FATTENING OF LAYING-TYPE COCKERELS

KUPCIKOVA LUCIE, ANDERLE VOJTECH, LICHOVNIKOVA MARTINA, JELINKOVA PAVLINA
Department of Animal Breeding
Mendel University in Brno
Zemedelska 1, 613 00 Brno
CZECH REPUBLIC

xkupcik2@mendelu.cz

Abstract: Males of four laying-type DOMINANT hybrids (D 104; D 109; D 459; D 853) from the company Hatchery Studenec, s.r.o. were used in the experiment. Approximately 208 laying-type males of each hybrid, in total 830, were fed till 11 weeks of age in two technologies–cage system and littered floor system. Both the housing technology and hybrid had significant effect on live weight of laying-type cockerels at 3rd, 7th and 11th weeks of age. In floor system the live weight was higher than in cage system. On the other hand there was no significant effect of hybrid or technology on feed conversion ratio. In littered floor system the hybrids D 104 and D 109 were significantly heavier ($P<0.05$) than hybrid D 853.

Key Words: layer cockerels, growth, feed conversion ratio, breast and thigh muscle

INTRODUCTION

The negative correlation between characteristics of reproductive performance and growth in the poultry industry resulted in an early separation of production for eggs and for poultry meat. The intensive breeding on egg production or on growth performance in the respective production branch has caused an extreme specialization of breeds. While, in fattening of broilers both female and male chickens (broilers) can be reared economically, no economically sustainable use could be developed for the males from laying hen breeds. Male layer chicks have only a moderate growth performance, and the quantity and distribution of meat in the carcass does not meet consumer expectations (Koenig 2012). Therefore these newly hatched male chicks are usually killed immediately after hatching. Considering, that approximately 10 million male layer chicks are affected by this killing action in the Czech Republic, in EU it is more than 280 million each year. Nevertheless, killing has raised concerns in highly welfare sensitive societies, resulting in calls for abandoning the practice and making alternative use of male chicks form layers (Ellendorff, Klein 2003). An alternative to this process could be in ovo–sexing determination of the gender in the egg (Nandi et al. 2003). Further approaches include the fattening of the male layer chicks and their marketing as specialty products, or the breeding of dual purpose breeds, which is also demanded by animal welfare organizations. The breeding of dual-purpose breeds, however, would lead to a significant decline both in egg production and in growth performance (Koenig 2012). Anyway till 1960´s the male chicks had been fattened in the Czech Republic and the consumers were very interested in their meat.

The aim of this study was to investigate the potential use of male laying chicks reared in two technologies in view of their performance.

MATERIAL AND METHODS

Males of four laying–type DOMINANT hybrids (D 104; D 109; D 459; D 853) from the company Hatchery Studenec, s.r.o. were used in the experiment. DOMINANT SUSSEX D 104 is an attractively colored layer, very similar as old native breed Sussex Light, for small scale and free range production conditions.

DOMINANT BLACK D 109 is very popular layer program, result of crossing Rhode Island Red paternal stock with Barred Plymouth Rock maternal stock. DOMINANT RED BARRED D 459 is result of crossing Rhode Island Red BARRED paternal stock with our Sussex maternal stock. DOMINANT RED D 853 is very similar as old native breed RHODE ISLAND RED (Tyller 2008–2014).

Approximately 208 laying–type males of each hybrid, in total 830, were fed till 11 weeks of age in two technologies-cage system and littered floor system. The average weight of day old cockerels was 36.8g.

During the first week the cockerels were housed in littered floor boxes according to the hybrids in agreement with technological guide requirements concerning the environmental conditions. Temperature in the room ranged from 28 to 29°C. The birds were provided with one hour of darkness following a period of 23h light. Both the water and feed were available *ad libitum*.

At day eight of the age, the cockerels were randomly divided into cages (316 chicks) and littered floor boxes (514 chicks). In cage system the cockerels were housed in total in 36 cages in three-floor batteries, it means 9 replications per hybrid, 8–9 cockerels in one cage. The cages were equipped with nipple drinkers with cups and with mechanical feeders.

In floor system the cockerels were divided into 12 boxes, 3 replications per hybrid, equipped with nipple drinkers with cups, mechanical tube feeders and wood shavings as litter material. In both technologies water and feed were available *ad libitum*. The light regime was changed to 6 hours of darkness followed by 18 hours of light. The environmental conditions were in accordance with Ordinance 208/2004 Sb. And 464/2009 Sb..

Starter, BR1 (crumble pellets), was fed till 3 weeks of ages, grower (BR2–pellets) was fed from 4 to 7 weeks of ages and finisher (BR3–pellets) was fed from 8 to 11 weeks of age. The composition of the diets is shown in the Table 1 and the content of nutrients in the diets is shown in Table 2.

