

TECHNOLOGICAL ADVANCES AND SOCIO-ECONOMIC IMPLICATIONS IN THE POULTRY INDUSTRY - AN ANALYSIS OF CURRENT TRENDS IN POULTRY MEAT PRODUCTION AND CONSUMPTION

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Abstract

This paper investigates the evolution of the poultry industry in recent decades, highlighting technological advances and socio-economic changes that have influenced the production and consumption of poultry meat. By analysing data on genetic selection, feeding technologies and impact on animal health, the paper highlights how the poultry industry has become a key pillar of food security. Consumer preferences and consumption trends, including demand for poultry semi-finished products, are also examined. This analysis provides a comprehensive insight into the evolution of the poultry industry and its impact on society, highlighting the importance of continuous research and innovation to ensure sustainable and high-quality poultry meat production.

Key words: chicken feeding, poultry industry, quality standard, semi-preparation, technological processes.

INTRODUCTION

Currently, poultry farming is considered one of the most stable branches of the agri-food complex, playing an essential role in guaranteeing food security of the state. (Macari, 2015).

After a transition period, this industry quickly managed to revitalize egg and meat production, registering a vertiginous development (Macari et al., 2014).

In the period between 1967 and 1971, Romania laid the modern foundations of poultry farming, developing specialized programs for their selection and hybridization.

In 1971, the Central Poultry Plant in Bucharest was established, marking a crucial moment in the development of the Romanian poultry sector (Văcaru-Opriș, 2004).

Broiler breeders have observed that feeding chicks to saturation can lead to a decrease in reproductive performance, but can achieve optimal hatching egg production by applying appropriate dietary restrictions (D'Eath et al., 2009). Limiting the diet to broilers is a significant concern, given the need to maintain a

high level of feeding motivation (Van Krimpen & De Jong, 2014).

Reducing feed consumption by 25% to 33% during the growth phase and by 50% to 90% during production is a common practice to minimize metabolic disorders and improve productivity in the poultry industry (Bruggeman et al., 1999; Chen et al., 2006). With the improvement of the growth rate of broilers, birds reach slaughter weight at younger and younger ages.

There is ample evidence indicating that restricting food intake can provoke physiological responses such as stress, boredom, aggression, and other abnormal behaviors in poultry (Mench, 2002; Van Krimpen & De Jong, 2014). In a 1983 experiment, it was found that chickens fed variable amounts of fodder in hot conditions experienced an 8.5% increase in body weight, compared to the thermoneutral environment where the increase was 9.6% (Smith, 2002).

As animal feed costs rise, total production costs are on an upward trend, with feeding accounting for between 60% and 70% of them. Most people are familiar with the concept of the three "R's"

(reduce, reuse, recycle). Adding a fourth "R", responsibility, could be the key to a sustainable society. The use of by-products as feed ingredients is one of the most effective ways to dispose of them, but this practice can sometimes be restricted by legislation and the specific nature of the by-product (Vlaicu et al., 2017).

In recent years, chicken meat production has seen a significant increase, thanks to outstanding productive performance, improvements in feeding technology and advances in animal health, biosecurity and welfare (Custura et al., 2019). In most countries, poultry meat is obtained within industrial production systems, but there are significant differences in the level of efficiency and especially in economic profitability (Curea et al., 2023). The main elements of the energy flow through the body of a broiler, used in the analysis of quantitative data on energy efficiency, include the following: the constant energy content of proteins and lipids, while other components, such as the mass of proteins and lipids in the bird's body, may vary depending on the breed (Tallentire et al., 2016). Variations in locomotor activity of young chickens are strongly influenced by genetic factors, and research has shown that this is reduced by 6% in fast-growing breeds compared to slow-growing broiler breeds (Bokkers & Koene, 2003).

There are a variety of natural or synthetic feed additives that can be used as alternatives to antibiotic-based growth promoters. They aim to improve technical and economic performance. Among these supplements are probiotics, which have shown the ability to improve production parameters such as body weight, specific consumption and reduction of animal mortality (Nawaz et al., 2016). The normal microbiota in the digestive tract of birds plays an essential role in maintaining the health and functionality of the digestive tract (Miles, 2002). Fast-growing broilers also demonstrated lower levels of physical activity compared to slow-growing broilers, both in terms of behaviors such as trickling, stretching, and pecking on the ground, as well as other aspects of their behavior (Siegel et al., 1997). The ability to identify and remedy problems in the environment in which birds live, as well as in their diet, can have positive effects on their health and performance (Miles & Butcher, 2002).

MATERIALS AND METHODS

The paper is based on the examination of various reports and articles related to the production and quality of poultry, especially chicken, and analyzes the correlation with products derived from it. Scientific and genetic advances over the past five decades, together with the unique biological characteristics of birds, have facilitated the production of high-quality chicken meat hybrids and led to improved technical standards (Cărătuș, 2020). The livestock industry supplies a diverse range of products, which include not only milk and meat, but also goods with high added value, such as leather or pre-cooked food.

