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Research Article

PARASITIC ACTIVITY OF DEMODEX TICKS AMONG CATTLE

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Abstract:

Under the conditions of the Northern Trans-Urals, they studied the parasitic activity of demodex ticks among cattle and analyzed the dynamics of their parasitism. During the period of 2002-2018, the cattle of different sex and age were examined. The research established that the diseases of parasitic etiology, in particular, cattle demodicosis, were recorded in $14.74 \pm 1.471\%$ of cases. Four types of demodectic colonies are identified: the first type (I type) - young, developing, the second type (II type) - mature developed, the third type (III type) - old, completing the development and the fourth type (IV type) - the type with completed development. The maximum number of colonies of the first type was noted in October - 36.4%, the maximum number of the second type colonies in December - 58.7%, the maximum number of the third type colonies in March - 64.3%, the maximum number of fourth type of colonies in August - 18.3%. The minimum number of young colonies (type I) was registered in March - 11.3%, the minimum number of type II colonies in August - 16.7%, the minimum number of type III colonies in December - 17.8% and the minimum number of the colonies with completed development (type IV) in December - 0.9%. The analysis of the potential and real possibility of the causative agent of demodicosis spread showed that the first two types of demodectic colonies correspond (type I - young and type II - mature). The greatest parasitic activity of demodex tick colonies in the quantitative ratio of the first and second type ratio is expressed in December and reaches 81.3%, quite high in October - 65.5% and 57.7% in July. The minimal parasitic activity of demodectic colonies was observed in March - 30.9%. The parasitic activity of demodectic colonies is an important point that should and must be taken into account during acaricidal treatments among cattle against demodex ticks.

Keywords: *cattle, ticks, parasites, parasitic activity, demodecosis, Demodex bovis.*

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INTRODUCTION:

The agro-industrial complex of the Tyumen region is the most important sector of the national economy, the main source of food resource development, ensuring national security. The production of livestock determines the economic and financial condition of the entire agro-industrial complex in many respects. At each stage of animal husbandry development, the tasks of the industry improvement are becoming more complex and large-scale. For their successful solution, the use of animals with high productivity, reproductive ability, resistance to diseases is of great importance and the conditions of their keeping are of great importance also, which should be based on the biological laws of an organism development and fully satisfy the physiological needs of animals [5, 7, 9-12].

Nowadays the main reason for the occurrence and the development of skin pathologies among cattle are the violations of zoohygienic requirements for feeding, keeping and caring for animals, as well as the violation of microclimate parameters [1-3, 15-16].

In the Tyumen region, one of the obstacles to animal productivity increase is skin diseases of various etiologies, from which agricultural producers suffer great losses. The economic damage caused by these diseases consists of curative measure costs for sick animals, impaired reproductive functions, the birth of weak, unviable young animals, the decrease in milk and meat productivity, and leather product quality. One of such diseases is cattle demodectosis [4, 13, 14].

In this regard, the issues of this problem study associated with the distribution, clinical picture, diagnosis and the prescription of treatment during demodectic invasion among cattle remain an urgent problem today.

MATERIALS AND RESEARCH METHODS:

The research work was performed during the period from 2002-2018 on the basis of FSBEI HE "Federal Agrarian University of Northern Trans-Urals", the departments of non-communicable diseases among agricultural animals and infectious and invasive diseases, the acarology laboratory of the All-Russian Scientific Research Institute of Veterinary Entomology and Arachnology - the branch of Tyumen Scientific Center (SB RAS), as well as in the farms of the Tyumen Region. We examined dairy, meat and meat-dairy cattle of various age groups. Examination and palpation of skin and hair were performed to establish the diagnosis. During examination, attention was paid to the presence of baldness and mop hair; during palpation attention was paid to compacted tubercles, skin thickening, and crusts. The diagnosis was confirmed by microscopic examination of samples taken from the affected skin. To obtain the contents of demodectic hillocks, the wool was cut, disinfected and punctured with a sterile needle in the center of the tubercle, then the contents of the demodectosis colony were squeezed out, transferred to a glass slide, two to five drops of glycerin or water were added. Then the content was evenly distributed on a glass slide by scalpel or needle and examined under a small microscope magnification in a darkened field of view (Figure 1).

