

Investigation on the influence of Cumbasil® Mite on the movement of the red chicken mite (*Dermanyssus gallinae*) on feathers

Roderich Garmeister & Marc Boelhauve

Introduction

At the Department of Agriculture of the South Westphalia University of Applied Sciences (SWUAS), a series of investigations was carried out on the effect of a compound of microminerals of natural origin (Cumbasil® Mite, Witteler, Germany) on the red chicken mite (cf. GARMEISTER & BOELHAUVE 2019a). After the determination of the particle size distribution (cf. GARMEISTER & BOELHAUVE 2019b) and the preparation of raster electronic images for the investigation of invasiveness (cf. GARMEISTER et al. 2019), the influence of Cumbasil® Mite on the ability of the red chicken mite to move on natural ground will be investigated in this study.

Material & Methods

In order to test the effectiveness of the prophylactic control by Cumbasil® Mite, red chicken mites were collected in a laying hen farm ("Bioland", NRW, Germany) by nocturnal, non-invasive mite traps, which were further investigated on the same day. Subsequently, the red chicken mite was determined with the corresponding development stages.

To investigate the influence of Cumbasil® Mite, mites in a Petri dish were artificially sprinkled with the product and absorbed with a piece of filter paper after excavation. The movement behaviour of the mites in the control and experimental groups was recorded on different feathers:

(a) untreated feathers, control and experimental animals were used without further treatment,

b) treated feather pollinated with Cumbasil® Mite, animals of the control and experimental group were used without further treatment,

(c) feathers cleaned with water, animals of the control and experimental group were lightly cleaned with water and then used. The mites were sprinkled with water for cleaning and left to dry in the air for two hours.

The photographic documentation was carried out under the stereomicroscope at 40x magnification (Leica MS 5) with a camera (Canon A640).

Results

Untreated feather: The animals of both variants were completely mobile on the untreated feather. The animals strived without exception towards the quill, which was climbed over.

Treated feather: All animals showed an immediate decrease in mobility. Insecure, slow walking in circles, partly backwards, was observed. Furthermore, hectic movements with the anterior extremities were observed (Fig. 1). Only one animal (from the treated group) managed to climb over the quill. Otherwise, all attempts were unsuccessful, with frequent falling on the back being observed despite sideways climbing attempts (Figs. 2 and 3). It was obvious that already a few minutes on the prepared feather had led to a renewed accumulation of particles on the underside of the mites (not shown).



Fig. 1: Light microscope image of a red chicken mite on a feather pollinated with Cumbasil® Mite. 40x magnification.

Cleansed feather: A higher mobility pattern was found than in variant b, but this was below the running and climbing activity of variant a. The same was true for variant a. However, no mite succeeded in climbing over the quill.

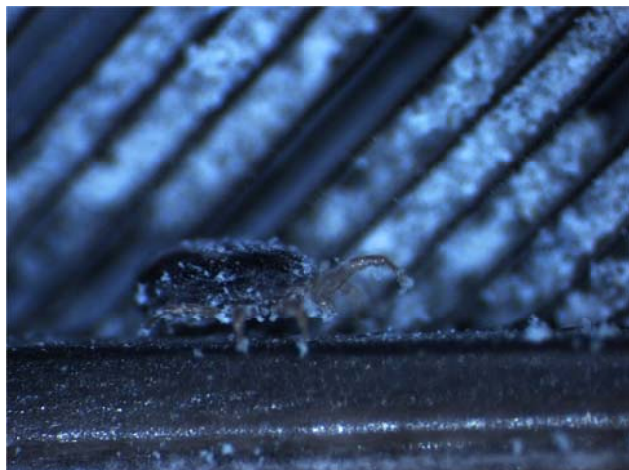


Fig. 2: Light microscope image of a sideways directed climbing attempt on the quill in the treated group. The particle stocking is visible at the tips of two extremities (Tarsi). 40x magnification.

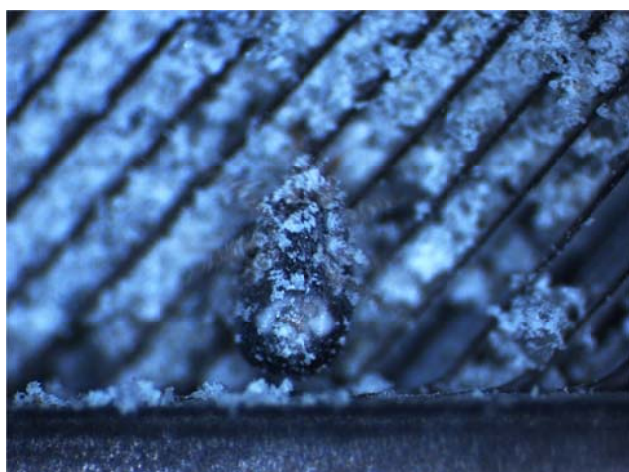


Fig. 3: Light microscope image of the back position of a red chicken mite after an attempt to reach the quill on a feather pollinated with Cumbasil® Mite. 40x magnification.

Discussion

MEWIS und ULRICHS (1999) reported that the kieselgur particles were difficult to remove when washing or brushing off their experimental animals (grain and flour beetles). This does not seem to be the case in the present study, as the treated mites showed full mobility after simple washing. The movement behaviour of the animals from the Cumbasil group after the simple cleaning step was comparable to that of the untreated control group.

Remarkable is the adherence of the particles of Cumbasil® Mite to the extremities of the red chicken mite (Fig. 3), which massively influenced the advancement, independent of the chosen movement method, and will therefore make it more difficult to reach the bird

body to perform the sucking act required for further development. Even the examination of the cleaned feather revealed this effect on all mites.

A blockage of the joints by firmly embedded Cumbasil particles could be excluded by light microscopy (cf. GARMEISTER & BOELHAUVE 2019a), so that the visibly strong attachment to the movement apparatus must be responsible for the poor mobility of the mites. The strong stocking found there coincided with a strong impairment of the otherwise very well developed climbing ability. This finding applied to all animals in the Cumbasil-treated and cleaned feather study.

The heavy stocking with Cumbasil particles resulted in a decrease in mobility. However, progress depended on the presence of particles on the surface.

A biocidal effect on the treated mites or the mites on the treated feather was not observed. These results therefore suggest a mechanical reduction of the possibility of blood sucking by the product Cumbasil® Mite.

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References

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