



## Review

## Production systems – An example from Brazil

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## ABSTRACT

Important information about the Brazilian agribusiness, population and economy are presented in this paper, as well as details of beef production, market, industry and production system, to inform people involved in meat industry about details on demography, production, economy and production systems of a country that is the largest player in beef exports in the world and that uses, mostly, *Bos indicus* based bovine population, reared under pasture conditions, for meat production purposes. Herd size, genetic evaluation programs, quantity of beef produced and market is informed, with figures about the global and major players' production. Some discussion related to environmental concerns, methane emission and carbon fixation is also presented, as well as meat quality. Meat quality of fed animals is also compared with beef from animals that are raised in pasture conditions.

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## 1. Introduction

## 1.1. Brazil and its agriculture production

Brazil, the largest south-american country, has a population of 190.8 million inhabitants (IBGE, 2008), an area of 8,514,876.6 km<sup>2</sup>, equivalent to 47% of South American territory, close to 12% of the fresh water reserves of the planet, a growth rate of 1.4% p.y., a gross national product (GNP) in 2008 of US\$1.30 trillion (R\$2.9 trillion, Instituto Brasileiro De Geografia Estatística (IBGE),

2009, <[www.ibge.gov.br](http://www.ibge.gov.br)>). The *per capita* GNP was, in 2009, around US\$6,830.00 (R\$15,240), according to the same official source. Close to 23% of population (43 million people) works with the Brazilian agribusiness.

Brazil has relatively low prices for land and labor and no extreme weather, which helps to compound the competitive frame for Brazilian agricultural and animal products. As a counterbalance, socio-economic problems, unsolved for centuries, span several dimensions and reach hazardous levels.

Brazilian livestock and agriculture production is important when compared to other countries. According to FAO (2009) and United States Department of Agriculture (USDA) (2009) data, based on 2005 crops and 2004 exports, the country has very important production in several crops, besides beef. As related to broiler, Brazil is responsible by 15.5% of production and

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40.7% of exports. In the pork business, the country accounts to close to 3% of world's production, but is the 4th largest exporter, with 15% of international market. The country is the bigger exporter of several agriculture products like soybean (24% of world's production and 33.4% of total trade), sugar cane (32.5% of production and 42.4% of exports), orange juice (29.7% of production and 57% of exports), and coffee (28.3% of production and 23% of exports). Brazilian agribusiness was responsible for 31% of the GNP, 37% of the jobs and 42% of the total exports in 2003. More details on the Brazilian economy can be found in <[www.ipeadata.gov.br](http://www.ipeadata.gov.br)>.

Livestock production in Brazil is important to the world's food commerce. The population size of different livestock is: beef and dairy cattle: the estimated herd size varies from 191.37 million animals (Scot Consultoria, 2006) to 199.7 million heads, at the end of 2007, according to IBGE (2008), swine: 32.39 million (CON-AB, 2006), goats and sheep (9.09 million and 14.18 million; FAO, 2009), water buffaloes: 1.13 million heads (IBGE, 2008) and poultry: 1.127 million (IBGE, 2008).

Brazilian beef production is the second largest in the planet. It produced 9.7 million t carcass weigh equivalent (CWE) in 2008, when USA produced a little over 12 million t, EU-27 around 8.1 million t, Australia and Argentina, between 2 and 3 million t and India, that did not appear in statistics before, around 2.5 million t CWE (ABIEC, 2009);

Regional distribution of the Brazilian cattle herd is 12% in North, 13% in Northeast, 21% in the Southeast, 15% in South and 39% in the Center-West (midwestern region). More than 160 million heads are located in areas free of foot-and-mouth disease (FMD), with vaccination. The major beef production of the country is done in medium to low fertility soils, in regions similar to savanas, called "cerrados", where African grasses, specially *Brachiaria* spp. and *Panicum* spp. adapted very well. The strong growth of the Brazilian beef production is based in the triploid Nellore-Cerrado-*Brachiaria*, after 1970.

Brazilian beef production has low cost, estimated to be 60% lower than in Australia and 50% lower than in the United States. The average slaughter age is at 4 years and the slaughter rate is around 21%, compared to 2 years and 37% in the United States (Dyck & Nelson, 2003), and that means that the Brazilian beef industry is less efficient.

