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STATUS OF OLD HUNGARIAN POULTRY BREEDS ADAPTED TO THE SUBTROPICS AND TROPICS OF VIETNAM

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Abstract

The aim of the study is to summarise the productivity results of old Hungarian poultry breeds adapted to the Vietnamese conditions including Hungarian Landrace Guinea Fowl (HLgf), Hungarian Bronze (BRt) and Hungarian Copper (COt) Turkeys, Partridge Coloured Hungarian Chicken (PHc) over the last 14 years of scientific co-operation (2002-2016). The high survival rate (HLgf: 97-100%, BRt: 92-97%, COt: 92-95%, PHc: 96%), comparable body weight (HLgf: 1.2-1.3kg at 13 weeks of age, BRt: 3.0kg, COt: 2.4kg at 12 weeks of age, PHc: 1.0-1.4kg), the advantages of increased egg production (HLgf: 56%, BRt: 49% , COt: 51%, PHc: 69%), with considerably high fertility and hatchability (HLgf: 92.6 - 96.0% for fertility and 79.1 - 85.5% for hatchability, BRt: 64.7% for fertility and 52.9% for hatchability, COt: 80.6% for fertility and 67.2% for hatchability, PHc: 96.0 ± 0.99%, for fertility, 85.9 ± 2.9%, for hatchability) confirmed their adaptive potential to subtropical climate. It emphasises the possibility of an agro-ecological way to integrate in the subtropics poultry breeds that are native in the Carpathian Basin. It also involves the ex situ protection and utilisation of an old, exotic poultry breed with special respect to conservation and sustainability.

Keywords: adaptation, conservation, old Hungarian breeds, poultry, subtropical.

Introduction

Following a period of increased use of poultry breeds selected for high performance and mass production, the trend is now changing and some old local breeds are regaining recognition in special conservation programmes (Szalay, 2015). The four main benefits of raising indigenous poultry breeds are: (1) easy to establish for low-income families, (2) more prolific and unproblematic to rear on small plots of land, (3) genetically more diverse, (4) well adapted, and more resistant to local pests and diseases. They are vital for future food security, leading towards self-employment and self-reliance. In Hungary, 14 old Hungarian poultry breeds including old Hungarian chicken, Transylvanian Naked Neck chicken, turkey, goose, old Hungarian duck and Hungarian landrace guinea fowl are officially registered by the Hungarian breeding authority and conserved under the Association of Hungarian Small Animal Breeders for Gene Conservation (MGE). The majority of these stocks are kept by Hungarian academic institutions as *in vivo* gene banks (Szalay et al., 2009; Szalay, 2015) such as the Research Centre for Farm Animal Gene Conservation (HáGK). At the same time, the adaptation and maintenance of these Hungarian poultry populations outside of their native environment have been initiated as a possible ex situ

conservation method (FAO, 1992; Dong Xuan et al., 2008). Previous adaptation studies of several exotic poultry breeds in Vietnam suggest that the introduction of Hungarian poultry breeds into Vietnam can be favourable with cautious consideration of local conservation approaches (Thuan, 2003; Nhan et al., 2010; Tuyen et al., 2010; Doan and Thanh 2011). MGE and KATKI (the predecessor of HáGK) introduced local Hungarian landrace guinea fowl (HLgf), Hungarian Cooper (COt) and Bronze (BRt) turkey breeds, and Partridge Coloured Hungarian chicken (PHc) into both subtropical and tropical regions of Vietnam for experimental purposes, based on transnational scientific and technological collaborative projects with the Vietnamese Thuy Phuong Poultry Research Centre (POREC). The aim of this study is to summarise the productivity results of Hungarian breeds adapted to Vietnam over the last 14 years of adaptation studies.

Hungarian landrace guinea fowl

Being a distinct species from the domestic fowl, HLgf posed no harmful effect on the local Vietnamese chickens, as occasional crossings of guinea fowl and local chickens have no reproductive ability (Szalay and Dong Xuan, 2007). In 2002, MGE and KÁTKI exported the first HLgf population to POREC for an adaptation study (Dong Xuan and Szalay, 2007).

Table 1: Body weight and feed intake of Hungarian landrace guinea fowl reared at Thuy Phuong Poultry Research Centre

Weeks of age	Generation I	Generation II	Generation III
Body weight (g)			
6	653	629.9	632
13	1295	1212	1218
27	1936	1791	1805
Feed intake (kg/bird)			
0 – 6	1.11	1.10	1.29
7 – 27	10.25	9.68	9.75
0 – 27	11.35	10.78	11.04

After two years of breeding, HLgf adapted very well to the subtropical region of North Vietnam. They were highly disease resistant and had high survival rate of 97.0 - 99.1% during growing and of 98.3 - 100% during laying period. The average body weight and feed intake of HLgf are shown in Table 2. Feed conversion ratio of HLgf at 12 weeks of age ranged from 2.34 to 2.81 kg feed/kg body weight gain, while the ratio of eviscerated carcass from 76.6 to 77.1%, in which, thigh and breast meat accounted for 51.1 – 51.7%, respectively. Fertility and hatchability was 92.6 – 96.0% and 79.1 – 85.5%, respectively.

