# Preliminary trials of in-vitro efficacy of miticides against the chicken mite (*Dermanyssus gallinae*) in New Zealand

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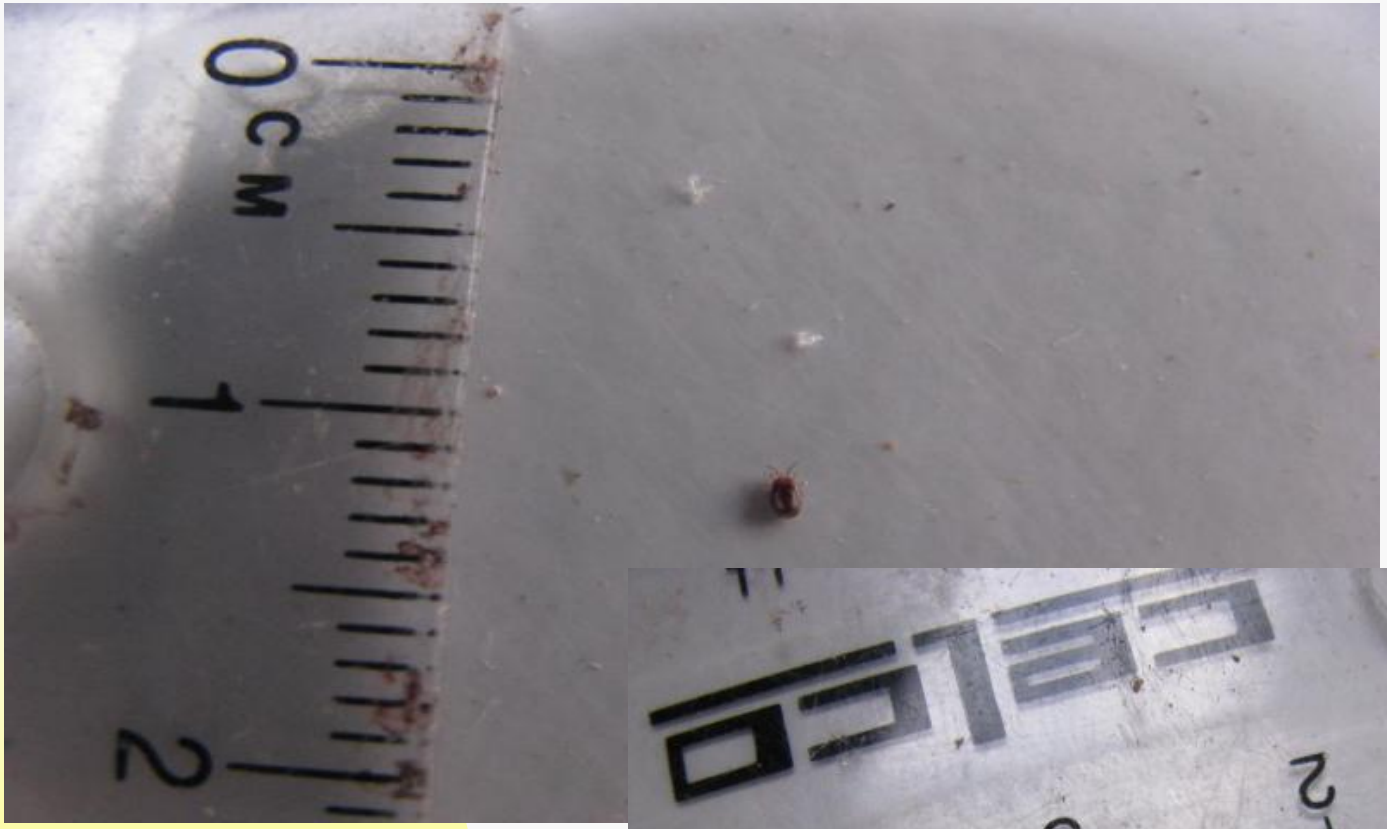
**The Life cycle of D gallinae** (Soulsby, 1968)

