

CHARACTERIZATION OF GENETIC RESOURCE IN CHICKEN OF ORAVKA BREED

E. HANUSOVÁ^{1*}, C. HRNČÁR², M. ORAVCOVÁ¹, A. HANUS¹

¹NAFC - Research Institute for Animal Production Nitra, Slovak Republic

²Slovak University of Agriculture in Nitra, Slovak Republic

ABSTRACT

Growth and some reproduction traits (fertilization, hatchability and egg weight) of Oravka breed were measured in two chicken lines (OR2 and OR3). The in situ conservation flock kept in Animal Production Research Centre Nitra (APRC Nitra) during the period between 2009 and 2012 was included in the experiment. During each season the breeding males not from the APRC Nitra flock were used. The breeding females originated from the mating between females raised in the APRC Nitra and those new males. The weight at age of 5, 12 and 20 weeks was monitored. The average weights of OR2 were ranged from 371.3 ± 68.9 g to 538.1 ± 79.4 g at 5 weeks, from 1246.1 ± 254.0 g to 1464.5 ± 242.2 g at 12 weeks and from 2076.3 ± 381.8 g to 2286.1 ± 535.4 g at 20 weeks of age. The fertilization rate for each line and season was higher than 84 % except for OR2 line in the season 2011/2012. The hatchability from fertilized eggs was higher than 80 % except for OR2 line in the season 2011/2012. The average weights of eggs in the middle of laying period (from March to May) were ranged from 53.9 ± 3.5 g to 56.6 ± 4.3 g for OR2 and from 52.9 ± 4.5 g to 56.4 ± 3.6 g for OR3 during the whole experiment.

Key words: Oravka; growth; fertilization; hatchability; egg weight; genetic resources

INTRODUCTION

The intensive selection of laying and meat breeds and lines can cause that some genes may disappear. Gardini and Villa (2003) reported that local breeds are an evidence of great achievement of many generations of breeding. For centuries, farmers have been adapting chickens to local conditions, cultural needs and preferences. Unfortunately, over last decades, as a result of the industrialization of agriculture, the old poultry breeds in Europe mostly suffered a graduate decrease in numbers.

The Research Centre of Animal Production in Nitra (APRC Nitra) deals with the conservation of poultry genetic resources not only on a methodology basis but also contributes to the maintaining of the local Oravka breed. This breed was formed by crossbreeding of the local hens in the Orava region with Rhode Island,

Wyandotte and New Hampshire breeds. The breeding programme aimed at forming a dual-purpose breed with good egg production, growth ability and adaptability to harsh environment started in 1950ies (Kadlečík *et al.*, 2004). The breeding programme consisted of three consecutive phases (Chmelničná, 2004), and Oravka breed was recognized in 1990.

Oravka is a dual-purpose breed kept for egg and meat production, respectively. The animals are of yellowish-brown colour and of rectangular body frame. The live weight of adult females is 2.2 to 2.7 kg and that of males is 2.8 to 3.3 kg. About 180 to 200 eggs per female and year are produced. The egg shell is brownish. The minimum hatching egg weight is 55 g (Hrnčár, 2008).

A survey of Oravka living animals (breeding males and females) was done by Hrnčár and Weis (2007) and Oravcová *et al.* (2010), respectively.

*Correspondence: E-mail: hanusova@vuzv.sk
Emília Hanusová, NAFC - Research Institute for Animal Production Nitra,
Hlohovecká 2, 951 41 Lužianky, Slovak Republic
Tel.: +421 37 6546 360 Fax: +421 37 6546 401

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Hrnčár and Janesová (2006) compared growth intensity between Oravka breed and some chosen breeds (New Hampshire, Plymouth, Rhode Island and Sussex). The growth of Oravka breed differed only from New Hampshire breed. The same results were confirmed by Hrnčár *et al.* (2010), who referred that New Hampshire chicken had the higher live weight from 8 weeks of age. The effect of sire on live weight of descendants was investigated by Hanusová *et al.* (2012). The production parameters (egg weight, growth) of Oravka breed were observed by Weis and Hrnčár (2009) and Hanusová *et al.* (2010). A study on Oravka reproduction traits over the recent years has not been done until now.

Therefore, the goal of this study was to analyse growth and some reproduction (fertilization, hatchability and egg weight) traits in Oravka population reared in the APRC Nitra.