Table 2: Laying rate, egg production and feed consumption/10 eggs of Hungarian landrace guinea fowl reared at Thuy Phuong Poultry Research Centre

Age	Generation I		Generation II		Generation III	
	% Lay	Egg/hen	% Lay	Egg/hen	% Lay	Egg/hen
1 - 4	12.75	3.57	29.57	8.28	68.68	19.23
5 – 8	28.71	8.04	81.82	22.91	67.71	18.96
9 – 12	52.18	14.61	70.29	19.68	68.64	19.22
13–16	54.64	15.30	68.82	19.27	61.29	17.16
17- 20	49.11	13.75	61.71	17.28	54.32	15.21
21-24	59.11	16.55	9.75	2.73	15.54	4.35
Average (%)		45.51		53.6		56.03
Egg no/hen		76.46		90.15		94.13
FC/10 eggs		2.26		1.99		1.90

Table 3: Age of laying, egg weight and layer weight at egg production of 5%, 50% and at 38 weeks of age

	At 5% egg production	At 50% egg production	At 38 weeks of age
Generation I			
Age of layer (days)	224	252	
Egg weight (g)	38.8	44.4	46.3
Hen weight (g)	2003	2212	2233
Generation II			
Age of layer (days)	211	222	
Egg weight (g)	38.2	42.5	43.2
Hen weight (g)	1950	2086	2207
Generation III			
Age of layer (days)	230	248	
Egg weight (g)	38.9	43.1	45.4
Hen weight (g)	1961	2089	2204

Following the success of this adaptation experiment, HLgf rearing was expanded to different tropical regions of South Vietnam such as Dong Nai and the Mekong Delta, where many underprivileged areas exist. Breeding technology and related information of guinea fowl were

given to the local "test-keepers" by POREC experts. The whole study was under the supervision of MGE's experts. Local Vietnamese agricultural researchers were also invited to join farmers to investigate the adaptation process and develop a low-input but profitable local keeping system for guinea fowls. During the 13 week rearing period, the mortality rate of guinea fowls was 2.6% in Dong Nai and 2.2% in the Mekong Delta. The average body weight of guinea fowls recorded in Dong Nai and the Mekong Delta was 601g and 590g at 6 weeks of age, while 1269 and 1610 at 13 weeks of age, respectively.

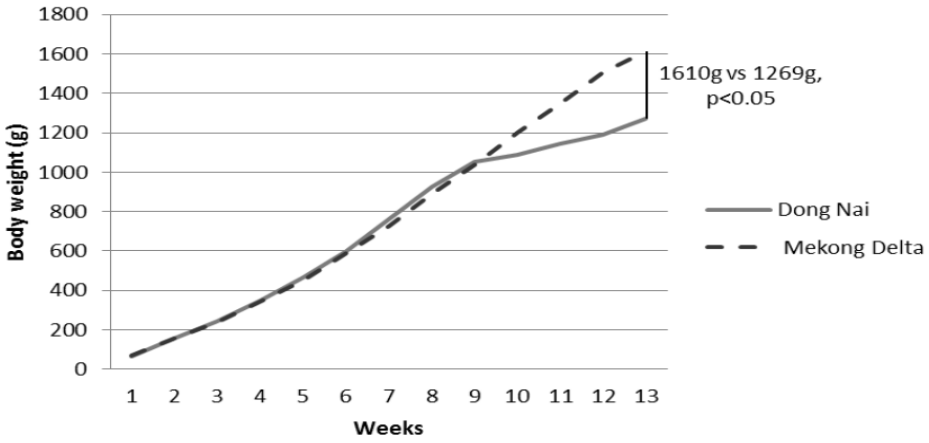

Figure 1: Progress of the average weekly body weight of Hungarian landrace guinea fowl during 13 weeks of rearing in Dong Nai and in the Mekong Delta.

