



Book reviews

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Paturages et alimentation des ruminants en zone tropicale humide.

Textes présentés au 1er Symposium sur «L'alimentation des ruminants en milieu tropical», Pointe-à-Pitre (Guadeloupe), 2-6 juin 1987.

Edited by A. XANDE and G. ALEXANDRE.

ISBN: 2-7380-0154-8, 1989, XVIII + 535 pp., price 250,00 Francs, Réf. 1034.

Available from: INRA Publications, Route de St-Cyr, F-78026 Versailles Cedex, France (Telex: INRAPUB 699 368 F).

This book is a collection of the papers presented at the First Symposium on «Ruminant feeding in tropical environments» held at Pointe-à-Pitre (Guadalupe) from 2nd to 6th June, 1987. The importance of the Symposium is immediately obvious, considering the scarce level of knowledge in animal husbandry and how little scientific attention has been paid to this sector, in spite of its potential for improving food production in these countries.

Topics concerned food supplies for ruminants, under the form of natural or artificial pastures, and fresh and stored fodder crops. None of the products are destined for human consumption, but are suitable for ruminants which in turn convert them to noble foodstuffs, i.e. meat and milk.

At present, the proportion of emerged land dedicated to pastures only meets about 10% of man's food requirements. At first sight, the contribution of meadow land does not seem to be very important from a quantitative point of view, but it most certainly is in terms of quality, because it offers an economic means of obtaining animal protein. It should also be remembered that grazing grounds are even more important in the tropics, where they are often the only form of land management. As well as the genuine pastures, in the more favourable areas a large proportion of the land, which varies enormously from year to year, is allotted to fodder which is used fresh, stored as hay, or siloed.

In the biological tropics, pastures are generally found in areas with an annual rain fall of between 250 mm (steppe and semi-arid scrub, and the sahel) and 2000 mm and more (tropical forests). Traditionally, several species of domestic animals graze on the first types of pastures, often together with wild species. The main problems of animal breeding in these areas are associated with the seasonal growth of food plants, which has resulted in migrant forms of husbandry (nomadism and transhumance) in search of food for the animals from place to place.

The problems in tropical wet zones, to which the Symposium paid special attention, are to some extent different, but no less serious. The typical plant associations in these areas are the evergreen rain forests and deciduous and semi-deciduous monsoon forests. Grass land in the rain forests is practically non-existent or extremely rare. When the forest is cleared or burnt down, new plant associations appear which are often unstable and of poor nutritional value. The situation in the deciduous and semi-deciduous forests is slightly better but far from good, and the problem of food supplies is one of the main obstacles to successful animal breeding.

The seasonal variability in biomass production used as food, particularly in rainy zones with a marked dry season, illustrates the difficulties in the tropics. It poses severe problems to the researchers committed to finding adequate solutions for intensifying animal husbandry, which is indispensable in these areas.

The papers published in the acts of this Symposium aim to give some of the answers to the many unsolved problems of feeding animals in this environment. The volume is particularly important because for the first time a huge amount of data has been collected under one cover and sensibly divided into specific sections, in spite of the inevitable diversity of topics which is characteristic of any meeting dealing with such a vast field of problems. Indeed, an enormous number of topics are discussed, but they reflect perfectly the extent of the problems facing researchers in tropical wet zones in all the continents.

The papers are divided into three sections. The first, or more correctly zootechnical section,

deals with the problem of food resources and animal production. This section is particularly concerned with fresh and stored fodder crops, as well with by-products, especially industrial by-products from sugar cane processing. The benefits of «stored fodder» (hay and siloed products) are very important; whilst it is true that it is not at all easy to produce good quality hay and siloed fodder, any form of modern and economically viable animal husbandry must obviously have fodder stocks in store. Not only do they free the breeder from the climatic restrictions of the area, they also allow him to feed his animals all year through, even when fresh food is not available or is in poor supply.

The difficulties of siloing in the tropics have several origins, but mostly depend on the high temperatures which cause unwanted fermentation. Moreover, the type of crops suitable for siloing are often subject to rapid lignification which makes it less digestible. This is another reason why it is often difficult to obtain good quality siloed products. The fodder must be harvested as quickly as possible, and often the building of the silos themselves requires special techniques. The crop to be siloed must be chosen with care, as it may need special additives to aid development and natural acidification.

The various types of hay, unfortunately often neglected in many tropical areas, are just as important as they can also compensate food shortages during the dry season or integrate the food of certain categories of animals during the rainy season. Rain is a major obstacle to hay making. It impairs the nutritional value of the crop and hinders the hay from being dried to the optimum level necessary for the prevention of fungus attack during storage.

Specific reference to the mineral content of fodder crops has not been ignored, which is a problem in all tropical and sub-tropical areas. An unbalanced diet or a mineral deficiency, not only of oligoelements but also of macroelements such as calcium and phosphorous, can have deleterious consequences on the growth and reproduction of the animal.

