Comparison of Indispron® D110 and Decis® in the control of red mites 
(*Dermanyssus gallinae*) infestation in Specific Pathogens Free Birds in Vom, 
Nigeria

DogoGoni Abraham¹*, Tanko James², Ari Rebecca², KogiCecilia Asabe¹, Biallah Markus 
Bukar¹, Kaze Paul Davou¹ and Hubertus Kleeberg³

¹Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, University 
of Jos, Jos- Nigeria

²National Veterinary Research Institute, Vom – Nigeria

³Trifolio - M, Lanau GmbH, Germany

Corresponding author’s email: gonidogo@gmail.com

**Abstract**

The main objective of this study was to compare the efficacies of Indispron® D110 and Decis® in the 
control of red mite (*Dermanyssus gallinae*) infestation in a specific pathogen free birds reared for 
vaccine production in National Veterinary Research Institute (NVRI), Vom. A total of 360 birds 
comprising of 150 Harcowsite growers (Pen A); 110 old layers (Pen B) and 100 cockerels (Pen C) all 
16 weeks oldhoused separately were used in this study. Two groups (Harcowsite and Old layers were 
sprayed with both insecticides according to manufacturer instructions for a period of 14 days while 
the Cockerels were left as control. Results in group 1 where Indispron® was used, showed a 
significant reductions (95%) in mite’s population after three days of spraying in the first week. There 
was a drastic reduction in the mite’s population as no clusters were seen and even the shanks were 
free of mite’s infestation three days after spraying in week two of treatment indicative of 100% 
efficacy. In group 2 where Decis® was used, there was reduction in the number of mites (75%) 
efficacy, though few clusters were still seen in cracks on day three post treatment. On day five after the 
third spray there were no mites seen (100%) efficacy in week two post treatment compared with the 
control group still having clusters of *D. gallinae* in the crevices of the pen and the shanks still scaly. 
Indispron® D110 was found to be superior to Decis® in action and effectiveness against the red mite 
and is hereby recommended for an integrated ectoparasites control in poultry farms in Nigeria.

**Keywords:** Efficacy, Indispron® D110, Decis®, *Dermanyssus gallinae*, specific pathogen 
free birds, Nigeria.

**Introduction**

In domesticated birds, ectoparasitic mites are a particular issue with *Dermanyssus gallinae* being 
ubiquitous as a poultry pest throughout much of the globe¹. Though *D. gallinae* are reported to be 
avian-specific, albeit infesting more than 30 species of wild birds². Increasing reports of attacks on 
non-avian hosts may be indicative of host expansion. Such events are not uncommon among 
invertebrates, being most often recorded in phytophagous insects. *D. gallinae* the red mite of poultry is 
a cosmopolitan species which attacks the fowl, pigeon, canary and other caged and wild birds and 
may also feed on man as it invades human dwellings³. Increasing densities of humans and associated 
livestock/companion animals may make medical and veterinary systems particularly susceptible to 
host expansion events, where increased host occurrence logically favours rising encounter rates with 
novel parasites⁴. Interestingly, *D. gallinae* has already been found to ‘switch’ more readily between 
avian hosts of different species than several other related species within the same genus⁵.

