

# Poultry Farming: Environmentally Friendly Method for Controlling Red Mites

## Field of Application

Red mites are the most common ectoparasites of poultry and cause substantial economic damage worldwide. In the EU alone there is an estimated yearly damage of 130 million Euros.

With high infestation of red mites not only the birds but also the farm workers are affected. The mites induce skin irritations and itching and also contribute to the development of allergies in humans (Mul et al., 2009: World's Poultry Science 65:589 -599).

## State of the Art

Because the parasite rapidly develops resistances against insecticides the long-term effect of current chemical treatment methods is not sustainable. Using silica dust is effective but has to be repeated frequently and can be detrimental to the health of both birds and farm workers (potential development of silicosis).

In several countries, the chicken houses are heated to 60 °C for 2 hours or to 45 °C for a longer period following depopulation. However, the heating of the entire barn to these temperatures requires a lot of energy, and to be efficient, this treatment has to be combined with an acaricide treatment.

## Advantages

- ✓ No development of resistance
- ✓ Treatment during the laying period without any risk of residues in the eggs
- ✓ Amortisation of the installation within 12 months
- ✓ No health risk for personnel
- ✓ Time saving compared to traditional methods
- ✓ Low installation and operational costs
- ✓ Simple fitting to existing hollow metal or plastic perches
- ✓ Application in commercial production, fancy and breeding stocks

## Innovation

Scientists at the University of Hohenheim have developed a method to combat red mites on poultry which utilizes the fact that the mites are sensitive to heat and that the parasite only visits the host at night for feeding and then hides in dark spaces near the host.

Since laying hens in particular prefer staying on perches during the night, perches have traditionally been designed in such a manner as to offer no hiding places. The present method in contrast, presents perforated perches as hiding places where all states of development are killed through thermal treatment.

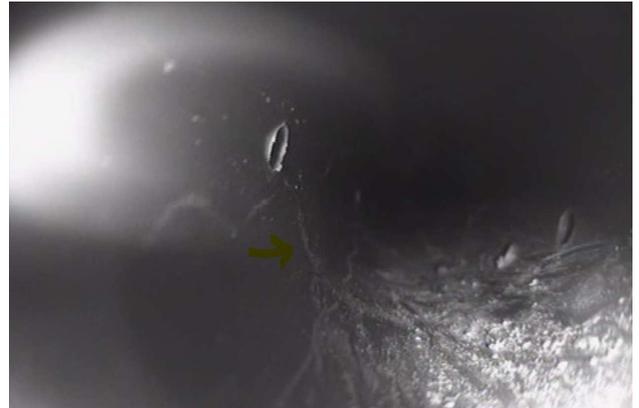


Figure 1: Mite path: The mites occupy the hollow perches starting from the holes.



Figure 2: Dead mites after heat application.

The perches consist of a hollow metal or plastic tube with a series of small drill holes through the tube wall. Within a short time, the red mites accumulate within the region of these small openings. When the heating device which is the subject of this invention is moved through the inside of the perch, the mites are killed by the heat.

Both temperature and speed of the heating device determine the effect of the treatment. According to first experience the mites and their eggs are destroyed with a temperature set at 150 °C and a speed of 10 cm/sec.

This exposes the mites to a temperature of around 100 °C over a period of 1 to 2 s. Under these conditions, a perch of 100 m length is treated within 17 minutes. The surface temperature of the perch does not noticeably increase so that birds are not affected even if they remain on the perch during the treatment.

The temperature and speed of the heating device are regulated by a PLC (programmable logic controller). Therefore farming personnel is free to carry out other tasks while the treatment takes place. An automated shut down stops the process in case of failure of the regulation system.

In smaller poultry houses, i.e. on mixed farms or fancy breeders, the equipment can be installed with a fixed temperature and the heating device can be moved through the perch manually.

All components necessary for the implementation of this invention are commercially available and can be produced using existing technologies. This contributes to the expectation that the final user should be able to amortize the equipment within about one year.

### Technical Details

The heating device consists of a quartz lamp which is fitted into a shock resistant quartz tube. The quartz tube also contains a thermal sensor which is used for the temperature control. The quartz tube is mounted on an aluminum sleigh with small wheels at its ends. The wheels ensure that the device does not get stuck on small irregularities on the inside surface of the perch. The electrical current (220 V) is connected to the heating device through an 8 mm diameter, stiff cable which simultaneously serves as the means to transport the device through the perch. The cable is guided over a driving gear wheel with a groove matching the cable diameter (Figure 3). On the opposite side, a spring pushes the cable against the gear wheel which is driven by an electric motor.

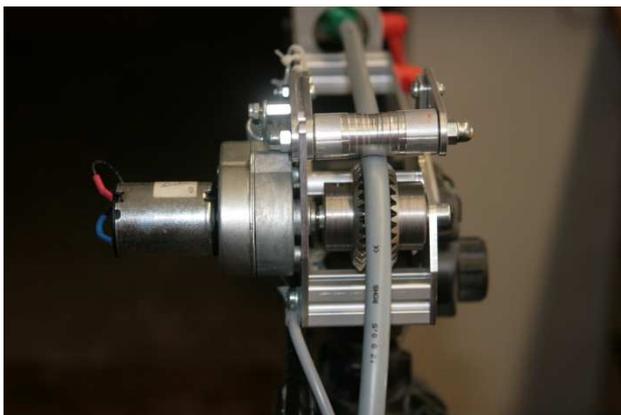


Figure 3: Drive of the heating device.

Heat level and electric drive of the motor are regulated via a conventional PLC. The quartz tube is introduced into the perch by means of a clamping fixture which is positioned in front of the electric drive and which can be adjusted to match the diameter of the perch (Figure 4).

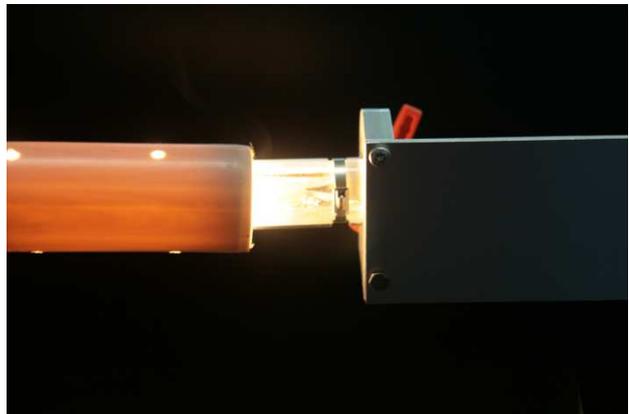


Figure 4: Perch, quartz lamp (in operation at a temperature of 150 °C) and clamping fixture.

The temperature level and speed of the heating device is controlled electronically by the PLC. As soon as the desired temperature is reached, the motor starts moving the device within the perch. The target temperature can be set between 0 °C and more than 200 °C with a precision of  $\pm 0.1$  °C.

Safety measures concerning excess temperature were also taken into consideration. The device can be shut down manually via an emergency switch. An automatic shut-down when reaching a predetermined temperature is integrated as well.

### Technology Transfer

The Technologie-Lizenz-Büro GmbH is charged with the commercialisation of this technology and is now offering suitable enterprises licenses for the use of this technology.

### Patent Portfolio

Patents granted in Germany and France; US patent pending.

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