MATERIAL AND METHODS

Growth and some reproduction traits (fertilization, hatchability and egg weight) of Oravka breed were measured in two lines (OR/2 and OR/3). The in situ conservation flock kept in the Animal Production Research Centre Nitra (APRC Nitra) during the period between 2009 and 2012 was included in the experiment. Each season the breeding males outside the APRC Nitra flock were used. The breeding females originated from mating between females raised in the APRC Nitra flock and these new males.

Chicken were kept until 12 weeks of age indoor in a heating room. Birds were placed in the weaning pen with wood shavings litter. From 12 weeks of age, they were kept outdoor in a heatless hen-house with covered yard. Feeding and watering was *ad libitum*. They were

fed with standard feed mixture which differed between age categories, but was the same within each category during the analyzed period. The chickens were exposed to the natural light.

The animals were weighed individually at 5, 12 and 20 weeks of age. The reproduction traits: the number of setting eggs, the number of fertilized eggs and the number of hatched chickens were recorded. The fertilization and hatchability were calculated. The eggs were weighed individually each month for a period of 7 days. Each season the parent's reproductive traits and growth of their offspring were measured.

The basic statistic characteristics were calculated using the SAS/STAT 9.2. software (2002-2008).

RESULTS AND DISCUSSION

The Oravka chicken growth during the three seasons is given in Tables 1 and 2. The growth traits of two lines at the age of 5, 12 and 20 weeks, regardless of sex, are given in Table 1. In Table 2, the growth traits by sex are shown. The lowest weight of 5 weeks of age had animals in season 2011/12. Line OR/2 had higher weight during the whole experiment in 20 weeks of age. The males had more intensive growth than females from 5 weeks of age (except for OR/3 line in season 2011/2012).

The body weight in our experiment was similar to that observed by Hrnčár *et al.* (2010) till the age of 12 weeks. As a difference, 20 weeks old females were heavier than those of the same age referred by Hrnčár *et al.* (2010).

Table 1: Live weight of animals of Oravka breed by season and line

Season	Line	n	Live weight (g)				
			5-week old		12-week old		20-week old
			$\bar{x} \pm SD$	n	$\bar{x} \pm SD$	n	$\bar{x} \pm SD$
2009/	OR/2	107	450.6 ± 64.4	88	1421.1 ± 245.4	33	2286.1 ± 535.4
2010	OR/3	78	468.2 ± 72.1	53	1464.5 ± 242.2	16	2076.3 ± 381.8
2010/	OR/2	93	538.2 ± 79.4	93	1318.7 ± 240.1	31	2258.5 ± 447.1
2011	OR/3	62	486.9 ± 85.2	62	1246.1 ± 254.0	22	2161.8 ± 255.0
2011/	OR/2	70	371.3 ± 69.0	60	1281.3 ± 233.8	27	2129.6 ± 468.3
2012	OR/3	103	383.6 ± 81.8	84	1373.9 ± 234.2	35	2106.9 ± 358.6

Table 2: Live weight of animals of Oravka breed by season, line and sex

Season	Line	Live weight (g)											
		5-week old				12-week old				20-week old			
		n	$\bar{x} \pm SD$	$\bar{x} \pm SD$	n	$\bar{x} \pm SD$	$\bar{x} \pm SD$	n	$\bar{x} \pm SD$	$\bar{x} \pm SD$	n	$\bar{x} \pm SD$	
		♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
2009/2010	OR/2	41	419.8 ± 40.8	45	486.0 ± 54.7	43	1260.2 ± 146.9	45	1574.9 ± 221.4	23	1993.0 ± 209.6	10	2960.0 ± 433.4
	OR/3	30	444.00 ± 55.9	22	502.3 ± 73.2	28	1313.2 ± 158.7	25	1364.0 ± 205.2	14	1977.1 ± 285.9	2	2770.0 ± 155.6
2010/2011	OR/2	41	499.5 ± 67.5	52	575.4 ± 72.6	41	1134.8 ± 162.2	52	1463.7 ± 186.4	21	2054.7 ± 274.3	10	2605.0 ± 481.5
	OR/3	32	445.7 ± 74.8	30	523.4 ± 79.0	32	1076.6 ± 154.5	30	1427.0 ± 211.3	14	2042.9 ± 216.8	8	2370.0 ± 173.2
2011/2012	OR/2	30	343.3 ± 64.2	38	390.0 ± 66.1	26	1116.2 ± 129.0	34	1407.6 ± 217.2	15	1766.0 ± 246.3	12	2584.2 ± 188.3
	OR/3	40	368.9 ± 77.2	53	366.7 ± 87.3	38	1243.2 ± 215.1	46	1482.0 ± 191.8	27	1962.6 ± 226.5	8	2593.8 ± 287.7