| | | |
|---|---|---|
| Adult females lay eggs 12-24 hours after first blood meal | (avg) | 18 hrs |
| Eggs hatch in 48-72 hours when warm (>24$^{o}$C) | | 54 |
| 6 legged larva molts without feeding in 24-48 hours | | 36 |
| 8-legged blood-sucking protonymph molts in 24-48 hours | | 36 |
| 8-legged blood-sucking deuteronymph molts in 12 hours | | 12 |
| Adult, females suck blood | | **156hrs** |



# The red mite has three important characteristics

- At certain stages of the life cycle mites suck blood from the host.
- The mite lives in the structure of the poultry house rather than on the birds, emerging to feed from the birds at night.
- The mite can survive for months without feeding.







**It is easy to underestimate how much blood a single mite can suck from a bird**

**The mite has exploited two divergent trends in modern egg production to regain its former prominence:**

**The move to high-rise cage systems because**

- their manure belts, egg belts (especially woven ones), manure driers and complex supporting structures offer more refuge to the mites than did the single tier cages;
- the economics of large cage houses make all in-all out stocking policies by shed the exception rather than the rule,
- any move to furnished cages will further increase the opportunities for mites to become established due to complexity of equipment.

# There isn't anywhere to hide (below) *cf* modern systems (left)





## Free range egg production

•has increased the proportion of the national flock infested because of the structure of free range houses (slats, perches, nest boxes),

•and the opportunities for contact with transport hosts e.g. sparrows, pigeons.

# There are many places for mites to hide in a free range house



**The problem has been exacerbated by a reduction in the availability of chemical controls due to decreased efficacy of some products or environmental concerns in some countries over others.**

**This trial looks at the in-vitro activity of some old and some new candidates for control of red mites in poultry houses**


PULSE
PENETRANT
For Improved Penetration
& Faster Uptake of Roundup
Renew, Roundup Renew Xtra,
Roundup Dry, Trounce and other
Brushwood Herbicides
Ascend
POISON
Watkins
Insect & Wasp Killer
carbaryl
neguvon 95%
RIPCORD
PLUS

**Supply of mites for trial**

Approximately 50g of red mites in various stages were collected from a local farm.

The test mites had been exposed to Ripcord sprays a number of times over the past year

## Potential miticides tested

| Spray miticides | Active | Use rate | Active/L |
|---|---|---|---|
| **Control** | water | n/a | n/a |
| **Ascend** | fipronil 20% (Holmes 2005) | 1ml/L, 0.5ml/L (+pulse) | 2mg/L, 1mg/L |
| **Ripcord** | cypermethrin 15g/L | 4ml/100ml | 600mg/L |
| **Elector /Extinosad** | spinosad 25mg/ml (Allin 2010) | 30ml/L | 750mg/L |
| **Organic** | blend of pyrethrum extract and natural essential oils | 12ml/L | 12ml/L |
| **Neguvon 98%** | 98% trichlorphon | 1.5g/L | 1.5g/L |
| **Carbaryl** | 80% carbaryl powder | 1g/160ml | 625mg/L |
| **Partna** | 400g/L trichlorphon + 20g/L cypermethrin | 3.75ml/L | 1.5g/L trichlorphon + 75mg/Lcypermethrin |
| **Neopredisan 3%** | Preventol CMK (p-Chloro-m-cresol) | 30ml/L | 30ml/L |
| **Powder Miticides** | | | |
| **Carbaryl dust** | 1g 80% carbaryl + 25g talc | 3% dust | 1g/plate |
| **Mitex** | Diatomaceous silica desiccant | 15-30g/$m^2$ | 1g/plate |
| **Stalosan-F** | Livestock environmental sanitiser Sulphates of Copper and Iron, Iron oxide | 5og/$m^2$ | 1g/plate |

## Methodology

1ml of each test miticide suitably diluted was sprayed onto a filter paper in a petri dish.

