# effect of genotype and GENDER ON PERFORMANCE and footpad dermatitis in broilers

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## Summary

With the objective of evaluating the performance and frequency of footpad lesions, an experiment was carried out with 480 birds allotted in a completely randomized experimental design under 2x2 factorial arrangement, including male and female from two different breeds of fast-growing broilers (Ross and Cobb), with 4 replications of 30 birds each, in order to get a total of 16 experimental subgroups. New wood shavings litter was used, turning it over weekly. A feeding program in three stages was used. Birds were weighed at one day of age and at the end of each stage, recording also the quantity of consumed feed and leftovers. At 42 days of age, birds yield assessment and macroscopic observations of legs of 100 birds were performed, scoring them 0 to 4 at slaughtering. Results from lesion frequency and yield were submitted to variance analysis (ANOVA), and means were compared by Tukey test with 95% of confidence, using the statistical software SAS (2004). For the studied parameters, it was possible to find significant differences (p<0.05) on feed intake and feed conversion between genotypes, observing the highest values in the Ross strain. Gender influenced (p<0.05) the average weight at 42 days of age: average weight gain, average daily weight gain, feed intake, feed conversion, and production efficiency index, males showing the best values. There was no interaction between genotype and gender. Higher frequency was found for footpad lesions that scored 3.

**Key Words:** Yield, Score, Footpad dermatitis, Footpad.

Support: CNPq/ PIBIC proc.13753.

## Introduction

Performance of broilers may be influenced by genetics and feed. Given the increasing demand of the market for animals with a superior genetic quality, there is always the necessity of counting with improving programs which may develop the breeds that, comprehensively, allow to get animals with higher yields. Experiments carried out with different broiler breeds and crossed breeds and breeds are published on scientific literature showing not only increases in their general performance by mainly in the carcass and cuts yield, talking about the geneticist concerns on the development of competitive genotypes, capable of satisfying the demands of the consumer markets (Stringhini *et al*., 2003). Changes in the global economy have forced poultry producers to increase the productivity, improve the product quality, and to reduce production costs, which is characterized by an increase of bird stock and the restriction of movement of the animals. The dense stock of birds per pen (house, barn, or premises) demands for a higher control of the environment. The use of breeds with high genetic potential and the advances in the diet formulation (equipment and management routine that characterize the modern Brazilian poultry activity), may be neutralized due to lack of more rigorous criteria in the conception and dimensions of the system. With the introduction of high yield breeds in the Brazilian market, the sector has reevaluated the criteria in management, nutrition, and broiler stock, in order to maximize the productivity and to optimize costs. It is fundamental to define the characteristics of production, given that the current breeds have quite differentiated requirements (Moreira *et al*., 2004). In papers that assessed of the effect of stock density on the animal performance, carcass yield, and poultry quality from broilers of different commercial breeds, Moreira *et al*., (2004) informed that the gender of the birds influenced the characteristics of performance, with males being superior to females in all of them. One of the economic issues for industrial poultry for turkey meat production in the United Kingdom, North America, Australia, Sweden, and Brazil is the contact dermatitis or pododermatitis. This may be considered as an important factor that limits the quality of the bird legs intended for export. Depending of the level of the lesion, the product may be depreciated by the cut done for the removal of the lesion, or even the complete discarded of the feet, which occurs in severe cases. Pododermatitis from contact in broilers is presented as a foot pad lesion of red-brown color, similar to that of a burn mark, with highly variable width, depth, and incidence. In experiments, pododermatitis pictures were related to lameness and depression in weight gain. Another factor that has been related to this disease is long contact with corrosive substances in the bird litter. These substances probably are part of the deterioration process of the litter material, where bacteria degrade the uric acid excreted by the birds that result in ammonia compounds. Under this situation, litter humidity plays a fundamental role, particularly in the increase of the microbiological activity. In this way, some authors attribute the incidence of lesions in foot pads to inappropriate conditions of the litter, especially due to an excess of humidity (Eichner, 2005).

## Material and Methods

The experiment was carried out in the FMVZ facilities, in the UNESP, Botucatu, Brazil with 480 broiler chickens. The experiment had a completely randomized design under a 2 X 2 factorial arrangement, with two fast-growing broiler breeds (Ross and Cobb) and both genderes, with 4 replications of 30 birds each, in order to get 16 experimental subgroups. Animals were housed in 2.5 m2 pens with a 10 birds/m2 density stock. New litter of wood shavings, turned over weekly was used. Feeding program consisted in three stages: starting from 1 to 21 days, growing from 22 to 35 days, finishing from 36 to 42 days. Nutritional levels recommended by Rostagno *et al*. (2005) were used. For the evaluation of yield characteristics, the quantities of consumed feed and feed leftovers were recorded at the end of each stage. Birds were weighed at one day of age and at the end of each stage. At 42 days of age average weight, average weight gain, daily gain weight, feed intake, feed conversion, mortality, viability, and production efficiency index were evaluated. For the analysis of the foot pad lesions, at 42 days of age macroscopic evaluations were performed in feet of 100 birds at slaughtering and were scored from 0 to 4 as follows: **0**= no lesion, **1**= initial lesion, **2**= inflammation, lesion with necrotic areas, **3**= very evident inflammation with pronounced necrotic areas and increase of volume of the foot pad; **4**= necrotic area covering the whole foot pad. The evaluated characteristics were subjected to Shapiro-Wilk test in order to verify the normality of the residues and Levene test for the homogeneity of variables. The statistical analysis was performed with the software *SAS* 9.2 (*SAS*, 2004). Given that in the study the characteristics were scored from 0 to 4, they were not associated to previous assumptions (Normality and Homogeneity). Comparisons of the effects were done by Kruskal-Wallis test (*P*<0.05). Data on performance were subjected to variance analysis (ANOVA) and means were compared under the Tukey test (*P*<0.05) with the help of the statistical software *SAS* (2004).

