

Land-Saving Technologies 2021

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Embrapa

Chapter 9

Technological and sustainable advances in the Brazilian broiler and swine chains

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Photo: Lucas Scherer



In recent decades, the continuous technological advances introduced by the broiler and swine production chains in recent decades have avoided the demand for an additional 2.55 million hectares for maize and soybean production in Brazil. This area is equivalent to the territories of Cyprus and the USA state of Connecticut combined. It also means 4.6% of the 55.4 million hectares that maize and soybeans occupy in the 2020/2021 season in Brazil (Conab, 2021). The saved area estimate for broiler and swine production relates to the gains in feed conversion achieved over time.

Contextualization

The broiler and swine production chains have been exponents of important transformations that have taken Brazil to a prominent position in the world as a food producer (Chaddad, 2016). In addition to contributing significantly to improve life quality in Brazil, providing quality animal protein at an affordable price, the two chains contributed to issues of interest such as soil preservation (ABPA..., 2020; Embrapa Suínos e Aves, 2021). In 2020, Brazil was the world's third largest producer of chicken meat, with 14.2 million tons, and as the largest exporter, with 4.2 million tons. In pork, the country ranks fourth as producer and exporter, with 4.2 million and 1.01 million tons, respectively (Brasil, 2021).

The social effects of the broiler and swine production chains are also

remarkable. Both activities generate about 4.2 million direct and indirect jobs (ABPA..., 2020). Moreover, through the integrated and independent production systems, the activities involve more than 100,000 families in primary production (Guimarães et al., 2017). There are countless small municipalities in the country whose economic activity depends on the full functioning of meat processing plants installed in each region (Mapeamento..., 2016).

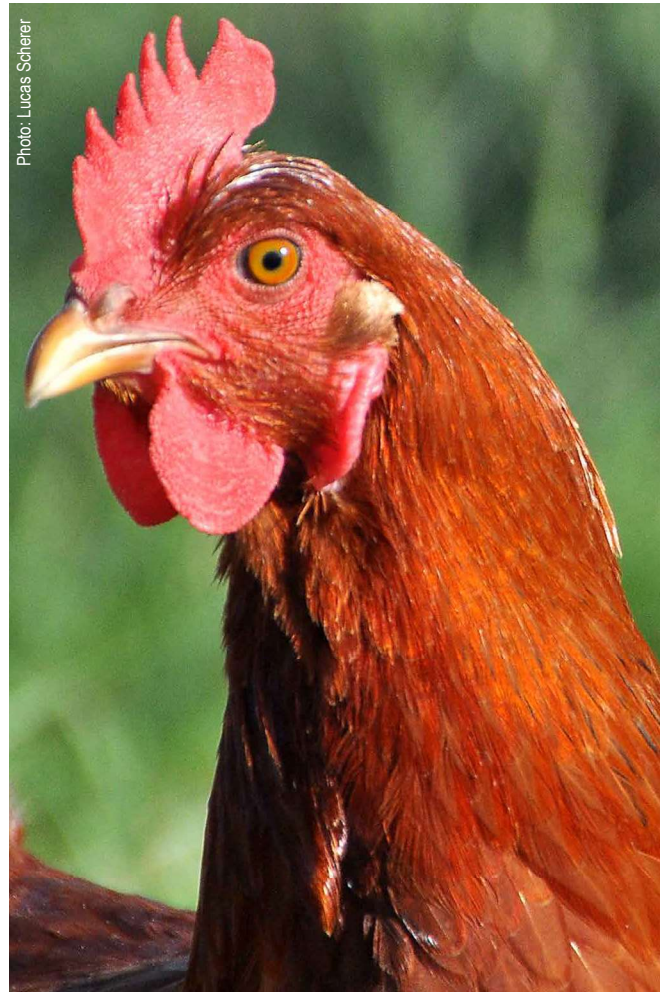
The social benefits of poultry and swine farming are not limited to the jobs and income generated in municipalities where primary production and agro-industrialization take place (Santos Filho, 2012; Santos Filho et al., 2015). Both are drivers of development for entire regions or states, impacting services, transport and trade sectors. In addition, the favorable climate, investments in renewable energy sources and the quality of production facilities allow Brazil to produce chicken with a carbon dioxide (CO₂) emission level 45% lower than those produced in the United Kingdom and 50% lower than those produced in France (United Kingdom, 2021). Furthermore, almost all poultry and pork production happens outside the Amazon biome – the Southern and Southeastern regions account for more than 80% of production (Produção..., 2014).