The petri dishes were renumbered to blind the scorer and a small teaspoon containing approximately 150 mites of various life stages were placed onto the centre of the filter paper.

1g of powder miticides were spread over the paper, and mites applied. The scorer was not blinded as the powders were easily identified.

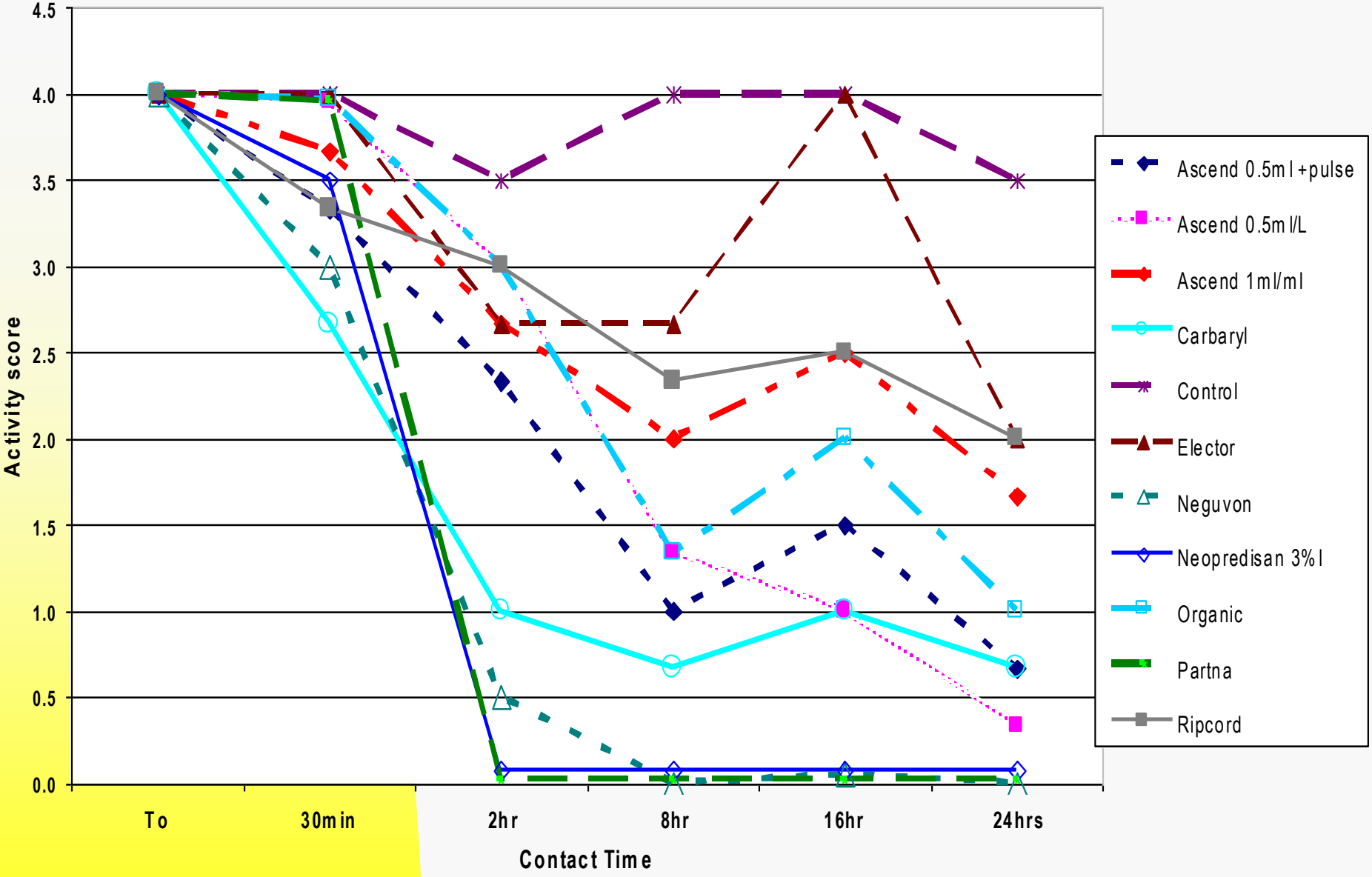
The number of moving mites was assessed at various time points

