MOSQUITOES COLLECTED IN A CO_2-BAITED CDC MINIATURE LIGHT TRAP AND A BOVINE-BAITED TRAP IN WYOMING[1]

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ABSTRACT. A comparison of adult mosquitoes captured in a bovine-baited trap and a CO_2-baited light trap collected over 5.5 x as many mosquitoes as did the bovine-baited trap. The CO_2-baited light trap collected 3.3 x *Aedes dorsalis*, 9.0 x *Ae. melanimon*, 3.9 x *Ae. campestris*, and 3.1 x *Ae. flavescens*. The bovine-baited trap captured 3.4 x *Ae. idahoensis*, 3.9 x *Culiseta inornata*, and the 2 different traps collected almost equal numbers of *Ae. fitchii*.

INTRODUCTION. To survey mosquitoes that attack cattle in Wyoming, a collection method was needed that was less laborious than the use of a bovine-baited trap. The objective of the following experiment was to determine whether a CO_2-baited CDC miniature light trap and a bovine-baited trap would collect mosquito species in the same relative abundance.

MATERIALS AND METHODS. The study was conducted in 1971 at the University of Wyoming Range and Pasture Experiment Station, which is located 3 mi.

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southwest of Laramie, WY at an elevation of 7,165 ft. The study was described earlier by Pennington and Lloyd (1975).

The bovine-baited trap (Roberts 1965) was located ca. 20 ft from the edge of the Laramie River. The bait animal was a 250 lb, 4 month old, Hereford heifer. Adult mosquito collections were made from inside the trap with a portable vacuum cleaner powered by a portable generator. A 24x24 nylon mesh screen was inserted in the extension tube of the cleaner to retain the mosquitoes.

The miniature CDC light trap (Sudia and Chamberlain 1962) was powered by a 6 volt dry cell battery. Twenty pounds of dry ice, wrapped in newspaper, were suspended adjacent to the trap to provide CO_2 gas for a 24 hr collecting period. This trap was positioned near the edge of the Laramie River at a distance of ca. 200 yards from the bovine-baited trap. Because of a small hill between the 2 trap sites it was not possible to see either trap from the site of the other.

The 2 traps were operated simultaneously for 24 hr on 2 different dates. The times (MDT) of operation were 8:30 pm July 12 to 8:30 pm July 13 and 8:30 pm July 26 to 8:30 pm July 27. All mosquitoes were collected from the traps at 4 different times of day: 5:30 am, 9:00 am, 5:00 pm, and 8:30 pm. The number of mosquitoes in each collection was determined by either counting every mosquito or by weighing the collection and estimating the number from the weight of a 100 mosquito subsample taken at random. Species determinations were made from all specimens collected or a randomly selected subsample of 75 individuals.

RESULTS AND DISCUSSION. The same mosquito species were collected by the 2 methods on both days of the experiment. The list of species collected is presented in Table 1.

Olson et al. (1968) who compared a CDC miniature light trap with a steer-baited Magoon-type trap (Magoon 1935), reported that the light trap collected representatives of all 16 species in their area, but the steer-baited trap provided representatives of only 7 species. Easton et al. (1968) indicated that the number of mosquito species attracted to a particular host animal will be much lower than the number collected in a Malaise trap.

Two "plains species," that were not collected in this study, *Ae. excrucians* and *Ae. increpitus*, were reported in the Laramie, WY area in an earlier year by Owen and Gerhardt (1957). These two species are reported to be pests of cattle, but were not encountered by intensive collection from a bovine-baited trap in 1971 (Pennington and Lloyd 1975). These 2 species might have been either absent or too rare to be detected by this method. Additional rare species might be missed because of infrequent sampling, or more rare species might have been obscured by the large numbers of *Ae. dorsalis* and *Ae. melanimon*, which required the use of a subsampling technique. Since our research concerns the most abundant species which presumably cause the greatest annoyance to livestock, less abundant species are of little interest.

As can be seen in Table 1, over 5½ x as many total mosquitoes were collected in the CO_2-baited CDC miniature light trap as in the bovine-baited trap. Olson et al. (1968) in Utah reported that a CDC miniature light trap (without CO_2) collected 1.5 x more total mosquitoes than

Table 1. Mosquitoes captured in a bovine-baited trap and a CO_2-baited, CDC miniature light trap.[1]

Species	Bovine-treated trap	CO_2-baited light trap
Aedes dorsalis	6,110	20,159
Ae. melanimon	5,564	49,935
Ae. campestris	1,015	3,951
Ae. flavescens	1,010	3,097
Ae. idahoensis	238	70
Ae. fitchii	36	31
Culiseta inornata	191	49
Total[2]	14,164	77,292

[1] The periods of trapping were: 8:30 pm July 12 to 8:30 pm July 13, and 8:30 pm July 26 to 8:30 pm July 27, 1975.

[2] ca. 1% of the mosquitoes collected in the bovine-baited trap were males. No males were captured in the CO_2-baited CDC miniature light trap.

did a Magoon-type bovine-baited trap. Roberts (1965), however, reported a much greater total collection from his steer-baited trap than from unbaited light traps. Olson et al. (1968) suggested that the Roberts trap was more efficient because it had more openings and more screen. Many investigators, including Newhouse et al. (1966) have compared standard CDC miniature light traps with and without dry ice and found that the CO_2 was responsible for a 4 to 5 x increase in total mosquito collection.

When dry ice is added as a bait to a light trap, some species are attracted in far greater proportion than their relative abundance as determined by other collection methods. (Newhouse et al. 1966). This is evident from our data in Table 1. For example, *Ae. dorsalis* very slightly outnumbered *Ae. melanimon* in the bovine-baited trap, however, in the CO_2-baited CDC miniature light trap collection *Ae. melanimon* was 2.5 x as numerous as *Ae. dorsalis*.

From Table 1 it can be seen that the larger collections of the CO_2-baited CDC miniature light trap were due to primarily nocturnal species, i.e., *Ae. dorsalis, Ae. melanimon, Ae. campestris,* and *Ae. flavescens*. The primarily diurnal *Ae. idahoensis* and *Ae. fitchii* were collected in lesser numbers in the CO_2-baited CDC miniature light trap than in the bovine-baited trap. Unbaited light traps were ineffective in collecting diurnal species (Newhouse, 1966). Presumably numbers of *Ae. idahoensis* and *Ae. fitchii* would have been lower in our light trap had we not used the CO_2 bait. According to Newhouse et al. (1966) significant numbers of diurnal mosquitoes are drawn so close to the trap by the CO_2 that they are caught during the daylight hours.

Only 20% of the total *Cs. inornata* that were collected occurred in the CO_2-baited CDC miniature light trap (Table 1). Morris and DeFoliart (1969) suggested that *Cs. inornata* was relatively scarce (33%) of the total collection in their CO_2-baited traps as compared to light traps because the volume of CO_2 released (from a 4–5 lb block of dry ice) was insufficient to attract this species in numbers. The volume of CO_2 released from our 20 lb block of dry ice probably was greater, but perhaps also not optimal for attraction of *Cs. inornata*.

A plains mosquito species that was not detected by either collection method that we believe was present in the area in small numbers at the time of the experiment is *Culex tarsalis*. *Cx. tarsalis* is primarily ornithophilic and usually does not feed on large animals until August or September when larger adult populations have been reached. *Cx. tarsalis* is attracted to light traps however, and it is possible that this species was repelled by a large volume of CO_2 from our 20 lb block of ice as was suggested by Morris and DeFoliart (1969).

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