Feed consumption of guinea fowls reared in Dong Nai and the Mekong Delta was 1183g/guinea fowl; 1038g/guinea fowl, respectively at 6 weeks of age and 4130g and 4499g/guinea fowl, respectively at 13 weeks of age. The feed conversion of guinea fowls, recorded in Dong Nai was always higher than in the Mekong Delta (at 6 weeks of age: 2.21 vs. 1.99 kg feed/kg body weight gain; at 13 weeks of age: 3.43 vs. 2.92kg feed/kg body weight gain). At 13th week, the average body weight of guinea fowls reared in the Mekong Delta was higher and the feed conversion lower than of those reared in Dong Nai.

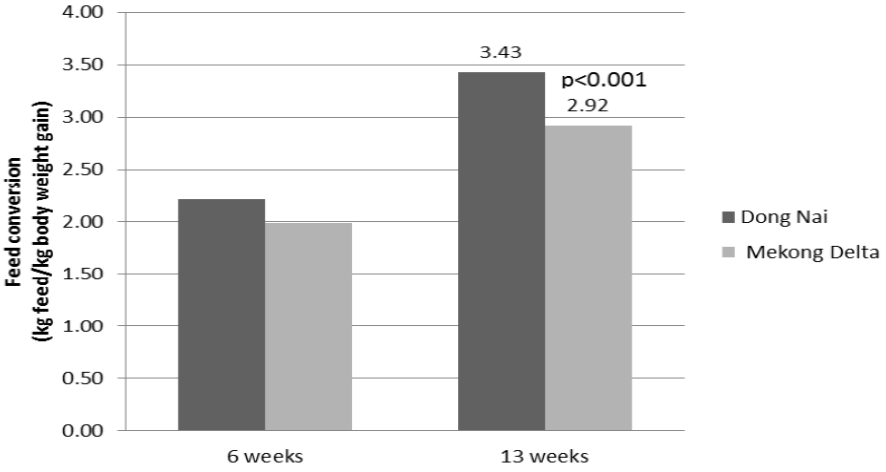

Figure 2: Feed conversion of Hungarian landrace guinea fowl during 13 weeks of rearing in Dong Nai and in the Mekong Delta

The egg production of guinea fowls reared in Dong Nai suggests a relatively good adaptability by reaching 71.1%. Hatchability of guinea fowl eggs produced in Dong Nai ranged between 30.5% and 71.74%. Less favourable results of rearing guinea fowls in Dong Nai than in experimental farms of CTU could also be explained by the lack of experiences and limited budgets for feeding. However, the low mortality proved high adaptation potential of guinea fowl to the South Vietnam's climate. Feed consumption was comparable and the average body weight was acceptable comparing to the result recorded at POREC (1.07-1.12 kg and 603-612 g respectively) at 6 weeks of age (Tien et al., 2007). Based on the results of this study accomplished in Dong Nai and the Mekong Delta, it was suggested that Hungarian guinea fowl can be also reared in South Vietnam with success. In fact, in the last decade, guinea fowl production has been developed in many provinces of North Vietnam such as Ha Noi, Nam Dinh, Soc Son, Vinh Phuc, Thanh Hoa, Yen Bai, Da Nang and was rated as one of the possible specialities of Vietnam's future poultry production with the price of 1.5 - 2 times higher than that of commercial chicken products (Tien et al., 2007).

Hungarian Cooper (COt), Bronze (BRt) turkey breeds

Hungarian turkey eggs were exported to POREC for adaptation studies in May 2006 (Tien et al., 2010). Fertility and hatchability of these turkey eggs were 80.6% and 67.2% for COt, 64.7% and 52.9% for BRt, respectively. At the age of 20 weeks, both COt and BRt have the survival rate of 97.1%. At the end of 48 weeks rearing, COt and BRt had the survival rate of 95.6% and 92.5% respectively. The average body weight and feed conversion of turkey are shown in Table 4.

Table 4: Average body weight and feed conversion of Hungarian turkey reared in POREC

Weeks of age	Cooper turkey		Bronze turkey	
	Body weight (g)	Feed conversion (kg/kg)	Body weight (g)	Feed conversion (kg/kg)
1	101		106	
4	539	1.61	548	1.47
8	1497	2.07	1618	1.88
12	2453	2.67	3000	2.23
15	3157	3.09	3906	2.53
20	4015	3.97	4906	3.27

Both turkey breeds laid the first egg at the age of 190-193 days. While the age of 50% lay for BRt was 252 days, it was 277 days for COt. Egg production results are shown in Table 5.