Table 1 Composition of the diets

Component	[%]		
	BR1	BR2	BR3
Wheat	43.2	47.9	53.2
Maize	20.0	20.0	20.0
Soybean extraction meal	29.0	25.0	20.0
Yeast	2.0	2.0	2.0
Vegetable oil	1.5	1.5	1.5
Natural rock salt	0.2	0.2	0.2
K2 200*	0.2	0.2	0.2
Lysine	0.3	0.25	0.25
Threonine	0.1	0.1	0.05
Methionine	0.3	0.25	0.2
Monocalcium phosphate	1.3	0.9	0.7
Calcium carbonate	1.7	1.5	1.5
Sodium hydrogen carbonate	0.2	0.2	0.2

**K2 200- premix for pullets*

Feed consumption of each cage and each box were recorded. All cockerels were weighted three times during the experiment, with the first weighting at third week of age, following in 7th and 11th week. On the basis of these data the feed conversion ratio (FCR) was calculated.

Data were analyzed by two ways ANOVA, evaluating the effect of hybrid and housing technology and their interaction on growth and feed conversion ratio. LSD test was used for subsequent testing using software package Unistat 5.1 (Unistat Ltd., England).

Table 2 Content of nutrients in the diets

Content nutrients [$g \cdot kg^{-1}$]	BR1	BR2	BR3
Crude protein	211.8	197.9	180.4
ME_N [MJ]	11.9	12.1	12.3
Fat	32.5	32.6	32.6
Linoleic acid	11.9	12.0	12.2
Fiber	28.7	28.4	27.9
Lysine	13.5	12.0	10.7
Methionine	6.1	5.5	4.7
Methionine + cysteine	10.0	9.2	8.3
Threonine	9.0	8.4	7.1
Tryptophan	2.7	2.5	2.3
Arginine	13.6	12.5	11.1
Ca	9.9	8.4	7.9
Na	1.5	1.5	1.5
P	7.1	6.1	5.5
P- availability	4.0	3.2	2.7

RESULTS AND DISCUSSION

Live weights of cockerels at 3, 7 and 11 weeks of age in both cage and littered floor technologies are shown in the Tables 3–5.

At the age of three weeks D 459 was significantly heavier ($P<0.05$) than D 104 and D 853 in littered floor on the other hand in the same age in cage technology D 109 had significantly highest ($P<0.05$) live body weight in comparison with all other hybrids.

In littered floor D 459 was also significantly heaviest ($P<0.05$) at seven weeks of age. In the same age the cockerels had lower weight in cage system but there was found lower variability among the cockerels in comparison with littered floor. In cage system in this age the lowest weight ($P<0.05$) was found in hybrid D 853.

At eleven weeks of age hybrid D 853 had significantly lowest body weight ($P<0.05$) in comparison with D 109 and D 104 in littered floor. In cage technology there was no any significant difference in live body weight among the hybrids.

Murawska et al. (2005) also did experiments with cockerels of laying type (Astra S) and they published live weight of cockerels at six weeks of age 669 g and at eighteen weeks of age 2.4 kg. Anyway it is hard to compare their results with results of this experiment because they used another hybrids.

In Thailand it is also popular to feed national chicks, which reach at four months live weight 1.5 kg (Jaturasitha et al. 2008).

Table 6 shows the P values of factors at different ages for live weight. The live weight of cockerels, regardless hybrids, was significantly higher in floor system in comparison with cage system during whole experiment period. Hybrid also had significant effect on live weight during whole experiment.

At the end of experiment, 11 week of age, there was no significant difference among the hybrids in live weight in the cage system ($P>0.05$). On the other hand, in littered floor system the hybrids D 104 and D 109 were significantly heavier ($P<0.05$) than hybrid D 853.

Table 3 Weight of cockerels at the age of three weeks in the cage and littered floor technologies [g]

Littered floor			Cage technology		
Hybrid	average ± SE	v_x	Hybrid	average ± SE	v_x
D 104	243^{ab} ± 2.5	11.4	D 104	238^{a} ± 2.8	10.4
D 109	248^{bc} ± 2.7	12.0	D 109	249^{b} ± 3.4	12.7
D 459	251^{c} ± 2.5	10.9	D 459	237^{a} ± 3.0	11.7
D 853	237^{a} ± 2.9	13.4	D 853	235^{a} ± 2.7	10.7

a, b means of the same order designated by different letters are significantly different (P<0.05)

Table 7 shows feed conversion ratio at 12th week of age. Neither the hybrids nor technology had significant effect on feed conversion ratio. FCR ranged from 2.93 to 3.15 kg · kg^{-1}. There was no interaction between hybrid and technology for FCR.

Koenig et al. (2009) reported lower feed conversion ratios (FCR) in the research with laying-type cockerels; 2.3 kg · kg^{-1} in Lohmann Brown and Hy-Line Brown. Lohmann Selected Leghorne and Dekalb White had a little higher FCR 2.7 kg · kg^{-1}. It is necessary to mention they fed them as Poussin chicks, it means till 650g of live body weight.

