Minimizing negative effects of Poultry Red Mite (*Dermanyssus gallinae*) in layer farms using an automated mite monitoring device

August 28 2013, M.F. Mul (MSc.)

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Help me! The vampires are killing me!
Abstract

- Poultry Red Mite (*Dermanyssus gallinae*) = ectoparasite
- Worldwide problem
- Control difficult
- Monitoring for timely and effective treatment
- Current monitoring is time consuming
- Our solution: Automated monitoring device
- Monitoring device: 1) model + 2) automated mite counter
- Preliminary results: 1) first step of model is finalized 2) sensor 100% detection, attractive, no clustering of mites
Background: Poultry Red Mite

- Most common ectoparasite in poultry
- All over the world
- 0.6 – 0.8 mm long, grey-red in colour.
- Lives in cracks and crevices in vicinity of hens
- Feeds on blood of poultry, birds, mouse, humans
- Stays on hen only for blood meal (30 – 60 minutes)
- Nocturnal
Lifecycle (5,5 – 17 days)

12-24 hours

V. Maurer, FiBL, Switzerland
Estimated costs in Europe € 130 million/annum!
Control of PRM

- Difficult due to
  - Development of resistance against Acaricides
  - Ban on Acaricides
  - Hiding in cracks and crevices
Farmers notice a PRM infestation when:

- Mites are seen on belt and feeders
- Clumps of mites are seen
- Blood spots are detected on eggs
- Employees are bitten

**THIS IS TOO LATE: INFESTATION IS HEAVY AND WIDESPREAD!!!!**
Why treatment in time/on time?

- Efficacy treatment
- Treatment costs (estimated €0.14/hen/laying round)
- Loss of production (estimated €0.29/hen/laying round)
Monitoring

- Monitoring to:
  - Detect a PRM infestation early
  - Point out best moment for applying control measures
  - Carry out local measures for contesting PRM
  - Determine the effectiveness of control measures
Monitoring methods

Present monitoring devices:
- Labour intensive
- Not distinctive enough
Monitoring in the future: automated mite monitor

- PRM mite monitoring tool=
  - Automatic mite counter
  - Dynamic adaptive model for each poultry facility

- Gives an indication of presence, spread and developing trend
- Help the farmer to identify the moment and place of application control method
Automated Mite Monitor: model

- A Dynamic adaptive model fits itself for
  - each housing facility
  - Management
  - Age of hen
  - Temperatures

- Model: first step
Automated mite monitor: automated counter

1. Sensor and processor counting mites
2. Attractive enough for mites to walk into
3. Prevent clutching of mites
4. Robust

- Ad 1) sensor detecting 100% nymfs-adults
- Ad 2) results laboratory test ≠ results field test:
  Further development in field: current recovery probably enough to detect differences
- Ad 3) sucking with 7.5 m/s
Conclusion

- Poultry Red Mite (*Dermanyssus gallinae*) = World wide problem
- Monitoring necessary for timely and effective treatment
- Current monitoring is time consuming
- Our solution: Automated monitoring device
- Monitoring device: 1) model + 2) automated mite counter
- Preliminary results: 1) first step of model is finalized 2) sensor 100% detection, attractive, no clustering of mites
Future research

- Finalize the development mite counter in poultry farm including robustness check
- Determine the relation counted number of mite – actual number of mites in small laying hen cages
- Develop models with available data (field trials, monitoring data from farms and laboratory tests):
  - Development of PRM in layer house including effect of control measurements.
  - Development of production performance incl. damaging effects of PRM
- Twin the counter and the model and test in small laying hen cages
Thank you for your attention. We need your help!