

The genetic reservation of Hungarian Speckled Hen and the Speckled Transylvanian Naked Neck Hen in Hódmezővásárhely

Ákos Benk

Szeged University Faculty of Agriculture, 6800, Hódmezővásárhely, Andrásy út 15, Hungary

Abstract

Our faculty has been dealing with the cross-breeding of Hungarian speckled hen to maintain the species since 1977. We keep two varieties of the Hungarian speckled hen, the feathered-neck variant and the bare-neck type on the pilot farm. The three colour variations of the domestic hen species were bred from the Hungarian lea-land bird by the middle of the 20th Century. Because of the spread of intensive poultry keeping the population of this species has become endangered. Programs supporting ecological-biological farming that began in the last two decades placed the domestically bred birds in the forefront both as purebreds and as candidates in projects for developing merchandisable bio-poultry. Beside the gene preservation, we endeavour to find the best way for the production-purpose utilisation of the speckled hen stock. On the basis of our experiments the laying hens can be used in small scale egg production. We examined the egg production, the eggshell colour and the hatching results.

Keywords: Hungarian Speckled Hen, Speckled Transylvanian Naked Neck Hen, genetic reservation, egg production, eggshell colour, hatching results.

1. Introduction

From the fifties years of the twentieth century the poultry hybrids fully transformed the structure of species. Due to the emergence of hybrids, the number of hen varieties, which play a role in the poultry-farming economy, greatly reduced. As a result of the chicken domestication, more than 200 varieties developed [1].

To produces high-performance hybrids only 5-6 different types of lines are used, however the pure-bred varieties are increasingly relegated to the background. During the animal breeding, the result of selection for economically advantageous characteristics, some important features like the body strength, the resistance, the adaptability and the variation, etc. disappear [2].

The protected traditional species represent a great genetic value. In order to be maintained the complete genome of chicken is necessary to protect the species situated in the Carpathian Basin, which include the Hungarian Speckled Hen and the Speckled Transylvanian Naked Neck Hen to.

The degradation of native (old traditional, local) varieties, their decline, and disappearance, says BÖGRE – DOHY [3] is a drastic form of a process, when the total gene pool of a breed (genotype group) is wasted.

The conscious, persistent, very intense selection, the one-sided (specialized) recovery targets, the production near the “biological ceiling” and all economic requires and expectations all have serious effects on this process.

Examining the issue from this aspect, HORN's [4] finding is remarkable that the one-sided “overdriving” the production parameters and ignoring the genotype x environment interaction can be risky.

* Corresponding author: Ákos Benk, Email: benkakos@mgk.u-szeged.hu

BODÓ [5] notes in his work, which he wrote in order to protect the genetic reserves, the evolution the local varieties with less productivity throughout the world.

In this process, the risk of extinction of species and populations is growing faster. The traditional varieties have value even if they are currently undetectable. The Hungarian Speckled Hen is a result of a cross-breeding system between the Hungarian domestic hen and many foreign species and after that were followed a pure-breeding [6].

BÁLDY [7] wrote the following about the economic value of the Hungarian chicken: the Hungarian backyard chicken is best suited for keeping as they are the most industrious food seekers, unpretentious, trained animals, well-adapted to our extreme climate.

With all commonly known varieties, the sexual maturity is related to egg-weight - found HAYS and KLEIN [8]- but it seems obvious is that the too early sexual maturity is not desirable for size of the eggs. HORN [1] found that the egg-weight is a well-heritable traits characteristic ($h^2 = 0.5-0.6$), which highly depends on chicken age. In poultry the high body weight is associated with a large egg-weight. This does not mean that the smaller animals do not lay large eggs or vice versa, but it means that on most of the farms where the egg is large, probably the body is quite large [8]

The experiments and studies carried out in Hungarian Speckled Hen stock kept since 1977 on the Pilot Farm of the Szeged University Faculty of Agriculture also served the purpose of finding the place of Hungarian poultry in hen production of goods [9-12].

2. Materials and methods

The native speckled hen stock was founded in our pilot farm in 1977. The aim is to maintain and conserve the breed. We are breeding two species: the Hungarian Speckled Hen (further: feathered neck) and Speckled Transylvanian Naked Neck Hen (further: naked neck). We maintain 4 lines from the feathered neck breed and 1 line from the naked neck breed.

Hatching takes place in spring every year preceded by a 7-10-days' egg collection period. The hatched chickens are marked with individual numbers wing bands, and they are taken to a nursery building". There are separate places for

of various biotechnology techniques results the more productive domestic breeds displace the feathered neck stock and the naked neck stock. The measurement of live weight will take place every 4 weeks.

