LOSSES IN MILKING QUALITIES OF DAIRY CATTLE CAUSED BY MOSQUITOES AND HORSEFLIES AND REDUCTION OF SUCH LOSSES DUE TO USE OF DIETHYLTOLUAMIDE REPELLENT

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Abstract. An experiment was carried out in South Bohemia, in which 10% water emulsion of diethyltoluamide was used as repellent against bloodsucking Diptera to protect pastured dairy cattle. The repellent was applied by means of a spraying frame and was effective for 30—36 hours. Seven mosquito species and 18 horsefly species were observed to be attacking the cattle. The average number being 120—300 mosquitoes and 50 horseflies per hour, the milking qualities in the cattle decreased by 6.2 %, the milk fat content by 11.8 %. After converting to milk with average fat content of 4 %, the difference in milking qualities between treated and untreated animals was 9.7 %.

The application of repellent substances for the protection of man and animals against bloodsucking Diptera is an effective and otherwise harmless method of defense against these important parasites and frequently vectors of pathogens as well. In the latest decade attention has been directed at the protection of domestic animals by means of repellents. These measures have become necessary because of losses observed in food-producing animals which are attacked by masses of blood-sucking Diptera. So far diphenyloxide, methyl ester of beta-naphtol, acetylaceoanil, diethylamid of caprid acid, chlorinated terpenes etc. have been tested (Andreïv et al. 1958, Belyaev 1962, Bukštvnov and Latyshev 1968 etc.), but hexamethylbenzamide and diethyltoluamide proved most effective (Andreïv and Zakamyrden 1961, Pavlov 1973, Palmer 1969, Blume et al. 1971 etc.). In Czechoslovakia Burda (1960) recommended a decoction of some plant leaves (walnut-tree, wormwood, tansy) for the protection of horses against mosquitoes and horseflies, while Čorba and Hovorka (1975) used a salve containing diethyltoluamide for the protection of eyes of cattle against synbovine flies transmitting parasitic worms of the genus Thelazia.

MATERIAL AND METHODS

From June to August 1977 the experiment was carried out at Chlum near Třeboň in southern Bohemia where mosquitoes and horseflies occur in considerable numbers. A herd of cattle pastured in summer from morning till night, was divided into two groups with 36 head each; one group was treated with repellents, the other was left for control. The milking qualities were compared in 25 physiologically equal animals from each group. Every alternate day the sentinel group was sprayed with 10 % water emulsion of diethyltoluamide which had proved to be relatively most effective in previous experiments (Gouck and Moussa 1969, Dremova 1973, Minář and Krejčíková 1977 etc.). The repellent was applied by means of a spraying frame provided with eight spray nozzles and a pump operated by petrol engine.

During the experiment the numbers, species composition and frequency of attacks of mosquitoes and horseflies on hosts were studied. The horseflies alighting on sentinel and control cattle were daily counted on particular body parts of animals according to the method of Breev (1930). All-day
collections of horseflies were made in Skufin and Manitoba traps (Skufin 1951, Bracken et al. 1962) and biting-collections of mosquitoes per man at five minutes intervals were made at the peak of their flying activity (Monchadsky 1952).

RESULTS

The following 7 common species of mosquitoes alighted on sentinel cattle in the moist pastures: *Aedes cantans* (Meig.), *Ae. excrucians* (Walk.), *Ae. sticticus* (Meig.), *Ae. punctor* Kirby, *Ae. vexans* Meig., *Ae. cinereus* Meig., *Mansonia richardii* Fic. The most numerous were *Ae. sticticus*, *Ae. cinereus*, *Ae. vexans* and *Ae. punctor*, accounting for over 80 % of alighting mosquitoes. The numbers of mosquitoes reached 120—300 specimens per hour.

Horseflies were represented by the following 18 species: *Chrysops caecutiens* (L.), *Ch. relictus* Meig., *Ch. viduatus* (Fabr.) (syn. pictus Meig.), *Tabanus bromius* L., *T. maculicornis* Zett., *T. bovinus* L., *T. sudeticus* Zeller, *Hybomitra kaurii* Chr. et Lyneb., *H. micana* (Meig.), *H. arpadi* (Szil.), *H. lunbeicki* Lyneb., *H. muehfeldi* (Br.), *H. bimaculata* (Macq.), *H. distinguenda* (Verrall), *Heptatoma pellucens* (Fabr.), *Haematopota pluvialis* (L.), *Haem. subcylindrica* Panz., *Haem. italic* Meig. The most numerous were *T. bromius* and *T. maculicornis*, accounting for 60 % of collections; also abundant were *Haem. pluvialis*, *T. bovinus* and some species of the genus *Hybomitra*.

On the average 32 horseflies per 40 min. alighted on control cattle, while the average number of horseflies alighting on treated cattle was 12.6. As many as 75 horseflies entered the Skufin trap, but only 11 specimens entered the Manitoba trap per day.

