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Growth performance, meat composition and haematological parameters of first generation of newly evolved hybridized pure chicken and their crossbred parents

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ABSTRACT

A total of 2000 un-sexed day-old chicks of FIRI (Fayoumi male × RIR female), RLH (White Leghorn male × F1 female (Fayoumi male × RIR female) and RLH-G1 (generation one of RLH) chickens were obtained from the hatchery of the Poultry Research Institute, Rawalpindi. The chickens of each crossbred were divided into 5 groups as replicates under a completely randomized design, so that there were 400 chickens in each replicate. The birds were maintained on a deep litter system for a period of 20 weeks. The results showed that the average day-old weight was highest in RLH, intermediate in RLH-G1and lowest in FIRI chickens. The RLH-G1chickens consumed less (P<0.05) feed than RLH and FIRI chickens, however, they gained more (P<0.05) weight than FIRI crossbred chickens at all ages of the growing phase. Poor (P<0.05) feed conversion was observed in FIRI chickens and better feed conversion was recorded in RLH-G1crossbred chickens during the growing phase. The RLH and RLH-G1crossbred chickens had lower (P<0.05) mortality than FIRI chickens. The highest (P>0.05) dressing %age was observed in FIRI (62.60) followed by RLH (62.10) and RLH-G1 (61.98) chickens. The breast and thigh meat composition had a non-significant (P>0.05) difference of all crossbred chickens. There was a non-significant (P>0.05) difference in haematological values between all crossbred chickens. The total erythrocyte number, Hb and packed cell volume (PCV) increased with the advancement of age. However, the erythrocyte sedimentation rate (ESR), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) values decreased gradually with the advancement of age. It may be concluded that RLH and RLH-G1crossbred chickens gained better body weight than FIRI chickens, with lower mortality. The first generation of RLH showed better FCR than RLH and FIRI crossbred chickens.

Key words: Crossbred chickens, body weight, meat composition, haematological parameters

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Introduction

Genetic progress can be accomplished either by selection or crossbreeding. Crossbreeding of the indigenous stock with exotic commercial birds will take advantage of artificial selection for productivity in the exotic birds, and natural selection for hardiness in the native birds. 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). To retain heterosis in the maternal traits, three-way or four-way crossing has to be applied. In three-way crosses the crossbred chicken is mated with a third line. 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.

Crossbreeding has been a key tool for the development of today's commercial breeds of chickens (SHERIDAN, 1981) and could equally be used to improve the rural chicken. Crossbreeding of indigenous chickens with fast-growing commercial birds will make full use of natural selection for resistance, and artificial selection for productivity in exotic chickens (ADEBAMBO et al., 2010). The optimal crossbred chicken would have higher growth rate, feed conversion efficiency, reproductive and carcass performance, without sacrificing adaptation to the local environment (ADEBAMBO, 2011). Comparatively little research and development work has been carried out on rural poultry breeds, despite the fact that they are usually more copious than the commercial chickens in most developing countries (CUMMING, 1992). Some attempts that have been made to increase productivity include upgrading and crossbreeding with exotic ones, and then leaving the hybrid offspring to natural selection (KITALYI, 1998). A study by NJENGA (2005) revealed that the crossbred offspring of Rhode Island Red (RIR) and Fayoumi had the best level of body weight and highest cost-benefit ratio, with low mortality, among four different breeds under a semi-scavenging system of production in Kenya.

Rhode Island Red and Fayoumi breeds have been imported to Pakistan since the 1980s (SAHOTA and BHATTI, 2003). The Fayoumi breed, as a rural poultry flock, survives normally with farmers as a scavenger bird, but Fayoumi is a small sized bird, lays smaller eggs, has low carcass yield and hence low economic return (RAJPUT et al., 2005). On the contrary, RIR, which is successfully maintained under rural as well as farming conditions in different parts of the country, has potential for a higher economic return as layers and / or broilers (JAVED et al., 2003).

Previous literature showed that crossbreeding can improve the meat quality of pigs and goats (ALONSO et al., 2009; JIA et al., 2009) but its effect on poultry meat yield traits is scanty in literature.

