

Cardboard traps

This monitoring approach provides a quantitative measurement of red mite numbers. The traps consist of a piece of corrugated cardboard of 8x8 cm placed in a 10 cm long PVC tube. These materials can be found in any hardware store. The cardboard is a good place for red mites to hide.

Material needed in poultry house:

Corrugated cardboard inserts (8 cm x 8 cm), PVC tube (10 cm length), cable ties, bottle brush, freezer/ziplock bag

Material needed at the office/lab:

Freezer, Petri dish, Camera (or phone), computer with Image J software, scoring sheet, pen



How?

Identify 12 monitoring points in your poultry house, regardless of building size:

- ▶ Choose monitoring points throughout the whole house and close to typical hiding places or close to where birds sleep at night (under the perches for example)
- ▶ Each monitoring point should be at least 3 meters apart
- ▶ Choose convenient points as you will have to check them often!

Fix the PVC tubes at each monitoring point underneath perches or other suitable structures of the system using cable ties or clips. The tubes can remain in place for the whole flock. Write a number on/close to the PVC for identification purposes.

To set up the trap:

- ▶ Cut a piece of corrugated cardboard of 8 cm x 8 cm. The length should be slightly smaller than the length of the PVC tube to avoid birds plucking the cardboard out
- ▶ Roll the piece of cardboard, smooth side inwards
- ▶ Place the cardboard inside the trap
- ▶ Leave the cardboard for 48 hours in place

Scoring method A: number of mites

- ▶ After 48 hours, remove the cardboard from the tube
- ▶ Immediately put it in an individually numbered freezing bag. Delaying this step could cause mites to crawl out of the trap. Do not put several cardboards inside the same bag!
- ▶ Put the bag in a freezer for at least 48h, until the mites are dead
- ▶ Take out the bag from the freezer, unroll, shake and tear the cardboard apart and throw the cardboard away (it cannot be used again)
- ▶ Put the content of the bag inside a Petri dish or a similar container. If there are many mites it is necessary to scatter them over several Petri dishes or a bigger container
- ▶ If there are just a few mites, count them directly. If there are many mites, you can take a picture and use free image analysis software (© Image J). Check our guide for using © Image J software for counting mites – see below)
- ▶ Write down the results per trap on a monitoring sheet
- ▶ Calculate the mean number of mites for all traps
- ▶ Keep records of all monitoring results, this will allow you to follow the evolution of the red mite population

Scoring method B : absence/presence

- ▶ After 48 hours, remove the cardboard from the PVC tube
- ▶ Unroll and shake the cardboard inside a plastic bag.
- ▶ Look for the presence of mites in the bag and mark the results per trap on a monitoring sheet. If in doubt about a small particle, crush it with your finger: if liquid is released, it is red mite(s)
- ▶ Calculate the percentage of positive traps
- ▶ Keep records of all monitoring results, this will allow you to follow the evolution of the red mite population

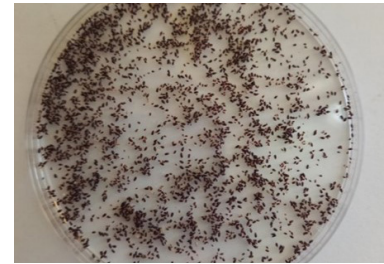
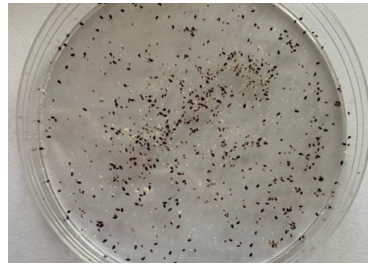
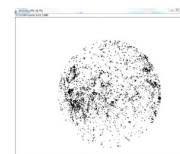
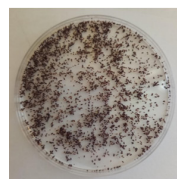


image J: Free open source software
Available at: <https://imagej.net/welcome>



File	Edit	Font	Results
Area	Mean	Min	Max
1607	1033	37.021	19 51
1608	61	47.344	41 51
1609	205	36.613	14 51
1640	163	45.614	32 51
1641	82	45.110	30 51
1642	372	32.081	15 51
1645	45.210	30 51	

Number of mites
shown at bottom left

Cleaning the trap: before using the PVC tube with another piece of cardboard, clean the PVC tube with a bottle brush as mites might still be in the tube affecting future monitoring

Interpretation of results

Mean trap results give you a rough indication of the infestation level ▶

Interpretation of results: cardboard traps

Infestation level	Mean PRM counts (Method A)	% of positive traps (Method B)
Low	< 250	< 20%
Medium	251 - 500	20 - 50%
High	> 500	> 50%

For more information

Video illustration of the cardboard trap method available on the MiteControl webpage

Complementary information on monitoring:

