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BOOK REVIEW

Capybaras: Behavior, Ecology, and Management

CAPYBARAS: A NATURAL HISTORY OF THE WORLD'S LARGEST RODENT. By Rexford D. Lord. Baltimore: Johns Hopkins University Press. 2009. 159 pp., $50.00 (cloth). ISBN 978-0-8018-9163-2.

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Capybaras, the largest extant rodents, are the subject of Rexford Lord's recent treatise, which is a combination of topics on the ecology and management of this species based on his 15 years of observations of living populations, including a ten-year intensive study on a Venezuelan ranch, and an extensive literature review. Lord, now retired from many years with the Pan American Health Organization, is a classically trained wildlife biologist and this work reflects his interest and strength in management and conservation biology. Lord has been a pioneer of health and management issues regarding wild mammals and their interface with domestic livestock, especially in South America. He was among the first to document the transport of arboviruses by migratory birds. Much of his work has had a practical and management focus and combines innovative research with a knowledge of wildlife, domestic animals, and diseases. His research is nicely exemplified by his development of the strategy of eliminating vampire bats through topical application of anticoagulants, to help control epizootics of rabies in that species.

Two extant species of capybaras are currently recognized—*Hydrochoerus hydrochaeris* and *H. isthmius*. This book focuses exclusively on *H. hydrochaeris*, the largest and most widely distributed of the two species, which is found across the northern and eastern two-thirds of South America from the coastal Guyanas to Uruguay and northern Argentina. The lesser capybara, *H. isthmius*, is restricted to central and eastern Panama and northern Colombia and Venezuela. As the common name implies, it is a somewhat smaller animal and little is known of its biology.

The text is written in a user-friendly manner with general introductory sentences preceding the detailed topics. Chapters include general characteristics; anatomy and physiology; natural history, ecology, and behavior; diseases, parasites, and hazards; censuses and population trends; conservation and management; and a case history of Lord's ten-year population study in Venezuela. There are three appendices; the first two summarize his census methods and data, reporting a range of 0.75–5.532 animals per hectare in good habitat. The third appendix is a synopsis of the biology presented in the book. The index is quite useable.

Fig. 240.—Carpincho. *Hydrochoerus capybara.* × $\frac{1}{12}$.

Throughout, the text includes Lord's firsthand observations and a review of the published literature. The

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extensive literature review (some 206 publications cited) primarily considers ecology and management. It pulls together a very scattered literature from all of the countries where capybaras are found, including both formally published and "unpublished" agency-type mimeograph reports, some of which would be unavailable to most researchers and provide valuable insights into capybara biology. Original data tables are provided for several topics, including sex ratios, cranial measurements, mortality, and parasite abundance.

Lord is an outstanding wildlife photographer and this book is nicely illustrated with his original photographs. A number of aspects of capybara morphology and biology are illustrated, including close-ups of adults and young, morphology, habitat, behaviors such as copulation (which incidentally occurs mostly in water but can occur on land), fights among males, predators (some in the act of feeding on a capybara), feces, parasites, and more. Reproduction of the photographs is generally good; however, Lord informs me that the colors were more vivid and some of the black-and-white photographs far sharper in his original photographs than reproduced here.

This book is very factually oriented, with its strength in ecology. The mass of adult capybaras is ca. 42–55 kg. We learn that capybaras live a maximum of five years in the wild, that females have a 4.25- to 4.5-month gestation, and that litter size is one to seven young with four being the average. Capybaras are easily tamed and have adapted well to being managed in herds on large ranches, and in such situations there is little competition between capybaras and cattle. In Venezuela where the meat is prized, it sells for twice the price of beef. In regions where the meat is undesired, the hide is worth far more than the meat; the leather is especially prized in Europe for gloves, boots, and jackets because it is soft and water resistant. The primary sources of mortality in these managed populations are poaching and accidental killing by vehicles. No other rodent is managed as extensively as are capybaras and Lord believes that active management and ranch-raised animals are key to the survival of the species.

Interesting and little-known insights include the regular practice of mutualism between capybaras and birds. Capybaras allow yellow-headed caracaras to remove and feed upon parasitic leeches that they pick up in the water and the carib grackle regularly feeds upon ticks, leeches, and insects that are attached to the skin of capybaras.

Capybaras feed primarily on semiaquatic grasses and water hyacinths, and to a lesser extent on mango fruits when available. Two different types of feces are produced, as in lagomorphs and a few other species of rodents. Coprophagy, or more specifically coecotrophy, passing of food through the digestive tract twice, is the consumption of the first feces (coprophagic fecal material), which are moist, soft, and unstructured. The second feces produced are typical dry pellets. Lord associates this process with hindgut fermentation and thus with better utilization of vitamins and nitrogen, as has been observed in other mammals.

Lord documents the hazards that capybaras face in the water, such as piraña s and manta rays. The young are especially vulnerable to predators (larger mammals, birds, and reptiles); there is little predation upon adults other than by humans and dogs. Diseases, including equine trypanosomiasis, brucellosis, and rabies, and intestinal parasites can be problematic.

The skull of the capybara is especially remarkable. In addition to its large size, the paraoccipital processes are proportionally the largest found in any mammal, yet we do not know their function. The incisors and cheek teeth (one premolar and three molars) are ever-growing. The last upper molar is exceptionally long, and all cheek teeth have complex lamellae. The massive incisors are used to cut grasses as well as other food plants, in grooming, and in fighting. However, Lord's statement that enamel is deposited on both sides of the incisor is incorrect. Enamel is laid down by the ameloblasts, the enamel-producing cells at the base of the growing incisors. Ameloblasts and thus enamel surround the ever-growing incisors of all rodents (as well as modern day elephants) early in fetal development; however, those cells cease production of enamel on the posterior surface before birth. Thus, a rodent incisor carries a sharp cutting edge because the hard enamel on the leading (labial) surface interfaces with somewhat softer dentine on the lingual surface.

Significant poaching takes place throughout the range, and capybaras have been eliminated from much of their former distribution due to overhunting. One of Lord's survey routes on a large Venezuelan ranch was abandoned because heavy poaching had reduced the number of animals present. Thus, the images we have in our minds of large herds of wild capybaras grazing in the Venezuelan and Argentinean marshes are in many respects an inaccurate view of their current abundance. Lord tells us that extirpation from the country of Uruguay in the near future is likely.

We learn that it is a tradition in Venezuela to eat capybara meat during Lent, a practice stemming from difficulty in obtaining fish early in the Spanish occupancy of South America; sympathetic priests seemingly sent the Pope salted meat with the explanation that this was an aquatic animal and needed for the Lenten fare. Elsewhere in South America, manatee meat also was declared as "fish" by a sympathetic pope.

Lord's documentation of capybara biology is heavily based upon his wildlife management background, and management is a theme that runs throughout the book. For example, age determination is based upon eye lens weight, a long-established technique in the field that Lord

originally developed for aging cotton-tailed rabbits in the midwestern United States.

Lord's extensive studies on capybaras and wildlife diseases and his interest in conservation are incorporated into a thorough picture of the current status and biology of this amazing animal. The strengths of this book are in ecology of living animals, a thorough review of the biology of the species, and the topics he poses as interesting questions for future researchers. Clearly, much remains to be learned about this largest of the living rodents, and research is possible given the large numbers that are raised and harvested commercially.