Our previous published work was on growth patterns in chickens of reciprocal crossing between RIR and Fayoumi breeds (KHAWAJA et al., 2012). The results showed that crossbred chickens of FIRI (Fayoumi male X RIR female) showed better performance in all traits than crossbred chickens of RIFI (RIR male X Fayoumi female). Two-way crossbred females of FIRI were retained from crossing of Fayoumi males with RIR females, and mated to the third breed for further improvement in production performance. Consequently, a three-way crossbred chicken, a Rural Leghorn (RLH) breed was developed by crossing White Leghorn male with females of FIRI chickens. So, RLH chickens contain White Leghorn (50 %), RIR (25 %) and Fayoumi (25 %; KHAWAJA et al., 2013). The hybrid vigour is significantly lower in rotation than in three-way crossbreeding (DEVI and REDDY, 2005). However, there is still a paucity of information about the role of maternal effects or the value of specific crosses. The lack of reference levels of blood chemical indices, specific to crossbred chickens necessitates research to establish these reference levels at different ages. Therefore the present study was planned to compare growth performance, meat composition and haematological parameters in generation-1 RLH chickens (RLH-G1) with their crossbred parent chickens.

Materials and methods

Birds and experimental feed. A total of 2000 un-sexed day-old chicks of each crossbred chickens of RLH-1 and their parent crossbred chickens of FIRI and RLH were obtained from the hatchery of the Poultry Research Institute, Rawalpindi, Pakistan. The chickens of each breed were divided into 5 groups as replicates, under a completely randomized design, so that there were 400 chickens in each replicate. The stocking density was 15 birds/m^2 (THIELE, 2007). All of the chicks were reared under standard temperatures controlled by gas heaters (33-35 ^{o}C at chick level for 1wk, followed by a reduction of 3 ^{o}C /wk until the temperature reached 18-20 ^{o}C at 6 wk of age). Artificial light was only provided during the first week (23L: 1D). The birds were maintained in floor pens on a deep litter system, for a period of 20 weeks. Chicks were fed standard chick starter diets up to 8 wks of age, containing 18 % CP, 2800 kcal of ME/kg, 1 % Ca and 0.56 % available P and chick rearing diets up to 20 wks of age containing 17 % CP, 2800 kcal of ME/kg, 2.5 % Ca and 0.51 % available P. Nutrient content of the feed (Table 1) followed the recommendations of the NRC (1994). Feed and water were supplied for *ad libitum* consumption. All chicks were vaccinated following a program typical for the region. Care and management of the birds followed the accepted guidelines (FASS, 2010).

Table 1. Ingredients and nutrients (%) composition of diets fed to experimental birds

Item	Wk 1 to 8	Wk 9-20
Corn	35.60	42.00
Rice	23.00	12.00
Rice polish	10.00	9.48
Soyabean meal	10.00	16.00
Canola meal	8.00	6.40
Corn gluten meal (60 %)	5.00	5.00
Fish meal	5.00	5.00
Lime stone	1.50	2.00
DCP	1.25	1.50
NaCl	0.33	0.27
Premix*	0.25	0.30
DL- Methionine	0.07	0.05
Total	100.00	100.00
Calculated Nutrients (%)		
ME Kcal/kg	2800	2800
CP	18.5	17
CF	3.80	4.30
EE	3.31	3.30
Ca	1.0	2.5
Available P	0.56	0.51
Lysine	1.00	0.69
Methionine	0.43	0.31

*Supplied per Kg of diet: vit. A, 12000 IU; vit. D3, 2200 IU; vit. E, 10 mg; vit. K3 2 mg; vit. B1, 1mg; vit. B2, 5 mg; vit. B6, 1.5 mg; vit. B12, 0.01 mg; Nicotinic acid, 30 mg; Folic acid, 1mg; Pantothenic acid, 10 mg; Biotin, 0.05 mg; Choline chloride, 500 mg; Copper, 10 mg; Iron, 30 mg; Manganese, 60mg; Zinc, 50 mg; Iodine, 1mg; Selenium, 0.1mg and Cobalt, 0.1 mg.

