Acta vet. scand. 1986, 27, 138—140.

Brief Communication

SUMMER MASTITIS IN HEIFERS: OBSERVATIONS ON THE EFFECT OF INSECT ATTACKS ON THE TEATS OF HEIFERS

An estimation of the possible etiology behind summer mastitis in heifers includes an evaluation of the significance of various insects as hosts for the causal microorganism. Under Danish conditions, several species of insects may be considered disease-carriers, such as Simulium sp., Culicoides sp., tabanids and Hydrotaea irritans (Fall.) in particular. In contrast to the other insects mentioned, Hydrotaea irritans is not able to penetrate the skin by itself but depends on one of the species of insects able to carry out the necessary opening of the skin in order to be able to pick up a "blood meal" (cf. *Høi Sørensen* 1979).

There is some information about the effect of attacks by Simuliidae, (*Rempel & Arnason* 1947, *Lipzig & Schyns* 1967, *Fredeen* 1973 and *Frese & Thiel* 1974) but reports differ as to the etiology of the pathologic lesions following attacks by Simuliidae. No information about the effect of the other insects suspected to be involved in the etiology of summer mastitis has been found, and the information available about Simuliidae gives no answer to the question of whether possible tissue lesions are toxically or immunologically determined.

As part of a Danish investigation into the etiology and pathogenesis of summer mastitis, it was of interest, if possible, to follow the consequences of insect attacks on teats of heifers under natural circumstances. Further information was desirable, partly concerning damage to the skin caused by insects suspected to be vectors for microorganisms important for the development of the disease, and partly concerning possible differences in the reaction of animals attacked for the first time and animals previously exposed to the insect species in question.

The effect of attacks by the following insects was studied: Culicoides impunctatus Goetgh. and C. pallidicornis Kieff., some Aedes sp., Simulium ornatum Meig., Hydrotaea irritans and Haematopota pluvialis (L.).

By exposing 6 heifers (Table 1) to insect attacts on the teats under controlled circumstances, and in 2 cases by obtaining renewed attacks by the same species of insect (Simulium ornatum), a reaction at the teats owing to the insect activity was observed in only 1 case (heifer No. 207), which was attacked

Table 1. Survey of heifers exposed and insect attacks observed.

Heifer No.	Insect attacks 1st observation period	Insect attacks 2nd observation period
52	Culicoides impunctatus and some Aedes sp.	No attack
207	Simulium ornatum and Hydrotaea irritans	Simulium ornatum
297	Simulium ornatum and Hydrotaea irritans	Simulium ornatum
348	Haematopota pluvialis	Not exposed
2	Haematopota pluvialis	Observation impossible owing to weather conditions
15	Culicoides impunctatus, C. pallidicornis and Simulium ornatum	Observation impossible owing to weather conditions

by a huge number of insects causing numerous petechial hemorrhages. Owing to the extravasated blood, the teats were very soon invaded by lots of Hydrotaea irritans. The reaction, as observed 14 h after exposure, consisted of multiple, slightly elevated, pink and firm spots, diameter about 4 mm and with a central red spot. The spots were found at the milk shield, at the skin of the udder, around the base of the teats and at the skin between the udder and the umbilicus. This reaction developing after the first exposure may be considered of toxic origin since the heifers were stalled until the day of exposure to insect antigens.

The re-exposure experiments of the first 4 heifers in Table 1 took place 15 days after the primary exposure allowing a possible sensitization to take place. These heifers were stalled between the exposures. The 2 remaining heifers were grazing in the bog for 10 days exposed to insect attacks. After that the animals spent 14 days in the cowshed to heal the lesions before the controlled re-exposure. A period of several weeks with very windy and rainy weather set in inhibiting all insect activity which did not return. The 2 re-exposures obtained, one of which was carried out on the heifer that reacted to the first exposure, did not induce any visible reaction in the animals. In none of the exposures were universal reactions observed, and the local effect at the udder and teats appeared to cause only little damage. Biting insects, such as Simuliidae and Culicoides spp. may how-

ever have an indirect effect because the bites and hemorrhages they provoke attract non-biting insects such as Hydrotaea irritans. This may cause an increased bacterial contamination. The results obtained do not exclude the possibility that universal toxic as well as immunological reactions may appear in the case of a very heavy attack, as is known for e.g. Simulium (*Lipzig & Schyns* 1967, *Fredeen* 1973 and *Frese & Thiel* 1974).

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ACKNOWLEDGEMENT

Farmer Lasse Petersen most kindly placed the heifers and the cowshed at our disposal. We highly apprecitate this. The authors are indebted to Karl M. V. Jensen, stud. scient., who contributed significantly by capturing and tethering the heifers. This study was supported by grant No. 5.23.26.04 from the Danish Agricultural and Veterinary Research Council.

REFERENCES

Fredeen, F. J. H.: Black flies. Agriculture Canada. Publ. 1499, 1973.

Frese, K. & W. Thiel: Zur Pathologie der Hautveränderungen beim Kriebelmückenbefall des Rindes. (Skin lesions caused by black flies (Simuliidae) in cattle). Zbl. Vet. Med. B. 1974, *21*, 618—624.

Lipzig, J. van & M. Schyns: Mass attacks of Simuliidae causing disease and death in cows. Tijdschr. Diergeneesk. 1967, *92*, 168—171.

Rempel, J. G. & A. P. Arnason: An account of three successive outbreaks of the black fly, Simulium arcticum, a serious livestock pest in Saskatchewan. Sci. Agric. 1947, *27*, 428—445.

Sørensen, G. Høi: Sommermastitis. (Summer mastitis). Disp. A/S Carl Fr. Mortensen, Copenhagen 1979, 77 pp.

(Received April 3, 1986).

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