significance were clarified using reports and determinants from the list of references [15-18, 23].

Research results. As a result of the research carried out on the territory of «Bayserke-Agro» LLP, several species of bloodsucking ticks were identified. Their general characteristics, taxonomic affiliation and images in Figures 1-4 are given below.

Family Argasidae - Argasi mites

The family includes about 200 species, the number of genera in different systems varies from 4 to 10, and needs additional research on the taxonomy of this group of ticks. The body has a length of 3 to 30 mm, flattened, oval. The covers are leathery, the color of ticks that have drunk blood is purple, and by hungry mites it is greyish, yellow-brown. Members of the family parasitize on wild and domestic birds, mammals etc., including humans (temporary ectoparasites), cause argasidosis. Able for a long term starvation (up to 11 years). Ticks from the *Argas* and *Ornithodoros* genera (12 species) attack man. Their bites cause itching, a red rash on the skin. Saliva is toxic. Vectors of tick-borne typhoid and tick-borne borreliosis. The proboscis lies in a recess on the ventral side at the anterior end of the mite's body. There are no dorsal scutes. Peritremes are small, lie between 3 and 4 pairs of coxa. Suckers on paws are available only in the larvae.

***Argas reflexus* (Fabricius, 1794)** - Shell mite (figure 1). Distributed in Europe, North and South America, Africa, Asia. On the territory of the former USSR, it is found in the Caucasus, Crimea, republics of Central Asia, South and Southeast Kazakhstan in the steppe, semi-desert and foothill zones. Pumped blood adult females can reach up to 10 mm long, males – about 4 mm. The body is flat, elongated, ellipsoidal. Hungry ticks are yellowish-gray in color, fed up – dark gray to black. Prefers pigeons as a host,

Figure 1 – *Argas reflexus* (Fabricius, 1794)

less often other birds. Found in the nests of pigeons, jackdaws, starlings, rollers, larks, turtle doves, swallows, peregrine falcons, owls, in burrows of bee-eaters and other birds, as well as in bat shelters. It can penetrate a human's houses, if there are or there were bird nests in the attics, especially pigeons. In case of severe hunger, the shell mite sticks to humans and other mammals (horses, dogs etc.). They stay during the day in caves, holes, or crevices near the host nests. Each phase of the larvae for further development needs 1 time in a few days to drink blood. Adult females suck blood several times in 20-40 minutes, laying from 12 to 70 eggs, respectively. In humans, allergic reactions to the bite of this species have been confirmed so far, up to the pre-anaphylactic shock. A secondary infection may occur on the combed areas, with the subsequent development of edema, lymphangitis, severe pain. The species is under suspicion as a potential vector of causative agent of Q fever. In the experiment of *A. reflexus*, tick-borne encephalitis virus was taken from infected chickens and transmitted during subsequent feeding to healthy chickens. Vector of domestic birds spirochetosis - chickens, guinea fowls and geese.

Material: 1 specimen - 15.04.2019, triticale field behind Arkabay village, dead on the ground, I.I. Temreshev; 1 specimen - 15.05.2019, on the ground, the soybean field at the ERPC building, I.I. Temreshev; 1 specimen – 20.05.2019, on a dead pigeon, alfalfa field near the ERPC building, I.I. Temreshev; 1 specimen - May 24, 2019, on the ground, a barley field near the building of the ERPC, I.I. Temreshev.

Family Ixodidae – Ixodid ticks

There are over 650 species in the world fauna. Ixodides are common all over the world, they are found even in the Arctic and Antarctic (tick *Ixodes uriae* White, 1852 parasitizes penguins, guillemotes and other polar birds). Representatives of the family are bloodsucking parasites. Females of ixodid ticks lay up to 20,000 eggs, but in connection with complex ontogenesis, only few survive to the adult stage. The hatching from eggs larvae feed once, usually on small mammals (rodents, insectivores, mustelids etc.), sometimes on reptiles and birds. The fed up larva falls to the ground and after some time turns into a nymph. After feeding and molting, the nymph turns into an "adult" stage - imago. Mature females of ixodid ticks feed once, mainly on cattle, as well as on wild ungulates, large predators and humans. Vectors of dangerous diseases of humans and domestic animals (Crimean hemorrhagic fever, tick-borne encephalitis, borreliosis, rickettsiosis, plague, etc.) are among them. During their feeding with the blood of the host a tick-borne paralysis is possible, which is an acute disease of animals and humans, resulting from poisoning by a neurotoxin secreted by ticks. The proboscis is located on the front end of the mite's body. It has a dorsal scutes. Peritrema is large and lie behind the fourth pair of coxa. There are suckers on mite's legs.

