

## An innovative approach in poultry mite management

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Insecticides have greatly improved human health and agricultural production worldwide, however their usefulness has been limited by the evolution of resistance in many major pests, with the addition factor that some species become pests only as a result of insecticide use. This aspect opens new avenues to look for insecticide formulation with new and innovative mode of action.

Currently a significant increase in acaricide resistance is being noticed which has resulted in the proliferation of hematophagous arachnids such as red poultry mite (*Dermanyssus gallinae*) and northern fowl mite (*Ornithonyssus sylviarum*) in endemic regions of the world.

These pests are becoming serious ectoparasites in poultry farms, with increased prevalence observed more often in non-intensive systems, such as free-range, barns or backyards and also more often in laying hens than in broiler birds. In addition, there are evidences of potential host-expansion such migration of *D. gallinae* infestation to ducks and turkeys. In this context it is of paramount importance that all hematophagous ectoparasite intervention strategies should take into account the future possibility of resistance development in pest populations.

Poultry red mite (*Dermanyssus gallinae*) is an important problem in Europe. The current control strategy in poultry production sites typically rely on synthetic acaricides in spite of advancements in other approaches (immunological and biotechnological). Repeated long term use of these constituents has resulted in the development of 'super-populations' of poultry mites, resistant to most of neurotoxins. Hence, the availability of effective acaricides has diminished rapidly.

Repeated use of acaricides, sometimes in high concentrations, to control infestations of red mites, have led to the pest developing resistance and intensive use of acaricides may possibly lead to accumulation of the active ingredient in chicken organs, tissues and eggs, causing harm to consumers.

A totally new strategy to control these hematophagous arachnids is the use of physical pest control, a mechanism which is a completely new approach to the current problems in poultry mite management. The product, Dergall has been developed as a sprayable formulation with a permeable, glue-like physical network structure that generates specific contact action through a fast spreading action, resulting in complete immobilization of the pest, leading to mortality.

This approach has the potential to tackle population of ecto-parasites to reduce economical losses, improve welfare, control zoonotic risk for farming workers and provide safety to consumers. The product can be used in all housing systems, extensive and intensive: the application method is different. In a battery cage housing, all areas where mites aggregate and the immediate surrounding areas, need to be sprayed from the top of the house downwards. Whilst in free range, it is recommended to apply directly on the birds.

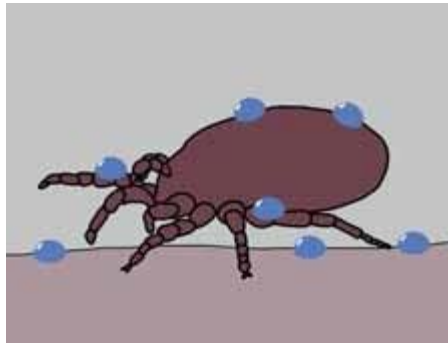


Fig.1. Deposition of standard acaricidal solution

The key parameter of this formulation is its quick and even spreading that makes it very efficient. It is due to this parameter, that it precisely proliferates over the surface and creates a cross-linking and three dimensional network structure, tightly covering all developmental stages of the pest and immobilizing them (Fig 1 and 2).

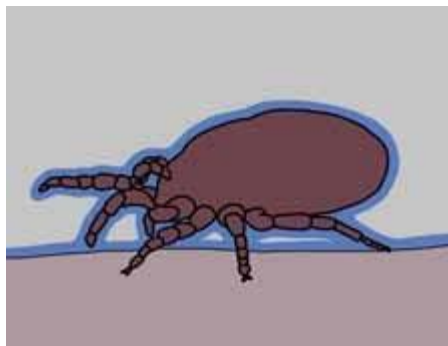


Fig.2. Effect of spreading



Fig.3. Immobilized poultry mites on cage structure

Unlike mineral oils, it creates a permeable (breathable) layer which does not disrupt the physiological processes by filling the trace holes and thus, blocking them. This technology allows penetration of the body surface of the pest and, as a secondary effect, immobilizes the valve of the spiracle, preventing them from closing or keeping them closed. This leads to dehydration, anoxic asphyxiation or osmotic stress, resulting in rupture of the gut in fed mites, leading to death (Fig 3 and 4). This is the effect of inhibition of the parasite's ability to excrete water by transpiration through the spiracles.

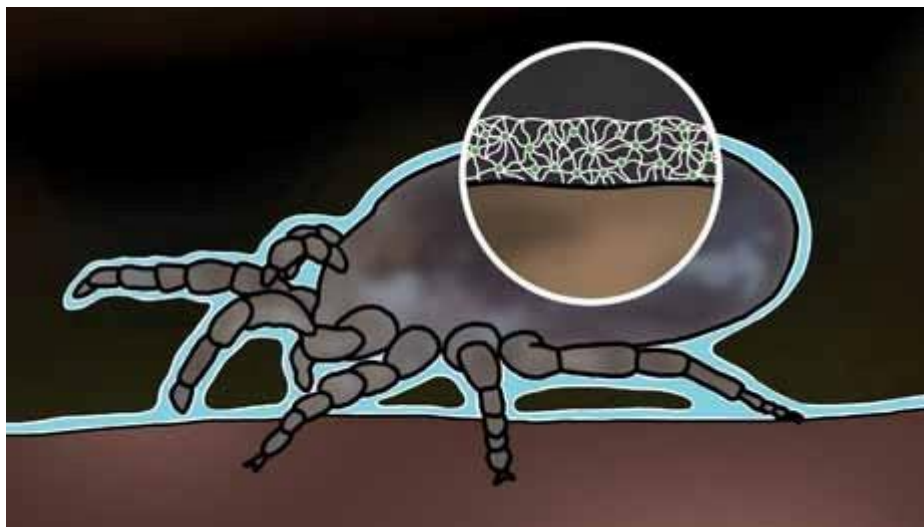


Fig. 4. 3-Dimensional network structure immobilizing the poultry mite.

Treatment of *Dermanyssus gallinae* in extensive housing systems has proven to be effective when birds were treated directly, especially in deep litter houses. Also efficacy results generated in battery cage housing and free range system (product applied directly to the vent of the birds) showed high reduction of ecto-parasite population (Fig 5). This

effect was clearly noticeable in improved poultry health condition (no mortality of birds), increased growth and egg production



Fig.5. Noticeable post-treatment improvement of health condition of the poultry. Photo provided by ICB Pharma.

#### Conclusion

This new approach in using Dergall in managing poultry mites based on a physical mode of action, with direct application onto birds, would be a perfect candidate for safe, effective and futuristic alternative preventing the possibility of pests becoming resistant.

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