

The evaluation of suitability of Dergall preparation for control of parasitic mites present in reptile terrariums in the Silesian Zoological Garden.

Blood-feeding mites are common in the vicinity of reptiles kept by humans. The most common species is the Ophionyssus natricis mite (Gervais), (Acarina:Macronyssidae).

It is a cosmopolitan, ruthless, temporary ectoparasite that also attacks small mammals and people who keep reptiles. Stable thermal conditions, high relative humidity of the air and continuous availability of hosts are the factors that contribute to maintaining a stable, numerous population of these parasites.

Fed with blood, dark red females of the parasite can be observed between the scales that cover the reptiles' bodies. Active parasitic stages are most commonly found on the head (around the mouth, eyes and auditory foramina) and around the cloaca, and in the case of an intensive invasion - on the entire surface of the reptile body. Mass infestation of mites causes changes in the general health condition and behaviour of the animals. Anaemia and decrease in the level of overall immunity are common. Scale loss and wounds on the bodies are the gateway of secondary bacterial infections accompanied by anxiety, irritation and loss of appetite of reptiles.

Ophionyssus natricis parasitizing may contribute to the spreading of viral *Inclusion Body Disease* (IBD) among reptiles. It has been shown that this mite can transmit gram-negative bacteria of the genus *Aeromonas* (*Enterobacteriaceae*) when blood feeding, causing gastrointestinal diseases (these bacteria are also dangerous for humans). Punctures by *O. natricis* may cause skin lesions and hypersensitivity in humans.

The small number of effective acaricide formulations and the observed increase in pesticide resistance in mites are the reasons to seek new solutions that will meet the requirements of complete parasite efficacy, safety for protected animals and environmental neutrality - all at the same time. High usefulness of a EctoNET used in Dergall's mode of action, has been used for control of the red mite (*Dermanyssus gallinae*) - a parasitic bird mite. In the present procedure it has been decided to assess the usefulness of pesticide-free Dergall preparation in control of parasitic mites present in reptile terrariums in the Silesian Zoological Garden.

Characteristics of Dergall.

Dergall is a pesticide-free formulation that has a physical effect on the arthropods. After the solution is dispersed in the environment and it has the necessary direct contact with the insect or mite body, a spatial, molecular network is formed that result in immobilization of the controlled arthropods (EctoNET). Their ability to move, find hosts and hideaways, take up food and their reproductive functions disappear. Immobilized respiratory valves result in uncontrolled disturbances of water and gas balance at arthropods. As a result of the contact of body surface with the efficient surfactant, the continuity of chemical structures of the cuticle of treated arthropods is broken. Laboratory observations have shown that this is the most important cause of water loss resulting in the elimination of the parasites that are controlled. Dergall also has non-specific antiseptic properties and its use contributes to the reduction of microbiological contamination and protects animals weakened by parasitic invasion from bacterial infections.

The preparation has been subjected to extensive tests that have shown:

- 1 Non-specific efficacy against many species of mites (Acarina) and insects (Insecta)
- 2 No effect on the organism of protected animals - the components of the preparation are not absorbed into the blood because no traces of chemical compounds used have been found in the tissues of directly treated animals

- 3 No absorption of the preparation through the egg casings
- 4 No impact on embryonic development of birds
- 5 Strong bactericidal activity of the preparation
- 6 Rapid degradation of chemicals used

(Test documentation for Dergall is available at the ICB Pharma archive).

Methodology of anti-parasite intervention.

According to the assessment of the Silesian Zoological Garden, the population of parasitic mites, including the *Ophionyssus natricis* species in the vicinity of the reptiles, increased significantly in the summer of 2016. In case of the threat to the condition and health of the animals, measures were taken to reduce the number of dangerous mites.

Large, most valuable reptiles of the Silesian ZOO were under protection, namely: reticulated python (*Python reticulatus*), royal python (*Python regius*) and the common boa (*Boa constrictor*), and other. The treatments and observations took place from 01/09/2016 to 30/10/2016

1st stage of intervention:

- 1 All small items that could have been used by mites as the places for hiding and metamorphosis were removed from the breeding rooms and then disposed of.
- 2 A 0.6% aqueous solution of Dergall was used for spraying. Approx. 70 ml of solution was used per 1 m².
- 3 With the use of Marolex-type electric sprayer with a nozzle diameter of 0.6 mm, the solution was distributed inside the terrarium, including the floor, walls, ceiling, lighting and heating items that were switched-off, grates and ventilation ducts, as well as tree boughs that are the permanent pieces of equipment.
- 4 The entire body surface of the reptiles, including the abdomen, has been sprayed.
- 5 The corridors adjacent to the terrariums and the backup rooms have been sprayed as well.

2nd stage of intervention:

Six days after the first spraying, all the steps from stage 1 were repeated. The aim of this procedure was to control the new generation of active mites that had started the parasitic phase after egg hatching.

After the treatments described hereinabove, the health and behaviour of the reptiles treated with Dergall were being observed. Attention was also been paid to the possibility of the emergence of a new generation of parasitic mites in terrariums and on the reptiles body surface.

Results obtained.

- 1 As a result of the steps described in the application procedure for Dergall at a concentration of 0.6%, the parasitic mites populations on and around the reptiles were effectively eliminated.
- 2 No negative impact of Dergall preparation used at a concentration of 0.6% on the health and behaviour of protected reptiles was observed.
- 3 After elimination of parasitic mites a gradual improvement of the health condition of the protected reptiles was observed.
- 4 After the lapse of 2 months from the Dergall application, no recovery of the parasitic mite population was observed.
- 5 No adverse effects of Dergall preparation on the health of employees who were spraying was observed.

Conclusions.

Dergall preparation, used at a concentration of 0.6%, has proven to be highly useful for the control of parasitic mites in reptile terrariums in the Silesian Zoological Garden.

Further observation of the animals is crucial in order to determine the probable time of restoration of the parasites population. On this basis it will be possible to draw a conclusion on the duration of protective effect of the preparation and the need for repeated intervention.

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