Continued technological progress in poultry and swine and the economy in the use of maize and soybean cultivation areas

The continuous investment in technological development is one of the pillars that explain why Brazilian poultry and swine production ranked among the best in the world (Souza et al., 2011). From the 1970s onwards, companies, producers, research institutions such as Embrapa and government agencies worked in synergy to develop local solutions or adapt new technologies generated in other parts of the world to Brazilian reality (Talamini et al., 2014). The result of this joint effort is that Brazil has one of the most efficient poultry and swine production in the world (Mapeamento..., 2016).

One indicator that best expresses the technological development achieved by the two activities is feed conversion rate (Fischer et al., 2019). In short, feed conversion is the amount of feed an animal needs to consume for every kilogram of weight it gains. Food conversion is revealing because it, as it progresses, reflects technological gains achieved in different areas. In other words, feed conversion relates straightly to the progress made over the years in various technical areas, such as genetic improvement, nutrition, animal health, management and ambience.

Feed conversion rate is also the key to understanding how poultry and pig



farming relate to land use. Chickens and swine consume large amounts of maize and soybean meal in their diets, absorbing a large part of the Brazilian production of these cereals. This means that the better the relationship between feed consumed and the animals' weight gain, the less pressure these activities exert on expanding areas for the production of maize and soybeans.

About 1.55 million hectares saved in poultry industry

Table 1 compares the average feed conversion achieved by the commercial production of Brazilian broiler chicken in the years 1975 and 2020. In 1975, it was needed 2.1 kg of feed to gain 1 kg of live weight while in 2020, that same kilo of weight required 1.7 kg of feed. Considering the country's current productivity of maize and soybean, if technological development had not provided broilers with greater capacity to convert feed into weight gain, this industry would require an additional 1,551,056.40 ha of land to deliver the

same 16.4 million tons of live weight produced in 2020. This area is equivalent to incorporating three times the size of the Brazilian Federal District into maize and soybean cultivation, if the poultry industry had not advanced its technological level.

Savings of more than 1 million hectares in swine farming

Table 2 compares the average feed conversion ratio of Brazilian commercial swine production in 1975 and 2020. In 1975, the swine consumed an average of 3.5 kg of feed to gain 1 kilo of live

Table 1. Estimated savings in the area of maize and soybean farmed due to improved feed conversion in the poultry industry.

Item	1975	2020
Production of live weight chickens (1,000 t)	679.8	16,452.1
World production share (%)	2.7	14.1
Export live weight (1,000 t)	4.2	4,843.1
World export share (%)	0.5	35.0
Food conversion (kg)	2.1	1.7
Final chicken weight (kg)	1.75	2.7
Feed consumed (1,000 t)	1,427.5	27,979.1
Feed savings (1,000 t)		6,581.2
Maize consumption (1,000 t)	999.2	19,579.1
Maize savings (1,000 t)		4,606.8
Productivity 2019/2020 (kg ha ⁻¹)		5,529.0
Maize: hectares saved		833,212.8
Soybean consumption (1,000 t)	535.3	10,488.8
Soybean savings (1,000 t)		2,467.9
Productivity 2019/2020 (kg ha ⁻¹)		3,438.0
Soybeans: hectares saved		717,843.6

Source: Patrício (2011), Brasil (2021), Conab (2021) and FAO (2021).



Table 2. Estimated savings in the area of maize and soybean farming due to improved feed conversion in swine farming.

Item	1975	2020
Swine production live weight (1,000 t)	972.8	5,373.8
World production share (%)	2.7	4.1
Export live weight (1,000 t)	50.0	1,021.0
World export share (%)	0.5	11.1
Food conversion (kg)	3.5	2.6
Swine final weight (kg)	100.0	120.0
Feed consumed (1,000 t)	3,404.8	13,971.9
Feed savings (1,000 t)		4,836.4
Maize consumption (1,000 t)	2,553.6	10,478.9
Maize savings (1,000 t)		3,627.3
Productivity 2019/2020 (kg ha ⁻¹)		5,529.0
Maize: hectares saved		656,055.6
Soybean consumption (1,000 t)	851.2	3,493.0
Soybean savings (1,000 t)		1,209.1
Productivity 2019/2020 (kg ha ⁻¹)		3,438.0
Soybeans: hectares saved		351,690.1

Source: Barbosa et al. (1988), Brasil (2021), Conab (2021) and FAO (2021).



weight, while in 2020 this consumption was 2.6 kg of feed. Considering the current productivity of maize and soybeans in Brazil, if the technology did not provide the swine with greater capacity to transform feed into live

weight, the activity would require an additional 1,007,745.70 ha of land to produce the 5.3 million tons of swine in 2020. This saving corresponds to a farming area equivalent twice the size of the Brazilian Federal District.



Photo: Griska Niewiadomski (Pixabay)

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