| Activity | score |
|---|---|
| No activity detected | 0 |
| 1-4 mites seen moving | 1 |
| 5-16 mites seen moving | 2 |
| 17-64 mites seen moving | 3 |
| 65-256 mites seen moving | 4 |



| *Spray Miticides* | *Replicates* | Mite activity score at times | | | | | |
|---|---|---|---|---|---|---|---|
| | | To | 30min | 2hr | 8hr | 16hr | 24hrs |
| Control | 2 | 4.0 | 4.0 | 3.5 | 4.0 | 4.0 | 3.5 |
| Ascend 0.5ml +pulse | 3 | 4.0 | 3.3 | 2.3 | 1.0 | 1.5 | 0.7 |
| Ascend 0.5ml/L | 3 | 4.0 | 4.0 | 3.0 | 1.3 | 1.0 | 0.3 |
| Ascend 1ml/ml | 3 | 4.0 | 3.7 | 2.7 | 2.0 | 2.5 | 1.7 |
| Carbaryl | 3 | 4.0 | 2.7 | 1.0 | 0.7 | 1.0 | 0.7 |
| Elector | 3 | 4.0 | 4.0 | 2.7 | 2.7 | 4.0 | 2.0 |
| Neguvon | 4 | 4.0 | 3.0 | 0.5 | 0.0 | 0.0 | 0.0 |
| Neopredisan | 2 | 4.0 | 3.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Organic | 3 | 4.0 | 4.0 | 3.0 | 1.3 | 2.0 | 1.0 |
| Partna | 2 | 4.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Ripcord | 3 | 4.0 | 3.3 | 3.0 | 2.3 | 2.5 | 2.0 |
| *Powdered miticides* | | | | | | | |
| Carbaryl dust | 1 | 4 | 1 | 0 | 0 | NT | 0 |
| Mitex | 1 | 4 | 3 | 0 | 1 | NT | 0 |
| Stalosan | 1 | 4 | 4 | 3 | 0 | NT | 1 |