Parameter measured. The growth performance data (initial body weight, final body weight, feed intake, and feed conversion) were recorded at 14-d intervals. Mortality was also recorded in different regimens over the brooding and rearing periods. Records of the feed intake were taken on a bi-weekly basis. Birds were checked twice daily; weight of dead birds was used to adjust for feed consumption. Feed conversion was calculated as the ratio of grams of feed to grams of weight gain. At the age of 20 weeks, five birds from each replicate were slaughtered to obtain their dressing percentage. The meat samples from the breast and thighs of different birds of each breed were also taken, dried, ground and then subjected to proximate analysis, such as percentage moisture, dry matter, crude protein, fat and total ash. Samples were analyzed using standard methods (AOAC, 2011).

Blood samples were collected from 25 birds of each type of chickens at 4, 12 and 20 weeks of age and analyzed for the estimation of red blood cell (RBC) count, packed cell volume (PCV), haemoglobin (Hb) concentration, and white blood cell (WBC) count. Differential WBC counts were made on monolayer blood films, fixed and stained with Giemsa-Wright's stain. Total RBC and total WBC count were determined manually using a hemacytometer (CAMPBELL, 1995). Packed cell volume was measured by a standard manual technique, using microhematocrit capillary tubes, centrifuged at 2500 rpm for 5 min. Hemoglobin concentration was measured by the Cyanmethemoglobin method. Erythrocyte indices (mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentrations (MCHC) were calculated from total red blood cell, PCV and Hb (RITCHIE et al., 1994), respectively.

Statistical methods. When differences between treatments were significant, means were separated using Duncan's multiple range tests at the 0.05 level of significance (STEEL and TORRIE 1984). The analyses were conducted using SPSS 15.0 software (SPSS Inc., 2006).

Results

The growth performance and mortality of FIRI, RLH, and RLH-G1crossbred chickens during the growing phase is presented in Table 2. The average day-old weight was highest in RLH (35.05g), intermediate in RLH-G1 (33.05g) and lowest in FIRI (30.0g). The RLH-G1chicken consumed less ($P<0.05$) feed than RLH and FIRI chickens, however, gained more ($P<0.05$) weight than FIRI crossbred chickens at all ages of the growing phase, which could be explained by the variations of genotype. The poorest ($P<0.05$) feed conversion was observed in FIRI chickens and the best feed conversion was recorded in RLH-G1crossbred chickens during the growing phase. The results showed that both RLH and RLH-G1crossbred chickens had lower ($P<0.05$) mortality than FIRI chicken. A non-significant difference ($P>0.05$) in dressing percentage was found between all crossbred chickens (Table 2). Numerically, the highest dressing percentage was found in FIRI (62.60) followed by RLH (62.10) and RLH-G1 (61.98) chickens.

The breast and thigh meat composition had a non-significant ($P>0.05$) difference between crossbred chickens (Table 3). The haematological values in crossbred chickens are shown in Table 4. There were no individual differences found amongst the experimental chickens.

Table 2. Comparative growth performance of first generation of hybridized chicken with their crossbred parents during brooding and growing periods (up to 20 weeks)

