Success factors for controlling poultry red mites in laying hens

Poultry red mites (PRM) are a major concern for the poultry sector, especially because they severely impact the welfare and performance of laying hens. For many decades, controlling the parasites has been problematic.

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At the end of 2017 in the EU, fluralaner (Exzolt, MSD Animal Health) became available as a new therapeutic pharmaceutical for combating PRM infestations in poultry.

A treatment consists of two administrations through the drinking water with a one-week interval. Mites taking a bloodmeal on treated birds, rapidly die during the period of efficacy (15 days). This cleans the flock from PRM. Afterwards, re-infestation should be avoided.

From November 2017 to October 2018, the Belgian poultry team of MSD Animal Health assisted farmers and veterinarians with the administration of Exzolt in 81 flocks of PRM infested laying hens. Immediately prior to the start of the treatment and three weeks later, they monitored the PRM infestation level in the poultry house.

This was done visually by using a standardised scoring system as well as through counting the number of PRM that were caught in a validated mite trap assay. In addition, they established a score for external and internal biosecurity.

This monitoring system had been developed specifically to estimate the biosecurity defence against introduction of PRM into the farms and the subsequent spread over the premises. It included 63 check points that are important for the kinetics of PRM between and within farms.

A very consistent and strong reduction of PRM

After treatment, PRM were no longer visually observed in any of the monitored flocks. Calculated from the mite trap assays, the reduction of PRM in the flocks varied between 99.5% and 100%. The average reduction measured over all the houses was 99.98%. In conclusion, the treatment had reached its goal in all the premises. The farmers were asked to stay alert and report when PRM reoccurred or, if still negative at that point, when the flock was slaughtered.

Key factors for success longer term

In 43% of all treated houses, PRM had not reoccurred by the time the flocks were loaded for slaughter. Of course, the time span between treatment and slaughter differed from one flock to another. The longest amounted to 450 days! During this period, no treatment against PRM of any kind had been done.

In 57% of the treated flocks, PRM were re-observed at varying time spans after treatment. The earliest report was at 30 days post treatment, the latest at 167 days.

Since all flocks had been treated in the same way and since treatment had been proven very efficacious, this high variation was quite surprising. To find an explanation for the varying period that the hen houses remained free of PRM after treatment, a regression model was developed. For this purpose, the data available at the start of treatment was tested in a stepwise procedure.

The available data included size of the treated flocks, age of the birds, season, housing system (enriched cages or aviary), pre-treatment visual infestation level, internal and external biosecurity scores and whether all flocks on the farm were treated simultaneously. A highly significant regression model ($p=<0.01$) for explaining the time spans that laying hen flocks remained visually free after successful treatment with Exzolt, could be established by using the following variables as predictors:

- **External biosecurity score.**

The model linked each percentage of the external biosecurity score to 1.19 PRM-free days. Since the external biosecurity score of the monitored farms ranged from 45-90%, this model could allocate up to 54 days (= 45 x 1.19) of difference in the post-treatment PRM-free period to the farms' external biosecurity level.

The situation before treatment in a PRM-infested house of laying hens. A mite trap installed next to a large cluster of PRM.

- **All flocks treated at the same time.**

Simultaneously applying treatment in all houses of the farm accounted for 72 extra PRM-free days, compared to farms where some houses were left untreated. All farmers had been advised to treat all their flocks at the same time, but some decided to include only the most heavily infested ones.

- **Treatment at an early stage of infestation.**

Starting treatment at a low to moderate visual infestation level instead of allowing the PRM population to grow to higher levels first, was valued with 35 PRM-free days. When treatment in infested farms also included the flocks that were still visually negative for PRM (true negatives or infestation below the visual detection level), these flocks on average remained free of PRM for 172 days longer than flocks that were already visually positive when treatment was started.

High external biosecurity

The regression model recognised the external biosecurity score as an important predictor to explain the PRM-free period

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after treatment. This may indicate that re-introduction of PRM from outside the premises has regularly occurred among the monitored farms.

External biosecurity refers to the measures that can be taken to avoid introduction of PRM by people, animals and materials. Many companies did not have a good procedure to prevent the introduction of PRM at the delivery of new chickens.

The new hens and the transport crates might be carrying PRM without being noticed. Such a PRM infested flock subsequently becomes a possible source of infection to the other flocks on the farm.

Intensive monitoring combined with immediate action, if needed, could bring a solution in such circumstances.

Simultaneous treatment

Another predictor of the model was whether all flocks on the farm were treated simultaneously. If not, the treated flocks turned positive again after a shorter period of time.

This may thus confirm that spread of PRM from one flock to another, is a consistent feature in infested farms. To obtain a long-term effect, treating all flocks simultaneously therefore seems to be appropriate.

Low infestation level

The lower the infestation level at the start of treatment, the longer treated flocks remain visually free of PRM, is the third conclusion of the model. For the most part, PRM are located near the hens. Through contamination of materials, clothes, people etc, a small part of the PRM population may be carried to distant places such as the changing room or the egg room.

These stray PRM might not be able to reach treated hens during the two week period they have effective blood levels of fluralaner, and thus remain as a possible source of re-infestation. It seems logical to assume that the number of stray mites increases as the PRM infestation level inside the shed is higher.

Postponing treatment could thus increase the risk of re-infestation. Besides starting treatment at an infestation level as low as possible, taking thorough hygienic measures to prevent re-introduction is recommended.

The explanatory potential of the above model is 50%, meaning that it explains half of the variation in PRM-free period after treatment. This is a satisfactory result since the model was established with field data, in which uncontrolled influences and measurement uncertainties are inevitable.

The fact that it was unpredictable if, how and when the biosecurity defence of a farm would be challenged with PRM, is an example of an uncontrolled field influence. The observation skills for detecting re-infestation probably differed from one farmer to another and that may have led to some measurement uncertainty.

Further, in flocks that were still PRM-negative at slaughter age, the time span between treatment and slaughter had to be used as the best estimator for the PRM-free period. Especially in flocks that were slaughtered rather early after the treatment, this period may therefore have been underestimated.

Efficacious and sustainable

The drinking water treatment with Exzolt brings a highly efficacious solution for farms struggling with poultry red mite infestations.

Obtaining a long-term effect from this treatment is related to maintaining high standards of external biosecurity, treating all flocks simultaneously and starting treatment as quickly as possible after infestation is noted.

This allows poultry farmers to use the product in a sustainable way, treat as few times as possible and enjoy the effect for as long as possible. ■

References are available from the author on request