***Dermacentor marginatus* Sulzer, 1776 – B0ordered Dermacentor** (figure 2). A vector of Hemorrhagic and Crimea-Congo fevers, tick-borne North Asian rickettsiosis000000, Omsk hemorrhagic fever, tick-borne encephalitis, pyroplasmosis; host of plague, tularemia, Q fever, brucellosis, listeriosis pathogens, in livestock - vector of babesiosis of horses, donkeys and dogs, anaplasmosis of goats, sheep and cattle. It is found in southern Europe, on some islands of the Mediterranean Sea, in Ukraine, in Moldova,

Figure 2 – *Dermacentor marginatus* Sulzer, 1776

Crimea, southern part of the European Russia, Kazakhstan, North Caucasus, southern part of Western and Eastern Siberia and Central Asia. It is a plain-steppe and mountain-steppe form, but some specimens are found in forest-steppe and mountain-forest areas. Three-host species. The full development cycle takes place in a year. Larvae, nymphs feed on rodents, hedgehogs, water rats and other small animals. Imago is parasitizing on cattle, sheep, goats, horses. Adult ticks often attack people. Tick attacks begin in May (mostly imago); in summer, mature ticks don't meet, and in the fall, there is the greatest increase in the tick's number on animals. Before the tick begins to suck blood it makes several test punctures. Characteristic is the presence of silver-white (light enamel) spots on a dark background of the dorsal scute (marble pattern), limbs and proboscis.

Material: 1 specimen - 29.04.2019, barley field at the ERPC building, mowing net, I.I. Temreshev; 2 specimens – 29.04.2019, barley field at the ERPC housing, manual harvest, A.M. Makezhanov, I.I. Temreshev; 1 specimen - 8.05.2019, waste land, mowing net, I.I. Temreshev; 1 specimen - 15.05.2019, on barley, field for alfalfa, mowing net, I.I. Temreshev; 1 specimen. - May 20, 2019, on a pole, an alfalfa field near the building of the ERPC, I.I. Temreshev.

***Rhipicephalus pumilio* Schulze, 1935 - Canine tick** (figure 3). Pasture three-host tick. The vector of the Astrakhan spotted fever, ehrlichiosis, host of plague and tularemia pathogens, in livestock - a vector of babesiosis of horses, donkeys and pigs, anaplasmosis of goats and sheep. A bite can cause tick-borne paralysis in humans and pets. The area includes all Central Asian republics, Kazakhstan, Transcaucasia, Dagestan and Mongolia. In Kazakhstan, it populates tugai-meadow biotopes in the valleys of the lower reaches of Syrdariya, Black Irtysh rivers, and the natural water flows of the Ile basin. Three-host species.

Figure 3 – *Rhipicephalus pumilio* Schulze, 1935

Adult ticks were recorded on a tolai-hare, a long-eared and a long-needled hedgehogs, a wolf, a jackal, a fox, a gazelle, a onager, a dog, a rabbit, a camel, a goat, a horse and a cattle, the larvae and a nymphs are on a tolai, hedgehog, great and tamarisk gerbils. Attacks a human. The spring-summer-autumn is a parasitic season, but the maximum number on the host is observed in April-June. Relatively small ticks (hungry 2-5 mm, fed up females 10-15 mm), are reddish-brown in color.

Material: 1 specimen – 29.04.2019, wheat field at the ERPC housing, mowing net, I.I. Temreshev; 2 specimens - 8.05.2019, wasteland, mowing net, I.I. Temreshev; 1 specimen – 20.05.2019, on the wall near the building of the ERPC, I.I. Temreshev; 2 specimens - May 24, 2019, wasteland, mowing net, I.I. Temreshev; 1 specimen – 06.05.2019, a field of wheat at the corps of ERPC, mowing net, I.I. Temreshev.

***Haemaphysalis punctata* Canestrini et Fanzago,** 1878 - **spotted Hemophysalis** (figure 4). The vector of causative agents of Q fever, Crimean hemorrhagic fever, tick-borne encephalitis, tularemia, Lyme disease etc., in livestock, is a vector of East Asian theileriosis in cattle, goats and sheep. In Kazakhstan, western part of the range covers the valley of Syrdarya river, northern slope of the Karatau ridge, southern part of Betpak Dala desert and Chu valley. The northern border of Kazakhstan area covers the

Figure 4 – *Haemaphysalis punctata* Canestrini et Fanzago, 1878

south-western Altai, Zaisan basin, Tarbagatay ridge and foothills of Saur ridge. The southern border covers the foothill and mid-mountain belts of the Zhetysu Alatau, the entire basin of Ile river, all ridges of the Tien Shan system. It prefers moist biotopes - along the banks of reservoirs. Pasture three-host parasite. Imago feeds on mammals (several dozen species), larvae and nymphs can also feed on birds and reptiles.