The preselection is made at 10 weeks based on body development, feathering, health status and skin colour. Chicks which are not suitable for the breeding program will be selected. In 15 weeks of age cocks are separated from pullets. In cocks stock there is a greater selection pressure, we keep those cocks who have optimal body development level, optimal feathers and skin colour corresponding to the standard. The colonization of pullets will be held in 20 weeks of age.

The elite stock is placed in 35 compartments. In 7 compartments we establish strains per-lines. We register the feathered neck variety lines with 21, 22, 24, 28 codes, and the naked neck line with a 26 code. The lines are separated by age groups, so that two-year-old hens are placed in three pens, and one-year-old hens are put in four pens. We put young, one-year-old cockerels in each pen. After the end of summer colonization the supernumerary pullets and cockerels will be sold.

In the laying period the egg production of each pen is recorded. Our trap-door nest technology is suitable for the measurement of individual egg production as well. Thanks to the "GALLUS_05" program we could measure the quantitative properties and some nutritive values of the eggs.

3. Results and discussion

After the colonization we monitor the egg production capability of each genotype according to lines. The laying period begins in September and lasts until June next year. Then the two-year-old hens are disposed of, and the one-year-old hens undergo a moulting period.

In the production of one year old hens the 22 line supplied the highest performance. However, its standard deviation was also the highest. There is no significant difference ($p < 5\%$) between the feathered neck and naked neck breeds. (Table 1)

Table 1. The average egg production of one-year-old hens

Line	n	Average egg production (nr)	
		x±s	CV%
21	100	121.30±22.41 ^a	18.48
22	100	131.31±54.01 ^a	41.14
24	100	118.99±28.46 ^a	23.92
28	100	109.26±27.71 ^a	34.51
26	100	117.16±21.41 ^a	18.28
Average		119.57±34.68	29.00

The average egg production of two-year-old hens confirms that trends reported in the literature that there is a decline in the number of eggs compared with the first laying period production. We don't find significant difference ($p < 5\%$) between the feathered neck and naked neck breeds production (Table 2).

Table 2. The average egg production of two-year-old hens

Line	n	Average egg production (nr)	
		x±s	CV%
21.	100	99.53±22.99 ^a	23.11
22.	100	95.23±13.02 ^a	13.68
24.	100	116.69±32.92 ^a	28.22
28.	100	108.84±23.13 ^a	21.25
26.	100	103.41±17.06 ^a	16.5
Average		104.74±23.05	22.01

In the one- and two-year-old hens stocks we made a representative egg measurements (3, Table 4). We can see in Table 3. that the one-year-old hens eggs show a homogeneous distribution, and there can not be detected statistical difference between the lines ($p < 5\%$).

Table 3. The egg weights of one-year-old hens

Line	n	Egg weigh (g)	
		x±s	CV%
21.	75	55.82±4.21 ^a	7.55
22.	75	56.33±5.08 ^a	9.02
24.	75	56.47±5.28 ^a	9.36
28.	75	56.21±4.67 ^a	8.31
26.	75	54.35±5.18 ^a	9.54
Average		55.89±4.91	8.79

. The naked neck hens produced smaller eggs, but the difference is not significant ($p < 5\%$). It is found in the two-year-old hens production, that near the decreasing of the number of eggs the egg weight was increased. The measured egg-weights comply with the Hungarian meal standard. The standard deviations are not significant

Table 4. The egg weights of two-year-old hens

Line	n	Egg weigh (g)	
		x±s	CV%
21.	75	59.47±3.86 ^a	6.49
22.	75	58.77±4.68 ^a	7.97
24.	75	58.54±5.26 ^a	8.99
28.	75	59.22±3.57 ^a	6.04
26.	75	57.31±3.96 ^a	6.71
Average		59.00±4.42	7.5

The egg production of the stocks was studied from 20 weeks of age (colonization). The production level of 30% was reached after the 6th production week. Top production occurred after the 21th production week.

In wintertime in December as a result of the outgoing system and the short and cold days the egg production of naked neck hens fell below the 10%. The observed fluctuations of persistence can be explained by climatic influences. Performances before the moulting were over 40%.

We examined the eggs shape index of the stock, which is the ratio of the egg length and width. Table 5 shows that 26. naked neck line producing significant ($p < 5\%$) more longish eggs, than the feathered neck variant. The shape index values in both varieties correspond to the breeding eggs standard.

