CONSIDERATIONS REGARDING PERFORMANCE IN TURKEY BROILER MEAT PRODUCTION, DEPENDING ON THE REARING SYSTEM

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Abstract

The production performance and slaughter yield in the turkey broiler are influenced by genetic, nutritional and technological factors. The average daily increase and feed conversion are essential indicators for evaluating the growth efficiency, which vary depending on the genetic line, the composition of the ration and the feeding program, but also on the exploitation system applied. The carcass yield is determined by the age of slaughter, sex and genetic potential, with particular importance given to the development of the pectoral muscles, considered the main commercial part. Recent studies show that genetic progress has contributed significantly to increasing the share of valuable parts in the carcass, but has also raised challenges in maintaining the health and integrity of the skeleton. An integrated approach, which correlates productivity with carcass quality and animal welfare, is the current direction of optimizing performance in broiler turkeys.

Key words: *turkey broiler, breeding system, production performance, carcass yield*

INTRODUCTION

Turkey farming is an important part of the poultry industry, as it contributes significantly to providing high-quality protein to consumers [1]. Meat from turkey broilers is valued for its nutritional value and economic efficiency of production, leading to a growing demand for this type of meat [2].

Many factors, including the applied growth system, environmental conditions, nutrition, and genetics, influence turkey meat production [3]. Intensive, semi-intensive and extensive are the three main types of systems that are used in practice. With high growth rates and maximum efficiency in the use of feed, the intensive system poses challenges for animal welfare. The semi-intensive system balances the productivity and welfare of the birds, combining the advantages of protected shelters and access to the outdoors. The natural behaviors of turkeys have a positive effect on the extensive farming system, but it is less efficient in terms of productivity and economic efficiency.

The purpose of this study is to analyze and compare the performance of turkey broilers in meat production according to the breeding system used. This focuses on important productivity measures such as final body weight, average daily increase and feed use efficiency. The method provides useful information to optimize breeding strategies and balance productivity with animal welfare.

MATERIAL AND METHOD

To carry out this work, scientific articles, specialized books and official reports published between 2000 and 2024 were consulted, available in databases such as Google Scholar, Scopus and on the websites of recognized institutions (EFSA, USDA, ISO). Keywords used in the search included: 'turkey broiler', 'breeding system', 'production performance', 'carcass yield'.

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The selection of papers was based on their relevance to the proposed theme, taking into account both experimental studies and synthesis articles. Only materials that directly analysed performance considerations in meat production, as well as aspects related to rearing systems, were included.

The extracted information was then grouped and synthesized according to the categories of factors presented in the text, in order to provide a clearer and more accessible picture of the main conclusions in the literature.

Breeding systems in turkey broiler production

There are used three growing systems in turkey broiler production (Fig. 1): extensive, semi-intensive and intensive.

The superior growth performance of the intensive system is demonstrated by the high final body weights and efficient feed conversion due to controlled microclimate conditions and balanced nutrition. The intermediate values of efficiency indices and final weight are moderate in the semi-intensive system, which is partially affected by access to free space and more intense physical activity. The growth rate is moderate. Extensive or free-range systems have lower production performance, but contribute to improving meat quality and ensuring a higher level of poultry welfare, which are increasingly appreciated nowadays in terms of sustainable production requirements (table 1).

Intensive system

The intensive system represents the industrialized form of raising meat turkeys, based on the exploitation of birds in completely enclosed shelters, where all environmental factors: temperature, humidity, ventilation and light, are automatically controlled [11]. Birds are reared in large flocks of up to 10,000 individuals/hall, with a density of about 4 birds/m² [12], with hybrid lines with rapid growth and high yield in the pectoral muscle being selected [13].

The main objective of the intensive system is to maximize productive performance, expressed by rapid growth, efficient feed conversion (FCR ≈ 2.5–2.7 kg/kg increase) and high meat yield [14]. Microclimate control, combined with fully automated feeding and strict biosecurity, allows full exploitation of genetic potential [15].

