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How to carry out monitoring for poultry red mite in layer houses

INNOVATION

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Why is monitoring important?

Monitoring of the population is a crucial step towards effective and sustainable control. Treatment should be carried out early on when the first mites are found. When red mites reach high infestation the hens' productivity may already have been impacted and the range of effective control actions becomes more limited. For more information on actions and treatments, please refer to the guide 'Sustainable control and treatmentof poultry red mite'.

Through monitoring you can follow the growth in the red mite population and ensure effective actions or control measures are taken[1-2]. Routine monitoring will provide answers to a number of questions:

- Are red mites present in my layer house?
- Where in the house are red mite present?
- How does the red mite population grow over time?
- When do I need to take further action to control or treat for red mite?
- What effect did control actions have? How effective have they been?

Monitoring methods

There are several methods available for monitoring red mite infestations[1-2]. Some are very simple to implement and do not require you to place equipment or tools in the layer house (i.e. non-trapping methods). For others, red mites are captured or lured into traps that are easy and cheap to fabricate. You can find practical instructions on some easy to do monitoring methods on the MiteControl project webpage.

Short overviews of the monitoring techniques which you can easily implement on your farm are given below. We describe both non-trapping and trapping methods. At the end of the guide you will find a table with some key features (Table 1) to help you decide which monitoring methods best suit your situation.

Non-trapping method

Mite Monitoring Score (MMS)

The MMS-method relies on the visual assessment of an area of 1m² for the presence and appearance of red mites (Figure 1)[1-3]. You then appoint a score according to the size of the red mite clusters for each monitoring point.

Figure 1: Carrying out MMS in the layer house

Trapping methods

Figure 2: Stick traps attached under a perch

Stick traps

A 12 cm long wooden stick with a screw in the middle is placed in a 10 cm long PVC tube[1-2-4]. The tube is attached under a perch or slats with cable ties (Figure 2). To assess the presence of red mites, the stick is briefly removed from the tube and scored accordingly.

Tape traps

Painter's tape can be folded and used in enriched cage housing systems to trap red mites[1-5-6]. Their presence or absence is assessed per tape trap (Figure 3).

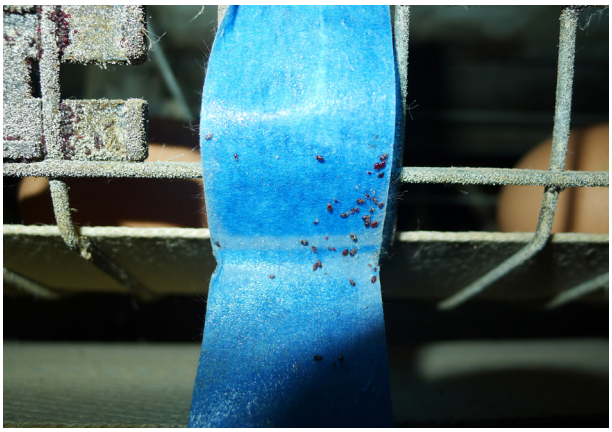

Figure 3: Using tape traps in enriched cage houses

Corrugated cardboard traps

This is a simple monitoring approach where a cardboard insert (8 cm x 8 cm) is placed in a 10 cm long PVC tube under a perch or slats (Figure 4). Cardboard inserts are removed after 48 hours and frozen to kill the mites that were trapped. The mites in each cardboard trap are then counted. The corrugated cardboard trap thus provides a quantifiable measurement that gives you information on the evolution of the red mite population[1-7-8].

Figure 4: Placement of cardboard trap under a perch

Figure 5: Placement of the AviVet Red Mite TrapTM under a perch

AviVet Red Mite Trap™

A scientifically validated monitoring method is the AviVet Red Mite Trap™ which is comprised of a piece of corrugated cardboard in a tylene tube (Figure 5)[9]. After 48 hours, the tylene tube with cardboard insert is removed and frozen to kill the mites. The mites can either be weighed or counted. The weight or number provides information on the evolution of the red mite infestation. The analysis can be done by a veterinarian who can then advise if further actions are warranted.

