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Brazilian beef produced on pastures: Sustainable and healthy

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ABSTRACT

With a herd of 209 million cattle, Brazilian beef production estimate for 2023 is 10,935 million tons, representing an increase of 28.9% and accounting for 20% of the world trade. Beef cattle production is constantly evolving; however, there are extremes, ranging from simple existing farm ranges to intensive forage systems, strategic supplementation, updated health and genetic improvement programs for the production of quality beef. This modern production is based on scientific research carried out at universities and other research institutions. A new generation of professionals with multidisciplinary knowledge and a holistic vision of the productive chainproposed management practices to reduce greenhouse gas emissions in the production of grass-fed beef cattle, whose meat has high omega-3 and CLA contents. Age at slaughter of steers and of heifers at first mating, significant increases in the ratio calves/100 cows, adequate traceability for pastoral systems with hundreds or thousands of animals per farm and a more intense transference of technology are required.

1. Introduction

1.1. Brazilian beef cattle production situation

Brazil has a cattle herd of approximately 209 million head, distributed in 20% of an estimated total pasture area of 174 million ha of land. Brazilian meat exports in 2013 amounted to 1,846,000 tons, representing an increase of 20% compared to the previous year (2012), reaching the value of US$ 6.6 billion, equivalent to 16.5% of total meat production. Economic estimates for the year 2014 indicate a total income of US$ 8 billion. Average annual consumption per capita meat was 43 kg, corresponding to 83.5% of total production in MAPA (2013). Furthermore, approximately 401,000 live animals were sold to other countries. Most of beef cattle production in tropical conditions is developed on a large diversity of soils, including transition areas among different soil types. In addition, there is wide regional and seasonal climatic variability in the southern subtropical areas, such as the State of Rio Grande do Sul, at the border with Uruguay and Argentine, which constitute the Pampa Biome. In addition, five other biomes occur in Brazil: Amazonia, Caatinga, Pantanal, Atlantic Forest and Cerrado.

Such wide environment diversity supports different beef cattle production activity levels, as also previously reported by Ferraz and Felicio (2010). Consequently, production and productivity levels present also a wide variation. On one hand, there are extremes of extractive/extensive beef cattle production, with minimum use of technology and human interference, consequently have very low productivity indexes, with 21% average cattle offtake (number of head slaughtered relative to total national herd). On the other hand, intensive farming uses genetic improvement programs that select thousands of cows and their progenies for better performance in those environments, intensive forage management, health control and modern managerial practices (Rosado Júnior & Lobato, 2010).

In many operations, *Bos taurus* heifers and zebu crosses are first bred at 13–15 months of age and Nelore heifers (*Bos indicus*), which is the predominant breed in Brazil, at 18 months of age. According to Ribeiro (2009), in the State of Rio Grande do Sul, such operations are usually managed as modern companies, and use integrated beef–crop systems, applying new technologies that make them references to other farmers. According to that author, there is a second level of operations that use some technology, such as artificial insemination and internal parasite control. However, this technology is not systematically applied, and many of their productivity indexes need to be improved.

In the lower end, there are traditional operations that practice the so-called "extractive" beef production, characterized by low use of technology. In these operations, heifers are first bred at 36 months of age, and pregnancy and weaning rates of primiparous cows are low. These heifers, with poor body conditions that do not allow their earlier breeding, are a huge obstacle to beef cattle production. However, they have the potential to achieve higher productivity, as reported by Potter, Lobato, and Mielitz Netto (1998), and Beretta, Lobato, and

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Mielitz Netto (2001). For instance, the cow/calf ratio in Rio Grande do Sul State is low, with 56 calves/100 cows (SEAPA, 2013), and it is not different from the Brazilian average.

Foreign and domestic markets demand better production, productivity and meat quality. However, several packing plants operate below their full capacity during some months, as observed in the last few years. Many of these packing plants were built in 1950–1970, when beef cattle slaughter was seasonal, extending from late spring to late autumn. Fig. 1 shows slaughter percentage in the most important Brazilian beef-cattle producing states, representing more than 70% of the national beef production (MAPA, 2013).

There are technologies available to improve production and productivity. However, the current low cow/calf ratio precludes higher production levels and the advance in genetic animal improvement. Evidently, no selection pressure is possible with ratios of 50–60 calves per 100 cows and only 28–30 replacement heifers. Also, there are thousands of heifers that do not present the minimum conditions required to produce a good steer.