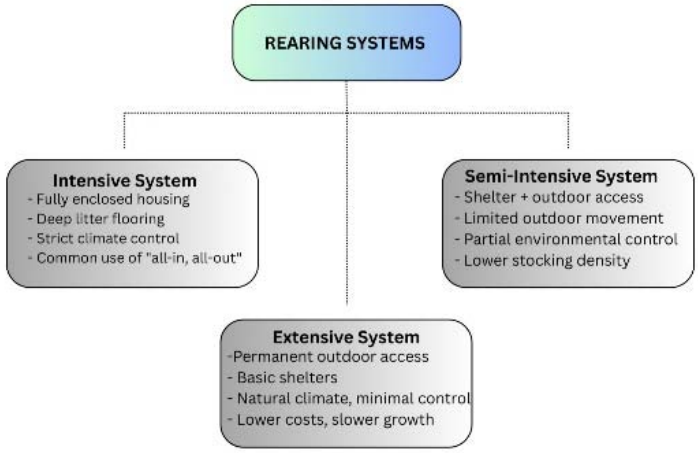

Figure 1. Broiler turkey breeding systems

Table 1. Growth performance depending on the system put into operation

Type System	Turkey breed	Duration (week)	Final Weight (kg)	Key results	Ref.
Intensive, semi-intensive	Bronze	28	7,49/ 4,60	For males, the growth difference between intensive vs extensive systems was significant at weeks 1232; in females, at weeks 1428. Semi-intensive or extensive systems allow good growth, but the final weight and feed efficiency are generally lower compared to intensive systems	Arslan, 2023 [4]
Intense	Converter	48	M 18.68/ F 7.16	Hybrid Converter turkeys had individual average weights: ~18.68 kg for males and ~7.16 kg for females at slaughter age; feed conversion was ~2,482 kg feed/kg of meat obtained	Dzsenifer, 2020 [5]
Cage (battery) vs deep litter	young turkeys (poults) – "unsexed indigenous strain"	4	weight per week higher in caged birds compared to those on the floor	Cage fistem → weight and greater weight gain at week 4; but more significant behavior and stress indicators in the cage, lower well-being; mortality was not significantly different	Ibrahim, 2024 [6]
Intense	Turkeys native breed	8	Fortifier treatments have improved growth, feed efficiency, economic feasibility	Food Fortifier → Better Growth and Feed Efficiency in Deep Bedding Systems; It could be used to compare performance between systems with different shelters if you have additional data.	Anigbogu, 2024 [7]
Extensive	Large White	18	M 12.28/ F 8.34	The Von Bertalanffy growth model fits best; higher performance (weight) in intensive, but freerange has advantages for well-being	Sogut, 2016 [8]
Free-Range	Bronze	21	-	It was observed that genotypes influenced weight much more than the growth system; The differences between Barn vs Freerange in slaughter performance (carcass yield, etc.) were negligible for some genotypes.	Sarica, 2009 [9]
Free-range	Bronze	25	21.4	The feed conversion ratio (FCR) did not differ significantly between breeds. The values were approximately 2.9:1 for Kelly, 2.8:1 for HoBr, and 3.1:1 for HoBl (kg feed per kg live weight)	Olschewsky 2021 [10]

However, the intensive system is often criticized for restricting natural behaviors (flying, exploring, scavenging), which causes the appearance of stress, aggression and locomotor problems [16] [17]. Also, the high density and genetic homogeneity favor the rapid emergence and transmission of diseases [18], requiring strict biosecurity measures and continuous monitoring [19].

The intensive system remains the best performing in terms of production and profitability, but requires rigorous management of animal welfare and health to avoid ethical and economic trade-offs [15].

Semi-intensive system

Semi-intensive turkey farming combines the advantages of both intensive and extensive methods. Birds not only benefit from protected shelters, which protect them against adverse weather conditions, but also have frequent access to the outdoors, where they can develop natural behaviors such as scavenging, grazing, and environmental exploration. Although the available space is less than in the extensive system, it is enough to support the physical exercise necessary to maintain the health and well-being of turkeys [3].

The shelters are kept controlled to keep the extensive system more financially profitable, while this combination creates a stimulating environment that improves the physical health and behavioral well-being of the birds. The way turkeys use outdoor spaces and express their natural behaviors is influenced by genes and seasonal conditions; this underscores the importance of careful environmental and temperature management [20].

Semi-intensive farming balances productive performance and animal welfare, allowing turkeys to live in a more natural environment and contributing to higher quality products without significantly compromising economic efficiency [3] [21].

Extensive system

The breeding of turkey broilers in semi-open shelters or outdoors, with permanent or limited access to outdoor areas (pasture, paddocks), in conditions similar to natural ones, is known as an extensive system. By encouraging the natural behaviors of birds and obtaining a higher quality meat, this system aims to create an environment that is as artificial as possible [22].

The extensive system, also called "free-range" or traditional, involves the development of turkeys in the open air. To be able to move naturally, birds need permanent access to pasture and sufficient space [23].