- ▶ Monitoring recording sheet
- ▶ Guide "How to carry out monitoring for poultry red mite in layer houses"
- ▶ Guidance for counting mites using image analysis software
- ▶ Other guides:
 - ▶ Biology and life cycle of poultry red mite
 - ▶ Sustainable control and treatment of poultry red mites

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

Infestation level	MMS (mites per trap)	Stick traps (chick traps)	Tape traps (% of positive traps)	Cardboard traps (mites per trap)	AviVet Red Mite Trap (mites caught in net)
Low	< 1	< 1	< 20%	< 100	< 500 mg
Medium	1 - 2	1 - 2	20 - 50%	101 - 500	51 - 2500 mg
High	> 2	> 2	> 50%	> 500	> 2500 mg

These resources are available on our webpages:



www.nweurope.eu



www.farmpep.net

Mite Monitoring Score (MMS)

The Mite Monitoring Score (MMS) is a monitoring method that relies on visual scoring of the presence of red mites in your poultry house. No traps are used. At each monitoring point visually assess an area 1 m² for the presence and appearance of red mites.

Material needed:

Head lamp/torch, scoring sheet, pen



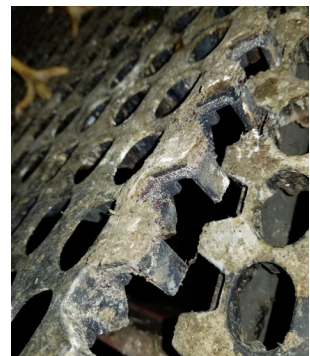
How?

Identify 12 monitoring areas in your poultry house, regardless of building size

- ▶ Choose convenient points as you will have to check them often!
- ▶ For aviaries and cage systems: choose areas at different levels throughout the poultry house and locations for which you know historically red mites are seen
- ▶ For single tier systems: choose the different areas of equal proportions between nests, slats and perches
- ▶ Each point must be at least 4/5 meters apart from each other
- ▶ Make sure to mark all monitoring points so you can always easily identify them and evaluate the same point throughout the flock

Assess the designated areas (1 m² each) for the presence of red mites

- ▶ Use a head lamp to improve your vision of the structures of the housing system (but be careful, it can stress out the birds)
- ▶ Be sure to look at the entire 1 m² areas : behind/below the different elements of the structure (bars, mats,...). In single tier housing system, to properly evaluate the areas, you may need to lift some equipment (perch bar, nest roof or slats)



Scoring system

Scoring:

- ▶ Give each monitoring point a score from '0' to '5' that represents your observation based on localisation of mites and the number of mites / size of aggregates (MMS)
- ▶ Calculate the mean of the 12 points to have a general score
- ▶ Keep records of all monitoring results, this will allow you to follow the evolution of the red mite population

SCORE	MITES	ILLUSTRATION
0	no PRM seen	
1	Individual PRM or clusters seen in cracks and crevices (no aggregates)	
2	Individual PRM or clusters seen in unprotected places of the housing system	
3	PRM aggregates (< 1cm²) seen in cracks and crevices	
4	PRM aggregates (> 1cm²) seen in unprotected places of the housing system	
5	PRM aggregates (> 3cm²) seen in unprotected places of the housing system	

Interpretation of results

Mean MMS scores give you a rough indication of the infestation level ▶

Interpretation of results: MMS

Infestation level	Mean score
Low	< 1
Medium	1-2
High	> 2

For more information

Video illustration of the MMS method available on the MiteControl webpage

Complementary information on monitoring:

- ▶ Monitoring recording sheet
- ▶ Guide "How to carry out monitoring for poultry red mite in layer houses"
- ▶ Other guides:
 - ▶ Biology and life cycle of poultry red mite
 - ▶ Sustainable control and treatment of poultry red mites

interreg North-West Europe MiteControl
The province of Antwerp
KOPPERT ITAVI
How to carry out monitoring for poultry red mite in layer houses
INNOVATION

interreg North-West Europe MiteControl
The province of Antwerp
Recording sheet red mite monitoring
Method used:
Date:
Monitoring point ID: (Use the same monitoring points throughout the length of the flock - marking their locations will help you to easily identify them in the poultry house)
1:
2:
3:
4:
5:
6:
7:
8:
9:
10:
11:
12:
Mean:
Overview for the interpretation of monitoring results
Infestation level MMS (mean score) Stick traps (mean count) Tape traps (% of positive traps) Cardboard traps (mean count) AviVet Red Mite Trap (mean weight in mg)
Low < 1 < 1 < 20% < 100 < 100 mg
Medium 1-2 1-2 20-50% 201-500 0.1-200 mg
High > 2 > 2 > 50% > 500 > 200 mg
*IP: Compare with previous results to see the evolution of red mite infestation in your poultry house

These resources are available on our webpages:



www.nweurope.eu



www.farmpep.net

Stick traps

The stick traps rely on the visual assessment of a 12 cm long wooden stick placed in a 10 cm long PVC tube. A screw in the middle of the stick ensures it is firmly held inside and prevents the birds from pulling it out of the tube. These materials can easily be found in any hardware store.