How to decide which monitoring method to use

In this guide we have briefly described some monitoring methods that could be easily implemented on-farm. In order to make an informed choice on which method would suit you best, we have listed some important features of each method in Table 1. More detailed information on these techniques are available as short instructional infographics on the MiteControl webpage. Additional monitoring methods also exist which are not covered in this guide. New methods such as monitoring based on hen behaviour using cameras are also

Table 1: Features of the individual monitoring methods to inform farmers' choice of preferred method(s)

Monitoring method	Quick to do?	Cheap materials?	Easy for farmer to analyse?	Provides information on spatial distribution?	Suitable for all housing systems?	Scores (categories) or numerical (weights/mite counts)?	Remarks
MMS	N	Y	Y/N	Y	Y	Score	Requires experience to identify suitable monitoring points
Stick trap	Y	Y	Y	N	Y	Score	Useful method to identify when the population starts to increase but less informative as the infestation progresses
Tape trap	Y	Y	Y	N	N	Score	Useful method to identify when the population starts to increase but less informative as the infestation progresses
Corrugated cardboard trap	N	Y	N	N	Y	Numerical (counts)	Counting mites is labour intensive
AviVet Red Mite TrapTM	Y/N	N	Y/N	N	Y	Numerical (weights/ counts)	Traps are purchased, which makes it more expensive than self-fabricated traps Outsourcing the analysis to a veterinarian reduces the effort required from the farmer; but also adds cost. Veterinarian will provide the results and advise on actions to take

(Y = yes; N = no)

under development.

How to interpret your monitoring results

Interpreting monitoring results can be quite challenging. No two layer houses are the same and even between consecutive flocks mite levels can differ greatly. However, consistent monitoring on a regular basis will generate information on the evolution of the red mite infestation in your flock. This can be used to aid your decisions about when to implement red mite control measures and also to assess the effectiveness of those measures.

No single method is able to tell you exactly how many red mite are present in your layer house. The actual size of the population cannot be established. But as a general reference, Table 2 gives an indication of how mean monitoring results correspond with red mite infestation level (i.e. 'low', 'medium' or 'high') to help you interpret your results.

Table 2: Overview for the interpretation of monitoring results (as based on [2, 3, 8, 9] and thresholds defined by AviVet)

Infestation level	MMS	Stick traps	Tape traps	Corrugated card-board traps	AviVet Red Mite TrapTM
	(mean score)	(mean score)	(% of traps positive)	(mean counts)	(mean weight in mg)
Low	< 1	< 1	< 20%	1 - 250	≤ 50
Medium	1 - 2	1 - 2	20-50%	251 - 500	51 - 250
High	> 2	> 2	> 50%	> 500	> 250

"I want to monitor red mite, so where do I start?"

Step 1: Please **choose** the **monitoring technique(s)** of your preference (please refer to our guide "Easy to do monitoring methods" for instructions on different monitoring techniques)

Step 2: Choose appropriate monitoring sites in your layer house. Make sure the monitoring sites are evenly spread throughout the house (in length, width and height). Place traps near where hens rest at night and along paths red mites will travel to feed on the birds (joins in the housing system, underneath perches or slats):

- For adequate monitoring, **12** is the **minimum number** of traps/monitoring points required per layer house (more traps are always better though!)
- Take care not to place traps next to clusters of mites as they are unlikely to leave their cluster to enter the trap
- Place traps at least **1m apart** to avoid them influencing each other
- Use a **unique number** to identify every monitoring point and make sure you can easily recognise these points in the layer house (e.g. use coloured labels to indicate where traps or MMS points are located). Drawing a map of the trap locations is useful to record where the traps are situated.

Step 3: Monitoring should be carried out **at least once a month** (but preferably more frequently) to keep a close eye on red mite population trends and ensure timely interventions can be applied to control red mite numbers

- Always use the same monitoring points throughout the flock and **keep records** (on paper or digitally)
- Routine monitoring throughout the entire flock will enable you to interpret results, assess the evolution of the red mite infestation, make informed decisions for the control of red mites and evaluate the effect of the control measures taken

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