Parameters	Age (Weeks)	Breeds			P-Value
		FIRI*	RLH**	RLH-G1***	
Day old weight (g/bird)	-	30.00 ± 0.23[b]	35.05 ± 0.20[a]	33.10 ± 0.18[b]	0.010
Body weight (g)	0-8	521.52	538.15	529.80	-
	9-20	739.00	762.21	755.05	-
	0-20	1260	1288.73	1279.15	-
Body weight gain (g/bird)	0-8	491.52 ± 4.48	503.10 ± 4.38	496.70 ± 4.29	0.000
	9-20	708.48 ± 2.30	727.16 ± 3.30	721.95 ± 2.45	0.000
	0-20	1230.00 ± 4.15[b]	1253.68 ± 3.30[a]	1246.05 ± 3.80[a]	0.000
Av. feed intake (g/bird)	0-8	2555.90 ± 9.33	2580.90 ± 9.30	2483.50 ± 9.35	0.000
	9-20	2302.56 ± 10.59	2326.91 ± 10.65	2274.14 ± 10.55	0.000
	0-20	5596.50 ± 161.28[a]	5591.41 ± 151.24[a]	5482.62 ± 156.25[b]	0.004
Feed conversion	0-8	5.20 ± 0.10	5.13 ± 0.11	5.00 ± 0.10	0.015
	9-20	3.25 ± 0.15	3.20 ± 0.16	3.15 ± 0.13	0.003
	0-20	4.55 ± 0.14[a]	4.46 ± 0.16[b]	4.40 ± 0.12[c]	0.030
Mortality (%)	0-8	7.10 ± 0.19[a]	1.50 ± 0.16[b]	2.00 ± 0.14[b]	0.000
	9-20	2.69 ± 0.13	1.59 ± 0.11	1.60 ± 0.16	0.000
	0-20	9.80 ± 0.22[a]	1.54 ± 0.20[b]	1.80 ± 0.24[b]	0.000
Dressing % age	20	62.60 ± 0.26	62.10 ± 0.23	61.98 ± 0.21	0.030

[a-c]Means with different letters differ significantly($P< 0.05$). *FIRI = Fayoumi Male X Rhode Island Red Male; **RLH = WLH male X (Fayoumi ♂ X RIR ♀) female; ***RLH-G1 = Rural Leghorn generation-1

Table 3. Comparative meat composition of crossbred chickens (at age of 20 weeks)

Parameters	Breeds			P-value
	FIRI*	RLH**	RLH-G1***	
Breast				
Dry matter	26.75 ± 00.21	25.70 ± 00.23	26.55 ± 00.20	0.145
Crude Protein	84.25 ± 02.18	83.65 ± 02.16	82.79 ± 02.11	0.159
Crude fat	06.15 ± 00.28	06.39 ± 00.28	06.13 ± 00.25	0.180
Total ash	04.25 ± 00.35	04.00 ± 00.39	03.98 ± 00.32	0.190
Thigh				
Dry matter	28.46 ± 02.30	28.45 ± 02.34	28.41 ± 02.32	0.179
Crude Protein	67.55 ± 02.35	67.35 ± 02.31	67.25 ± 02.30	0.198
Crude fat	17.90 ± 02.80	18.15 ± 02.60	18.10 ± 02.50	0.197
Total ash	05.00 ± 00.73	04.80 ± 00.76	04.86 ± 00.74	0.185

*FIRI = Fayoumi Male X Rhode Island Red Male; **RLH = WLH male X (Fayoumi ♂ X RIR ♀) female; ***RLH-G1 = Rural Leghorn generation-1

Table 4. Haematological parameters in breeds of crossbred chickens at different ages

