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Original Paper

Comparative study of productive performance and carcass parameters of Oravka, Amrock and their reciprocal crossbred chickens

Cyril Hrnčár[1]*, Jozef Bujko[1], Emília Hanusová[2], Anton Hanus[2],
Henrieta Arpášová[1], Martin Fik[1], Radovan Kasarda[1]
[1]*Slovak University of Agriculture in Nitra, Slovak Republic,*
[2]*National Agriculture and Food Centre – Research Institute of Animal Production, Lužianky, Slovak Republic*

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The objective of this study was to compare the pure chicken breeds Oravka (OR; *n* = 50), Amrock (AM; *n* = 50) and their cross Oravka × Amrock (ORAM; *n* = 50) and Amrock × Oravka (AMOR; *n* = 50) for productive and carcass parameters. The birds were maintained on a deep litter system for a period of 20 weeks. We recorded that crossbred ORAM and AMOR chickens performed better than the average of parental genotypes for body weight and body weight gain in brooding and growing period. The poor (*P* <0.05) feed conversion was observed in AM chickens and better feed conversion was recorded in OR and both crossbred chickens. The crossbred chickens had lowest (*P* <0.05) mortality than pure bred AM chickens. The carcass parts, giblets and abdominal fat percentages had non-significant (*P* >0.05) difference among pure and crossbred chickens. The highest carcass yield was observed in ORAM (62.53%) followed by AMOR (62.48%), AM (62.41%) and OR (62.39%) chickens.

Keywords: body conformation, body weight, chicken, crossbreding, feed utility

1 Introduction

Dual purpose chicken genotypes are increasingly popular in some regions of Eastern and Middle Europe and Asia, where they play an important social role among farmers and have a positive impact on maintaining rural society and traditional form of agriculture as well as gratify certain local traditions (Almasi et al., 2012).

Cross breeding can be carried out as two-way, three-way or four-way crosses, back crosses or rotational crosses. This system also maximizes the expression of heterosis, or hybrid vigour in the cross, normally reflected in improved fitness characteristics (Hoffmann, 2005).

A good combining ability resulting from a choice of the best performing crossbred could lead to the production of birds that will be better in growth rate, efficiency of feed conversion and reproductive traits, without sacrificing adaptation to the local environment, thereby resulting in reduced costs of production (Adebambo et al., 2011; Khawaja et al., 2016).

The aim of present study was designed to develop a rural breed resulting in reciprocal crossing between native Oravka and Amrock breeds with better body weight and feed conversion efficiency.

2 Materials and methods

A total of 200 unsexed day-old-chicks of Oravka (OR, *n* = 50), Amrock (AM, *n* = 50) and their reciprocal crossbred (OR male × AM female: ORAM, *n* = 50; and Amrock male × Oravka female: AMOR, *n* = 50). All of the chicks were reared under standard temperatures 33 °C at chick level for 1 week, followed by a reduction of 2 °C/week until the temperature reached 19 °C at 6 week of age. The birds were maintained in floor pens on deep litter system for a period of 20 weeks.

Chickens were *ad libitum* fed standard feed mixtures (208.95 g crude protein, 11.76 MJ metabolizable energy, 8.46 g calcium, 5.72 g available phosphorus up to 8 weeks of age and 162.94 g crude protein, 12.01 MJ metabolizable energy, 8.96 g calcium, 5.30 g available phosphorus up to 20 weeks of age.

The growth performance data (initial body weight, final body weight, and feed conversion) were recorded at 8 and 20 weeks of age. Feed conversion was calculated

***Corresponding Author:** Cyril HRČÁR, Slovak University of Agriculture in Nitra, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovak Republic, e-mail: cyril.hrncar@uniag.sk

as the ratio of grams of feed to grams of weight gain. Mortality was also recorded over period.

At the age of 20 weeks, 10 representative birds from each replicate were slaughtered to obtain their carcass parameters. The breast, thighs, back, wings, giblets and abdominal fat were collected and weighed individually and their percentages in relation to live body weight were calculated. The results obtained were used to calculate carcass yield.

The statistical analyses were conducted using JASP 0.8.6 software (JASP, 2018). Significant difference was used at 0.05 probability level and differences among groups were tested using the Duncan's Multiple Range Test (Duncan, 1955).

3 Results and discussion

The growth performance and mortality of Oravka, Amrock and crossbred chickens during growing phase is shown in Table 1. The average day-old weight was highest in OR (34.26 g), intermediate in ORAM (34.11 g) and AMOR (33.98 g), lowest in AM (33.89 g). In brooding and growing period, we that found both crossbred ORAM and AMOR chickens recorded better than the average of parental genotypes for body weight and body weight gain. The poorest (P <0.05) feed conversion was observed in OR chickens and the best feed conversion was recorded in ORAM crossbred chickens. The results showed that both ORAM and AMOR crossbred chickens had lower (P <0.05) mortality than pure AM chickens.

