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A STEER-BAITED TRAP FOR SAMPLING INSECTS AFFECTING CATTLE

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In recent years, the methods used for sampling and studying populations of insects have become more specialized as the accumulated knowledge concerning various taxonomic groups has suggested more suitable sampling techniques. With regard to insects affecting livestock, especially cattle, the principal method of study has been based on counts made at a particular time on animals in the field. This method has been effective in estimating populations of host-inhabiting species, but it does not provide an accurate estimate of nocturnally active species. Estimates of the nocturnally active insects have been based on light-trap collections. Although light-trap collections yield usable data, we cannot assume that cattle and light will attract the same species and in the same proportions. Because of the possibility of erroneous interpretation of light-trap data, a study was conducted on the efficacy of a steer-baited insect trap for sampling the populations of Diptera attracted to and attacking cattle.

The trap designed and used in this study was a modification of the stable trap described by Magoon (1935). Two main objectives were sought in the modifications: (1) To allow as much circulation of air through the trap as possible for insect attraction and (2) to enable insects approaching the trap to have ingress at several heights above ground level.

This paper includes the trap design, materials required for its construction, and a check list of the insects collected in the baited trap as compared with those collected in light traps. A report on a comprehensive study on the seasonal collections is planned for a later paper.

TRAP DESIGN AND MATERIALS. The structural plan for the trap is shown in Fig. 1 and a photograph of the completed trap in Fig. 2. The following materials were used in the construction of this trap:

Lumber (number and size of pieces):

- 7—2″ x 4″ x 14′
- 7—2″ x 4″ x 12′
- 1—2″ x 4″ x 8′
- 3—2″ x 4″ x 10′
- 2—1″ x 4″ x 12′
- 6—1″ x 10″ x 14′
- 2—1″ x 10″ x 12′
- 250 linear ft of screen molding

Hardware:

- 1 box corrugated fasteners, ⅜″ x 5 gauge
- 1 pair strap hinges, 4″
- 1 safety hasp, 4″

[1] In cooperation with the Delta Branch of the Mississippi Agricultural Experiment Station.

5 lb common nails, 16[d]
¼ lb screen tacks
½ lb wire nails, 1″ x 17 gauge
40 ft^2 polyethylene sheeting
28 in. x 12 linear ft copper wire screen, 24x24 mesh

The first objective, greater air circulation, was accomplished by covering the lower two-thirds of the sides and ends of the trap with screen. A 24x24-mesh screen was used in order to retain any of the smaller Diptera, such as the Heleidae, that might enter the trap.

So as to facilitate insect entrance into the trap (the second objective), three louvered entrances were located at several heights. One opening was at ground level, the second at about 2 ft, and the third at about 4½ ft above the ground. These openings were placed on the sides but not on the ends of the trap.

Within the trap, a stanchion was constructed to keep the animal in a center position and to prevent damage to the screen. The entrance to the stanchion was closed by removable boards. The trap entrance was sealed by a lightweight door constructed of 1 x 4-in. lumber and covered with screen on the lower two-thirds and with polyethylene on the upper third.

Insect collection was facilitated by the use of a portable 12-v vacuum cleaner (Fig. 3). A 24x24-mesh screen cylinder was inserted in the extension tube of the vacuum cleaner to retain the insects and prevent the damage to the specimens that would have occurred if they had been allowed to pass through the fan blades into the vacuum cleaner's dust bag. The vacuum cleaner was operated on the power supplied by the 12-volt battery of

