

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

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1. SUBJECT CLASSIFICATION	A. PRIMARY Agriculture	AL72-0000-0000
	B. SECONDARY Pests of animals	

2. TITLE AND SUBTITLE
Load-lifting capacity of the vampire bat

3. AUTHOR(S)
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4. DOCUMENT DATE 1970	5. NUMBER OF PAGES 3p.	6. ARC NUMBER ARC 599.4072.8967
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
Interior

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(In J. of mammalogy, v. 51, no. 3, p. 627-629)

9. ABSTRACT

10. CONTROL NUMBER PN-RAA-470	11. PRICE OF DOCUMENT
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12. DESCRIPTORS Bats, vampire Body weight Lifting capacity	13. PROJECT NUMBER
	14. CONTRACT NUMBER (PASA RA(ID)1-67 Res.
	15. TYPE OF DOCUMENT

PASA-RA (ID) 1-67

Reprinted from JOURNAL of MAMMALOGY
Vol. 51, No. 3, 28 August 1970
pp. 627-629
Made in United States of America

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LOAD-LIFTING CAPACITY OF THE VAMPIRE BAT

Studies to determine movement patterns, feeding behavior, and roost preferences of vampire bats (*Desmodus rotundus murinus*) were recently initiated in Mexico. These data are needed to develop selective control techniques for application in areas where rabies transmitted by vampire bats is an economic problem. This study sought to determine the maximum load-lifting capacity of vampire bats as a prelude to the possible use of radio transmitters for gathering this ecological information.

Vampire bats were collected with mist nets placed in the entrance and interior of two caves in the state of Morelos. The first cave, located at the southern edge of Cuernavaca, is a calcareous cave with a temperature of 21°C and a relative humidity of 59 per cent. The second cave, with a temperature of 22°C and a relative humidity of 50 per cent, is near Apatlaco, Xochitepec.

Thirty-five bats were collected, sexed, weighed to the nearest gram, and divided into seven groups of five animals each. Weights of bats averaged 32.9 grams and ranged from 24.4 to 42.3 grams. Animals had not fed for at least 12 hours before tests, and no obviously gravid females were used.

Group number 1 served as controls. Loads of 6, 8, 10, 12, 14, and 16 grams were attached to bats in groups 2 to 7, respectively. Bats were lightly anesthetized with ether, the hair on the back was trimmed with scissors, and a metal weight was attached with a fast-drying adhesive (Eastman 910 Adhesive, Armstrong Cork Co., Lancaster, Pennsylvania) that proved satisfactory for temporary attachment. Weights were fabricated from preweighed pieces of galvanized tin folded into rectangles (approximately 3 by 1.2 by 0.6 centimeters). The weight was pressed firmly to the back for approximately 2 minutes, and the animal was permitted to recover from the anesthetic. Bats were then released separately, and individual flight patterns, designated as "flew easily," "flew with difficulty," or "unable to fly," were recorded.

Bats were released at chest height in a parking lot located on a hilltop (1540 meters) that, depending upon the direction of flight, afforded a good view of flights for approximately 200 meters. Group number one was released, one by one, without weights to deter-

