

Effect of Housing System, Slaughter Age and Sex on Slaughter and Carcass Parameters of Broiler Ducks

Cyril Hrnčár*¹, Ján Weis¹, Ľuboslava Petričová¹, Jozef Bujko²

¹Department of Poultry Science and Small Animal Husbandry

²Department of Genetics and Breeding Biology

Faculty of Agrobiological and Food Resources, Slovak University of Agriculture in Nitra, Slovakia

Abstract

The aim of this study was to determine the effects of housing system, slaughter age and sex on performance and carcass parameters of broiler ducks. The experiment was carried out in half-operation conditions experimental base of Department of Poultry Science and Small Animal Husbandry of Slovak University of Agriculture in Nitra. A total of 60 one day old ducklings (type Peking Duck White) were randomly divided to 2 housing groups: three-floor cage system and deep litter system, both under uniform microclimate conditions. The housing system, slaughter age and sex significantly affected the slaughter weights of broiler ducks in 49 and 56 day of fattening. The results of this study showed the influence of housing system, sex and slaughter age on slaughter and carcass parameters. The slaughter and carcass parameters were statistically higher ($P < 0.05$) in three-floor cage system in comparison with the deep litter system. Breast, thighs, back and wings weights and carcass yield were significantly affected ($P < 0.05$) by slaughter age. Sex no significantly affected carcass yield ($P > 0.05$). The some slaughter and carcass parameters of male ducks were statistically higher ($P < 0.05$) compared with female ducks.

Key words: cage, carcass, , deep litter, duck slaughter

1. Introduction

Duck production may partly compensate the increasing demand for animal protein. Ducks are able to adapt to wide range of environmental and natural conditions, which may be the reason for the increasing importance and popularity of the duck production [1].

Studies on the growth and development of domestic fowls are very important, both from the biological and the economic perspective. Age-related changes in their body weights are usually closely correlated not only with proportions of body parts, but also tissue components in the carcass [2].

Meat quality depends on a number of factors. Of the biological ones, the greatest impact

is produced by genotype, sex and age. Among numerous non-genetic factors that may have a considerable effect on meat quality, a broiler rearing system has been recognised over the past years by a large number of authors as being particularly important [3,4].

Meat traits in ducks are of medium to high heritability [5,6], what ensures successful selection. Useful guidelines on how to carry out such selection are provided by simple correlations calculated between tissue components and *in vivo* body dimensions [7-9].

The purpose of this research was to determine the effects of housing systems, sex and slaughter age on slaughter and carcass parameters of broiler ducks.

* Corresponding author: Cyril Hrnčár, + 421 37 6414744, Cyril.Hrnear@uniag.sk

2. Materials and methods

The experiment was realised in half-operation conditions of experimental basis of Department of Poultry Science and Small Animal Husbandry of Slovak University of Agriculture in Nitra. Ducks were healthy and their condition was judged as good at the commencement of the experiment. Conditions of animal care, manipulations and use corresponded with the instruction of ethical commission. Care and use of animals and experimental devices met the requirement of the certificate of Authorization to Experiment on Living Animals (State Veterinary and Food Institute of Slovak Republic, no. SK PC 30008).

The feeding period lasted 56 days. Two types of complete feed mixtures have been distributed according to periods of fattening: starter (d1-d21) in powdery form and grower (d22-d56) in granular form. Nutritional value of diets

is shown in Table 1. Feeding was provided on an *ad libitum* basis.

A total of 60 ducklings of similar weights we divided to two groups: 30 ducklings in the 6 deep floor pens with area of 1.225 m² for each pen and 30 ducklings in the 6 cages with area of 0.375 m² for each cage.

In 49 and 56 day of fattening, 10 broiler ducks of similar body weight to the group average were selected from each treatment, weighted and killed by severing of the bronchial vein. From carcass parameters we observed slaughter weight in gram, weight of giblets in gram (liver, gizzard, heart), weight of breast in gram, weight of thighs in gram, weight of back in gram, weight of wings in gram and carcass yield in %.

Data were analyzed using analysis of variance (SAS, 2001) [10]. Significant difference was used at 0.05 probability level and differences between groups were tested using Tukey's test at the levels of significance.