When
removed from hens and offered canaries as a host, *D. gallinae* readily switched between the two, whereas *Dermanyssus longipes* could not. *Dermanyssus carpathicus* was able to switch between hosts, but only after suffering high initial losses not seen with *D. gallinae*. This apparent tendency for higher switching success may reflect the generally broader host range of *D. gallinae* as compared to other species in the genus *Dermanyssus*. Increasing reports of bird-mite attacks on humans and mammalian companion animals may be of increasing medical and veterinary concern. Though several species of bird mite from multiple genera may be responsible for gamasoidosis, *D. gallinae* is most commonly implemented as the causal agent. *D. gallinae* is called red mites only when it has recently fed on its host blood otherwise it is whitish or black in colour and the dorsal shield does not quite reach the posterior end of the body and its posterior margin is truncated. The setae are smaller than those on the skin around the dorsal plate, and chelicerae are long whiplike compared to *Cheyletiella*, and *Ornithonyssus*. *Dermanyssus gallinae* is a blood feeding ectoparasite that lives in cracks and crevices in poultry pens, coming out at night to hop in birds for least. They cannot fly but are a very serious problem for poultry keepers and large infestation can kill birds by sucking their blood making them anaemic. They are not species specific and can feed from any type of birds, and can be carried into the flock from wild birds and transfer from bird to bird. The rapid life cycle of *D. gallinae* undoubtedly contributes to its status as a pest. Complete development from egg to adult typically occurs over two weeks, though may take place in less than half this time. Temperatures of 10-35°C and high relative humidity (>70%) facilitate *D. gallinae* reproduction and development and weekly doubling of populations is possible in egg-laying facilities where these conditions are often met. Resulting *D. gallinae* densities typically reach 50,000 mites per bird in caged systems though can escalate to 500,000 mites per bird in severe cases. The life cycles are divided into larvae, two nymphal stages and adult which lay the eggs. *D. gallinae* is a vector of *Borrelia anserine* in Australia, and a vector of viruses of St. Louis encephalitis and Western encephalitis because it has been found naturally infected with the viruses. Also it transmits fowl pox and Newcastle Disease Viruses. As an avian mite recorded from numerous bird hosts it is of little surprise that *D. gallinae* may pose a threat to domestic fowl other than poultry. Companion birds, such as hobby pigeons and budgerigars are also at risk and in canaries *D. gallinae* has even been linked to infection with the bacteria *Chlamydia psittaci*. *D. gallinae* have also been reported as posing a risk to poultry workers, so much so that this work proposes their presence as an ‘occupational hazard’. For *D. gallinae* at least, this body of literature, though currently small, confirms ingestion of human blood, propensity for persistent infestation when feeding on human blood alone and geographically wide-spread occurrence on a global scale. That *D. gallinae* is assigned responsibility for the majority of gamasoidosis cases is perhaps unsurprising, with laboratory study demonstrating that these mites can be induced to feed upon humans, albeit at low levels, whereas other avian-ectoparasitic mites (*Ornithonyssus* (syn. *Bedellonyssus*) cannot. The aim of this study was to found out whether Indispron® D110 is a better parasiticide compared with Decis® against the Red mite (*Dermanyssus gallinae*) infestation in specific pathogen free birds reared in deep litters for research and vaccine production purposes in the National Veterinary Research Institute (NVRI), Vom, Nigeria.

**Materials and Methods**

**Study area**

This study was conducted in Jos Plateau State which is located in Nigeria’s middle belt, with an area of 26,899 square kilometers and an estimated population of about three million people. It is located between Latitude 9° 0’ to 9° 40’ North and longitude 8° 30’ to 10° 30’ East of the equator. The altitude ranges from around 1,200 metres (about 4000 feet) to a peak of 1,829 metres above sea level in the Shere Hills range near Jos. Years of tin mining have also left the area strewn with deep gorges and lakes. Though situated in the tropical zone, a higher altitude means that Plateau State has a near temperature climate with an average temperature of between 18 and 22°C. Harmattan winds cause the
coldest weather between December and February. The warmest temperatures usually occur in the dry season months of March and April. The mean annual rainfall varies from 131.75 cm (52 in) in the southern part to 146 cm (57 in) on the Plateau. The highest rainfall is recorded during the wet season months of July and August.

**History**

Following several complaints from the specific pathogens free poultry unit of N.V.R.I Vom of tiny moving organisms on the bodies of the poultry attendants and on the walls of the pen, investigations were carried out on the flocks to identify the causative agents. These birds were raised in low pens on deep litter that had 150 Harco white growers at 16 weeks old and 110 old layers and 100 cockerels housed separately. The birds were fed rations produced at Dagwom Farm of NVRI, Vom. Vaccines administered were in accordance with the institute vaccination programme, and routine deworming with albendazole according to the manufacturers recommendation. There were decreases in egg production in layers, and increased feed consumption in all the pens.

**Physical Examination**

Examination of the three pens (A, B and C) revealed tiny reddish, whitish and black dots organism clustered in cracks, crevices, loose clods of manure, under the slate, in the laying boxes and nests. Also some of the organisms were found on the shanks. From the farm records, there were decreased egg production and increased feed consumption. On physical examination, the combs were pale and whitish; there were scales on the shanks and weightlessness of the birds. Some of the organisms were collected in 70% alcohol in pyrex test tube for laboratory examination at Parasitology laboratory of NVRI Vom. In addition, 2 ml each of blood were collected from 10 birds in each pen for haemoparasitic investigation.

**Laboratory Examination**

The tiny clustered organism were placed in Petri dishes and examined under a stereomicroscope for examination based on morphological and morphometric characteristics as described by 6. From the blood samples, thin smears and packed cell volumes (PCV) were assessed as described by 23.