Table 5. The shape index of one-year-old hens reaching the 30 % production level

Line	n	Egg shape index (g) (2)	
		x±s	CV%
21	25	1.31±0.08	6.08
22	33	1.33±0.08	5.69
24	40	1.34±0.11	8.28
28	31	1.32±0.06	4.49
26	25	1.36±0.05	3.97
Average		1.33±0.08	6.18

In Table 6. we can observe that the feathered neck hen's egg weight in each examined time (reaching the 30% production level, in top production level, and under 30% production level) are bigger. Single trend in both breeds that the highest measured weights are in top production time. This is not supported by the literature, because the performance tests have shown that the egg weights are the highest at the end of the egg production period.

The higher egg weights measured in top production period can be explained by the fact that the yolk weight for the top production period has increased significantly. In top production period

the eggshell strength in both species are the weakest, which are in contrast to the other Hungarian bred hens (Yellow Hungarian Chicken, White Hungarian Chicken) eggshell strengths, which show lower values at the end of the laying periods. (GALLUS_05). The dried eggshell weight in both species was the biggest in top production period, which can be explained by the size of the eggs.

Examining the nutritional values of the eggs Table 7 shows that the dry matter and crude protein

content of the yolk is the biggest in top production period. Compared the feathered neck and naked neck breeds results can be seen that the naked neck's parameters show significantly ($p < 5\%$) higher values.

Table 8. shows that the nutritive value of albumen, in contrast to the parameters of the nutritional values of the eggs yolk, shows higher value in feathered necks stock.

Table 6. Quantitative properties of the eggs

Production level	n	Egg weight (g)	Height (cm)	Latitude (cm)	Shell strength (N)	Albumen weight (g)	Yolk weight (g)	Eggshell weight (g)
F-neck ¹ 30%	80	55.10	5.59	4.28	25.80	31.01	16.61	7.09
N-neck ² 30%	20	53.33	5.61	4.21	22.87	29.71	16.31	6.87
F-neck top production	80	61.49	5.81	4.47	24.80	33.84	19.75	7.62
N-neck top production	20	59.25	5.76	4.39	20.47	31.55	19.88	7.46
F-neck under 30%	80	60.64	5.82	4.43	28.13	30.64	20.27	7.35
N-neck under 30%	20	55.05	5.66	4.30	23.40	29.53	18.16	6.84

¹Feathered-neck

²Nake-neck

Table 7. Nutritive value of the eggs (egg yolk), %

Production level	n	Dry matter	Crude protein	Crude fat	Crude ash
F-neck ¹ 30%	80	49.17	15.08	26.22	1.86
N-neck ² 30%	20	49.42	15.50	27.02	1.68
F-neck top production	80	49.49	15.30	26.28	1.63
N-neck top production	20	49.60	15.92	26.03	1.67
F-neck under 30%	80	47.94	15.14	25.45	1.67
N-neck under 30%	20	48.74	15.64	25.81	1.67

¹Feathered-neck

²Nake-neck

Table 8. Nutritive value of the eggs (albumen), %

Production level	n	Dry matter	Crude protein	Crude fat	Crude ash
F-neck ¹ 30%	80	12.61	9.61	0.01	0.58
N-neck ² 30%	20	12.23	9.28	0.02	0.59
F-neck top production	80	11.94	9.58	0.00	0.59
N-neck top production	20	11.91	9.65	0.00	0.62
F-neck under 30%	80	11.90	9.87	0.01	0.65
N-neck under 30%	20	12.41	9.42	0.00	0.64

¹Feathered-neck

²Nake-neck

The eggshell colour is important to consumers opinion. The preliminary studies and publications have shown that the Hungarian speckled hen produces mixed eggshell colours. In Table 9. we can see the shell colour distribution of tested stock.

Table 9. The eggshell colour of one-year-old hens

Line	n	White		Light		Beige		Brown	
		nr	%	nr	%	nr	%	nr	%
21.	25	0	0	3	12.0	16	64.1	6	24.0
22.	35	0	0	8	22.9	20	57.1	7	20.0
24.	40	0	0	7	17.5	24	60.1	9	22.5
28.	31	0	0	6	19.4	15	48.4	10	32.3
26.	25	0	0	3	12.0	7	28.0	15	60.0
Total	156	0	0	27	17.3	82	52.3	47	30.1

The four-scale colour distribution examination showed that the beige coloured eggs occur the largest percentage in the feathered neck breed, while we could register brown shelled eggs in largest proportion in naked neck hens stock. The typical Leghorn-type, white egg-shell has not occurred during the laying period.