Material: 1 specimens – May, 2018, alfalfa field at the ERPC building, mowing net, I.I. Temreshev; 2 specimens – Ma,y 23, 2018, wheat field at the ERPC building, mowing net, I.I. Temreshev; 7 specimens - April 15, 2019, barley field at the ERPC building, mowing net, I.I. Temreshev; 6 specimens - 15.04.2019, barley field at the ERPC building, manual collection, I.I. Temreshev, A.M. Makezhanov; 2 specimens – 15.04.2019, triticale field behind Arkabay village, mowing net, I.I. Temreshev; 3 specimens - 15.04.2019, barley field in Arkabay village, mowing net, I.I. Temreshev; 2 specimens. - 15.04.2019, alfalfa field beyond Arkabay village, mowing net, I.I. Temreshev; 2 specimens - 29.04.2019, barley field at the ERPC building, mowing net, I.I. Temreshev; 5 specimens – 29.04.2019, barley field at the ERPC building, manual harvesting, I.I. Temreshev, A.M. Makezhanov; 1 specimen - May 8, 2019, Dormaster barley field, mowing net, I.I. Temreshev; 2 specimens. - May 8, 2019, on the ground, Dormaster barley field, hand picking, A.M. Makezhanov; 9 specimens - 8.05.2019, waste land, mowing net, I.I. Temreshev; 5 specimens - 8.05.2019, wasteland, manual collection, A.M. Makezhanov, A.M. Tursynkulov; 1 specimen. – 20.05.2019, mowing net, alfalfa field near the hull, I.I. Temreshev, 2 specimens. - 20.05.2019, waste land, mowing net, I.I. Temreshev; 2 specimens. - May 24, 2019, vacant lot, mowing the net, A.B. Yeszhanov; 3 specimens – 24.05.2019, ibid., manual collection, I.I. Temreshev; 1 specimen - May 31, 2019, alfalfa field near Korpol ERPC, mowing net, I.I. Temreshev; 3 specimens - 31.05.2019, waste land, mowing net, I.I. Temreshev; 1 specimen - 06/05/2019, a field of wheat at the corps of ERPC, mowing net, I.I. Temreshev; 1 specimen - 7.06.2019, barley field near the shell of ERPC, mowing net, I.I. Temreshev.

Discussion of research results. Thus, for the territory of the fields of forage crops of «Bayserke-Agro» LLP, 4 species of bloodsucking ticks were identified, belonging to 4 genera from 2 families - Argasidae and Ixodidae. Ixodid ticks, represented by 3 genera and 3 species, dominate both in numbers and species diversity. *Haemaphysalis punctata* Canestrini et Fanzago, 1878 has the highest abundance and incidence of them, which was found in almost all the examined sites. Due to its prevalence and high abundance, this species also has the greatest sanitary and epidemiological significance. The smallest and limited in distribution form is the shell mite *Argas reflexus* (Fabricius, 1794). It was found only in two places - near the ERPC center and on the triticale field behind the Arkabay village. This limitation may be due to its biological features. Namely, not far from the building there is a building with a large colony of pigeons, which are its natural hosts. Not far from the triticale field on the elevator, there is also a large colony of these birds, the hosts of the shell mite. For these reasons, *Argas reflexus* (Fabricius, 1794) was found only at these two points.

Findings. Mass reproduction of bloodsucking ticks on the territory of «Bayserke-Agro» LLP in 2019 was caused, apparently, by a very mild and short winter of 2018-2019, which allowed hibernating individuals to survive it without loss from freezing. When working in the fields as an agent for protection against ticks, the «Reftamid» aerosol drug, which has a deterrent effect not only for them, but also for mosquitoes, midges and other representatives of gnats, has proven itself well. In addition, in laboratory tests on two species of ticks - *Haemaphysalis punctata* Canestrini et Fanzago, 1878 and *Dermacentor marginatus* Sulzer, 1776 - biological preparations Acarofit and Entolek from the group of avermectins – individuals died 10 and 7 minutes after treatment, well proved themselves. In the future, production testing of preparations of this group against bloodsucking ticks should be carried out and then used as a means of controlling their numbers.

Source of research funding. The work was prepared as part of the project implementation of the Ministry of Agriculture of the Republic of Kazakhstan BR 06249249 "Development of a comprehensive system to increase productivity and improve the breeding qualities of farm animals, using the example of «Bayserke-Agro» LLP" under subproject 2 "Improving the technology of cultivation and harvesting of forage crops".