Table 5: Egg production of Hungarian turkeys reared in POREC

Weeks of age	Cooper turkey			Bronze turkey		
	Egg pieces /hen/week (egg)	Laying rate (%)	Feed intake/10 eggs (kg)	Egg pieces /hen/week (egg)	Laying rate (%)	Feed intake/10 eggs (kg)
33	0.42	6.05	47.8	1.67	23.81	11.76
37	1.93	27.61	10.40	2.8	40.00	7.02
41	3.51	50.14	5.72	3.47	49.52	5.66
45	1.2	17.15	16.6	3.28	46.8	5.99
49	1.02	14.57	19.7	2.0	28.57	9.82

Partridge Coloured Hungarian chicken

PHc is a colour variety of the Hungarian landrace chicken, having kept in the Carpathian Basin for several centuries. The breed had adapted well to the climate, keeping conditions and farming systems of Hungary. Nowadays, it has become a valuable pure genetic resource not only in Hungary, but also in other countries. The importation of PHc to Vietnam were initiated in 2010. At first, PHc was reared at POREC. The aim was to investigate the adaptability of PHc chickens (strictly separated from other local breeds) in a subtropical region (North Vietnam), by monitoring and comparing the performance of two PHc flocks of the same origin, parallel in Hungary and Vietnam.

The survival rate of birds was relatively high, both at 12 weeks of age (96.2%), and during the laying period (between 24 and 54 weeks of age, 96.6%). The results of adaptation studies are shown in Table 6.

Table 6: Results of Partridge Coloured Hungarian chicken reared at Thuy Phuong Poultry Research Centre (POREC) for adaptation studies

Parameters		Mean ± SE
Survival rate	at 12 weeks of age (%)	95.0 ± 0.80
	between 24 and 54 weeks of age (%)	96.5 ± 1.3
Body weight	of male birds at 12 weeks of age (g)	1412 ± 4.4
	of female birds at 12 weeks of age (g)	1093 ± 2.3
FCR at 12 weeks of age (kg feed/kg body weight gain)		3.4 ± 0.01
Eviscerated carcass percent at 12 weeks of age (%)		75.6 ± 0.06
Weeks of age when	1st egg was laid	24
	egg production reached 30%	29-30
	egg production reached 50%	34

Parameters	Mean ± SE
Number of produced eggs/layer/7 months	112 ±0.05
Egg weight (g)	54.9 ± 0.63
Egg mass/layer/7 months (kg)	6.1 ± 0.07
Egg yolk weight (g)	16.2 ± 0.26
Egg white weight (g)	30.3 ± 0.14
Egg shell weight (g)	6.8 ± 0.31
Egg length (cm)	4.8 ± 0.06
Egg height (cm)	4.2 ± 0.03
Egg index	1.1 ± 0.01

Egg production of PHc hens peaked in the 4th month (69.3 ± 4.1%) and was persistently greater than 50% until the 7th month. Fertility, hatchability and the percentage of standard hatchlings of eggs produced were relatively high (96.0 ± 0.99%, for fertility, 85.9 ± 2.9%, for hatchability).

From June of 2013, MGE developed a NEFE project with special regards to Poultry Research for Development (PRD) in disadvantageous regions of the Mekong Delta, by introducing pure PHc chicks to Southwest Vietnam. Tra Vinh province was identified as a new potential breeding region of PHc in the Mekong Delta. The following results were obtained in Tra Vinh.

Table 7: Results of Partridge Coloured Hungarian chicken reared in Tra Vinh

Age of chicken (week)	Survival rate (%)	Feed consumption (g/chicken/week)	Feed conversion
0-1	99.6	61.5	
1-2	99.8	86.2	2.46
2-3	100	157.8	2.61
3-4	99.2	161	2.28
4-5	100	242	
5-6	99.6	297.6	2.5
6-7	99.8	329.7	2.5
7-8	100	375.2	2.27

Conclusions and discussion

The high survival rate, overall productivity and reproductive ability of the old Hungarian poultry breeds studied in Vietnam confirmed their adaptive potential to subtropical climates. The comparable body weight, slaughtering yield of male birds, the advantages of increased number of eggs and total egg mass produced per layers with considerably high fertility and hatchability, outweighing the drawback of reduced egg size make the involvement of those indigenous poultry in subtropical poultry production promising. It emphasizes the possibility of an agro-ecological way (Archimede et al. 2014) to integrate poultry breeds that are native in the Carpathian Basin in the subtropics of Southeast-Asia. It also involves the ex situ protection and utilisation of an old, exotic chicken breed with special respect to conservation and sustainability (Szalay et al. 2009). Considering that breeds well adapted to higher temperatures and lower quality diets may become more widely used (Hoffmann, 2010), the study may provide additional data for the climate change mitigation strategies of both Hungary and Vietnam. Further studies of egg and meat quality, as well as the crossing of Hungarian poultry breeds with Vietnamese indigenous breeds for sustainable, traditional production purposes, as described by Dong Xuan et al. (2006) and Lan Phuong et al. (2015), are recommended to strengthen breeding and conservation.

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