These tests establish that, if due attention is paid to location of traps, CO_2 is a suitable attractant for monitoring the biting activity of *Ae. triseriatus*. The significant differences found between trap sites (Table 1) indicate that if CO_2 is to be used as a tool for routine monitoring, several trap locations should be tested initially. Traps at low-yielding locations can then be removed.

The trap described above requires minor modifications if used only with CO_2. The plastic crisper used to house a bait animal in our tests is unnecessary. The circular cover can also be eliminated and the trap suspended directly below a dry ice container. The amount of dry ice needed could be reduced by supplying only enough to last through the daylight hours and picking up the catch at the end of the day. This would necessitate 2 trips per day to service the traps, but would extend battery and motor life. Battery and motor life could also be extended by adding a photo-activated switch (Pfunter 1979). This would necessitate a larger supply of dry ice or use of CO_2 from a pressurized cylinder and addition of a method of killing the accumulated mosquitoes; otherwise, they would escape when the fan is turned off.

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References Cited

Beier, J. C., W. J. Berry and G. B. Craig, Jr. 1982. Horizontal distribution of adult *Aedes triseriatus* (Diptera: Culicidae) in relation to habitat structure, oviposition, and other mosquito species. J. Med. Entomol. 19:239–247.

Berry, W. J., D. Fish and G. B. Craig, Jr. 1980. The use of an ovitrap grid for measuring adult movement and population density of the treehole mosquito *Aedes triseriatus*. Proc. Ind. Acad. Sci. 89:208–209.

Burkot, T. R. and G. R. DeFoliart. 1982. Bloodmeal sources of *Aedes triseriatus* and *Aedes vexans* in a southern Wisconsin forest endemic for La Crosse encephalitis virus. Am. J. Trop. Med. Hyg. 31:376–381.

Craig, G. B., Jr. 1983. Biology of *Aedes triseriatus*: Some factors affecting control, pp. 329–341. *In:* C. H. Calisher and W. H. Thompson (Eds.). California Serogroup Viruses. Alan R. Liss, New York.

Hanson, R. P. and M. G. Hanson. 1970. The effect of land use practices on the vector of California encephalitis (La Crosse) in north central United States. Mosq. News 30:215–221.

Loor, K. A. and G. R. DeFoliart. 1969. An oviposition trap for detecting the presence of *Aedes triseriatus* (Say). Mosq. News 29:487–488.

Nasci, R. S. 1981. A lightweight battery-operated aspirator for collecting resting mosquitoes in the field. Mosq. News 41:808–811.

Pfuntner, A. R. 1979. A modified miniature surveillance trap. Bull. Soc. Vector Ecol. 4:31–35.

Service, M. W. 1976. Mosquito ecology. Field sampling techniques. J. Wiley and Sons, New York. 583 pp.

AN ADJUSTABLE RESTRAINER FOR SENTINEL CHICKENS USED IN ENCEPHALITIS SURVEILLANCE

ROBERT R. VIGLIANO
AND
DOUGLAS B. CARLSON

Indian River Mosquito Control District,
P.O. Box 670,
Vero Beach, FL 32961

Sentinel chickens are routinely used in many areas of the United States for St. Louis, eastern equine and western equine encephalitis virus surveillance (Crans 1982, Emmons et al. 1982, Burgess et al. 1984, Day and Carlson 1985). Periodic blood collections are made from the wing vein of each chicken to detect antibodies to these mosquito-borne viruses. The technique normally requires two persons, one to hold the chicken while the other draws the blood (Sudia et al. 1970, Florida Dept. Health and Rehabilitative Services 1979).

In 1984, the Indian River Mosquito Control District constructed and began using an adjustable device designed to temporarily immobilize a sentinel chicken to allow a single person to collect the blood samples. The restrainer is a wooden assembly (measuring 10 × 46 × 31 cm, fully assembled) designed to immobilize the chicken on its back. The bird's body, legs, neck and wings are secured with Velcro® straps[1]. A vertical attachment (measuring 4 × 10 × 20.5 cm) on one end of the restrainer holds the bird's legs upward, with each leg strapped individually, for better stability. The underside of each wing is held downward by extensions attached to the base of the device at a 45° angle. Birds of varying sizes can be held by sliding the individual strap sections (secured onto the device with machine bolts and wing nuts) along routed slots. Separate adjustments for the leg

[1] Velcro® pressure-sensitive fabric fasteners, available in varying sizes or in rolls, consist of two strips, each containing either hook or loop material on one side. Straps for the restrainer were cut from a 26 mm (= 1 in) width roll (total length = 1.5 m).

(by length and height), wing and neck straps (by length) are possible. Figure 1 shows a general layout of the restrainer. A photograph of a chicken secured onto the device is shown in Fig. 2. A list of materials needed for constructing this restrainer is available from the authors upon request.