Table 1. Nutritional value of complete feed mixtures

Nutrient	Unit	Starter	Grower
Crude protein	g/kg	min. 200.00	min. 170.00
ME	MJ/kg	min. 12.00	min. 12.00
Lysine	g/kg	min. 10.00	min. 8.50
Methionine and cistine	g/kg	min. 8.00	min. 6.00
– from that methionine	g/kg	min. 4.50	min. 3.50
Calcium	g/kg	min. 8.00	min. 11.00
Phosphorus	g/kg	min. 6.00	min. 5.00
Sodium	g/kg	1.40	1.40
Manganese	mg/kg	min. 110.00	min. 110.00
Iron	mg/kg	min. 120.00	min. 120.00
Copper	mg/kg	min. 15.00	min. 15.00
Zinc	mg/kg	min. 100.00	min. 100.00
Vitamin A	i.u./kg	min. 12000	min. 12000
Vitamin B ₂	mg/kg	min. 9.00	min. 9.00
Vitamin B ₁₂	µg/kg	min. 40.00	min. 40.00
Vitamin D ₃	i.u./kg	min. 4000	min. 4000
Vitamin E (α-tokoferol)	mg/kg	min. 250.00	min. 250.00

3. Results and discussion

The effects of housing system, sex and slaughter age on slaughter and carcass parameters of broiler ducks are presented in Tables 2 and 3.

The slaughter weights of ducks in the cage system were significantly higher ($P < 0.05$) than for those in the deep litter floor system (2774.58 vs. 2936.97 g). The housing systems statistically

significant ($P < 0.05$) affected weight back of broiler ducks (610.51 g in deep litter; 646.15 g in cages). In contrast, there were no significant differences ($P > 0.05$) in weight of breast, things and wings between cages and deep floor pens.

Slaughter age had statistically significant positive effect ($P < 0.05$) on the slaughter weight and body broiler duck composition in 8 weeks of age (2905.31 vs. 3194.83). The best slaughter age of

ducks was found between 7 and 8 weeks of life. Within this range, the meat content of carcass was the highest and meat to fat ratio proved the most favorable [11]. When, the age of the ducks exceeds 8 weeks the muscles no longer gain in weight, while, the gain of skin with subcutaneous fat increases [12-14]. The tissue composition of carcasses changes with age, because particular components show different growth rates. The percentage of meat and skin fat increases, whereas the percentage of bones decreases, as birds grow older. These changes are more radical in ducks than in chickens [15].

The effect of sex was significant ($P>0.05$) for slaughter weight (3187.62 in male; 2895.24 in female) weight of breast (560.84 g in male; 506.63 g in female) and things (506.49 g in male; 460.31 g in female).

The housing systems had no significant effect ($P>0.05$) on body composition and carcass yield of broiler ducks. The weights of heart, liver and gizzard of male ducks were ($P<0.05$) significantly higher than female ducks. Carcass yield of ducks were not significantly affected ($P>0.05$) by sex.

Heart, liver, gizzard and carcass yield statistically significant increased ($P<0.05$) in ducks at 8 weeks of age.

Table 2. Effect of housing system, slaughter age and sex on slaughter age and body composition of broiler ducks

Treatment		Slaughter weigh (g)	Weight of breast (g)	Weight of thighs (g)	Weight of back (g)	Weight of wings (g)
Housing system	Deep litter	2774.58±118.47	485.49±72.56	441.25±41.29	610.51±83.05	249.66±31.07
	Cage	2936.97±136.21 ^b	513.97±74.81	466.98±39.85	646.15±81.88 ^b	264.33±37.71
Sex	Male	3187.62±126.43 ^a	560.84±70.23 ^a	506.49±42.11 ^a	675.79±84.56	286.79±39.26
	Female	2895.24±157.30	506.63±74.21	460.31±41.57	636.94±82.78	260.51±34.88
Slaughter age	7 week	2905.31±146.42	508.37±73.94	461.89±40.56	615.88±80.41	261.85±33.57
	8 week	3194.83±157.62 ^b	556.51±71.64 ^b	508.09±42.84 ^b	680.24±88.15 ^b	305.64±40.79 ^b

Values shown are mean ± SD (standard deviation)

^{a,b} means in a row with different superscript differ significantly ($P<0.05$)

Table 3. Effect of housing system, slaughter age and sex on weight of giblets and carcass yield of broiler ducks

Treatment		Weigh of heart (g)	Weight of gizzard (g)	Weight of liver (g)	Carcass yield (%)
Housing system	Deep litter	19.42±3.08	88.78±14.47	58.27±9.84	72.34±1.85
	Cage	20.55±3.14	93.98±17.05	61.74±10.85	72.73±2.08
Sex	Male	22.32±3.22 ^a	102.01±19.54 ^a	66.47±11.99 ^a	72.99±1.98
	Female	20.28±2.99	93.81±16.39	60.81±10.55	71.88±1.74
Slaughter age	7 week	20.33±3.11	93.36±17.59	61.11±11.47	71.15±1.64
	8 week	22.36±3.33 ^b	102.24±18.04 ^b	67.08±12.35 ^b	72.93±1.99 ^b

Values shown are mean ± SD (standard deviation)

^{a,b} means in a row with different superscript differ significantly ($P<0.05$)

4. Conclusions

In conclusion, results obtained from the present study showed that the cage gave higher slaughter and back weight than the litter floor system for broiler ducks. The slaughter weight and carcass parameters were higher in males than in females except for the weights of back and wings. It is recommended that broiler ducks in the study be slaughtered at 8 weeks of age in order to have better slaughter and carcass parameters.

