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BROILER BREEDS AND HYBRIDS IN NON-INDUSTRIAL REARING SYSTEMS

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Abstract

Research in the field of poultry farming has often concentrated on non-industrial poultry rearing systems. This has certainly been facilitated by legal regulations adopted in many European countries, as well as by standards on the quality of products and animal welfare in poultry farming.

Considering the above and the fact that research on poultry rearing systems has also been underway in Serbia, this paper provides a review of major results of studies in this field in terms of the effect of broiler breed and hybrid or type.

The objective is to present a comparative analysis of major results of previous studies on non-industrial rearing systems regarding the effect of broiler breed or hybrid on growth performance and major slaughter traits. Another objective is to use this review to indicate potential areas for further research and practical implementation of the results obtained.

Key words: *breeds, growth performance, hybrids, rearing systems, slaughter traits.*

Introduction

Over the last decades, the intensification of poultry farming has been towards industrial production, characterised by confinement facilities, artificial lighting and ventilation, a large number of highly productive hybrid poultry kept in enclosures, often in batteries, the use of complete feeds supplemented with different additives, the administration of disease prevention and treatment

products, and the use of hygiene maintenance products for facilities and farms. This intensification of poultry production has led to the suppression of traditional extensive poultry meat and egg production. Poultry products have become available on the market throughout the year, in large amounts, at a relatively low price. This has triggered the increasingly common belief that products from intensive production systems are not healthy or natural. Moreover, dramatic warnings have often been issued by ecologists in the scientific and professional community on high levels of environmental pollution, with intensive poultry farming being recognised as a source of pollution. On the other hand, animal rights advocates have been increasingly active in expressing their loud opposition to poultry rearing in confined black-out facilities. There has been a rise in the demand for the return to nature, if not on a completely unconfined basis, then using at least an enclosed free range area (Bogosavljević-Bošković *et al.*, 1998, 2003 and 2006a).

The above problems in intensive poultry production have been first faced by developed Western European countries, where this type of production is most intensive. Therefore, legal regulations and directives, VO/EWG 1538/91, VO/EWG 1804/99, were adopted by these countries several years ago (Ristić, 2003; Pavlovski, 2004), focusing on bird welfare, improved quality of products and environmental protection. As part of new regulations defining modifications of the intensive poultry rearing system in the transition period and its subsequent substantial change, standards have been prescribed for alternative rearing systems, i.e. non-industrial and organic poultry production.

Broiler rearing systems have also captured the attention of Serbian researchers. The aim of these studies is to define standards for non-industrial and organic poultry meat production that would be harmonised with current regulations in EU countries, while fully respecting the distinctive characteristics of Serbian agricultural production in general, and livestock production in particular.

The objective of the present study was to provide a comparative review of the results of research on fattening performance and major slaughter traits of different broiler genotypes (most commonly produced in Serbia) reared under non-industrial systems (free range, extended fattening period, specific feeding programmes, etc.).

Basic principles of non-industrial poultry meat production

The term “non-industrial production” is often used in the literature as a synonym for semi-intensive and extensive or traditional broiler production systems. This type of broiler production includes a number of rearing systems, which have been strictly defined in some countries, such as EU countries (Milošević *et al.*, 2005;

Bogosavljević-Bošković *et al.*, 2006a and 2006b). Organic production is one of the systems defined. The EU environmental directive (VO/EWG 1538/91, VO/EWG 1804/99) prescribes standards for this type of production in EU countries (Ristić, 2003). These standards generally define poultry breeds and hybrids used for rearing, housing conditions, use of free range, feeding programmes and length of fattening. A comparative overview of major standards for different poultry production systems is given in *Table 1*.

Table 1. - Comparison of different production systems (Ristić, 2003)

Criteria	Intensive production	Free range (VO/EWG 1538/91)	Environment-friendly production (VO/EWG 1804/99)
Hybrids	Fast growth	Slow growth	Hybrids adapted to the environment, vital resistant breeds, strains
Diet	About 50% cereals	At least 65% cereals	At least 65% cereals with up to 20% DM in the feed, preferably from farm's own local production
Length of fattening/days	30-35	>56	>81
Stocking density, birds/m ²	22/35 LG	13/27.5 LG	10/21 LG
Range area, m ² /bird	Without	1	4

Unlike certain EU countries where non-industrial broiler meat production has come into use to be clearly distinguished, among other things, by substantial amounts of meat being placed on the market, this type of production has not been efficiently organised in Serbia, yet, and no clear trademark has been assigned to it.

The facts that the quality of a product is growing in importance and that health food is gaining supporters who can afford their higher price (Pavlovski *et al.*, 2001; Rodić *et al.*, 2003; Milošević *et al.*, 2004) give particular importance to research on non-industrial broiler rearing systems as an advance towards a broader practical use.

