

EXPERIMENTAL USE OF MR-08 TO REPEL MOSQUITOES AND BLACK FLIES FROM A WORKING DOG IN NORTHERN MANITOBA, CANADA

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During July and August of 2006, MR-08 was administered to my dog, a 1.5 year old (at the time) Dutch Shepherd, to evaluate its ability to repel black flies and mosquitoes from him while he worked. The following is a brief report describing the research project, working environment, test subject (dog), methods of application, criteria for evaluation and suggestions for future.

The project: Noninvasive polar bear study

As part of my PhD work, I am using molecular analysis of passively collected polar bear scat (feces) and hair to estimate abundance, spatial distribution, relatedness and diet of the polar bear population in Western Hudson Bay. To increase detection probability of samples, I have been using a specially trained dog (see attached NY Times article) to find scat. A combination of spring, summer and fall surveys are used to examine movement patterns across the landscape, expand abundance estimates to include all demographic groups (adults, subadults and family groups) and determine relatedness among closely associating bears along the coast (from adjacent beds) and from clusters of peat dens around inland lakes. Also, the quantification of plant and prey items in scat can be compared to previous studies and used as a baseline against future studies to determine if the polar bear diet is shifting in response to changing food supply and ice conditions. In light of the recent threats to polar bear populations from global climate change, particularly to those at the southern extent of their range, this study seeks to provide a new, noninvasive approach to expanding the information database on polar bears and more accurately identify any behavioral and/or demographic shifts in response to changing environmental conditions.

Working environment of Northern Manitoba, Canada – West Coast of Hudson Bay

Our field research is based out of the town of Churchill, Manitoba, which is located along the west coast of Hudson Bay at latitude 59°N. The tundra vegetation is characterized by subarctic shrub heath and stunted, scattered spruce trees across inland areas. Sphagnum and sedge peatlands support heath-lichen vegetation across the lowland coastal areas. In summer, as the top layer of permafrost melts with the receding snow cover, the resulting landscape is mostly wet with frequent ponds and

bogs just inland of the coastal beach ridge. The coastal surveys are conducted mostly along this elevated beach ridge, but often cross inland to the wetter areas.

Average temperature in July is 12°C, but can change drastically depending on wind speed and direction and fluctuate widely from day to day. Multiple species of biting flies including mosquitoes (most of the genus *Aedes*, some *Culiseta*) and black flies (of the genus' *Simulium* and *Prosimulium*) are present from May through September. Some are short-lived, emerging for only a month at a time, others predominate throughout the summer. In the absence of strong winds along the coast or in wetter areas, these flies can swarm in extremely large numbers, making work without protective facial and arm nets impossible. The dog is not able to wear protective nets because they would catch on passing vegetation, tear and impede his movements, therefore, alternative measures were sought.

Quinoa (the dog)

Quinoa (keen-wah) is a working dog, who is specially trained to seek out and signal on polar bear feces, which is collected and stored for future molecular analyses. He is used on surveys along the west coast of Hudson Bay and around inland lakes which brings him through a variety of vegetation and landscape types. He walks in front of his handler on a 10-meter line, usually traveling in a zig-zag pattern as he seeks his target.

The dog can evade most biting flies when he is moving, but when he stops to smell something or signal on scat he is bombarded with insects on warm days with low wind. He has a dense coat of fine black fur over most of his body except his armpits, chest, stomach, groin region and ears. Here, the hair is very sparse leaving him very vulnerable to insect bites. Often surveys lead him through (fresh) water which he happily walks through to seek relief from the insects and heat.

Method of application

Between 5 to 30 minutes prior to beginning a survey, MR-08, which was provided in a white, aloe vera-based lotion, was applied to the complete underside of the dog and the exposed region of each ear (interior and exterior). Reapplication was done when possible when the dog walked through a large body of water and his underside was completely immersed or he began showing signs of extreme agitation, presumably from insects (i.e., rolling on ground and biting at them). If water was encountered very frequently in an area, the repellent was not reapplied because time did not permit. The repellent was rarely manually washed off at the end of the day because it was my impression that most was removed from walking through water, leaving little excess on his skin or fur. His ears, however, were occasionally wiped down with a damp cloth.

Criteria for evaluation

In the absence of a control, the only method used to evaluate the effectiveness of MR-08 to repel biting flies was by observation of the dog with and without its application

in similar circumstances. Prior to obtaining the repellent (in the June, 2006) the dog performed surveys near denning sites around inland lakes. In many instances, the dog did not have any repellent on him, as the weather often changed unexpectedly to conditions ideal for insects to emerge. From exposure to these insects, Quinoa developed bites (red welts) around his groin area with visible blood droplets present in some spots, presumably from black flies. He occasionally became extremely agitated (whining, rolling) and sought water to immerse himself in.

In July and August, we had a number of days that were similarly ideal for insects to emerge. However, the conditions were not identical to those in the spring. Often, the wind is stronger directly along the coast which is where the majority of sampling took place. Nevertheless, from sampling done in more inland areas, sheltered from the wind, it became clear that the repellent was effective in reducing insect bites on the dog. I only occasionally saw red bumps on his underside and almost never saw blood droplets. Although insects still did surround the dog, causing him to become slightly agitated, he did not appear to get bitten. When reapplication of the repellent was not possible after emerging from water, he still did not seem to get bitten nearly as much as when no repellent was applied. This occurrence may have been from the MR-08 residue left on him or the fact that he was wet – I can not be completely sure.

Suggestions for future

As I have found this product to be effective in protecting my dog from mosquito and black fly bites, I would like to continue using it during our 2007 summer (July and August) field season in Manitoba. If possible, a mixed petroleum/aloe vera base for the MR-08 might be more effective in keeping the dog protected after traveling through water. Also, if I could be provided with a control (just the base constituent) I would be able to evaluate its effectiveness better. I could perform experiments whereby half of the dog's stomach has the full MR-08 formula and half has the control. I could then record visual observations and take pictures of both areas of his stomach 30 and 60 minutes after application to detect any differences.

Thank you very much for providing me with test samples of MR-08 and allowing me to participate in this study. I look forward to continuing using it in the future.