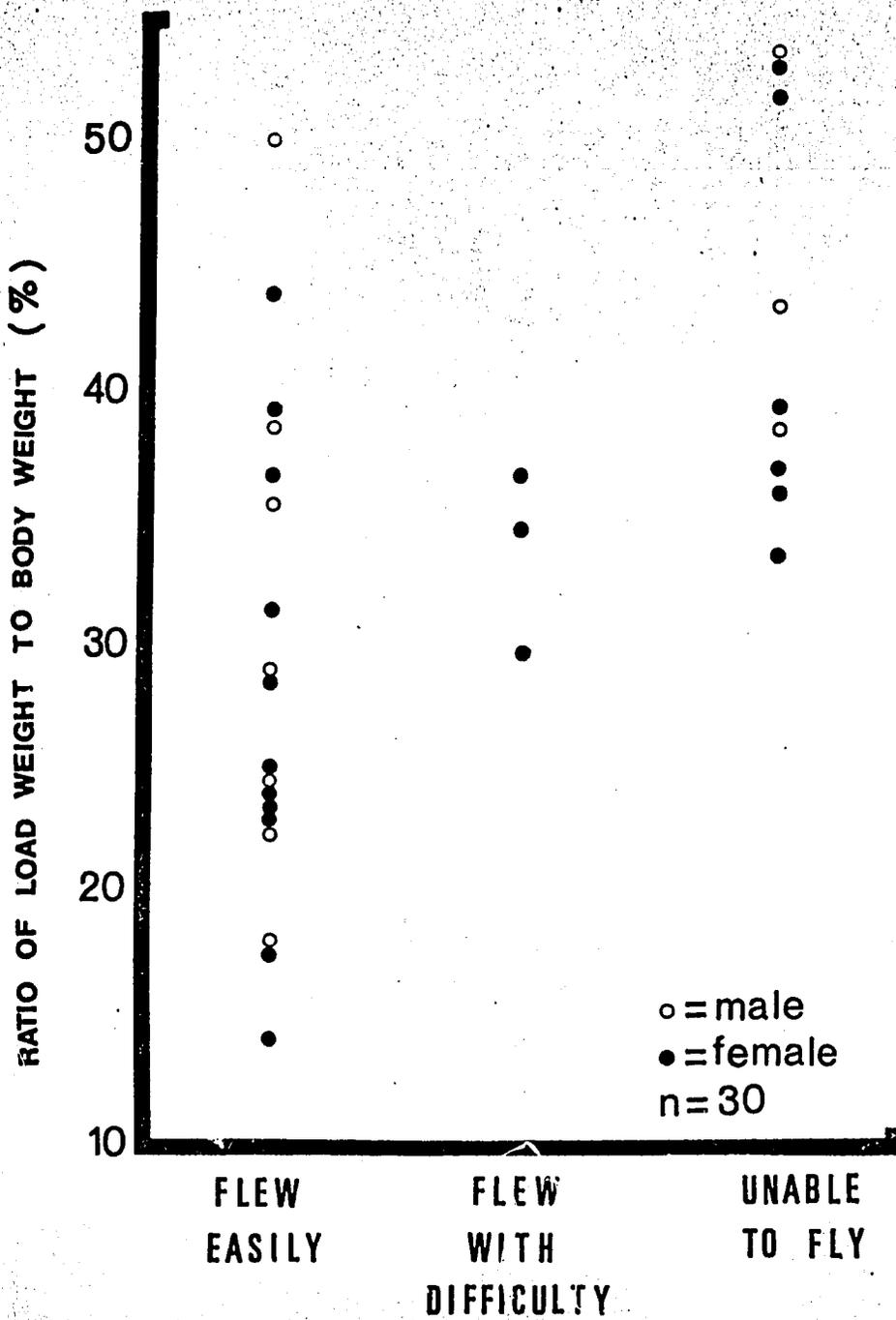


FIG. 1.—Flight performance of the vampire bat carrying different loads.

mine normal flight patterns. All five generally flew at a height of 1 to 3 meters above the ground. Villa (Los murciélagos de México, xvi + 491 pp., 1966) and others have indicated that this species normally flies near the ground.

Results are shown in Fig. 1, where the ratio of load weight to body weight is plotted with respect to the flight pattern observed. With one exception, bats carried loads up to 33 per cent of their body weight with no apparent immediate difficulty. Some bats could not fly, or flew only with difficulty, when the load exceeded that percentage. However, several were able to fly with heavier loads, and one flew normally with a load equaling 50 per cent of its body weight. Experimental design and available animals did not permit determination of sex differences with respect to load-lifting capacity. Although our methodology differed from that of Davis and Cockrum (J. Mamm., 45:643-644, 1965), our figures for the load-lifting capacity of vampires fell about midway in the range of 9.3 to 73.3 per cent of body weight that they reported for five different species of insectivorous bats.

Position of metal weights and related balance difficulties probably accounted for the reduced lifting capacity of bats that we studied. Moreover, wild vampire bats may consume an estimated 53 per cent of their body weight in blood and later return to their roost (Wimsatt, J. Mamm., 50: 233-244, 1969). Pregnancy is another limiting factor. We have taken a female with a near-term fetus that weighed 7 grams, or 21.9 per cent of the body weight of the female. Indeed, the combined weights of transmitter, blood meal, and possibly a fetus, probably limits to some extent the use of radio telemetry equipment on this species.

The authors thank Dr. William Wimsatt, Cornell University, Ithaca, New York, for his suggestions and advise. This study was supported by the Agency for International Development, U. S. Department of State (use of trade names does not imply endorsement of commercial products by the U. S. Government).—RAÚL FLORES CRESPO, RICHARD J. BURNS, AND SAMUEL B. LINHART, *Instituto Nacional de Investigaciones Pecuarías, Secretaría de Agricultura y Ganadería, Apdo. 41-652, México, D. F. (Flores Crespo), and Denver Wildlife Research Center, Bureau of Sport Fisheries and Wildlife, Denver, Colorado, 80225, (Burns and Linhart). Accepted 14 March 1970.*