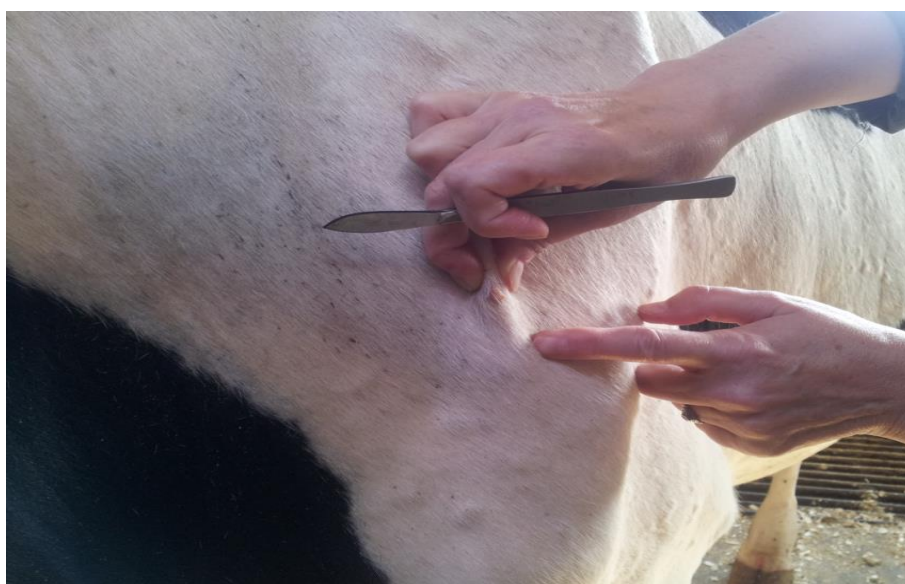


Figure 1 - Taking the contents of demodectic colonies

In the absence of clinical signs of the disease, they used the method of demodicosis diagnosing proposed by B.A. Frolov and S.V. Larionov (1981). In the places of the most frequent localization of ticks (neck, undershirt, shoulder blades, shoulder), hair was harvested on the area of 1.5-2 cm, smeared with oil, scraped with a blunt side of a scalpel, transferred it to a glass slide and examined under a microscope. The obtained results were statistically processed using Microsoft Excel.

Study results and their discussion:

After the research, special attention was paid to the condition of the hair and skin. The changes associated with parasitism of demodex ticks were visible from a distance among sick animals with a strong and generalized form of the disease. At the site of the opened colonies, the hair was glued in small bunches. In the presence of large crusts of the resulting contents of demodectic colonies and over large developing tubercle colonies, the hair was slightly tousled and clearly visible during examination.

During diagnostic activities of *Demodex bovis* ticks, we detected the demodectic colonies of the following types (Figure 2):

The first type (young, developing) - the colonies of the first type have no channel connecting them with the external environment, and, therefore, there was no scab (crust). During examination, they were present due to their small size. In the locations of larger colonies, the hair was slightly tousled. During palpatory events, young colonies were identified as compacted, mobile intracutaneous tubercles. Microscopic studies confirmed the presence of a large number of demodectic ticks in the contents of tubercles during all stages of development.

The second type (II type), (mature developed) - the colonies had a canal closed by a small crust, often imperceptible even on palpation, but visible after wool cutting the wool. The mobility of these colonies was limited. During microscopy of the colony contents they observed the presence of *Demodex bovis* ticks at all stages of development, with the predominance of adult stages (nymphs, adults).

The third type (III type), (old, completing the development) - demodectic colonies of this type had characteristic crusts. Palpation revealed skin lesions in the form of small dense foci covered with crusts, which covered the skin defect almost completely and were easily removed. After removal of the crusts, small amount of clots was found of yellowish or grayish color. Microscopy of ticks discovered mainly deuthymph and imago.

The fourth type (IV type) (completed development) — the colonies of this type were detected on palpation in the form of seals, covered with dry flat crusts. Crusts in turn had hairs, and, therefore, were well kept on the skin. Small crusts were easily removed. Under a removed scab, the regenerating skin with regrowing hair was observed.