To secure a chicken on the adjustable restrainer, the bird is laid on the board while maintaining a firm grip on its legs. The straps are first applied to the legs, followed by the neck and body. To strap each leg, the shorter Velcro® hook strip, which only wraps approximately halfway around the leg, is first positioned, then attached to the corresponding loop strip (see Figs. 1 and 2). The legs are secured first because we have found that whenever a chicken was able to free even one of its legs, controlling it was difficult. The body straps are applied with one strap tucked between the bird's legs, as shown in Fig. 2. Finally, the wing selected for blood sampling is secured. The other wing can be tucked under the body straps unless bleeding from that wing becomes necessary. Strapping the wing downward exposes the wing vein in a near-vertical position allowing blood to flow easily into a syringe. The bird can be hooded to help it remain calm.

This device has reduced our personnel requirements for chicken bleeding by using only one person to perform these tasks. In 1983, two persons conducted the bleedings. Using this restrainer has resulted in a savings of ca. 3 man-hours per week, or ca. 90 man-hours annually, in 1984 and 1985. Our experience has shown that each chicken was restrained for approximately 3 min per blood sampling. This apparently will not harm the bird, assuming it is secured properly onto the device. The bird is immediately released into the flock cage after bleeding. The wood construction of the adjustable device did require occasional repairs, especially to the leg strap section. After several months of use, some of the Velcro® straps (particularly the leg straps) required replacement. The adjustable chicken restrainer costs approximately $24.00 for materials and required ca. 4 hr for construction. This device has proven to be a useful addition to the SLE surveillance program of the Indian River Mosquito Control District.

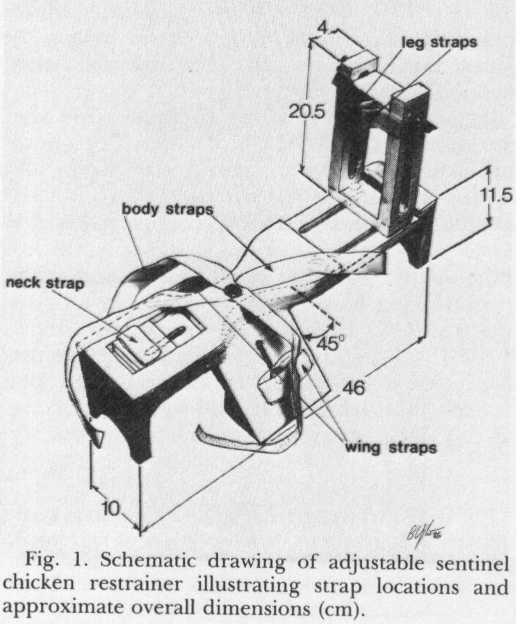

Fig. 1. Schematic drawing of adjustable sentinel chicken restrainer illustrating strap locations and approximate overall dimensions (cm).

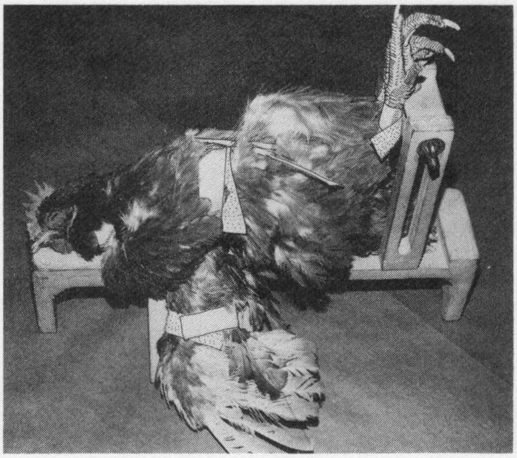

Fig. 2. Chicken immobilized on the restrainer.

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References Cited

Burgess, J. H., G. Wichterman and T. W. Miller, Jr. 1984. St. Louis encephalitis surveillance in Lee County 1977–1983. J. Fla. Anti-Mosq. Assoc. 55:28–31.

Crans, W. J. 1982. The use of sentinel chickens for St. Louis encephalitis surveillance in New Jersey. Proc. N. J. Mosq. Control Assoc. 69:39–41.

Day, J. F. and D. B. Carlson. 1985. The importance of autumn rainfall and sentinel flock location to understanding the epidemiology of St. Louis encephalitis virus in Indian River County, Florida. J. Am. Mosq. Control Assoc. 1:305–309.

Emmons, R. W., M. M. Milby, P. A. Gillies, W. C. Reeves and E. V. Bayer. 1982. Surveillance for arthropod-borne viral activity and disease in California during 1981. Proc. Pap. Calif. Mosq. Vector Control Assoc. 50:29–38.

