

BOOK REVIEW

Edited by Charles E. Rupprecht

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Chemical and Physical Restraint of African Wild Animals. 3rd Ed. Edited by Michael D. Kock and Richard Burroughs. Published by Michael D. Kock, International Wildlife Veterinary Services (Africa). 2021. 476 pp. ISBN: 978-199121725-7. US \$100.

Review by Andrew Di Salvo

Nearly two decades in the making, the third edition of *Chemical and Physical Restraint of African Wild Animals* continues to serve as an excellent resource for wildlife professionals. While the primary focus of the book is on the capture of free-ranging wild animals found predominantly in sub-Saharan Africa, many of its chapters cover concepts that are applicable to individuals capturing any free-ranging or captive wild animals across the globe.

The book is edited by Drs. Michael D. Kock and Richard Burroughs, two South African wildlife veterinarians who have served as editors of the book since its inception in 2006. This edition sports a slightly different title to previous versions and is 90 pages longer than the second edition. Tables, figures, and full-color photographs, many of which were taken by Dr. Kock, are plentiful across the book's 476 pages. Such a format feels unique for a technical resource but delivers a truly enjoyable reading experience, at times perhaps worthy of a coffee table! Each chapter is authored by a collection of wildlife professionals, many of whom have been involved in teaching the Zimbabwe capture course that heavily influenced the development of this book. The general organization of the book has remained the same in this latest version, with many of the

chapters appearing in the same order, although there has been extensive reorganization and revisions made within each chapter. Navigating the book is easy, with color-coded titles for each chapter aligned along the bottom right corner on the front of each page.

Legal and ethical considerations of immobilizing drugs are discussed at the outset, with particular attention to legislation and policies in Namibia (new to third edition), South Africa, and Zimbabwe. Despite those regional specifics, the chapter does provide excellent ethical guidelines that all individuals capturing wildlife should follow. It also stresses the ever-important need for veterinarians and non-veterinarians to continue to work together for the benefit of wildlife, and exhibit humility, a critical topic that is often talked about but infrequently written down.

A general discussion of physiology follows covering the nervous, cardiovascular, respiratory, and gastrointestinal systems, with accompanying original figures. The chapter is well balanced without getting too lost in the weeds, and the provided glossary is a nice touch. The next chapter covers basic pharmacology, diving into pharmacokinetics, pharmacodynamics, and methods to calculate drug doses. This latter section is presented well with adequate examples; however, there is an oversight in how to calculate the drug concentration if reconstituting from powder form. Dissolved drugs will always occupy a certain volume, so simply dividing the drug quantity by the volume of diluent added will always lead to an overestimation of the concentration of the reconstituted drug. Those who have reconstituted Telazol® know this firsthand as the resulting volume always exceeds the volume of added diluent. Such a

miscalculation might lead to underdosing wild animals and unsuccessful captures. To the book's credit, the Telazol issue is addressed in the next chapter.

Applied pharmacology occupies the next 31 pages and, while a few notable drugs are missing (e.g., dexmedetomidine, tolazoline), the most-often used wildlife immobilizing drugs are covered, including some new formulations, such as butorphanol-azaperone-medetomidine (BAM), that have gained popularity in recent years. Much of the drug formulation information is tailored to South Africa, with frequent reference to V-Tech and Kyron, two pharmaceutical companies based in that country.

The fifth chapter pivots to an essential review of capture-related complications that may arise in wild animals, specifically covering respiratory issues, bloat, aspiration, thermoregulatory dysfunction, stress, maladaptation, cardiovascular issues, capture myopathy, trauma, and death. One of the highlights of the chapter is the "twelve commandments to prevent or reduce stress," a well-thought-out list that has grown by one since the second edition. The book then moves on to discussions of human safety measures and response protocols pertaining to firearms and drug exposure along with protective measures that should be taken to promote animal welfare. The legal implications for a nonqualified individual to administer treatment to another person and how that varies from country to country is an important point that is mentioned.

A stepwise evaluation of the capture event, from planning to execution, is covered in its own standalone chapter and offers solid practical advice even for the most seasoned personnel.