Economic development and individual income growth have contributed to increased demand and changes in diets (Henning et al., 2006).

Among the factors that have contributed to the evolution of consumer education is the significant influence of media reports on public perception of the relationship between diet and health (Lungu et al., 2023). The quality standard of products is one of the key criteria taken into account by consumers of animal products when deciding on their purchase (Custura et al., 2013). Among consumers aged 50 years and older, an increased interest in the quality of chicken meat is observed. As for the active population, people who have preferences regarding certain parts of chicken predominate and appreciate chicken for its nutritional benefits. For example, Serbia has the highest proportion of consumers showing disinterest in chicken meat (Dubravka et al., 2017).

RESULTS AND DISCUSSIONS

Global poultry production increased by approximately 46 million tonnes between 2003 and 2018 (WATT executive guide to world poultry trends, 2018), and their breeding process is becoming increasingly centralised (Schibabaw, 2019). It is estimated to increase from around 123 million tonnes in 2018 to 139 million tonnes in 2027. At the same time, pork production, its main competitive product, is estimated to increase from around 121 million metric tons to 130.9 million tons in 2027 (WATT executive guide to world poultry trends, 2018).

Figure 1 shows significant differences in mixed sex size and body weight between birds aged 0, 28 and 56 days. Thus, the development over the years is illustrated.

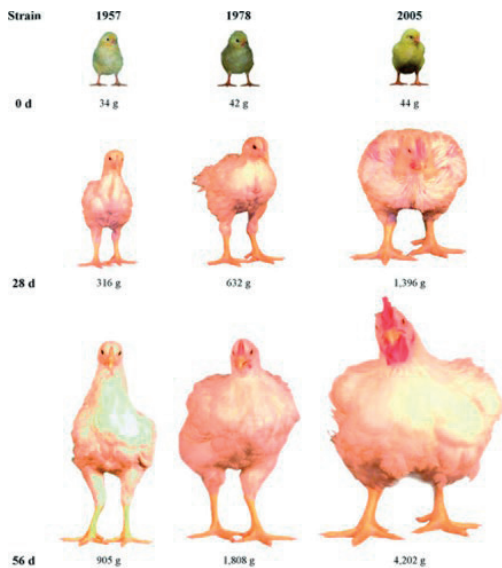


Figure 1. A front profile pictorial record at 0, 28, and 56 d of age along with average mixed-sex BW for each strain (Zuidhof et al., 2014)

The average meat yield per carcass, expressed in kilograms per chicken, has changed over time with an increase in body weight from one year to the next (Figure 2).

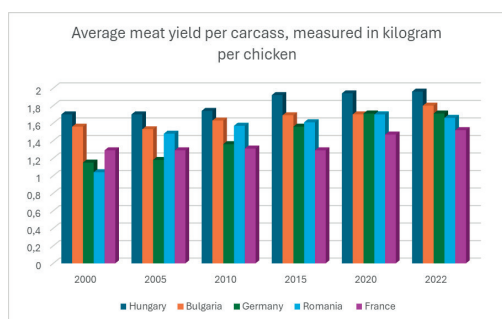


Figure 2. Average meat yield per carcass (Source: Our World in Data - Meat and Dairy Production, 2000-2022)

The present data in Figure 2 indicate a higher yield of meat per carcass in Hungary compared to France, suggesting significant variations in farming practices and poultry farming conditions between the two countries.

After examining the data collected from "Our World in Data - Meat and Dairy Production" regarding the yield of meat per carcass in the five countries of the European Union, according to Table 1, we find that there were no significant differences in the amount of raw material during over 22 years.

Table 1. Appendix (Source: Our World in Data - Meat and Dairy Production)

	Hungary	Bulgaria	Germany	Romania	France
2000	1.70 kg	1.56 kg	1.15 kg	1.04 kg	1.29 kg
2005	1.70 kg	1.53 kg	1.18 kg	1.48 kg	1.29 kg
2010	1.74 kg	1.63 kg	1.36 kg	1.57 kg	1.31 kg
2015	1.92 kg	1.69 kg	1.56 kg	1.61 kg	1.29 kg
2020	1.94 kg	1.70 kg	1.71 kg	1.70 kg	1.47 kg
2022	1.96 kg	1.80 kg	1.71 kg	1.66 kg	1.52 kg

On the other hand, in accordance with the data in Table 2, poultry meat production recorded a significant increase in Germany and Romania, while France recorded a decrease during the same period of time. These trends can be attributed to the conditions of poultry breeding and welfare in each country. In terms of people's nutrition, food is not only a provider of essential nutrients and energy, but also a carrier of information.