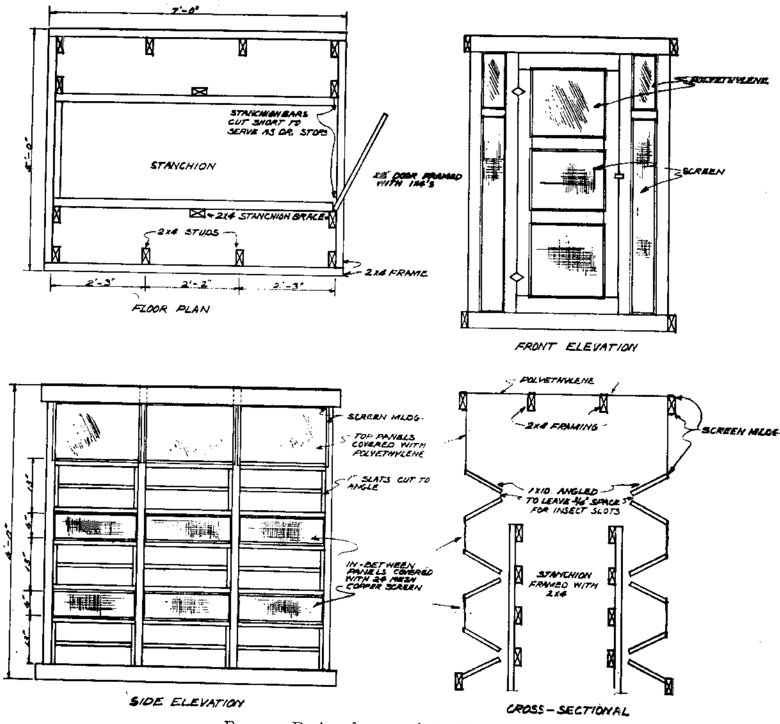

FIG. 1.—Design for steer-baited insect trap.

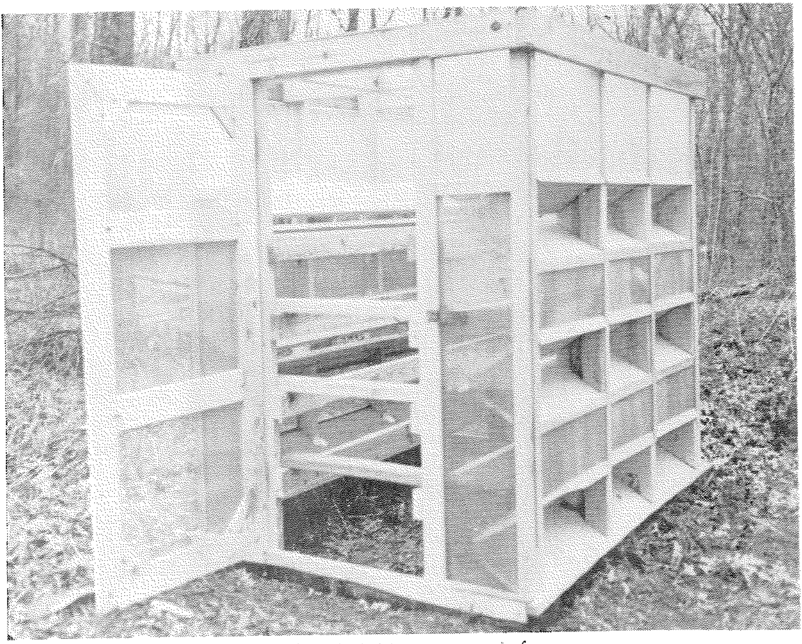

Fig. 2.—Steer-baited insect trap ready for use.

the truck used to transport the steer. After collection, the screen cylinder containing the trapped insects was inserted into a killing jar and the contents emptied. Small collections were identified and counted completely. Large collections were weighed and three 2-g aliquots taken to determine the species and numbers trapped.

Collection Results and Discussion. The species of Culicidae collected in light traps and bait traps are listed in Table 1, and those in the families Heleidae, Simuliidae, Psychodidae, and Chloropidae in Table 2. Also included (Table 3) is a list of Tabanidae collected in the bait traps. In addition, the stable fly (*Stomoxys calcitrans* (L.)), the horn fly (*Haematobia irritans* (L.)), the house fly (*Musca domestica* (L.)), and the secondary screw-worm fly (*Cochliomyia macellaria* (F.)) were also collected in the bait traps.

Although the stable trap was originally developed for use in malaria control programs, the possibilities of the use of an animal-baited trap in the study of insect vectors of other diseases have not been overlooked, as evidenced by the work of Lumsden (1958), Minter (1961), Dow *et al.* (1957), Rainey *et al.* (1962), and Blackmore and Dow (1958). However, as pointed out by Lumsden, there are inherent problems associated with such a trap, namely, the difference between species in their willingness to enter and feed in the trap, and the variable proportion of different species that might escape from the trap after feeding. Although both problems need to be resolved, the preliminary data indicate that there is a definite advantage in the use of these traps in the study of haemophagous Diptera affecting cattle.

At present, this conclusion is based primarily on the greater number of species collected in the bait trap, although the ultimate goal of measuring accurately the population parameters of the various spe-

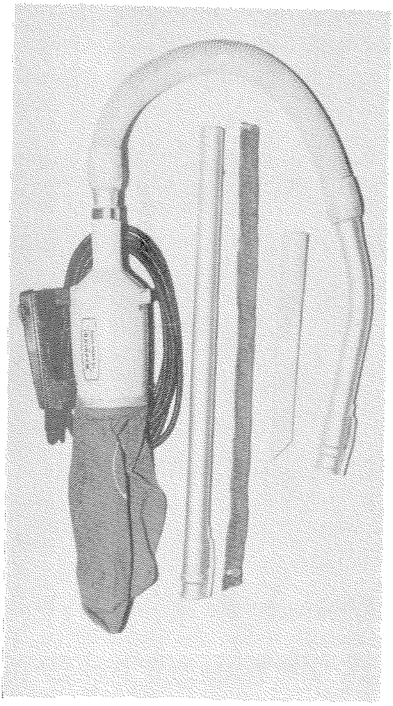

FIG. 3.—Portable 12-volt vacuum cleaner and attachments.

