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Beef Science Cluster

Factors Affecting the Risk of Ticks and Biting Flies

Project Title:

Biology of animal disease vectors – ticks and biting flies

Researchers:

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Background:

Bluetongue is a viral disease of ruminants. Cattle do not usually become sick but the disease can be fatal to sheep. Bluetongue cannot spread directly from one animal to another. It can only move from one animal to another animal if it is carried by a biting fly (*Culicoides sonorensis*). Bluetongue is found in the U.S. It does not have a foothold in Canada, although it's biting fly vectors is found in parts of southern BC, AB, and likely SK.

Until recently, concerns about the health of Canada's sheep herd resulted in import restrictions on US feeder cattle. Pre-import bluetongue testing is no longer required. Laboratories are required to notify the CFIA when they confirm a bluetongue diagnosis to monitor the presence or spread of the disease.

Climate change can also make conditions favourable for disease outbreaks in new areas. To prepare for these possibilities, it is important to identify potential vector species and develop information on their seasonal abundance, biology, and population dynamics. This information can be used to develop sound strategies to control vectors minimize or prevent disease spread. But the first step is to identify the best way to study the flies.

Objectives:

- Compare standard trapping methods for sampling abundance of biting flies; and
- Determine the relationship between trap captures and biting rates on livestock.

What They Did:

Three types of black-light (found in bug zappers) traps were compared at two sites in Southern Alberta. One trap used only black light to attract flies. The other two traps also had carbon dioxide (CO_2) to attract insects. Like humans, cattle inhale cool air and oxygen and exhale warm air and CO_2. Biting flies and mosquitos have CO_2 sensors that help them locate cattle to feed on. The CO_2 traps took advantage of this behavior. One trap simulated the CO_2 output of a calf, and the other trap simulated the CO_2

output of an adult.

The traps were operated for 27 nights during the summer, and the numbers of *Culicoides* and mosquitoes captured were compared each day. One trap of each type was able to segregate the catch into 3 hour intervals to determine the optimal time of night to trap in the next study.

In the second year, they compared captures using black light and CO_2 traps to the numbers of insects attracted to sheep.

What They Learned:

Adding CO_2 to black light traps increased capture of most biting flies. *C. sonorensis* and *C. gigas* and *C. palmerae* accounted for 78 – 89% of the *Culicoides* captured regardless of trapping method. Adding CO_2 increased the percentage of *C. sonorensis* and *C. palmerae* captured while *C. gigas* declined. These three species were active at different times of the night. *C. sonorensis* appeared to be most active between 6PM and midnight.

Even though black light traps captured fewer *C. sonorensis* than either of the CO_2 traps, a detailed analysis indicated that they are as sensitive as 300 ml/min CO_2 traps at detecting the presence of *C. sonorensis* if operated for 7 nights. These traps are much easier to use, and would provide reliable information on the presence of*C. sonorensis* in an area.

C. sonorensis and *C. gigas* accounted for 92% of the *Culicoides* captured on sheep. The black light and CO_2 traps will trap other *Culicoides* species that are not attracted to sheep. But only *C. sonorensis* is not known to be a vector of any pathogen, these other species of *Culicoides* are likely not important and do not need to be counted.

What it means:

Unsophisticated black light traps can be used to monitor whether *C. sonorensis* are present in an area, how common they are, and how active they are in efforts to monitor the risk of bluetongue transmission.

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