Acknowledgements

This work was financially supported by VEGA 1/0493/12 and KEGA: 035SPU-4/2012.

References

- Solomon, J. K. Q., Austin, R., Cumberbatch, R. N., Gonsalves, J., Seafoth, E. A comparison of live weight and carcass gain of Pekin, Kunshan and Muscovy

- ducks on a commercial ration. *Livestock Research for Rural Development*, 18, 2014, from <http://www.lrrd.org/lrrd18/11/solo18154.htm>
- 2.Bochno, R., Brzozowski, W., Murawska, D. Age-related changes in the distribution of lean, fat with skin and bones in duck carcasses. *British Poultry Science*, 46, 2005, 199-203
- 3.Bokkers, E.A.M., Koene, P. Behaviour of fast and slow growing broilers to 12 weeks of age and the physical consequences. *Applied Animal Behaviour Science*, 81, 2003, 59-72.
- 4.Hellmeister Filho P., Machado Menten J.F., Neves da Silva M.A., Coelho A.A.D., Savino V.J.M. Efeito de genótipo e do sistema de criação sobre o desempenho de frangos tipo caipira. *Revista Brasileira de Zootecnia*, 32, 2003, 1883-1889.
- 5.Kosba, M. A., Negm, H. M., El-Sayed, T.M. Selection for breast meat weight of ducks. *Proceedings of the 11th European Symposium on Waterfowl*. September 8-10, Nantes, 1997, 348-352.
6. Mazanowski, A., Kisiel, T., Gornowicz., E. Carcass quality, meat traits and chemical composition of meat in ducks of paternal strains A44 and A55. *Animal Science Papers and Reports*, 21, 2003, 251-263.
- 7.Książkiewicz, J. Zależności między składem tkankowym a niektórymi wymiarami tuszek kaczek angielskich i krajowych. *Zeszyty Naukowe Drobiarstwa COBRD Poznań*, 8, 1993, 57-65.
8. Książkiewicz, J. Wskaźniki zawartości mięśni piersiowych lub nóg w tuskach kaczek z dwóch rodów hodowlanych. *Roczniki Naukowe Zootechniki*, 20, 1993, 65-75.
- 9.Książkiewicz, J., Kontecka, H. Charakterystyka zależności między masą i wymiarami ciała a składem tkankowym tuszek kaczek mini, orpingtonów i z różnym udziałem khaki campbell. *Roczniki Akademii Rolniczej w Poznaniu*, 246, 1993, 45-56.
- 10.SAS User's Guide: Statistics version 6.12 Edn., SAS Institute, Inc., Cary, NC., 2011, USA.
11. Bochno R., Lewczuk, A., Janiszewska, M., Mazanowski, A., Wawro, K. Use of multiple regression equations for evaluation of muscle and fat weight of duck. *Acta Academiae Agriculturae Technicae Olstenensis. Agricultura*, 31, 1988,197-203.
- 12.Górski, J. Wzrost i proporcje podrobów, produktów ubocznych i składników tkankowych tuszki u kaczek rasy pekin w okresie odchowu. *Przegląd Naukowej Literatury Zootechnicznej*, 35, 1990, 147-154.
- 13.Górski, J. The effect of two-way crossbreeding of Pekin ducks of P-11, P-22, P-44 and P-55 strains on fleshing and fatness of crossbred ducks. *Proceedings of 11th European Symposium on Waterfowl*. September 8-10, Nantes, 1997. 354-360.
14. Górski, J. The effects of two-way crossbreeding of Pekin ducks of P-11, P-22, P-44 and P-55 strains of fat and protein content in the muscles of crossbred ducks. *Proceedings of 11th European Symposium on Waterfowl*. September 8-10, Nantes, 1997, 362-367.
15. Bochno, R., Lewczuk, A. The content of edible and inedible parts of duck bodies depend on age. *Proc. of the 7th Europ. Poultry Conf.* (published by WSPA French Branch. 12, 1986, 1270-1275.