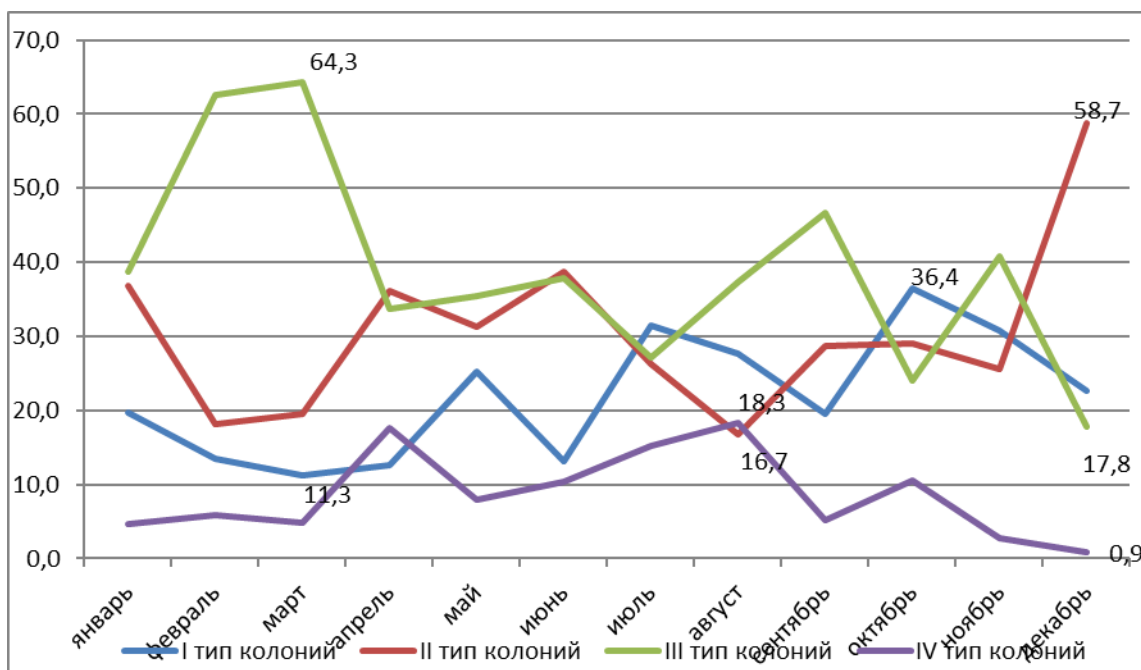
Analyzing the obtained result, the above classification of demodectic colony types in our opinion more fully reflects the development and the course of demodectic invasions and represents the process from the point of view of acaricidal agent use and their therapeutic action evaluation. For this purpose, it is necessary to select the animals with the first two types of colonies ("young" and "mature"), containing all the stages of demodex tick development in large numbers.



Figure 2 - Strong degree of cattle damage with Demodex ticks

The quantitative ratio of demodectic colony types during different seasons of the year is shown by Figure 3. According to our observations, the maximum number of colonies of the first type was noted in October - 36.4%, the maximum number of colonies of the second type in December - 58.7%, the maximum number of colonies of the third type in

March - 64.3%, the maximum number of colonies of the fourth type in August - 18.3%. The minimum number of young colonies (type I) was registered in March - 11.3%, type II colonies - in August (16.7%), type III colonies - in December (17.8%) and the colonies with completed development (type IV) - in December (0.9%).



январь - January / февраль - February / март - March / апрель - April / май - May / июнь - June / июль - July / август - August / сентябрь - September / октябрь - October / ноябрь - November / декабрь - December / I, II, III, IV тип колоний - Ist, IInd, IIIrd, IVth type of colonies

Figure 3 – The ratio of demodectic colony types depending on the season, %

For the qualitative characteristics of the demodex tick colonies D.K. Polyakov (1966, 1977), Skosyrskikh L.N. (1993) used the term “parasitic activity”, meaning that the more active the ticks in some colony, the more active it is, the more pronounced the pathological processes developing in animal skin. According to the authors, with the presence of such active colonies, the possibility of demodicosis spread among cattle increases. The greatest parasitic activity of demodectic colonies is manifested during the spring-summer period with their maximum number in March and the minimum number in October.

Analyzing the obtained data, taking into account the potential and real possibility of the causative agent of demodicosis spread, the first two types of demodectic colonies correspond (the first type is young and the second type is mature). The greatest parasitic activity of demodex tick colonies in the quantitative ratio of the first and the second type colonies is expressed in December and reaches 81.3%, quite high in October -

65.5% and in July - 57.7%. The minimal parasitic activity of demodectic colonies was observed in March - 30.9%.

Thus, the analysis of the studies showed that the parasitic activity of demodectic colonies is an important point that should and must be taken into account when you plan and conduct acaricidal treatments of cattle against demodex ticks.

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