The repellent used in the mentioned dose protected the treated cattle for 30—36 hours. The landing of insects on the treated cattle was observed as late as the second half of the second day after spraying, and their number was low. The use of a spraying frame for the treatment of sentinel group of cattle with the repellent proved good. The application of the repellent was simple and quick, lasting 15—20 minutes.

The attacks of horsefly mosquitoes on dairy cattle in pastures had negative results in their milking qualities. The differences in the amount and fat content of the milk observed with the experimental and control groups were evaluated by mathematical-statistical methods and the results were found statistically significant (Říha et al. 1978). In the two-month period of the highest occurrence of biting insects (62 days) the difference in the milking qualities with experimental and control group was 6.23 %, i.e. 43.56 kg of milk per head, the difference in the milk fat content was 11.81 %, i.e. 3.62 kg per head. After converting to milk with average fat content of 4 %, the difference in milking qualities between treated and untreated animals was 9.7 %, the milk value per 1000 animals per day being 709.41 Czechoslovak crowns.

DISCUSSION

The above results were obtained under conditions when the numbers of horseflies and mosquitoes were not very high, but such numbers may be considered as average in all regions of Czechoslovakia with water reservoirs promoting the breeding of these insect families. Higher losses in milking qualities in dairy cattle as indicated by some authors, were ascertained in regions with many times higher population density of bloodsucking two-winged insects such as Siberia or the Far East. In these regions of the USSR the losses in milking capacity of dairy cattle caused by these insects accounted for 10—40 % and the losses in the increase in weight of young cattle made up 20—40 % (Monchadsky et al. 1964, Andreev 1966, Lutta 1970, Olsufjev 1977 etc.). The assessment of economic losses caused by these insects in pastured dairy cattle,
based on the experiment for the protection of cattle by means of repellents, was a first attempt of this kind made under natural conditions of Central Europe. The differences in the milk fat were detected for the first time ever.

The protection of pastured dairy cattle against bloodsucking Diptera by effective repellents is a relatively simple solution applicable under different conditions, facilitating a higher productivity of cattle and a better exploitation of pastureland for cattle breeding.

УШЕРБ В УДОЙНОСТИ У МОЛОЧНОГО СКОТА, НАНОСИМЫЙ КОМАРАМИ И СЛЕПНЯМИ И ПОНИЖЕНИЕ ЕГО ВСЛЕДСТВИЕ ПРИМЕНЕНИЯ ДИЗИТИЛТЮАМИДА В КАЧЕСТВЕ ОТПУГИВАЮЩЕГО ВЕЩЕСТВА

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Резюме. В южной Чехии проводили эксперимент по охране выпасаемого молочного скота против кровососущих двукрылых с помощью 10 %-ной водной эмульсии дизитилтюамид в качестве отпугивающего вещества. Его использовали способом опрыскивания с эффективностью 30-36 часов. На скот нацапало 7 видов комаров и 18 видов слепней. При нападении среднего числа 120—300 комаров и 50 слепней в час, удойность у скота понизилась на 6,2 %, жирность молока на 11,8 %. При средней жирности молока 4 % разница в удойности между обработанными и необработанными животными составляла 9,7 %.

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Received 17 February 1978.


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Between 27 September and 1 October 1976 the Centre for Tropical Veterinary Medicine in Edinburgh organized an International Conference on ticks and diseases transmitted by them. The reviewed proceedings contain the papers and in some cases abstracts of contributions presented at this meeting. Each of the plenary sessions opened with two introductory main communications followed by workshop papers. The first range of problems was concerned with tick biology. Attention was paid to the life cycles of different tick species, the effects of pheromones and hormones, the effect of relative humidity on the tick life cycle, the relationship of neurosecretory cell types to life manifestations, the immune response of hosts to tick feeding, histopathology of bite lesions, and to the faunistics. The second plenary session dealt with control of ticks and diseases. The first part of workshop papers, under the heading Epidemiology, covered the occurrence, epizootology and immunology of anaplasmosis, babesiosis, theileriosis and egyptianellosis, the results of experimental transmission of some causative agents, and the occurrence and ecology of tick species of veterinary importance. The second part of workshop papers discussed control of ticks and diseases. Pointed out were the efficacy of various acaricides with regard to some new compounds as well as the problems of acaricide resistance in ticks and cattle resistance against ticks. The third plenary session was concerned with tick-borne Protozoa. The papers were devoted to different aspects of research on theileriosis and babesiosis. The subsequent two plenary sessions covered tick-borne viruses and rickettsiae. Occurrence of various viruses in the USSR, transvarial transmission, growth in cell lines and epizootology of looping ill were discussed, the last range of problems being focused on the problems of transmission, diagnostics and immune processes in agents of the genera Chlamydia, Ehrlichia, Cowdria and Anaplasma.

The reader is provided with excellent information particularly in comprehensive introductory papers which summarize the status of research in each scientific discipline and which are suitably supplemented with subsequent workshop papers. The publication is profusely illustrated and well documented by tables and graphs, and carefully edited. Its appearance will be welcomed by all those who concern themselves with ticks and tick-borne diseases.

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