TABLE 1.—Comparison of light-trap and bait-trap collections of Culicidae.[a]

Species	Collected in Light-trap	Collected in Bait-trap
Aedes		
atlanticus Dyar and Knab	*	*
canadensis (Theobald)	..	*
fulvus pallens Ross	..	*
grossbecki (Dyar and Knab)	..	*
infirmatus Dyar and Knab	*	*
sticticus (Meigen)	*	*
triseriatus (Say)	..	*
vexans (Meigen)	*	*
Psorophora		
ciliata (Fabricius)	..	*
confinnis (Lynch-Arribalzaga)	*	*
discolor (Coquillett)	*	*
ferox (Humboldt)	..	*
horrida (Dyar and Knab)	..	*
Anopheles		
crucians Wiedemann	*	*
punctipennis (Say)	*	*
quadrimaculatus Say	*	*
Culex		
erraticus (Dyar and Knab)	*	*
quinquefasciatus Say	*	*
restuans Theobald	*	*
salinarius Coquillett	*	*
tarsalis Coquillett	*	*
territans Walker	*	..
Culiseta		
inornata (Williston)	*	*
Mansonia		
perturbans (Walker)	..	*
Uranotaenia		
sapphirina (Osten Sacken)	*	..

[a] An asterisk indicates species collected.

cies is far from being achieved. However, some comparisons between the percentages of culicids collected in the bait and light traps for the more prevalent species may be of interest. For example, *Psorophora confinnis* represented 69 percent of the light-trap collections and 78 percent of the bait-trap collections. Two species, *Aedes sticticus* and *Culex erraticus*, of minor importance in light-trap collections (0.3 percent and 0.6 percent, respectively) represented 3.1 percent and 5.7 percent, respectively, of the total in the bait traps. On the other hand, the percentage of *A. vexans* in the light traps, 8.2 percent, exceeded that in the bait traps, 6.3 percent; whereas *C. salinarius* represented 4.5 percent of the light-trap collections and only 1.2 percent of the bait-trap collections. These percentages are based on a total of 7,381 culicids collected in the light traps and 105,387 culicids collected in the bait traps. During the period upon which these comparisons are based, 10 light-trap and 4 bait-trap collections were made per week.

Though these data are promising, the aforementioned problems need further study before we can assume the bait-trap data to be an accurate indication of the species attracted to and attacking cattle and of their relative abundance.

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TABLE 2.—Check list of light-trap and bait-trap collections of several Diptera families.[a]

Species	Collected in	
	Light-trap	Bait-trap
Heleidae		
Culicoides		
biguttatus (Coquillett)	*	*
crepuscularis Malloch	*	*
guttipennis (Coquillett)	*	..
paraensis (Goeldi)	*	..
travisi Vargas	*	*
variipennis (Coquillett)	*	*
Simuliidae		
Simulium		
vittatum Zetterstedt	..	*
jenningsi group	..	*
Psychodidae		
Phlebotomus		
vexator Coquillett	..	*
Chloropidae		
Hippelates		
pusio Loew	..	*
pallipes (Loew)	..	*
bishoppi Sabrosky	..	*
plebejus Loew	..	*

[a] An asterisk indicates species collected.

ing the Heleidae, Alan Stone for identifying the Simuliidae and Psychodidae, and Curtis Sabrosky for identifying the Chloropidae and *Cochliomyia macellaria* (F.) collected in this investigation.

TABLE 3.—Tabanidae collected in an animal-baited insect trap.

Species
Hybomitra lasiophthalma (Macquart)
Tabanus americanus Forster
Tabanus atratus F.
Tabanus calens L.
Tabanus fulvulus Wiedemann
Tabanus fuscicostatus Hine
Tabanus lineola F.
Tabanus proximus Walker
Tabanus stygius Say
Tabanus sulcifrons Macquart
Tabanus vittiger schwardti Philip
Chrysops flavidus Wiedemann
Chlorotabanus crepuscularis (Bequaert)
Leucotabanus annulatus (Say)

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