Table 2. Poultry production (Source: Our World in Data - Meat and Dairy Production)

Poultry production, 2000 to 2022. Expressed in tons				
	Hungary	Germany	Romania	France
2000	470,028	790,202	259,414	2,147,673
2022	485,157	1,506,688	475,450	1,478,476
Absolute Change	+15,129	+716,486	+216,036	-669,198
Relative Change	+3%	+91%	+83%	-31%

Human nutrition is fundamental to an individual's well-being. The link between health and personal balance is closely linked to food choices. Adopting a proper diet, along with other beneficial behavioral practices, contributes to a healthy and balanced life (Hodoşan et al., 2023).

One study shows that the frequency of chicken consumption for a person is 2 to 3 times a week, with a dietary intake of at least 90-100 g at each meal, within a daily meal (Hessel et al., 2019). Meat processors give high priority to the diversified assortment of chicken meat products,

which is considered the main attribute of quality. In the context of retail strategies, special attention is paid to issues such as adequate shelf lighting and strategic product placement in order to maximise visibility and attract consumer attention (Djekic et al., 2018). As for the consumption of chicken meat products, they are in high demand around the world.

According to own study on preferences for semi-finished products, as presented in Table 3, we found that in Romania there is a significant demand for Milanese schnitzel, mainly attributed to its savory taste and aroma, generated by the presence of Parmesan cheese in the crust. In Germany and Croatia, preferences go to Viennese products, which also include flour in the composition, while in England they opt for double bread crumbled schnitzel. In Croatia and France, ready-to-eat chicken cubes are preferred, they only require the defrosting process and can later be added as a topping on various dishes.

Table 3. Chicken semi-finished products according to the preferences of that country (own source)

Country	Preferred product
Croatia	Viennese chicken cordon
Finland	Cooked chicken cubes
Romania	Milanese
Germany	Viennese Schnitzel
England	Schnitzel double crumbed
France	Cooked chicken stripes

As detailed in Table 4, the target values and limit for colony forming units concentration (CFU/g) and presence of Salmonella for poultry meat products shall be determined according to ISO method 6579, with the objective of achieving absence in 25 grams for both measurements, according to specific standards and food safety requirements established for assessing food quality.

Table 4. Specific Product Patterns, Parameters of biological testing (Moise, 2023)

Testing parameter	Testing method	Target value CFU/g	Limit value CFU/g
Salmonella	ISO 6579	Absent in 25 g	Absent in 25 g

In order to comply with quality standards, a trace metal check is carried out using a special detector in accordance with the test procedures. The purpose of this procedure is to ensure the conformity of the packaged product with the quality standards, by identifying and eliminating possible traces of metal present in the packaged product. This reduces the risk of contamination and guarantees the safety and integrity of the product, protecting all consumers, according to the information in Table 5.

Table 5. Parameters of physical testing (Moise, 2023)

Testing of metal traces	Purpose	Max 3.5mm Fe, Max 3.5mm NonFe, Max 3.5mm StSt
	Testing requirements	Every package to be checked by metal detector.

Based on the Table 6, more than 50% of leading manufacturers and brands of chicken products occupy an established position in the market.

Table 6. Semi-prepared food, market share July 2019- June 2020 (Source: revistaprogresiv.ro)

Top producers:
Frosta, Macromex, Hochland, Europrod, Transavia - 56.3%.
Own brand owners - 25.4%
Others - 18.3%
Top Brands:
Edenia, Hochland, Agricola, Papane, Frosta - 52.8%
Own brand owners - 25.4%
Others - 21.8%

As per the Gierlinger-Holding, the characteristics leading to the purchase of ready-to-eat products include:

- Speed of preparation;
- Pleasant taste;
- Favorable price-quality ratio;
- Offering an alternative to serving in restaurants or dining out;
- Pleasant appearance of the product;
- The advantage of a meal at an affordable price;
- It is a product appreciated by both adults and children.

CONCLUSIONS

After a careful analysis of the data on the consumption behaviour of the population regarding semi-prepared products, it is observed that they are spread to a significant extent, especially in the urban environment. There is an

obvious preference for these products among busy people who do not have time to cook, but have higher incomes. It is also found that the interest in semi-prepared products is more pronounced in the urban environment compared to the rural one. In terms of consumption behaviour according to days of the week and seasons, no significant differences are observed, and search preferences go mainly to supermarkets and local shops. These observations underline the important role of the poultry industry in ensuring food security and adapting to market needs.

Also, the focus on the responsible use of resources in the poultry industry is related to the concern for product quality and safety. The introduction of natural additives and alternatives to antibiotic-based growth promoters is an important direction to meet the health demands of consumers and to maintain high quality standards in poultry production.

In conclusion, previous observations on consumption preferences, purchasing behaviour and the importance of the poultry industry for food security are complemented by findings on technological evolution and innovations in this field. These aspects are essential to ensure a sustainable and high-quality production of poultry meat, in accordance with the demands and expectations of consumers.

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