Surprisingly, live-animal biologic specimen collection is not mentioned anywhere within this chapter and only barely referenced at all in the book, which is odd considering that it occurs during most wildlife captures. The subsequent chapter reviews helicopters, fixed-wing aircraft, and the role they play in wildlife captures. Such components are often the most dangerous aspects of capture events, so this section should not be overlooked.

The book particularly shines within the 169-page seventh chapter, which covers individual species' requirements. The Aders' duiker (*Cephalophus adersi*), black-footed cat (*Felis nigripes*), bat-eared fox (*Otocyon megalotis*), and Cape fox (*Vulpes chama*) are recent additions. Body mass, habitat, behavior, reproduction, recommended capture techniques, and other unique considerations for each species are provided. For certain species, variations in drug doses across sex and age class are provided in table form. Icons highlighting critical pieces of information appear throughout the chapter, providing warnings or emphasizing significant disease issues or species, such as the hippopotamus (*Hippopotamus* spp.), that are exceedingly challenging to capture with or without drugs. Notably, even wild felids' inability to resist the smell of Calvin Klein's *Obsession for Men* fragrance is discussed! The chapter is overwhelmingly focused on terrestrial mammals, with only limited information provided for primates, reptiles, amphibians, and birds. Perhaps this could be expanded in future editions, but the book is already approaching 500 pages.

Over the next two chapters, a primer on drug-injecting equipment, from syringes and needles to pole syringes and blow pipes, is provided, and darts and projectors are reviewed. The latter section has been extensively revised and condensed from two chapters into one. Information is limited to the most popular darting systems—Pneu-Dart®, Motsumi®, Dan-Inject®, Telinject®, Tele-Dart®, Cap-Chur®—while alternative options, such as home-made darts, have been removed. Many readers will never utilize these alternative options in the field. In this age of 'too many options and analysis paralysis,' such simplification is very much appreciated. The reader is introduced to additional restraint tools, such as net guns and cages, in the chapter that follows.

One area where there may be room for improvement is the organization of some of the later chapters. For example, Chapter 13 is dedicated to emergency and ancillary treatments, but with capture-related complications first introduced in the fifth chapter, perhaps these mitigation strategies, which encompass

only 13 pages, could have been added there. Likewise, some of the capture methods in Chapter 14 were previously discussed in the seventh chapter. Combining the brief discussions of wild animal transport from Chapter 14 and postcapture boma management from Chapter 15 into one chapter might be beneficial.

Nearing the end of the book, readers will notice a new chapter has been added covering wildlife telemetry. While this may seem out of place in a wildlife capture book, many will find this to be a welcome addition. It will be interesting to see if future editions expand on the discussion of other tracking devices used with wildlife, such as ear tags, leg bands, and passive integrated transponder (PIT) tags, many of which are only mentioned in passing. However, with space at a premium, it might be better to flesh out some other sections first.

Necropsy techniques occupy the penultimate chapter. While excellent advice is provided, the reader is expected to have a general knowledge of mammalian gross anatomy, as no diagrams or photos demonstrating entire body cavities or complete organs are provided other than a photo of the canid brain. Curiously, such photos are provided in the bird and reptilian sections. The final chapter is brief but offers thoughtful and

practical recommendations for compiling an immobilization kit and for utilizing data sheets.

Web addresses are occasionally provided throughout the book, but some of the URLs are broken. One possible solution to this might be to direct readers to an online reference list that can be updated as needed, but even that only works if that referenced URL remains intact. In general, references are limited as the bulk of the book's content is drawn from the collective knowledge of the more than 20 credited authors. The advice and warnings provided by the authors were gleaned over decades of field experience, a fact that should not be lost on any reader.

This book is a must-have for any personnel who work with African wildlife, particularly terrestrial mammals, in either a free-ranging or captive setting. Its comprehensiveness is unmatched and while much of its content is tailored to those working in Africa, it still offers plenty of practical advice and concepts that can be applied to successfully capture wildlife anywhere in the world.

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