This section also examines some technological problems linked with two main animal products, meat and milk. Others concern hygiene and sanitation, often criticized in the tropics, especially regarding parasites.

The second section is entirely dedicated to graminaceous-leguminous associations capable of providing good quality grazing pastures with continuous pabular supply throughout the different seasons. This subject is extremely important for the optimization of animal production, although the artificial leguminous-graminaceous consociations of tropical species are not yet widely used. Results have not always been satisfactory in terms of nutritional value or the quantity of nitrogenized substances compared to similar consociations widely employed in temperate countries. However, from the results of the studies in the book, it seems there has been a marked increase in research in this field recently, and a number of interesting associations, suitable for rainy tropics, are given which can supply a quantity of dry matter and raw protids comparable to temperate countries. Apart from the papers on the quantitative and qualitative side of production, this section of the book also includes methodological studies for the analysis of the nutritional value of food stuffs. Examples of utilization by animals are given with particular emphasis on feeding systems.

The last section concerns the latest technological inventions, aimed essentially at improving the nutritional value of agricultural or agro-industrial by-products through physical and chemical treatment. This topic is also of maximum importance, in economic and qualitative terms, animal production cannot ignore the rational use of by-products, particularly in the ruminant sector. By-products have been the object of numerous studies all over the world, but relatively little information on the subject in the tropics is available. The book also offers some interesting notes on developments in this sector.

Finally, although the book covers such a wide variety of subjects, they are logically divided into sections, so that specific information of special interest or new techniques can be found easily and quickly. Anybody studying tropical zootechnology should therefore find the book extremely useful. Apart from the «scientific» destination of the Acts, the originality of the contents make them a useful tool for experienced technicians and animal breeders interested in animal husbandry in the rainy tropics.

The frogs of Zimbabwe.

By A.J.L. LAMBIRIS.

Monografie X, 1989 (1990), 246 pp., 24 colour pls, 111 figs, price Italian lire 70.000. Available from: Museo Regionale di Scienze Naturali, Via Giolitti 36, 10123 Torino, Italy (Tel. 011-8125249).

The past thirty years have seen an explosion in the publication of popular field guides to the world's wildlife, such that now a traveller in even the most remote corners of the earth can usually include in his baggage an authoritative and well illustrated account of the birds he is likely to encounter. Inevitably, there are many more books on birds and mammals than on amphibians and reptiles, but Africa has not fared significantly worse in this respect than other major regions of the third world. Some outstanding contributions have been Pitman's (1938) *Guide to the Snakes of Uganda* (revised 1974), FitzSimons' (1962) magnificent *Snakes of Southern Africa* (revised Broadley 1983), Rose's (1962) *Reptiles and Amphibians of South Africa*, Wager's (1965) *Frogs of South Africa*, Stewart's (1967) *Amphibians of Malawi* and Passmore & Carruthers' (1979) *South African Frogs*.

It is no coincidence that most of these publications deal with the herpetofauna of Southern Africa, where a sound academic infrastructure promoting fundamental biological research has existed for much longer than in other parts of the continent. *The Frogs of Zimbabwe*, as its author freely acknowledges, leans heavily on the foundations provided by previous research, and particularly that most recently presented by Poynton & Broadley (1985-1988) in their splendid *Amphibia Zambesiaca*. Since Angelo Lambiris is currently studying for a Ph.D. under the supervision of John Poynton, while the foreword to his book was contributed by Donald Broadley, there can be little doubt that the taxonomic framework of *The Frogs of Zimbabwe* is both authoritative and thoroughly up-to-date. The work must therefore be judged primarily on how effectively its author conveys information on the 23 genera and 65 species of Zimbabwean frogs to the non-specialist teachers, naturalists and conservationists, who constitute his intended readership.

Lambiris begins with an outline of the origins, classification and biology of frogs, which he clearly felt constrained to make as brief as possible. This is a pity, especially when a more careful organisation of the main text would have allowed this to be reduced in volume and the introductory section expanded. The non-specialist reader may be unperturbed by, or even fail to notice, some of the author's more sweeping generalisations (is it really true that nocturnal species are less heavily preyed upon than diurnal ones?) or errors of fact (*Nectophrynooides occidentalis* is a West African, not Ethiopian, species; *Afrixalus* is not confined to Central and SE Africa; there are more than two subfamilies of Microhylidae, even in Africa). He is, however, likely to be puzzled by a discussion of cryptic colouration which is immediately followed by the statement that «some cryptic species (such as *Phrynomerus*) rely (for protection) on aposematic or warning colours». He may well regret that references such as Orton (1953) and Savage (1961) are mentioned in the text but not included in the bibliography (particularly since the latter is so highly recommended), and that the words «nektonic» and «sonographic» are omitted from a glossary which, nevertheless, defines such non-technical terms as «marsh» and «woodland». Some readers might also be irritated by the higher than usual incidence of typographic errors.