**Treatment**

Birds in Pen A and B were treated based on the life cycle of *Dermanyssus gallinae* and control strategy adopted on the birds and the environment to suit best practices. Those in Pen C were left as untreated control. The two products used were Indispron® D110 and Decis® respectively. Indispron® D110 synthetic amorphous silica produced by Evonik industries, Germany. Indispron® D110 was used in pen A where both birds and the environment were sprayed at a reconstituted dose of 1 litre to 2 square metre of the poultry house and 1 litre per 15 litres of water for application on the birds. This was repeated after one week for three consecutive weeks. Decis® was used at 1 litre per 10 litres of water weekly for three weeks according to the manufacturer’s guidelines.

**Results**

The laboratory result revealed that the tiny clustered organism were *Dermanyssus gallinae* based on the morphometric and morphological characteristics as described by 3,6,14. The PCV were within normal ranges for poultry. Blood smears showed no parasites. In Pen A where Indispron® D100 was used, after three days of spraying there were significant reductions in mites population as accidentally very few clusters of the tiny dot like organisms were seen. At the second spraying a week after there was dramatic reduction in the mite’s population as no clusters were seen and even the shanks were free from the mites. However in Pen B where Decis® was used, there was a high significant reductions (90%) seen after the second spray. Few clusters of the red mites were still seen in cracks and cravices until five days post treatment thereafter, no mites seen indicative a 100% effectiveness Table 1. Also with Indispron® D100 three days after the second spray no mites were seen but the third spraying was done according to the manufacturer’s recommendation.
Table 1: Indispron® D100 and Decis® treatment against *D. gallinae* infestation on birds and the environment for 14 days

<table>
<thead>
<tr>
<th>Pen</th>
<th>Number of birds</th>
<th>Breed</th>
<th>Parasitcides used for treatment</th>
<th>Treatment day (s)</th>
<th>Efficacy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>150</td>
<td>Harcowhite</td>
<td>Indispron® D100</td>
<td>1, 8</td>
<td>95, 100</td>
</tr>
<tr>
<td>B</td>
<td>110</td>
<td>Shika brown (Layers)</td>
<td>Decis®</td>
<td>1, 8, 14</td>
<td>75, 95,100</td>
</tr>
<tr>
<td>C*</td>
<td>100</td>
<td>Cockerels</td>
<td>None</td>
<td>NA</td>
<td>0</td>
</tr>
</tbody>
</table>

C*: Pen C used as control showing 0% efficacy since there was no treatment applied.

**Discussion**

Despite its potential significance, little research had been conducted on the threat of gamasoidosis to non-avian animal and human health, with the bulk of work being formed of case studies documenting occurrence only. Where medical significance is concerned, this is in stark contrast to work undertaken with other (primarily) veterinary ectoparasites of medical concern (e.g. biting flies and ticks); this probably reflects the historically low prevalence of gamasoidosis in comparison. Several literature reports indicated that red mite’s infestation is a difficult problem in poultry raised on deep litters (3, 6, 8, 14). Chemicals used for the treatment of mite’s infestation in Nigeria include BenzoneHexadiluride, Gamatore® and Decis®. However Indispron® from the results seen has several advantages over Decis® due to the fact that Indispron® gives quicker action and no irritation to the mucosal lining. Decis® though effective, it is accompanied by irritation of the mucosal membrane resulting in catarrh or coughing both to the birds and the person spraying. Decis® can also contaminate feeds and water which is toxic to the birds while Indispron® D100 is not toxic and caused no problem to the birds. The laboratory finding indicates that *Dermanyssus gallinae* is a common problem to old laying birds compared to the growers due to excessive decrease in egg production with increased feed intake which make it unprofitable to the farmer. Indispron® D110 has been used in boosting the productivity of egg – laying hens by wiping out the notorious red mites parasite known particularly to be a problem for non-caged birds and can significantly reduce both the number and quality of the eggs produced. In severe cases they can also result in early deaths of the birds (24). The usual treatment is to use powder-based patricides to destroy the mites chemically, but these may leave behind organic residence and in some cases the mites have also been found to develop resistance to the treatments. Indispron® D110 mode of action is to exerts its effects physically and killing the mites by drying them off and thereby giving no room for parasite resistance; nor toxicity or residue in eggs or poultry products, (24). Other mites of poultry diagnosed in the laboratory were *Criemidocorptes mutons* and *Cremidoceples gallinae* indicating that mite’s infestation could pose aserious health and economic lossesin poultry industry in Nigeria. From this study, red mite infestation had negative effect on egg production in poultry reared in deep litters in Vom. The product exhibited a better and faster response on mites and was found to
be environmentally friendly with no side effects on the attendants compared with Decis®. It is therefore recommended for routine application in the control of mites and other related ectoparasites of poultry in Nigeria.

**Competing interests**
The authors declare that they have no competing interests.

**Acknowledgements**
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**References**

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