Damme a Ristic (2003) fed cockerels of laying type and at age 80 days they reached FCR 3 kg · kg^{-1}.

Table 4 Weight of cockerels at the age of seven weeks in the cage and littered floor technologies [g]

Littered floor			Cage technology		
Hybrid	Average ± SE	v_x	Hybrid	Average ± SE	v_x
D 104	1050^{a} ± 22.7	23.8	D 104	927^{b} ± 15.7	15.2
D 109	1073^{a} ± 23.5	24.4	D 109	932^{b} ± 13.3	13.1
D 459	1179^{b} ± 27.4	25.3	D 459	905^{ab} ± 13.4	13.4
D 853	1081^{a} ± 22.5	23.1	D 853	878^{a} ± 13.7	14.3

a, b means of the same order designated by different letters are significantly different (P<0.05)

Table 5 Weight of cockerels at the age of eleven weeks in the cage and littered floor technologies [g]

Littered floor			Cage technology		
Hybrid	Average ± SE	v_x	Hybrid	Average ± SE	v_x
D 104	2037^{b} ± 34.0	18.4	D 104	1878^{a} ± 30.0	14.3
D 109	2037^{b} ± 34.0	21.3	D 109	1839^{a} ± 31.5	15.7
D 459	1976^{ab} ± 36.2	19.9	D 459	1820^{a} ± 31.3	15.6
D 853	1883^{a} ± 34.0	20.0	D 853	1795^{a} ± 39.6	20.1

SE- standard error; a, b - means of the same order designated by different letters are significantly different (P<0.05)*

v_x- coefficient of variance (%)

Table 6 The effect of technology, hybrid and their interaction on live weight in 3rd, 7th and 11th week of age (P value)

Factor	Age		
	3rd week	7th week	11th week
Hybrid	P < 0.001	P < 0.01	P < 0.01
Technology	P < 0.05	P < 0.001	P < 0.001
Interaction	P > 0.05	P < 0.01	P > 0.05

Table 7 Feed conversion ratio at 12 weeks of age [kg · kg^{-1}]

Hybrid	Average ± SE	v_x
D-104	$3.10^a \pm 0.08$	6.13
D-109	$2.93^a \pm 0.09$	7.68
D-459	$3.15^a \pm 0.11$	8.71
D-853	$3.11^a \pm 0.08$	6.34
Littered floor	$2.99^a \pm 0.06$	6.65
Cage technology	$3.15^a \pm 0.07$	7.37
P value		
Hybrid	P > 0.05	
Technology	P > 0.05	
Interaction	P > 0.05	

a, b means of the same order designated by different letters are significantly different (P<0.05)

CONCLUSION

Both the housing technology and hybrid had significant effect on live weight of laying-type cockerels at 3rd, 7th and 11th weeks of age. On the other hand there was no significant effect of hybrid or technology on feed conversion ratio. In littered floor system the hybrids D 104 and D 109 were significantly heavier (P<0.05) than hybrid D 853.

ACKNOWLEDGEMENT

The authors would like to thank the IGA IP 8/2015 AF MENDELU project for financial support and to company Hatchery Studenec s.r.o. for cooperation.

REFERENCES

Announcement n. 464/2009 Sb., amending Decree no. 208/2004 Sb., minimum standards for the protection of farm animals, as amended by Decree no. 425/2005 Sb. (in Czech).

Damme K., Ristic M. 2003. Fattening performance, meat yield and economic aspects of meat and layer type hybrids. *World's Poultry Science Journal*, 59(1): 50–53.

Ellendorff F., Klein S. 2003. Current knowledge on sex determination and sex diagnosis: potential solutions. *World's Poultry Science Journal*, 59(1): 7.

Jaturasutha S., Kayan A., Wicke M. 2008. Carcass and meat characteristics of male chickens between Thai indigenous compared with improved layer breeds and their crossbred. *Archiv Tierzucht (Dummerstorf)*, 51(3): 283–294.

Koenig M. 2012. Verwendung männlicher Hühnerküken aus Legehybridherkünften zur Erzeugung von Stubenküken. *Disertation work*, Universität Hohenheim, 65.

Koenig M., Hahn G., Damme K., Schmutz M. 2009. *Utilization of laying-typecockerels as poussins* [online]. [2015-09-10]. Available from: http://www.cabi.org/Uploads/animal-science/worlds-poultry-scienceassociation/

Murawska D., Bochno R., Michalik R. 2005. Age-related changes in the carcass tissue composition and distribution of meat and fat with skin in carcasses of laying-type cockerels. *Archiv für Geflügelkunde*, 69(3): 135–139.

Nandi S., Mcbride D., Blanco R., Clinton M. 2003. Sex diagnosis and sex determination. *World's Poultry Science Journal*, 59(1): 8–14.

Tyller M. 2008–2014. *DOMINANT CZ–breeding laying type hens* (in Czech) [online]. [2015-09-15]. Available from: http://www.dominant-cz.cz/?q=dominant