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Investigation of the impact of alternative control of the red chicken mite on its population and on animal health in laying hen husbandry

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Introduction

The red chicken mite (*Dermanyssus gallinae*) is widespread in poultry houses and is one of the biggest animal welfare and economic problems in laying hen houses. In addition to restlessness, cannibalism and loss of performance due to constant loss of blood, severe infestation can also lead to anaemia and death of the animals (SCHNIEDER et al. 2006; HIEPE et al. 2006). The control of the red bird mite is often difficult due to the lack of approved chemicals. The difficult legal situation regarding the approval of chemical products in the occupied barn, but not on the animal, is uncertain for poultry farmers. Silicates have long been used as an alternative and drug-free method. The amorphous silicon dioxide, as it is present in diatomaceous earths (Kieselgur), is not considered harmful to health. Crystalline silicates and their modifications, in contrast, can reach the alveoli with a sufficiently small particle size (< 5µm) and cause silicosis (quartz dust lung) in humans during prolonged exposure. Quartz fine dust can also cause lung damage in laying hens (ZENNER et al. 2009). The current fibronil discussion will probably intensify the search for alternative treatments. Witteler's Cumbasil® Mite dust bath is an alternative to an active substance-free and less lung-damaging control method. The dust bath should not only promote the natural behaviour of the animals, but also reduce the infestation pressure by the red chicken mite. In order to determine the effectiveness and to gain indications as to whether the effect of the preparation is based on biocidal mechanisms, a number of investigations were carried out at the Department of Agriculture of the South Westphalia University of Applied Sciences (SWUAS).

This study investigated the effect of the dust bath with Cumbasil® Mite on the number of mites and the animal health of laying hens.

Material & Methods

An experiment was carried out from October 2016 to August 2017 in a "Naturland" laying hen farm in NRW, Germany, with an existing bird mite infestation, in order to test the effectiveness of the prophylactic control with Cumbasil® Mite. The barn had four compartments with 3,000 animals each, so that two compartments each could be used as experimental and control groups (cf. Fig. 1). In order to record a possible mite reduction, mite traps were set up and evaluated at regular intervals. In addition, 20 animals per compartment were weighed on two dates. The weighing took place after the increase of the mite population on 13.07. and 02.08.2017. In addition, on the dates when the mite traps were laid out, the animals were assessed for their plumage and behaviour (overall impression of the herd with regard to feather pecking, jitteriness).

During the test, three dust baths were additionally installed in each of the two test compartments, which were filled once a week with 25 kg Cumbasil® Mite each. This corresponds to the application rate of 1,3 kg cumbasil per hen per year as declared by the producer.

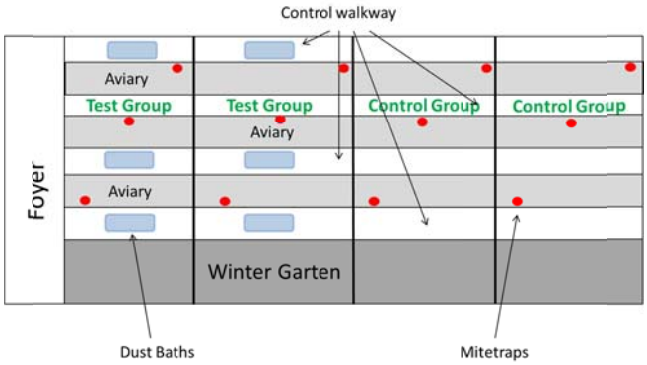

Fig.1 Experimental design

Results

A total of 18 traps were set up in each compartment on seven dates and the maximum number of mites countable per date was significantly higher in the control compartments than in the test compartments (Table 1). Due to the colder temperatures and the new housing, only a few mites (none to one or two) were found in the tubes in all compartments at the beginning of the experiment (Table 1). The maximum number of mites with 208 animals in a trap was detected during the tests in the control compartments.

Tab. 1: Overview of total captured mites per compartment

status	number of traps	min.	max.	median
Test	18	0	33	1
Test	18	0	29	0,5
Control	18	0	204	3,5
Control	18	0	208	5

The counting of the mite traps showed a moderate increase of the mite population at the beginning of the experiment, with the rising temperatures in summer the mite pressure also increased. As illustrated in Fig. 2, the increase in the untreated control compartments is significantly higher than in the test compartments. Although three traps could not be evaluated in the control group in the summer (May to August 2017), the total number of mites in the experimental group was 127 and in the control group 688 mites.

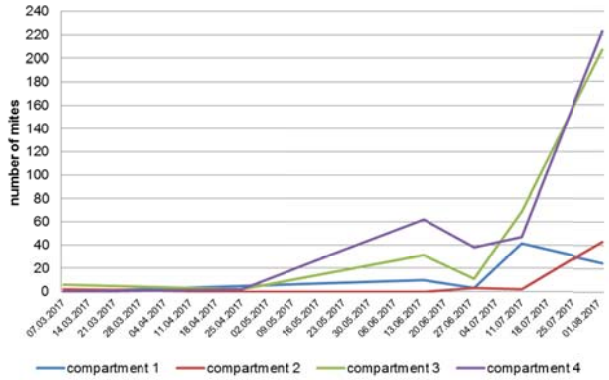

Fig. 2: Evaluation of the captured mites over time

Weighings showed significantly higher animal weights in favour of the experimental group (1.99 to 1.93 kg, p = 0.021 with n = 80 animals per group). There was no difference in the number of bottom eggs and losses. Overall, the losses were very low at less than 1% and the number of ground eggs with only 1-2 eggs laid per day in the whole barn, so that further evaluation at compartment level was not meaningful. The average laying performance was only recorded at stable level, but showed better performance compared to the previous herd, which showed a strong mite infestation (92-93% compared to 87-89% laying performance).

The evaluation of the animals revealed more restless animals with partly destroyed plumage in the control group after an increase of the mite population, which was mainly shown by loss of feathers around the cloaca. Altogether, the animals in all four compartments were more restless at this time and there was only a tendency to perceive more pickled animals in the control compartments.

Discussion

A jointly agreed termination of the experiment by the farmer and SWUAS took place when in the last six weeks the number of mites in the control group increased very rapidly and the external appearance of the control animals had already suffered as a result of itching. As a result, the control compartments were also equipped with the Cumbasil® Mite product. The available data from the abandoned practical trial clearly shows the reduction of the mite population by using the product Cumbasil® Mite. The resulting animal health can also be demonstrated by the better animal weight of the experimental group. Whether there would have been a change in the number of laying eggs or bottom eggs or their quality was not deducable from the available data. This would have to be investigated in a further experiment with a more moderate mite infestation or can also be determined by examining similar laying hen farms from an animal welfare point of view. The explosive increase of the chicken mite in the control compartments during the last four weeks of the examination shows the explosive nature of the infection. Another complicating factor for laying hen husbandry is the difficulty of interactions with active substances against the red chicken mite in the occupied barn. A continuous interaction is desirable which keeps the infestation with the chicken mite at a moderate level and thus enables stable animal health over the entire laying period. The product Cumbasil® Mite showed this potential in this initial trial, as in the trial group an increase in the mite population was also observed, but this was much more moderate. However, it is not possible to give a statement about the entire stable occupancy phase. Fortunately, the mite reproduction rate remained quite low even in the high-risk months.

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