The knowledge produced by Brazilian Federal Universities through their graduate programs that started in 1965, and by EMBRAPA (Brazilian Research Agency) and the other governmental research institutions have shown that production and productivity may be increased if the published technologies are massively applied. Farmers that apply these technologies have become leaders in the beef cattle industry and have increased national productivity index. However, it is still a huge challenge to make these technologies available to farmers (Andreatta, 2009; Ribeiro, 2009). There is still a lot of room to increase production and productivity and to create conditions to obtain differentiated products, both for the domestic and foreign markets.

2. Results of the adoption of technology

For a long period of time (1950–1970), Brazilian beef production was primarily based on the expansion of extensive pastures. However Martha, Alves, and Contini (2012) recently showed that, especially during the period of 1996–2006, the productivity increased at an impressive rate of 6.64% per year. Table 1 shows the Brazilian beef production characteristics between 1950 and 2006. For instance, carcass equivalent increased from 17.61 kg/head to 40.13 kg/head between 1975 and 2006, which was achieved by increasing the stocking rate (35%) and better animal performance (65%). During the period of 1950–2006, productivity improvements explained 79% of the growth in beef production and supported a land-saving effect of 525 million ha. A long-term run program of pasture fertilization or carry-over fertilizer effects applied on crops (integrated crop–livestock systems), together with the use of modern cattle management, is recommended to obtain high productivity in the next years.

Universities and researchers increasingly publish new results and propose new practices to be adopted by the farmers. However, new technologies are only adopted when they prove to be competitive relative to the existing alternatives, already in use, and when relative prices are favorable (Martha Júnior, Alves, & Contini, 2011).

An important issue is that the adoption of the technologies needs to be considered under a multidisciplinary approach in grazing systems (Wade & Carvalho, 2000) and relative to costs. The costs of fertilization, soil preparation, seeds, etc., to recover pastures and improve soil fertility can be compensated using Crop and Livestock Integrated Systems (CLIS). Many studies on the application of CLIS to mitigate deforestation and/or pasture degradation in the Cerrado of Brazil demonstrated that it improves animal and crop production, as shown by higher stocking

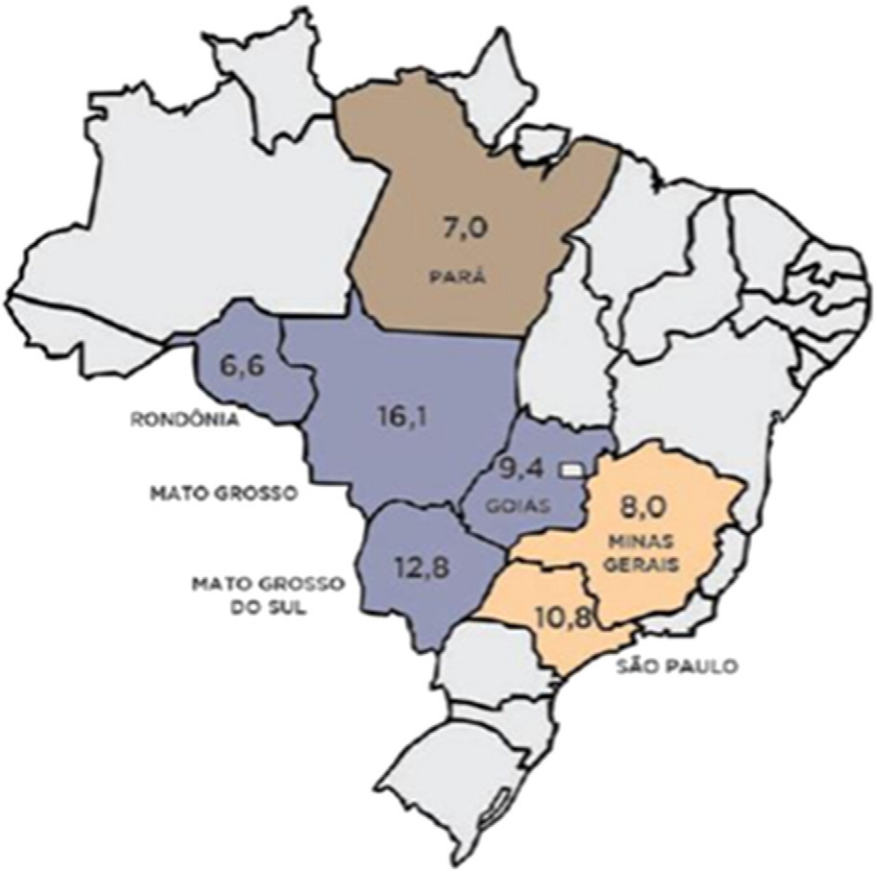

Fig. 1. Distribution of the percentage of beef slaughter per state in 2013 (MAPA, 2013).