Parameters	Breeds	Age (Weeks)		
		04	12	20
Total erythrocyte count, 10^6/mm^3	FIRI**	2.00 ± 0.02	2.20 ± 0.08	2.55 ± 0.01
	RLH***	2.75 ± 0.26	2.72 ± 0.08	2.77 ± 0.11
	RLH-G1****	2.70 ± 0.25	2.69 ± 0.05	2.75 ± 0.12
Haemoglobin concentration, g/dL	FIRI	7.86 ± 0.80	8.19 ± 0.10	8.60 ± 0.08
	RLH	8.00 ± 0.15	8.24 ± 0.09	9.00 ± 0.07
	RLH-G1	7.89 ± 0.14	8.22 ± 0.08	8.90 ± 0.06
Packed cell volume, %	FIRI	27.43 ± 0.56	28.38 ± 0.40	28.85 ± 0.60
	RLH	28.20 ± 0.60	29.00 ± 0.50	29.35 ± 1.46
	RLH-G1	27.67 ± 0.50	28.60 ± 0.47	28.67 ± 1.34
Erythrocyte sedimentation rate, mm in 1st hour	FIRI	3.37 ± 0.16	2.76 ± 0.10	2.26 ± 0.10
	RLH	3.55 ± 0.10	3.00 ± 0.40	2.73 ± 0.24
	RLH-G1	3.42 ± 0.11	2.80 ± 0.43	2.77 ± 0.15
Mean corpuscular volume, µm^3	FIRI	136.09 ± 3.72	120.12 ± 4.60	99.76 ± 5.90
	RLH	164.45 ± 9.90	153.50 ± 8.44	112.56 ± 6.50
	RLH-G1	154.35 ± 9.70	133.40 ± 6.40	107.36 ± 5.50
Mean corpuscular haemoglobin, pg/mL	FIRI	38.29 ± 01.80	33.80 ± 0.39	30.02 ± 0.25
	RLH	40.46 ± 10.30	35.50 ± 2.00	30.48 ± 1.81
	RLH-G1	38.26 ± 07.10	34.30 ± 1.80	29.99 ± 1.70
Mean corpuscular haemoglobin concentration, %	FIRI	28.02 ± 0.65	28.51 ± 0.65	29.77 ± 0.70
	RLH	28.55 ± 0.54	29.19 ± 1.06	31.35 ± 1.47
	RLH-G1	28.35 ± 0.38	28.30 ± 1.13	30.44 ± 1.27

*FIRI = Fayoumi Male X Rhode Island Red Male; **RLH = WLH male X (Fayoumi ♂ X RIR ♀) female; ***RLH-G1 = Rural Leghorn generation-1

Discussion

The average day-old body weight of FIRI was recorded as 30 g; however, EL-MAGHRABY et al. (1975) reported that the average day-old weight of crossbred chicks of FIRI was found as 37.5 g, so this value was higher than the current study. MALAGO and BAITILWAKE (2009) reported that the mean weight of day-old crossbred chicks was recorded as 28.54 g, which is close to the weight of day old chicks of FIRI. In the current study, the higher weight of newborn chick of RLH could probably be due to larger egg weight and size than other crossbred chickens. WILSON (1991) determined that egg weight loss affects chick weight, chick weight composes 62-78 % of egg weight, and the correlation between egg weight and chick weight decreases as the parent's age increases. ABIOLA et al. (2008) determined that there was a positive correlation between egg weight and chick weight in chickens. The high body weight group had the highest growth rates from day-old to 8wks, 9 wks to 20 wks and overall from day-old to 20 weeks of age. Following the same trend, the light body weight group had the lowest growth rates. Similar findings were reported by EL-DLEBSHANY et al. (2009), who found that high body weight chickens had the highest growth rates from day-old to 4 wks, 4 wks to 8 wks and day-old to 8 wks of age. Similarly, light body weight chickens had the lowest growth rates during the same growth period. The difference in growth rates of chicken is due to the interplay of multiple genes, and this trait could be improved through intensive genetic selection (CHAMBERS, 1990).

In the present study, RLH and RLH-G1 crossbred chickens were heavier (P>0.05) at 20 weeks of age than chickens of FIRI breed. Heterosis was found in body weight at the age of sexual maturity, as reported by KICKA et al. (1978), who observed that the body weight at sexual maturity of FIRI was 1290 g, which is slightly higher than the current study (1260 g). The crossbreds from Bovan Brown local chickens in Uganda were superior to local chickens in terms of daily gain, although their superiority decreased gradually to zero at 6 months of age in the case of Bovan crosses (SORENSEN and SSEWANNYANA, 2003). CHATTERJEE et al. (2007) reported that the body weights of reciprocal crosses of Brown Nicobari fowl with ILI-80 (White Leghorn) at different ages were much higher than pure Nicobari fowls under both backyard and intensive management systems. MOSAAD et al. (2010) reported that crossing Baheij chickens (as dams) with Silver Montazah (as a sire parent) throughout three generations (upgrading) improved the growth traits (body weight, growth rate percentage and growth efficiency) of progenies of both F2 and F3. The body weight gain of the FIRI crossbred chickens in this study is higher (491.52g) at 8th wk than the findings shown by EL-MAGHRABY et al. (1975), who found the body weight of birds at the same age to be 316 g for FIRI. It is suggested that to express their full genetic merit, birds needs to be allowed to grow up to sexual maturity. In the present study, the difference in body weight gain of RLH and RLH-G1chickens to other crossbred FIRI chickens was 2.0 % and 1.3 %, respectively at 20 weeks of age, which indicates hybrid vigour was improved in three-way crossing (DEVI and REDDY, 2005).