## Results and Discussion

Statistical differences (*P*<0.05) were found for the studied parameters in feed intake and food conversion between breeds, with the higher values for the Ross genotype (Table 1). Similar data were found by Moreira *et al*., (2003) with conventional and conformation breeds. Influence of the gender (*P*<0.05) was observed in mean weight at 42 days of age, average weight gain, average daily weight gain, feed intake, food conversion, and production efficiency index. With males with the best values (Table 2). There was no interaction (*P>*0.05) between breeds and gender related to the studied variables in the period from 1 to 42 days of age. Pododermatitis frequency din not have strain x gender influence (*P>*0.05), with higher frequency of lesions on foot pad scored 3 (Graphs 1 and 2). Santos, Nunes, and Baião (2002) observed different cases of pododermatitis in some farms, finding a variation of 20 to 80% in affected birds.

**Table 1 –** Mean weight at 42 days of age (MW42), average weight gain (*AWG*), average daily weight gain (ADWG), ration consumption (RC), food conversion (FC), mortality (MO), viability (VB), and production efficiency index (PEI) in broilers within the period of 1 to 42 days of age (two breeds)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Strain** | **Variables** | | | | | | | |
| **MW 42** | ***AWG*** | **ADWG** | **RC** | **FC** | **MO %** | **VB %** | **PEI** |
| **Ross** | 2,452.28a | 2,412.95a | 57.45a | 4,303.8a | 1.79b | 1.67a | 98.33a | 316.02a |
| **Cobb** | 2,362.51a | 2,324.14a | 55.34a | 3,981.6b | 1.72a | 2.08a | 97.92a | 314.80a |
| **Average** | 2,407.39 | 2,368.54 | 56.39 | 4,142.69 | 1.75 | 1.87 | 98.13 | 315.41 |
| **CV %** | 7.74 | 7.87 | 7.87 | 7.12 | 0.94 | 156.13 | 2.98 | 7.36 |

Averages followed by different letter in the same column differ under Tukey test (P<0.05); CV (%): coefficient of variation.

**Table 2 -** Mean weight at 42 days of age (MW42), average weight gain (*AWG*), average daily weight gain (ADWG), ration consumption (RC), food conversion (FC), mortality (MO), viability (VB), and production efficiency index (PEI) in broilers within the period of 1 to 42 days of age (effect from gender)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gender** | **Variables** | | | | | | | |
| **MW 42** | ***AWG*** | **ADWG** | **RC** | **FC** | **MO %** | **VB %** | **PEI** |
| **Males** | 2,543.42a | 2,504.53a | 59.63a | 4,349.4a | 1.74a | 2.08a | 97.92a | 335.27a |
| **Females** | 2,271.37b | 2,232.56b | 53.16b | 3,936.0b | 1.77b | 1.67a | 98.33a | 295.55b |
| **Average** | 2,407.39 | 2,368.54 | 56.39 | 4,142.69 | 1.75 | 1.87 | 98.13 | 315.41 |
| **CV %** | 7.74 | 7.87 | 7.87 | 7.12 | 0.94 | 156.13 | 2.98 | 7.36 |

Averages followed by different letter in the same column differ under Tukey test (P<0.05); CV (%): coefficient of variation.

**Figure 1 –** Lesions scores to foot pad



**Score 2**

**Score 4**

**Score 0**

**Score 3**

**Score 1**

**0** =no lesion; **1** = initial lesion; **2** = initial lesion with necrotic areas; **3** = very evident inflammation with pronounced necrotic areas and increase of volume in foot pad; **4** = necrotic area in the whole foot pad.



**Frequency (%)**

**Score**

**Score**

**Frequency (%)**

**Lesions in the left foot pad**

**Lesions in the right foot pad**

**Ross Hembra**

**Cobb Hembra**

**Ross female**

**Cobb female**

## Conclusion

It is concluded that there was no interaction between strain and gender of birds related to the studied yield characteristics. The best values from feed intake and food conversion were from the Ross chickens. Related to gender, males presented better results in the evaluated parameters. Pododermatitis frequency was not influenced by genetics or gender, finding the highest frequency of lesions scored 3.

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