The reproduction traits of the two Oravka lines are given in Table 3. The fertility of eggs during the experiment was higher than 84 per cent except for season 2011/2012 in line OR/2. In this line, fertility was only 40.18 % since the cock had hormonal disorder. It had a higher level (82.72 pmol/l) of estradiol (predominant sex hormone present in females) and low level (0.861 pmol/l) of testosterone (male sex hormone). The cock in line OR/3 had 1.809 pmol/l of testosterone and no estradiol. Hatchability from pickled eggs was similar in both lines within the two seasons. Only in the third season, the hatchability was higher in line OR/3.

The eggs were weighed individually for a period of 7 days each month (10 laying months in total). The average egg weight within the three most intensive laying months is given in Table 4. The average weights of eggs were from 53.9 ± 3.5 g to 56.6 ± 4.3 g in OR/2 and from 52.7 ± 4.2 g to 56.4 ± 3.6 g in OR/3 during the whole experiment. The average egg weight had an increasing tendency in line OR/2 during the whole experiment. Benková *et al.* (2003) detected the average egg weight 49.48 g in 1996, 54.87 g in 1998 and 55.24 g in 2001 in Oravka breed. Weis and Hrnčár (2009) observed the average weight of eggs 52.40 g in 2004. This value increased to 55.70 g in 2008.

CONCLUSION

The experiment showed good growth and reproduction traits of Oravka breed, which is known for good adaptability to harsh environment. The average live weights of OR/2 animals were from 371.3 ± 68.9 g to 538.1 ± 79.4 g at 5 weeks of age, from 1246.1 ± 254.0 g to 1464.5 ± 242.2 g at 12 weeks of age and from 2076.3 ± 381.8 g to 2286.1 ± 535.4 g at 20 weeks of age. The fertilization in each line and season was higher than 84 % except for OR/2 line in season 2011/2012. In the analyzed period, the improvement in egg weight in line OR/2 from 53.9 ± 3.5 g to 56.6 ± 4.3 g was observed. It is recommended to continue in selection aimed at an increasing egg production and egg weight to be in line with the standard of breed, which is as high as 180 - 200 eggs for egg production and 58 g for egg weight.

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Table 3: The reproduction traits of Oravka breed by season and line

Characteristic	Season 2009/2010		Season 2010/2011		Season 2011/2012	
	Line		Line		Line	
	OR/2	OR/3	OR/2	OR/3	OR/2	OR/3
Number of setting eggs	183	133	158	132	224	164
Number of fertilized eggs number	164	112	142	127	90	143
Fertilization (%)	89.6	84.2	89.9	96.3	40.2	86.7
Hatchability						
(%) Fr. pickled eggs	72.1	67.7	79.8	84.9	33.9	84.4
Fr. fertilized eggs	80.5	80.3	88.7	88.2	73.9	85.3

Table 4: Average egg weights of Oravka breed by line in the most intensive laying period (March-May)

Season	Line	Month	Eggs number	Weight (g) $\bar{x} \pm SD$
2009/2010	OR/2	III/10	69	53.9 \pm 3.5
		IV/10	70	54.8 \pm 3.8
		V/10	59	54.4 \pm 4.3
	OR/3	III/10	40	54.7 \pm 3.2
		IV/10	45	54.4 \pm 4.8
		V/10	36	55.7 \pm 7.1
2010/2011	OR/2	III/11	86	54.5 \pm 3.9
		IV/11	83	55.3 \pm 4.1
		V/11	62	54.0 \pm 4.1
	OR/3	III/11	59	56.4 \pm 3.6
		IV/11	53	55.8 \pm 3.9
		V/11	46	54.8 \pm 3.7
2011/2012	OR/2	III/12	75	55.3 \pm 3.8
		IV/12	61	56.3 \pm 5.3
		V/12	60	56.6 \pm 4.3
	OR 3	III/12	59	53.0 \pm 4.5
		IV/12	42	53.3 \pm 5.4
		V/12	40	52.7 \pm 4.2

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