Material needed:

Wooden stick (12 cm length, 1.2 cm diameter), PVC tube (10 cm length), screw, cable ties, bottle brush, scoring sheet, pen



How?

Identify 12 monitoring points in your poultry house, regardless of building size :

- ▶ Choose convenient points as you will have to check them often!
- ▶ Choose monitoring points throughout the whole house and close to typical hiding places or close to where birds sleep at night (e.g. under the perches)
- ▶ Each monitoring point should be at least 3 meters apart

To set up the trap:

- ▶ Cut a piece of 10 cm PVC tube
- ▶ Fix the PVC tubes at each monitoring point identified to bars of the system using cable ties or clips
- ▶ Cut a piece of wooden stick of 12 cm long. The stick should be slightly longer than the PVC tube to ease the removal of the stick from the tube. Also, be careful not to have rough edges or cracks in the sticks which make them very difficult to clean. Rough edges can be sanded down. If the stick has cracks, discard it
- ▶ Insert a screw in the middle of the stick, it avoids birds plucking the stick out
- ▶ Place the stick inside the trap and twist so it is blocked in the tube. If this doesn't work, loosen the screw

The traps can remain in place for the whole flock

Scoring:

- ▶ After 7 days, remove the stick from the PVC tube (you might have to twist it)
- ▶ Score the stick right away as mites might crawl out if you delay the scoring. Look at the stick and give it a score from 0 to 4. You can use a head lamp to improve visibility (but be careful, it can stress out the birds)
- ▶ Write down the score for each trap on a monitoring sheet
- ▶ Calculate the mean score of all traps
- ▶ Keep records of all monitoring results, this will allow you to follow the evolution of the red mite population

Cleaning the trap: before re-inserting the stick in the tube, clean the tube and stick with a bottle brush or brush as mites still in the tube/ on the stick might false future monitoring. If the sticks get too difficult to clean, consider changing it.





Scoring system

SCORE	MITES	ILLUSTRATION
0	no mites	
1	Few individual mites present (easily counted)	
2	Several mites are present, both individual and small groups of mites can be seen (countable)	
3	Many mites, larger clusters are seen but the stick is still visible (uncountable)	
4	Very many mites, large clusters, huge infestation (uncountable)	

Interpretation of results

Mean trap results give you a rough indication of the infestation level ▶

Interpretation of results: stick traps

Infestation level	Mean score
Low	< 1
Medium	1-2
High	> 2

For more information

Video illustration of the stick trap method available on the MiteControl webpage

Complementary information on monitoring:

- ▶ Monitoring recording sheet
- ▶ Guide "How to carry out monitoring for poultry red mite in layer houses"
- ▶ Other guides:
 - ▶ Biology and life cycle of poultry red mite
 - ▶ Sustainable control and treatment of poultry red mites

Infestation level	MMS (mean score)	Stick traps (mean score)	Tapen traps (% of positive traps) (mean count)	Cardboard traps (mean count)	Aviject Red Mite Trap (mean weight in mg)
Low	< 1	< 20%	< 20%	< 500	< 50 mg
Medium	1 - 2	20 - 50%	20 - 50%	500 - 2500	50 - 250 mg
High	> 2	> 50%	> 50%	> 2500	> 250 mg

These resources are available on our webpages:



www.nweurope.eu



www.farmpep.net

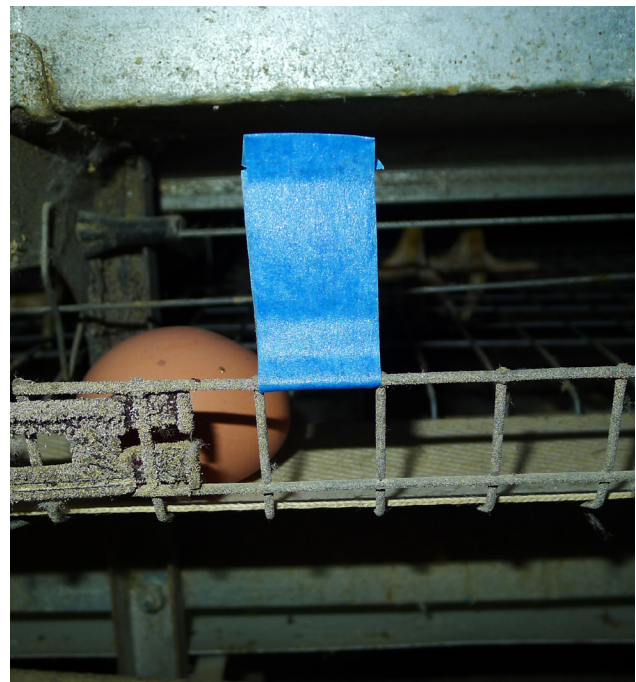
Tape traps

The tape trap is an easy, simple and cheap monitoring method that relies on trapping mites in a folded piece of blue painter's tape that can be found in any hardware store. The trap is placed around a bar or wire of the enriched cage system to recreate a typical mite hiding spot. The advantage of the blue colour is that it contrasts with the different coloured mites.