Each bird needs at least four square meters to allow them to express their natural habits such as scavenging and flying, which helps maintain their well-being.

Despite the fact that this system creates exceptional welfare conditions, the increasing yield is lower. To gain one kilogram in weight (FCR greater than 3 kilograms per kilogram) turkeys grow more slowly and need more feed. They barely reach 10–12 kilograms between 26 and 28 weeks, compared to 20 kg at 20 weeks in the intensive care system [24].

Meat obtained by extensive growth has a low fat content, a firm texture, and a more distinct flavor. These effects are determined by the physical activity of the birds, as well as the natural diet of the birds [25]. Especially when it comes to ethical products or products intended for niche markets, where customers accept higher prices for meat obtained in a responsible and sustainable way, this method becomes economically profitable [26].

In general, extensive systems improve product quality and animal welfare in a substantial way, but intensive systems perform better in terms of economic efficiency and biological performance [15].

Meat production performance in the intensive system

The performance of broiler turkeys is maximized in intensive farming systems, where environmental factors, nutrition and genetic selection are strictly controlled to allow the spores to grow rapidly. With an average daily gain (ADG) of 95–110 g/day, turkeys raised under intensive conditions reach final body weights of 16–20 kg in males and 9–12 kg in females [27] [28]. The Feed Conversion Index (FCR) is between 2.5 and 2.8 kilograms of feed per kilogram of growth, suggesting efficient feed use.

The slaughter yield is also higher, from 78 to 82 percent, and the proportion of breast meat is 28 to 32 percent of the carcass weight [29] [30]. A tender texture, light

color (final pH 5.6–5.8) and a high protein content (22–23) in combination with a low fat level (2–3%) are the characteristics of meat from the intensive system [31].

High density and severe genetic selection can cause locomotor problems and skin damage, despite relatively low mortality (3–5%) [16] [32]. Thus, the intensive system offers the most efficient technical-economic efficiency in meat production, but presents problems with the well-being and sensory quality of the final product.

Meat production performance in the semi-intensive system

The semi-intensive growing system ensures balanced development by combining the advantages of free space and partial environmental control. According to studies by Inci and Arslan & Cetin [27] [4], turkeys bred in this system reach final body weights of 14–17 kg in males and 8–10 kg in females. In addition, the average daily gain is 75–90 g.

The slaughter yield is 75–78 percent, with a proportion of breast meat of 26–29 percent, and the efficiency of feed use is moderate (FCR = 3.0–3.3). With a slightly higher fat content (3–4%), the meat has a more intense color and a firmer texture, which gives it a higher sensory quality [30] [28].

The semi-intensive system offers a high level of well-being and competitive economic results; it is suitable for medium farms and integrated production, as it balances productivity and quality [27].

Meat production performance in the extensive system

Productive performance is lower in the extensive system due to variations in environmental conditions, partially natural feeding and a large amount of physical activity. This system has turkeys with a final body weight of 10–14 kg in males and 6–8 kg in females, with an average daily gain (ADG) of 55–70 g/day, according to Aksoy and Inci [27] [28].

The forage conversion index (FCR) is 3.5 to 4.0, and the slaughter yield is 70 to 75 percent, and the breast yield is 23 to 26 percent [29]. The meat obtained is of higher quality, even if these values indicate lower efficiency. It has a darker color, a higher final pH (6.1–6.3), a firm texture, a protein content of 23–24%, and a fat content of 4–6% [29] [31].

These sensory features allow extensive production to address the premium segment of the market, which focuses on traditional or eco-friendly goods. The extensive system guarantees the best organoleptic quality of the meat and a high level of animal welfare, despite the inferior technical performance.

CONCLUSIONS

The comparative analysis of breeding systems for turkey broilers demonstrates that each method has both benefits and disadvantages. Rapid growth and efficient use of feed are features of the intensive system, but there may be problems with the welfare of birds.

Productive performance can be balanced with more natural growing conditions with the semi-intensive system, making it a viable option for farms looking for both financial profitability and animal welfare. The natural behaviors of turkeys can be shown with the extensive system, but it is less productive and requires more resources for the maintenance of grazing areas.

The results of the study show how important it is to choose a breeding system based on the farm's objectives, the resources you have at your disposal and your animal welfare priorities. In turkey broiler meat production, implementing strategies tailored to each system can help optimize performance, ensuring a balance between productivity, sustainability, and growing conditions.

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