One admirable feature of *The Frogs of Zimbabwe* is the author's emphasis on how much still remains to be discovered about the distribution, ecology, behaviour and life histories of these animals and what a great deal could be contributed to this database by the well-informed amateur. To this end, he provides sound advice on how to preserve limited numbers of specimens (although it is doubtful whether many museum curators would agree that formalin is the most appropriate storage medium). Unfortunately, Lambiris offers very little guidance on how, where and when to find amphibians and only after diligent study of the systematic text is it likely to dawn on the inexperienced reader that most frogs are best sought by night, during the breeding season, and that the distinctive calls which assist in their discovery are produced by the male.

The main text consists of an account of the morphology, habitat, behaviour, life history and distribution of the 65 Zimbabwean species. A diagnosis of each genus is followed by a key to its constituent species and then a diagnosis and description of each of those species. This is a format which inevitably leads to considerable repetition of information (the details of colouration which

distinguish *Pyxicephalus adspersus adspersus* from *P. a. edulis* are mentioned no less than five times in the space of four pages and there are numerous references to digital intercalary cartilages in members of the Hyperoliidae, despite the fact that these are a diagnostic feature of the family as a whole). Such repetition not only makes for tedious reading, but occupies space which could have been better devoted to other topics. Similar criticism might be directed at the line drawings of hands and feet which, although admirably clear and often very valuable, are nevertheless provided for every species, regardless of whether or not they show features of diagnostic significance. In contrast, it would surely have been advantageous to include more information on sexual characters, as an aid to distinguishing male from female, and at least some indication of the total range of each species beyond the borders of Zimbabwe. On the credit side, Lambiris appears to have a special interest in the developmental biology of amphibians and his descriptions of life history stages and fine drawings of larvae and their mouthparts are very welcome, not least because this topic so often receives less attention than it deserves. Certainly, some scope for confusion is introduced in the case of *Bufo gutturalis*, *Phrynobatrachus natalensis* and *Kassina maculata*, where there are discrepancies between text and figures as to the number and arrangement of lower tooththrows in the tadpole. Quite possibly no error is involved, but Lambiris gives the reader not a hint that such features are subject to intraspecific variation.

Particularly praiseworthy are the 24 colour plates of frogs, beautifully painted by the author. Inevitably, these lack the impact of fine photographs (but allow far more species to be illustrated at much lower cost) and in a few instances the colours are perhaps rather lurid (which may well be the fault of the printer rather than the artist) but, in general, the reproduction is excellent and the plates are a valuable adjunct to the text. The author would certainly wish it so, since he recommends the reader seeking an identification to first consult the plates, then the distribution maps and descriptions, resorting to the dichotomous keys only if all else fails. At first glance, this approach might appear to be a concession to the amateur, but the more experienced herpetologist (probably inclined to turn immediately to the keys) will quickly find that these too are heavily biased towards identification by colour pattern. It could be argued that there are better characters to distinguish *Rana* from *Ptychadena* and *Breviceps* from *Probreviceps*; suspicions might be entertained that a key to species of *Bufo* based almost exclusively on colouration will be a cause of much frustration, but such prejudice would be unfair. The efficacy of the keys can really be determined only through frequent use, preferably in the field and by the non-professional. There are, however, indications of some pitfalls in the path of the unwary. As the descriptions and illustrations make clear, two Zimbabwean species of *Phrynobatrachus* have reduced webbing between the toes, but in none is it «absent» as claimed by the key. A comparison of the key and diagnostic characters for *Arthroleptis troglodytes* with the description and illustration of the same species totally fails to resolve the question as to whether this animal does or does not have the tips of the digits expanded. Similarly, the key to *Leptopelis*, which indicates that three of the four Zimbabwean species lack digital discs, is starkly contradicted by drawings of the feet of *L. mossambicus* and *L. broadleyi*, in which these structures are shown to be well developed.

The Frogs of Zimbabwe is not without flaws; nevertheless it is an important work, unique in its field, exceptionally well illustrated and containing a wealth of knowledge presented in a form which makes it readily accessible to the general biologist or enthusiastic amateur. It is to be hoped that it may also prove inspirational to less committed Zimbabweans and, more particularly, instill in present and future generations of students a desire to learn more about these fascinating animals. The review copy of this book is soundly and attractively bound in hard covers, but a paperback edition is also required if the work is to be made affordable to the largest possible audience within Zimbabwe. Public education and opinion, just as much as legislation and financial resources, are essential ingredients in the struggle to conserve African wildlife, of which amphibians are such a conspicuous and important component. Mr Lambiris is to be congratulated on making such a valuable contribution to the cause.

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