## 2. The importance of beef production: breeds and crosses used in Brazilian production systems

The country has the second largest bovine herd in the world, following India, but has the biggest commercial herd. Important information about the Brazilian beef and dairy business (Fries & Ferraz, 2006; Rosa, 1977 and Instituto Brasileiro De Geografia Estatística (IBGE), 2009) are presented in following lines:

- The herd size is estimated in around 199.7 million heads, at the end of 2007, according to (IBGE, 2008, <[http://www.ibge.gov.br/home/presidencia/noticias/noticia\\_visualiza.php?id\\_noticia=1269&id\\_pagina=1](http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=1269&id_pagina=1)>). Other sources estimate slightly different sizes for the Brazilian bovine population (191.37 million animals; Scot Consultoria, 2006).
- 80% of that herd has influence of zebu cattle (*Bos indicus*), according to the Brazilian Zebu Breeders Association (ABCZ, <[www.abcz.com.br](http://www.abcz.com.br)>);
- Although around 80% of the Brazilian herd has *B. indicus* contribution, only less than 7,000 purebred Zebu animals have been imported from India in 19th (beginning in 1870) and 20th century. The importation from India was forbidden around 1962.

From 1870 to 1930, only 1904 *B. indicus* animals were imported from India. Between 1952 and 1962, 565 bulls were imported from India (Santiago, 1987).

- The Brazilian *B. indicus* population was, mostly, produced by "grading up", mating *Bos taurus* cows, brought to America by Portuguese and Spanish colonizers to *B. indicus* bulls, imported from India or animals with ancestry of imported animals (Santiago, 1987);
- The beef breed that has the largest number of animals in Brazil is Nellore (standard/horned and polled), followed by Guzerat and Gir. Indubrasil is, also, a *B. indicus* Brazilian breed originated from crossbreeding among other Zebu breeds, mainly Gyr and Guzerath, with some Ongole (Nellore), decreased sharply in number of animals. Details of those breeds can be seen in <<http://www.ansi.okstate.edu/breeds/cattle/>> and, also, in the website of the Brazilian Zebu Breeders Association (ABCZ: <<http://www.abcz.org.br/>>). A newer Brazilian *B. indicus* breed, that has growing numbers is a pooled breed, Tabapuã (<<http://www.tabapua.org.br/>>, <<http://www.abcz.org.br/>>);
- Purebred *Bos taurus* is raised in Southern Brazil, a temperate region. Some of that meat, due to better quality, specially tenderness and marbling, is exported and other part supply special niche domestic market;
- Crossbreeding is used in all regions of the country, but the higher the percentage of *Bos taurus* contribution, the poorer the adaptability to tropical environment, especially to ectoparasites (flies and ticks), what causes an important impact in production costs, in insects control;
- The major European breeds that are used in beef crossbreeding are Angus and Red Angus, Simmental, Charolais, Polled Hereford, Limousin and Braunvieh, among others;
- Synthetic breeds, like Brangus, Braford, Canchin/Charbray and Santa Gertrudis are also used. In the last decade, *Bos taurus* breeds, adapted to tropical environment, like the Brazilian Caracu, showed renewed interest. Breeds like Senepol and Bonsmara were introduced and, also, composite programs (e.g. Montana Tropical) started to grow in the country;
- Uses 140 million hectares of land (all other crops, together, use 75 million hectares);
- Is produced in 1.8 millions farms. The small beef enterprises raise less than 500 head per household per year. The so-called medium specialized beef operations on average produce over 1000 head annually. The last category is called commercialized beef production enterprises with over 4000 head per year (Somwaru & Valdes, 2004).
- Generates 6.8 million direct or indirect employees (8.3% of the 82 million employment positions);
- 40.5 million head were slaughtered in 2008, with offtake rate of 21.2% (CNPQ, 2009);
- Roughly 150 million animals are used for beef production and 40 million for dairy and dual-purpose.
- The herd has around 64 million cows, 50 million of them used in beef production and the rest in dual purpose or dairy production;
- There are close to 3 million bulls what leads to a need of around 450,000 young replacement bulls per year;
- Between 5% and 7% of beef cows are inseminated. Since less than 5% of these replacement bulls were selected based on EPDs (estimations of the animals' breeding value, expressed in Expected Progeny Differences) or performance data one can conclude that more, better and larger breeding programs are needed.
- The Brazilian beef industry exports over US\$1.1 billion in leather and US\$1 billion in shoes, produced in 4200 shoe companies and 560 tanning plants.

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