The carcass parts, giblets and abdominal fat percentages had a non-significant (P >0.05) difference between pure and crossbred chickens (Table 2). We found no significant difference (P >0.05) in carcass yield between all crossbred chickens (Table 2). Numerically, the highest carcass yield was found in ORAM (62.53%) followed by AMOR (62.48), AM (62.41%), and OR (62.39%) chickens.

In present experiment, crossbred animals performed better than the average of parental genotypes for body weight, body weight gain and feed efficiency. Heterosis was found in body weight and body weight gains, as reported by Khawaja et al. (2016). In contrast, Sharaf et al. (2006) recorded that crossbreeding did not improved body weight at sexual maturity. The results of our experiment are partially in line with the findings of Nawar et al. (2004), Iraqi et al. (2005) and Besbes (2009), who found that crossbreeding improved chick viability.

Breed differentiation showed no significant (P >0.05) difference in body composition of crossbred chickens at age of 20 weeks. The results agreed with the work of Khawaja et al. (2016) for first generation of newly evolved hybridized pure chicken and their crossbred parents. According to the literature, the mean yield for slow-growing chickens ranged between 13.4 and 26% for breast, between 24.6 and 37.4% for thighs (Janocha et al., 2003; Sengül et al., 2003).

Accordingly with Khawaja et al. et al. (2014), we found out no significant (P >0.05) effect of crossbreeding on carcass yield. Although, carcass yield is affected by a number of

Table 1 Comparative productive performance of Oravka, Amrock and reciprocal crossbred chickens during brooding and growing period

Parameter	Age (weeks)	Breeds			
		OR	AM	ORAM	AMOR
Day old weight (g.bird^{-1})	–	34.26 ±3.86	33.89 ±3.72	34.11 ±3.87	33.98 ±3.49
Body weight (g)	8	641.23 ±143.08	652.98 ±149.97	651.69 ±148.47	648.57 ±146.81
	20	1,844.21 ±249.78	1,889.76 ±255.88	1,871.88 ±25164	1,862.45 ±252.62
Body weight gain (g)	0–8	606.97 ±3.29	619.09 ±3.24	617.58 ±3.31	614.59 ±3.37
	8–20	1,202.98 ±4.47	1,236.78 ±4.52	1,220.19 ±4.28	1,213.88 ±4.42
	0–20	1,809.95 ±4.88	1,855.87 ±5.02	1,837.77 ±4.91	1,828.47 ±4.86
Feed conversion	0–8	6.42	6.39	6.22^{a}	6.25^{b}
	8–20	3.78	3.89	3.73	3.74
	0–20	4.37	4.31	4.24	4.26
Mortality (%)	0–8	2.00	4.00	2.00	2.00
	8–20	2.00	2.00	2.00	2.00
	0–20	4.00^{a}	6.00	4.00^{b}	4.00^{c}

$^{a–c}$ Means with different letters differ significantly (P <0.05); OR – Oravka, AM – Amrock, ORAM, OR male × AM female; AMOR, AM male × OR female. Data are expressed as mean ±standard deviation

Table 2 Comparative carcass parameters of Oravka, Amrock and reciprocal crossbred chickens

Parameter	Age (weeks)	Breeds			
		OR	AM	ORAM	AMOR
Breast (%)	20	16.69 ±0.51	16.84 ±0.49	16.92 ±0.51	16.89 ±0.48
Thighs (%)	20	23.21 ±0.79	23.28 ±0.77	23.48 ±0.82	23.34 ±0.76
Back (%)	20	14.74 ±0.55	14.89 ±0.59	14.98 ±0.58	14.81 ±0.56
Wings (%)	20	6.29 ±0.38	6.33 ±0.36	6.34 ±0.33	6.32 ±0.36
Giblets (%)	20	4.86 ±0.14	4.79 ±0.12	4.91 ±0.17	4.84 ±0.15
Abdominal fat (%)	20	0.31 ±0.09	0.28 ±0.11	0.33 ±0.07	0.32 ±0.12
Carcass yield (%)	20	62.39 ±0.37	62.41 ±0.39	62.53 ±0.32	62.48 ±0.36

OR – Oravka, AM – Amrock, ORAM, OR male × AM female, AMOR, AM male × OR female. Data are expressed as mean ±standard deviation

factors including genetic, slaughtering conditions, feed, and live weight (Havenstein et al., 2003; Brickett et al., 2007).

4 Conclusions

In conclusion, crossbred chickens gained better body weight than Oravka and moderate than Amrock chickens with partially lower mortality. The carcass parameters had no significant difference between pure and crossbred chickens. The crossbred chickens of ORAM showed better performance in all traits than crossbred chickens of AMOR.

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