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**"БАЙСЕРКЕ АГРО" ЖШС ЖИНАЛҒАН
ҚАН СОРҒЫШ КЕНЕЛЕР (*ARACHNIDA, ACARI, IXODIDA*)**

Аннотация. "Байсерке Агро" ЖШС жем-шөп дақылдары алқаптарының аумағы үшін 2 тұқымдас – *Argas reflexus* (Fabricius, 1794), *Dermacentor marginatus* Sulzer, 1776, *Rhipicephalus pumilio* Schulze, 1935 және *Haemaphysalis punctata* Canestrini et Fanzago, 1878). Ixodidae 4 түрі қан сорғыш кенелердің (*Argas reflexus* (Fabricius, 1794), *Dermacentor marginatus* Sulzer, 1776, *Rhipicephalus pumilio* Schulze, 1935 және *Haemaphysalis punctata* Canestrini et Fanzago, 1878) анықталды. Саны бойынша да, түрлік әртүрлілігі бойынша да иксод кенелері басым, олар 3-ші босану және 3-ші түрмен ұсынылған. Олардың ең жоғары саны мен кездесу болды *H. punctata*. Бұл түр өзінің таралуы мен жоғары санына байланысты барынша санитариялық-эпидемиологиялық мәнге ие. Ең аз және шектеулі түрі – a.reflexus. 2019 жылы "Байсерке Агро" ЖШС аумағында қан сорғыш кенелердің жаппай көбеюі 2018-2019 жж. өте жұмсақ және қысқа қыста болды. Алаңдарда жұмыс жүргізу кезінде кенеден қорғайтын құрал ретінде тек оларға ғана емес, сонымен қатар масалар, жөке және гнустың басқа да өкілдеріне үркітетін әсері бар аэрозольды "Рефтамид" препараты өзін жақсы көрсетті. Сонымен қатар, *H. punctata* және *D. marginatus* кенелердің екі түрінде зертханалық сынақтар кезінде – авермектиндер тобынан алынған Актарофит және Энтолек-дарақтар өңдеуден кейін тиісінше 10 және 7 минуттан соң өлді. Болашақта осы топтағы қан сорғыш кенелерге қарсы препараттарға өндірістік сынақтар жүргізу, содан кейін олардың санын бақылау құралы ретінде пайдалану керек.

Түйін сөздер: қан сорғыш кенелер, Acari, Argasidae, Ixodidae, *Argas reflexus*, *Dermacentor marginatus*, *Rhipicephalus pumilio*, *Haemaphysalis punctata,* «Байсерке Агро» ЖШС.

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**КРОВОСОСУЩИЕ КЛЕЩИ (ARACHNIDA, ACARI, IXODIDA),
СОБРАННЫЕ В ТОО «БАЙСЕРКЕ АГРО»**

Аннотация. Для территории полей кормовых культур ТОО «Байсерке Агро» было выявлено 4 вида кровососущих клещей (*Argas reflexus* (Fabricius, 1794), *Dermacentor marginatus* Sulzer, 1776, *Rhipicephalus pumilio* Schulze, 1935 и *Haemaphysalis punctata* Canestrini et Fanzago, 1878), относящихся к 4 родам из 2-х семейств – Argasidae и Ixodidae. Как по численности, так и по видовому разнообразию преобладают иксодо-

вые клещи, представленные 3-мя родами и 3-мя видами. Наиболее высокую численность и встречаемость из них имел *H. punctata*. Данный вид в силу своей распространенности и высокой численности имеет и наибольшее санитарно-эпидемиологической значение. Самый малочисленный и ограниченный в распространении вид – *A. reflexus*. Массовое размножение кровососущих клещей на территории ТОО «Байсерке Агро» в 2019 г. было вызвано, по всей видимости, очень мягкой и короткой зимой 2018-2019 гг., позволившей зимующим особям пережить её без потерь от вымерзания. При проведении работ на полях в качестве средства для защиты от клещей хорошо зарекомендовал себя аэрозольный препарат «Рефтамид», обладающий отпугивающим действием не только для них, но и комаров, мошек и прочих представителей гнуса. Кроме того, при лабораторных испытаниях на двух видах клещей – *H. punctata* и *D. marginatus* – хорошо показали себя биологические препараты Актарофит и Энтолек из группы авермектинов – особи гибли через 10 и 7 минут соответственно после обработки. В будущем следует провести производственные испытания препаратов данной группы против кровососущих клещей, и затем использовать в качестве средства контроля их численности.

Ключевые слова: Кровососущие клещи, Acari, Argasidae, Ixodidae. *Argas reflexus*, *Dermacentor marginatus*, *Rhipicephalus pumilio*, *Haemaphysalis punctata,* ТОО «Байсерке Агро».

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