

Nutrient Requirements of Zebu and Crossbred Cattle

BR-CORTE

Third Edition

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Summary

Brazil is one of the last agricultural frontiers in the world and has the largest commercial herd. Our challenge is to increase productivity, since national production indexes are still relatively low, despite of considerable improvement occurred on recent years. The use of new technologies is essential to improve animal productivity of Brazilian beef cattle. One way to increase animal productivity is to improve the nutritional requirements systems, using data produced under tropical conditions, making more efficient activity.

Experiments conducted in Brazil evaluating the nutritional requirements of cattle, in contrast to other countries, are relatively new, and started only in the 70s. Especially, professors José Fernando Coelho da Silva and Celso Boin at *Universidade Federal de Viçosa* (UFV) and *Escola Superior de Agricultura Luiz de Queiroz* (ESALQ), respectively, who were the pioneers in this research area in Brazil. Later, other professors/researchers from other institutions started their research in this theme. The first publication on this subject was made at the International Symposium on Nutritional Requirements of Ruminants in October of 1995 in Viçosa, Minas Gerais.

In June of 2006, during the V SIMCORTE, the first edition of Nutritional Requirements of Zebu and Feed Composition system was published, named BR-CORTE. Only data of Zebu cattle was used with a small number of individual data (187 observations).

The second edition of the BR-CORTE was published in June of 2010, during the VII SIMCORTE. This edition included Zebu and their crosses with beef cattle. In this version, the database (752 individual observations) was increased and could be considered reliable.

Subsequently, a software was developed to formulate diets and to calculate the nutritional requirements, named BR-CORTE 1.0, which was made available online on the website www.brcorte.com.br in June of 2012. This software has been updated in 2014, including performance prediction, named BR-CORTE 2.0, also available on the same website.

The third edition of Nutrient Requirements of Zebu and Crossbred cattle (BR-CORTE) included four new chapters, using a new and updated database to estimate the nutritional requirements of cattle, being the only system specifically described for Zebu cattle. The committee of this third edition was composed of members from different universities in Brazil: UFV-MG, UFBA-BA, UFLA-MG, UFMG-MG and UESC-BA.

Chapter 1 is a new chapter that provides equations to empty body weights of cattle in different physiological conditions. Equations to estimate shrunk body weight from body weight and empty body weight from shrunk body weight, using allometric models are presented.

Chapter 2 presents equations for estimating dry matter intake (DMI) of beef cattle, including intake of dairy crossbred, composed of Zebu, especially Gyr, crossed with dairy breeds, especially Holstein cattle. Moreover, equations to estimate DMI of animals fed different concentrate levels in the diet were developed and an equation from animals raised on pasture receiving supplements.

Chapter 3 presents different techniques to measure rumen degradable protein, including equations to estimate microbial contamination in the residues of ruminal incubation in roughage and concentrate. Moreover, new equations were developed to estimate the microbial protein synthesis, from crude protein and TDN intakes.

Chapter 4 presents new equations to estimate feed energy value, in terms of TDN, digestible energy and metabolizable energy from its chemical composition. In this chapter, equations to estimate digestion and passage rates of potentially digestible neutral detergent fiber were proposed.

Chapter 5 presents prediction of carcass and empty body composition, with some equations published in the last edition of the BR-CORTE (2010), which were readjusted, and new equations to estimate body composition of dairy crossbred cattle. A new section included in this chapter discusses ways to estimate the composition of non-carcass components. Also, some alternative techniques to estimate body composition were suggested.

Chapter 6 is a new chapter that evaluates the use of the respirometry technique for estimating the net energy from diet and the efficiency of metabolizable energy (ME) use for maintenance, weight gain, pregnancy and lactation. Moreover, an equation is presented to estimate ME concentration from the dietary digestible energy concentration. Also equations are presented for estimating methane production.

Chapter 7 provides an update of energy requirements for maintenance and weight gain of Zebu and crossbred cattle of different sexes. This chapter discusses the requirements for cattle on feedlot or pasture. Also, the maturity weight of Zebu and crossbred from different sexes was estimated, making possible to use a single equation to estimate net energy requirements for gain adjusted to different sexes and crosses.

Chapter 8 provides an update of equations to estimate the metabolizable protein requirements for maintenance and gain of cattle from different genetic groups and sexes. Furthermore, the total requirements of protein predicted by the BR-CORTE (2010) were considered overestimated after they were tested. At the end of the chapter, results of two recently conducted experiments were presented comparing performance of cattle fed diets containing different levels of crude protein.

Chapter 9 presents the dietary mineral requirements. In this chapter, macromineral requirements have been re-evaluated, and it was included the sulfur and microminerals requirements. In the evaluation of minerals, the BR-CORTE

estimated net requirements and true retention coefficients for each mineral. Finally, this publication presents some informations not available in the international literature on micromineral requirements.

Chapter 10 is new and describes energy and protein requirements for maintenance and pregnancy of Zebu cows. The efficiency of utilization of metabolizable energy for pregnancy is presented. Furthermore, data regarding pregnancy requirements are scarce, mainly for Zebu cattle.

Chapter 11 presents energy, protein and mineral requirements for lactating Zebu cows and their calves. In this chapter, equations were included for estimating dry matter intake of cows and calves and one equation was obtained to estimate milk production of Zebu beef cows.

Chapter 12 is a new chapter that discusses regarding to environmental management. This issue has been much discussed recently. Initially, equations were tested as described in the literature for estimating excretion of nitrogenous compounds (N) and phosphorus (P). As these equations do not adequately estimate these excretions, new equations were obtained to estimate the excretion of N and P under tropical conditions.

We hope this book will help farmers and researchers involved in beef cattle production.

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