Only for enriched cage systems!

Material needed:

Blue painter's tape (2.5 cm width), head lamp, scoring sheet, pen



How?

Identify 12 monitoring points in your poultry house, regardless of building size:

- ▶ Choose monitoring points throughout the whole house and close to typical hiding places or close to where birds sleep at night
- ▶ Choose bars that are out of reach of the birds because they can destroy the trap. Therefore, this method is only recommended to use in enriched caged systems
- ▶ To avoid bending over too often when setting up and collecting the traps, choose bars that can be reached easily
- ▶ Each monitoring point should be at least 3 meters apart

To set up the trap:

- ▶ Rip a piece of tape appropriate for the diameter of the bar (typically 8-10 cm long)
- ▶ Fold both ends of the piece of tape so facilitate the removal when collecting the trap
- ▶ Roll the tape around the bar and stick the two ends together. Be careful, it must not be too loose in order for the trap to stay in position and at the same time not too tight: a small hiding spot needs to be there in order for the mite to go in

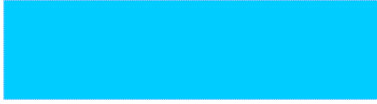
- ▶ Give a number to the trap for recording purposes
- ▶ Leave the trap in place for 7 days

Scoring:

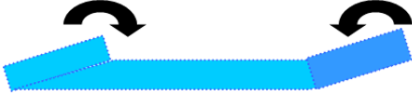
- ▶ After 7 days, open the trap with the 2 folded ends
- ▶ Score the trap right away as mites might crawl out of the trap if you delay the scoring. Look at the center of the trap and give it a score: '0' when mites are absent or '1' when present. You can use a head lamp to improve your vision of the content of the trap (but be careful, it can stress out the birds)
- ▶ If there is a hesitation if what you see is a mite or not, crush it with your fingernail. If liquid oozes out, then it is considered to be a mite. If not, it is considered to be dust
- ▶ Record all individual results on a recording sheet
- ▶ Calculate the percentage of positive traps
- ▶ Keep records of all monitoring results, this will allow you to follow the evolution of the red mite population

Scoring system

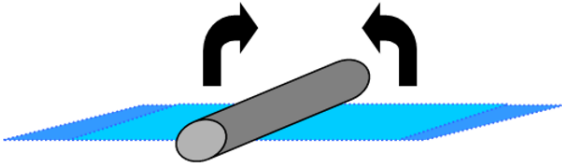
1) Cut out a piece of tape



2) Fold both ends



3) Fold it around the bar



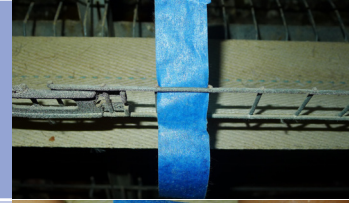
SCORE

MITES

ILLUSTRATION

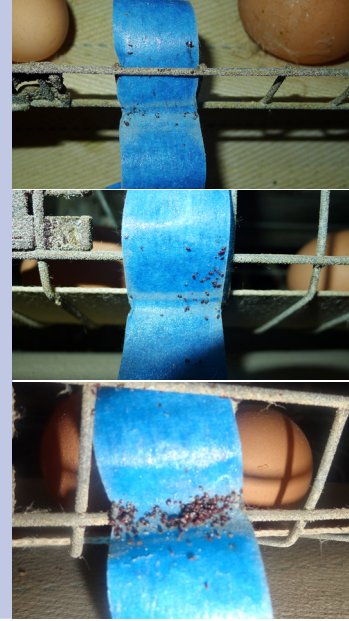
Absent

no PRM seen



Present

PRM seen (from a single mite to large aggregates)



Interpretation of results

Mean trap results give you a rough indication of the infestation level ▶

Interpretation of results: tape traps

Infestation level	% of positive traps
Low	< 20%
Medium	20 - 50%
High	> 50%

For more information

Video illustration of the tape trap method available on the MiteControl webpage

Complementary information on monitoring:

- ▶ Monitoring recording sheet
- ▶ Guide "How to carry out monitoring for poultry red mite in layer houses"
- ▶ Other guides:
 - ▶ Biology and life cycle of poultry red mite
 - ▶ Sustainable control and treatment of poultry red mites

These resources are available on our webpages:



www.nweurope.eu



www.farmpep.net