During the period of 9-20 weeks, the feed conversion of birds seems to be better than in the period of 0-8 weeks. A probable explanation is that with the increase of the age of the birds, their activity (movement) and vocal production also increase, which requires more maintenance energy. As a result birds may utilize the feed more efficiently. HAQUE et al. (1999) reported that the indigenous naked neck (D. Nana) X RIR showed better growth (1142.4g) and feed conversion efficiency (5.10) compared to pure exotic breeds (Fayoumi; 975.8g & 6.20, respectively and WLH; 987.7g & 5.40, respectively) and other crosses (D. Nana X WLH; 1082.9g & 5.20, respectively and D. Nana X Fayoumi; 1094.8g

& 10.25, respectively) at 16-17 weeks of age. However, the present experiment showed that RLH and RLH-G1were found to be the best performers among the crossbreds in terms of FCR (4.46 and 4.40, respectively) at 20 weeks of age. AZHARUL et al. (2005) reported that RIFI crossbred chicken performed better in terms of growth performance in intensive systems under the rural conditions of Bangladesh, compared to pure breed Fayoumi. They explained that the body weight gain is mainly related to feed consumption and to feed efficiency, which depends on the physiological condition of the birds, climatic change and other factors.

In the current study, mortality during the rearing period (0-8 week of age) was higher than in the growing period for all types of chicken. Therefore further managerial practice improvement is necessary to reduce mortality among the chicks since no particular infectious disease was reported during the experimental period. When genetic mortality has reached a minimum level, that theoretically might even be zero, there will still be losses caused by environmental factors, such as disease and accidents, against which no genetic barrier can guard. Viability is a composite characteristic concerning the question of the adaptive value of the organism. Furthermore, it relates to all physiological steps leading from genotype to the resultant phenotype. Viability shows less overall genetic variation weighted against other economic traits (KHALIL et al., 1999). The results of the present experiment are in line with the findings of some investigators (NAWAR et al., 2004; IRAQI et al., 2005), who found that crossbreeding improved chick viability. BAIRAGI et al. (1992) found better survivability in the crossbreds of RIR or WLH males with indigenous Nana females compared to RIR or WLH chickens. In another study, crossbreds of RIR or WLH males with D. Nana females showed lower mortality (SHIVAPRASAD et al., 1994).

Breed differentiation showed no significant (P>0.05) difference in the meat composition of crossbred chickens (at age of 20 weeks). It was observed that there was a higher content of crude protein in the breast meat than in thigh meat. It has been generally reported that in the protein composition of chicken breast muscle, myofibrillar, sarcoplasmic, and stromal proteins comprised 56.2, 42.3 and 1.5 % of the total protein respectively (LAN et al., 1995). The results with respect to the protein and fat content of breast muscle agreed with the work of WERNER et al. (2008), who reported that fast-growing turkey strains had lower protein concentrations than those in slow-growing turkey strains; a similar trend was observed in the current study: fast-growing chickens (RLH) had numerically lower breast and thigh protein than that of medium (FIRI) and slow growth (RIFI) chickens. The above authors stated that the differences could not be logically explained and have no practical influence on the quality of breast muscle in turkeys.