## In vitro effects of sprayed miticides on chicken mite *Dermanyssus gallinae*

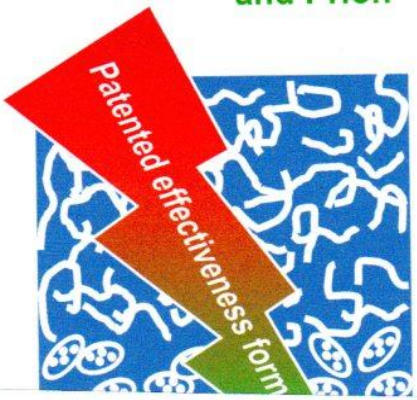


## Discussion

| | | |
|---|---|---|
| **Control** | *3.5* | Water |
| **Ascend 0.5ml +pulse** | 0.7 | Fipronil is the active ingredient in Frontline spray used for control of fleas in dogs. Frontline was taken up by fancy poultry keepers, from where the idea came. I believe these results were affected by drying out. Ascend has been used in the field with some success at both 0.5ml and 1ml per litre. There is considerable data available about this active, which holds considerable potential. |
| **Ascend 0.5ml/L** | 0.3 | |
| **Ascend 1ml/ml** | 1.7 | |
| **Carbaryl** | 0.7 | Variation between replicates reflects desiccation |
| **Elector/Extinosad** | 2.0 | Elector has been approved for control of red mites in poultry facilities in EU, so these results are disappointing; they also reflect limited field trials in NZ. The trials used Extinosad at a dilution rate equal to that recommended for the 17.5x more concentrated Elector available in Australia and EU. |
| **Neguvon** | 0.0 | Uniformly effective |
| **Neopredisan** | 0.0 | The most consistent performer across all replicates; whether the wetting ability played a role in this is open to question. |
| **Organic** | 1.0 | Less effective in 2/3 replicates |
| **Partna** | 0.0 | Uniformly effective |
| **Ripcord** | 2.0 | Ripcord showed poor efficacy across all replicates, interpreted as a result of resistance due to previous repeat exposure. |
| ***Powdered miticides*** | | |
| **Carbaryl dust** | *0* | Very rapidly effective when applied as a powder |
| **Mitex** | *0* | Mitex and Stalosan both showed limited effect on motility of mites for at least 8 hours, when the viability of mites fell off; issues to be considered is the high concentration of powder used (175g/m$^2$) |
| **Stalosan** | *1* | |

# NEOPREDISAN® 135-1

**The unique broad-spectrum disinfectant with patented effectiveness formula against excreted endoparasites: wormeggs, coccidia, cryptosporidia**
**Also effective against clostridia, tuberculosis and Prion**




**Effectiveness against:**
**exctreted endoparasites:**

- against **wormeggs** (*ascaris suum*)*A 2 % - 2 h
- against **wormeggs** (*heterakis*)*B 2 % - 2 h
- against **coccidia** (*isospora suis*)*C 2 % - 1 h
- against **coccidia** (*eimeria tenella*)*D 3 % - 4 h
- against **cryptosporidia***E 3 % - 1 h
- against **clostridia***F 4 % - 1 h
- against **tuberculosis***A 4 % - 3 h resp. 6 % - 2 h*A
- against **bacteria, fungi and virus***G
- against **Prion** (*strain 263K*)*H 2 % - ½ h

*B Test report of Institut für Parasitologie und Zoologie, Veterinärmedizinische Universität Wien, Prof. Dr. A. Joachim, 21.09.04. Result of the in vivo trial: 2 % / 2 h.

The advantage of NEOPREDISAN® 135-1

**Active ingredient:** Preventol CMK (p-Chloro-m-cresol)
**Biological degradation:** 90% according OECD-Test guidelines 301C
**Acute toxicology:** $LD_{50}$ oral, rat: 2500 mg/kg
$LD_{50}$ dermal, rat: > 500 mg/kg, 7d exposion
$LD_{50}$ inhalation, rat: > 0,7 mg/l, 4h exposion

**Registration**
Preventol CMK (p-Chloro-m-cresol) has been listed as a registered preservative: 11th cosmetic ordinances (1988) annexe VI, part 1; with the maximum dose of 0,2 % and the restriction „prohibited in products, which may have contact with mucous membranes."
In the USA p-Chloro-m-cresol and/or its sodium salts are allowed as preservatives for food by the FDA (Food and Drug Administration).

⇒ **Usable in presence of animals – by proper use.**

NEOPREDISAN 135-1 at a concentration of 2 % to 3 % ... proteinase K-resistant material. [..] When a final concentration of 2 % NEOPREDISAN 135-1 was used, none of the hamsters showed clinical signs of a scrapie infection.

**Bears the quality seal of (DLG) Deutschen Landwirtschafts Gesellschaft**



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PREFACE

*This technical bulletin is intended for use only as a guide in providing general information about fipronil insecticide. As this bulletin is being distributed in many different countries, it must be emphasized that products containing fipronil must be used in accordance with local regulations and registrations. The laws of each country in which these products are registered govern the use or extent of use of products containing fipronil. As such, we strongly recommend that users read, understand and follow all label directions, warnings and precautions prior to the use of any product containing fipronil.*

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Ascend toxicology details available in the Fipronil technical bulletin