Non-industrial broiler rearing systems in Serbia

In Serbia, initially and at the time a growing interest in non-industrial broiler rearing systems was expressed, studies were focused on making minor modifications to the established intensive production technology. Comparisons

were commonly made between the fattening traits and meat quality of different popular broiler strains present on the Serbian market. Relatively small modifications in the rearing technology (implementation of a free range system) were used in an attempt to obtain a better quality of products. Bogosavljević-Bošković *et al.* (1998, 2003 and 2006a) compared the two rearing systems using Hybro G and Ross 208 broiler hybrids in a 7-week fattening trial. Routine intensive production technology and access to free range were used for broilers in intensive and semi-intensive production systems, respectively. These early investigations determined differences between the rearing systems analysed. Namely, as compared to broilers from intensive systems, broilers reared under semi-intensive system had a lower final body weight, a lower feed conversion ratio, but lower mortality. Nevertheless, certain meat quality traits were found to be better (a higher percentage of class 1 meat, and a higher amount of muscle tissue in this meat).

The results of these studies stimulated new research into the use of modern strains, their fattening traits and meat quality under different non-industrial rearing systems. For example, Bogosavljević-Bošković *et al.* (2005) compared the results on free range broiler production and those on extensive indoor production (according to standards on these systems defined in EU countries). These studies also involved evaluation of the effect of length of fattening (49, 56 and 63 days) in Cobb 500 broilers.

This research suggested that the broiler rearing systems tested did not have a significant effect on fattening and slaughter traits. In addition, as indicated, extended fattening induced an increase in live weight of broilers and cooled carcass yield, and a decrease in the dressing percentage. Nevertheless, dressing percentage was statistically significantly higher only in broilers slaughtered on day 49, as compared to those slaughtered on day 63 of age, but opposed to broilers slaughtered on day 56 of age.

Given the EU requirement for broiler fattening in non-industrial meat production to last a minimum of 56 days, this study may suggest that fast-growing hybrids can be fattened over a period of 56 days and used for this type of production without any adverse effects on yield and slaughter traits.

The average body weight of these broilers on day 56 of age was 3114 g (free range system) and 3135 g (extensive indoor system). The dressing percentage of these broilers ranged from 72.65% to 73.48% in the two respective systems.

Perić *et al.* (2003) studied the fattening and slaughter traits of Ross 308 broilers reared under free range system employing a specific feeding programme. At 70 days of age, these broilers had an average body weight of about 2500 g, and an average dressing percentage of 67.54%. A similar fattening trial was conducted in Hybro PN broilers over a period of up to 77 days of age, involving access to

free range and a specific feeding programme up to 28 days. Broilers obtained the following results: average body weight 3430 g, and dressing percentage 67.80% (Milošević *et al.* 2005).

Apart from hybrid strains, studies on non-industrial systems in Serbia often involved certain indigenous and some other chicken breeds. In their analysis of local genetic resources in Serbia, Mitrović *et al.* (2005) underlined the importance of indigenous poultry populations and strains for the future development of natural environmentally safe biological feeds and environmental protection.

Indigenous broiler breeds reared under extensive systems were the subject matter of a study by Pavlovski *et al.* (2009). Different varieties (white, black, grey) of indigenous Naked Neck broilers and French Naked Neck Farm Q broilers were used as an experimental material in this study. Length of fattening was 91 days (Farm Q) and 98 days (Naked Neck) The average body weight at slaughter ranged from 1371.0 g (FQ) to 1295.9 g (NN). The dressing percentage of “ready to grill” carcass was 62.6% in FQ broilers and 58.7% in NN broilers.

Body conformation measurements suggested poor body development in both male and female broilers (due to the strong effect of low body weight) and indicated the necessity for further research on the nutritional characteristics of the broiler meat from this system.

Indigenous broiler populations (White Naked Neck and Black Svrlijig) reared under semi-intensive systems were also studied by Mitrović *et al.* (2011). After 84 days of fattening, major results on fattening and slaughter traits were as follows: average body weight at slaughter: 1562 g (BS) – 1587 g (WNN), dressing percentage of “ready to grill” carcass: 61.73% (WNN) – 61.99% (BS).

Semi-intensive rearing systems used for the production of different hybrids and breeds of broilers have been studied by many other authors in Serbia. Another interesting research is a study on Redbro broilers (Milićević, 2006). After 84 days of a semi-intensive fattening trial, these broilers attained an average body weight of 1742 g, but somewhat lower values for the dressing percentage, which was most favourable on day 49 (65.75%).

Conclusion

Improved quality of poultry meat, poultry welfare and environmental protection have been imperative for researchers in Serbia for many years. Moreover, non-industrial broiler production systems have gained increasing importance. A number of studies have been conducted, giving different results. The differences are due to different broiler genotypes, different lengths of fattening and, often, great differences in the feeding programmes used. Therefore, the available results

should be used to define standards for non-industrial poultry meat production in Serbia. Also, attention should be given to further research, primarily on the nutritional traits of poultry meat produced under non-industrial rearing systems.

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