Data showed that erythrocyte count, Hb and PCV increased with the advancement of age, being lowest at 4 weeks and highest at 20 weeks of age. This may be due to the positive relationship between blood volume and age advancement, as indicated by ISLAM et al. (2004) regarding total body weight estimates or body surface area. Among the crosses, the highest values of RBCs were recorded in RLH (2.75 $10^6/mm^3$) and the lowest in RIFI (2.37 $10^6/mm^3$) cross. The Hb values were in the normal levels as stated by JAIN (1993), who reported that Hb values were between 7.0 and 13.0 (g/dL). These results agreed with the findings of ALSOBAYELL et al. (1990) who reported that PCV measurements increased significantly with age up to 30 wks, and then showed a slight decrease at 49 wks of age. However, ESR, MCV and MCH values decreased steadily with the advancement of age. Values of ESR in crossbred chickens are inversely related to age. Higher ESR at an early age in this study was in accordance with that of KUNDU et al. (1993). ORAWAN and AENGWANICH (2007) reported that there were no statistical differences found in MCH values with respect to breeds, and they observed that the values ranged from 34.76 to 37.39 pg for broilers and Thai indigenous chickens. RITCHI et al. (1994) stated that mean values of PCV of red blood cells and Hb concentration obviously determined health status in chickens, which were normal in the current study. Haematological parameters in birds have been shown to be influenced by various factors, such as: age, sex, season and nutrition. In general haematological parameters are affected by diurinal fluctuations or changes in daily physical and metabolic activities (PICCIONE et al., 2005). The normal rate of the haematological parameters as a result of crossbreeding gave clear evidence for the viability of those crossbreeds.

Conclusions

In conclusion, RLH and RLH-G1 crossbred chickens gained better body weight than FIRI chickens, with lower mortality. The first generation of RLH showed better FCR than RLH and FIRI crossbred chickens. However, more studies are needed to explore other factors, such as immunity and adaptability to a harsh environment.

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SAŽETAK

U radu je korišteno ukupno 2000 jednodnevnih pilića, neodređenog spola, dobivenih iz valionice Instituta za istraživanje peradi u Ravalpindiju. S obzirom na roditelje, pilići su imali oznake FIRI (Fayoumi mužjaci × RIR ženke), RLH (mužjaci bijelog leghorna × F1 ženke (Fayoumi mužjaci × RIR ženke) i RLH-G1 (prva generacija RLH). Metodom slučajnog izbora pilići su podijeljeni u 5 skupina po 400 jedinki u svakoj skupini. Tijekom razdoblja od 20 tjedana, primijenjen je sustav držanja pilića na dubokoj prostirci. Rezultati su pokazali da je prosječna masa jednodnevnih pilića najveća u skupini RLH, zatim slijede pilići u RLH-G1, te pilići s najnižom prosječnom masom iz FIRI skupine. Pilići iz RLH-G1 skupine konzumirali su manje (P<0,05) hrane u odnosu na piliće RLH i FIRI skupina, a njihov prirast mase bio je veći (P<0,05) nego kod pilića križanaca FIRI skupine tijekom različite dobi u fazi rasta. Loša (P<0,05) konverzija hrane opažena je u FIRI pilića, a bolja u RLH-G1 pilića tijekom faze rasta. Pilići RLH i RLH-G1 skupina križanaca imali su nižu (P<0,05) smrtnost u odnosu na FIRI piliće. Najviši randman (P>0,05) opažen je u skupini FIRI (62,60 %) pilića, slijedili su pilići RLH (62,10 %) i RLH-G1 (61,98 %) skupina. Sastav mesa prsa i bataka nije se signifikantno razlikovao (P>0,05) između pilića križanaca. Također, nesignifikantne (P>0,05) razlike između pilića utvrđene su i za sve krvne pokazatelje. Ukupni broj eritrocita, hemoglobin i hematokrit rasli su s porastom dobi pilića, dok su sedimentacija, prosječni volumen i prosječni hemoglobin eritrocita s porastom dobi postupno opadali. Može se zaključiti da su pilići križanci RLH i RLH-G1 skupina imali bolji prirast tjelesne mase u odnosu na piliće FIRI skupine koji su imali manju smrtnost. Prva generacija pilića iz RLH skupine pokazala je bolji FCR prirast nego pilići križanci RLH i FIRI skupina.

Ključne riječi: pilići križanci, tjelesna masa, sastav mesa, krvni pokazatelji