EXTENSION

AGRICULTURE

Winter cattle lice

Part 3: essential oils for the alternative control of cattle lice

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Cattle lice

Lice can cause significant production losses in both beef and dairy cattle, and populations increase rapidly during winter when animals are housed in close contact. There are four species of lice affecting cattle in Vermont, one species of chewing louse (*Bovicola bovis*) and three species of sucking lice (longnosed cattle louse *Linognathus vituli*, little blue cattle louse *Solenopotes capillatus*, and shortnosed cattle louse *Haematopinus eurysternus*). For more information on the biology and identification of these lice, see the Winter cattle lice factsheet Part 1: biology and life cycle of cattle lice.

Control of cattle lice

This publication will focus on essential oils for the alternative management of cattle lice. For an overview of other management practices, see the Winter cattle lice factsheet Part 2: control of lice in cattle. Treatment for lice can be challenging, and repeated application of livestock pesticides throughout the winter can result in reduced treatment efficacy due to lice populations developing resistance. There are also environmental concerns regarding the nontarget impacts of livestock pesticides on terrestrial and aquatic invertebrates. However, there have been limited alternatives.

Oily substances coat lice and block their spiracles, suffocating them. A thin application of light oil such as vegetable oil or mineral oil can be effective. Essential oils exhibit insecticidal properties and unlike chemical treatments they will also destroy lice eggs. Between 2023-2024, UVM Extension in collaboration with Philo Ridge Farm (Charlotte, VT) conducted a study to develop and test an essential oil based formulation for the control of winter cattle lice. The results of this work are presented below.

Essential oils—how they work

Essential oils are botanical insecticides and are made of volatile plant secondary metabolites such as terpenes and aromatic hydrocarbons. They are naturally occurring insect toxins which degrade rapidly in the environment and generally have low mammalian toxicity. Plant essential oils act on cellular or neuronal targets within the insect, which elicits a toxic effect in order to deter insect herbivory on the plant. Because each essential oil may consist of up to 80 different compounds, resistance is very slow to develop, if at all. Synthetic chemical pesticides are usually based on a single compound, against which resistance can rapidly develop. Essential oils are therefore good candidates for alternative control agents against veterinary ectoparasites, particularly lice, mites, and ticks.

Essential oil formulation for lice

We developed a formulation based on lavender, clove, and thyme essential oils in a mineral oil base. These oils are known to have both high insecticidal efficacy and low mammalian toxicity, and are used in other topically applied cattle treatments such as fly repellants. The formulation was tested in the laboratory at various concentrations so that the lowest effective concentration could be found.

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Our laboratory trials showed that at a concentration of 4% essential oils, the formulation resulted in 97% louse mortality after 15 mins exposure. Increasing the concentration to 8% resulted in 100% louse mortality after 15 mins exposure. A control containing just mineral oil resulted in 40% lice mortality, and there was 0% mortality in another control containing no oils at all (Fig. 1).

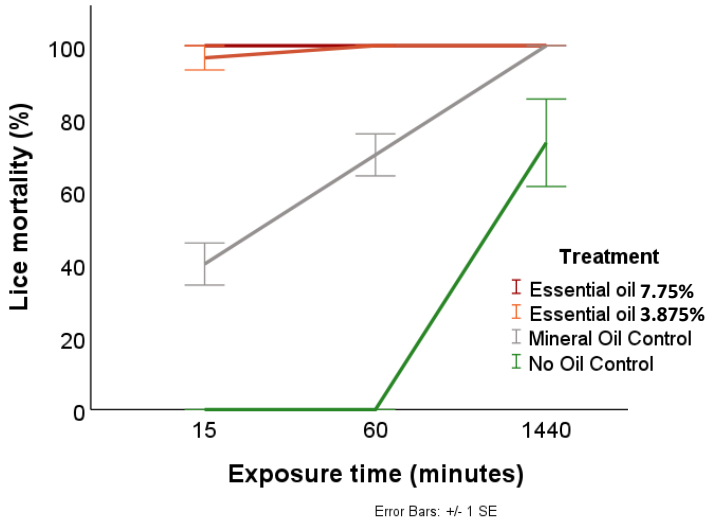

Fig. 1 Cattle lice mortality after exposure to essential oil-based formulations. 100% mortality was seen after 24 hours for all groups because lice did not survive in the laboratory off-host.

Applying essential oils to cattle

We trialed the formulation with a herd of Belted Galloway cattle (Philo Ridge Farm, VT) by passing them through a chute, applying it along the back line, and brushing it in to their coat. There were two groups of animals housed in separate barns, the cow-calf group and the steer group. We applied the formulation to the cow-calf group at the beginning of winter, with the steer group as an untreated control. The essential oils prevented lice infestation in the cow-calf group, whereas lice in steer group significantly increased to an average of 32 lice per animal (Fig. 2). Later in winter, the formulation was applied to the steer group and lice numbers significantly decreased to zero.

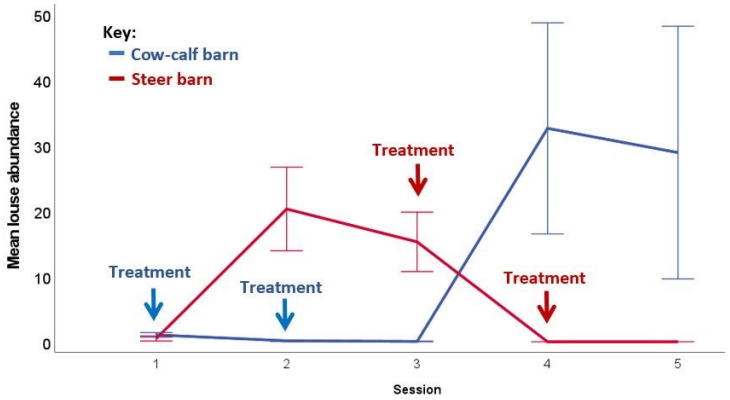

Fig. 2. Lice abundance on cattle housed in two separate barns. Arrows indicate when groups were treated with the essential oil formulation over winter (November—March).

Meanwhile, lice numbers in the cow-calf group (who were not treated again) increased to an average of 30 lice per animal. These results indicate that the essential oil formulation can effectively prevent as well as treat lice infestations in winter housed cattle.

Essential oils in a groomer-scratcher

To reduce time and labor costs, the essential oil formulation was used in cattle self groomer-scratchers that were set up on two separate farms. Cattle were able to self-administer the treatment on demand (Fig. 3). This helps to prevent lice populations building up, however it was not as effective as administering the formulation directly to cattle. Effective management could be achieved through a combination of the cattle groomer-scratcher supplemented by individual treatment if needed.

Fig. 3 Cattle self-administering the essential oil formulation using a groomer-scratcher. (Essex Farm, NY).

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