Florida Dept. Health and Rehabilitative Services. 1979. St. Louis encephalitis and other selected arthropod-borne viruses. H. R. S. Manual 150–2. March 1, 1979. 19 p.
Sudia, W. D., R. D. Lord and R. O. Hayes. 1970. Collection and processing of vertebrate specimens for arbovirus studies. Public Health Service, U. S. Dept. Health, Education and Welfare. 65 p.

A SIMPLE, YET EFFICIENT AIRCRAFT CHEMICAL LOADING SYSTEM

W. E. HUDGINS, R. D. NUNEZ AND L. G. TERRACINA

Calcasieu Parish Mosquito Control, Building #6
Chennault, Lake Charles, LA 70601

Calcasieu Parish Mosquito Control has been operating its own aerial spray program since 1982. As with all programs, much trial and error goes into the development of all related systems. Such was the case in the development of a simple yet efficient loading system.

When operations first began, a gasoline powered engine pumping system was utilized. The system proved adequate, but many times engine problems developed, causing delays and the need for a backup system. The heat generated by the engine and the need to carry extra gas was also considered a safety hazard. A search was begun for a more efficient loading system during the fall of 1982. The end result was the development of such a system (Fig. 1). The main components used in our system included:

1) One Ace continuous duty solenoid
2) One Sherwood pump (BBV-5)
3) One rebuilt automotive starter (35–1055 Arrow)
4) Two gauge battery cable with eye terminals (footage will vary)
5) Fourteen gauge wire with necessary terminals (footage will vary)
6) Two FC 75× 5/8 hubs
7) One B075 spider
8) Thirty foot 3/4" polybraid hose
9) Three sets brass quick couplings
10) Three foot brass pipe and elbow

Brand names associated with these materials are the ones we used because of their local availability. Substitute parts of equal quality would probably suffice. The total cost of the above merchandise was less than $350.00.

The system is set up on the rear of a one-ton flat bed, pickup truck (Fig. 2). The base is fabricated out of two 3" × 18" pieces of channel iron welded together (Fig. 3). This is bolted to the wooden bed with 4 stainless steel hex-head bolts. The entire base sits approximately 1" off

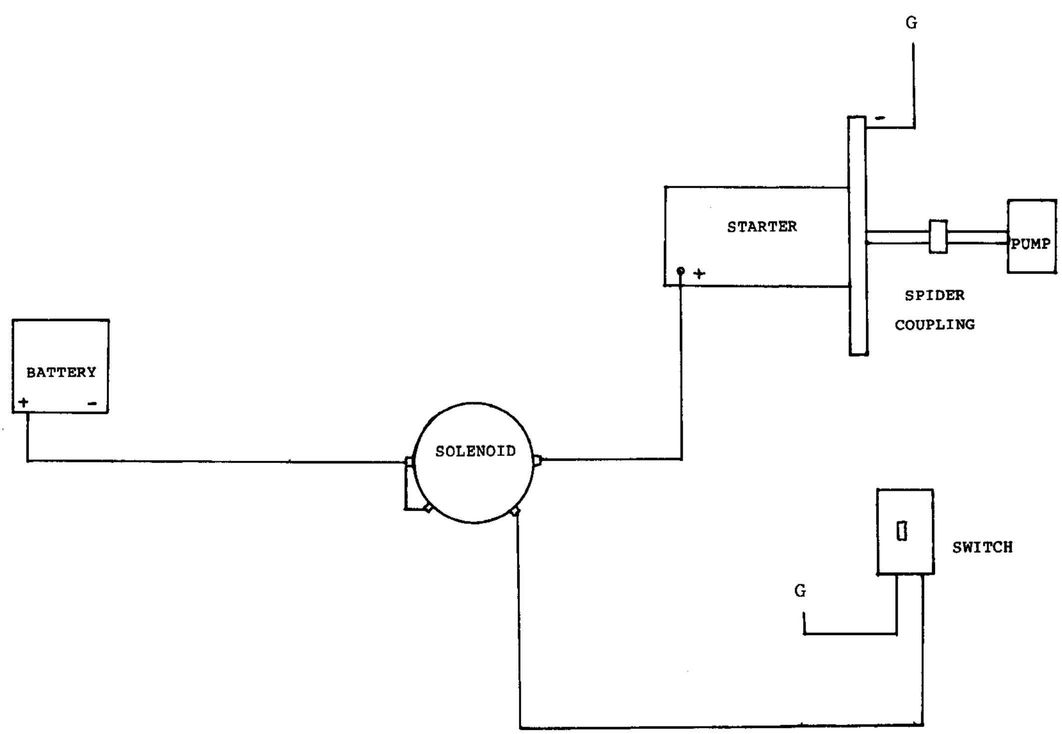

Fig. 1. Schematic drawing of loading system.