Hatching to replace the breeding stock happens once a year. The growing of the young animals begins in April, the egg collection takes place in a 10-day period in March. The hatchery eggs are candled on 10th day of incubation period. The results of incubation are presented in Table 10.

Table 10. The results of incubation in 2010

Line	age (year)	incubated egg (nr)	infertile egg %	bloody egg %	suffocated egg %	hatched egg %
21	1	315	7.6	4.4	6.0	81.9
21	2	125	6.4	4.0	12.0	77.6
	Total	440	7.3	4.3	7.7	80.7
22	1	341	4.4	5.0	23.8	66.9
22	2	148	2.7	6.1	14.2	77.0
	Total	489	3.9	5.3	20.9	69.9
24	1	339	7.1	7.1	12.7	73.2
24	2	122	7.4	7.4	11.5	73.8
	Total	461	7.2	7.2	12.4	73.3
26	1	346	10.4	4.0	23.4	62.1
26	2	98	11.2	3.1	14.3	71.4
	Total	444	10.6	3.8	21.4	64.2
28	1	359	10.0	3.6	9.5	76.9
28	2	151	8.6	6.0	23.2	62.3
	Total	510	9.6	4.3	13.5	72.5
	Total	2344	7.7	5.0	15.2	72.1

The results show that the highest percentage of infertility occurs in naked neck stock. The highest percentage of bloody eggs was in the 24 line. The highest proportion of rotten (suffocated) eggs was in the 22 code. The hatching percent projected on inlaid eggs was 72.1 %, which can be considered a good result for this genotype.

Learning from the experience of previous years, where the hatching percentage was lower (>60%) and the number of infertile eggs was higher, in 2009/2010 laying year we put 3 cockerels on 20 hens in each compartment. The results draw attention to the fact that could be achieved narrower cock:hen sex ratio than 1:10 ratio, furthermore reserve cockerels should be ensured, especially if the candling results are disadvantageous.

Between the examined hatching parameters there was no significant difference ($P < 5\%$). The proportion of infertile eggs, there was significant difference ($P < 5\%$) between the one-year and two-year-old hens, as a consequence of the less favourable results of two-year-old hens. We investigated the differences between the lines,

separately for the one-year and two-year-old hens. Significant difference ($P < 5\%$) was not observed.

4. Conclusions

- The Hungarian Speckled Hen and the Speckled Transylvanian Naked Neck Hen egg production can not be a competitor to the intensive varieties and hybrids.
- Species produce the greater quantity of eggs in the first egg production period.
- The average weight of eggs in the second year is greater than in the first laying period.
- Contrary to the published literature in our stock we can measure the largest eggs in top production period.
- After 6th week of the colonization the egg production level reaches 30%, and the top production is after the 21st laying week.
- The average shape index values correspond to the meal- and breeding eggs standard.
- The naked neck species produce longer eggs.
- The smallest shell strength can be found in top production period.

- The dry matter- and crude protein content of the egg yolk shows highest value in top production period, while the smallest value is at the last laying period, below the 30% level of production.
- The nutritive value of Naked neck hen's egg yolks are higher than the feathered neck hen's values, contrary the nutritive value of albumen of feathered neck hen's showed the better values.
- The colour of the eggshell belongs to the colour category (light, beige, brown).
- There is a difference between the egg shells colour of two species, while the feather neck variety produced the largest amount of beige-coloured eggs, the naked neck variety mostly produced brown eggs.
- The incubation results showed that the two years old hens's hatching results are worse.
- The narrowed sex ratio increased better incubation results.

To summarize, the Hungarian Speckled Hen and the Transylvanian Naked Neck Hen are suitable for households to produce meal-eggs as well as hatching and breeding-eggs.

References

1. Horn, P., Tyúkfajták és hibridek (in. A baromfitenyésztők kézikönyve szerk.: Horn Péter). Mezőgazdasági Kiadó, Budapest, 1981, pp.300-314
2. Szabóné, Willin, E., A gazdasági állatok géntartalékainak megőrzése (in. Az állattenyésztés alapjai. Szerk.: Nagy Nándor). Mezőgazda Kiadó, Budapest, 1996, pp. 276-278
3. Bögre, J., Dohy, J., Gondolatok a génerózió és az állatnemesítés néhány új aspektusáról, az „adekvát mutációk” tükrében, *Állattenyésztés és Takarmányozás* 1991, 40(3), 195-201
4. Horn, P., A környezeti tényezők és a genotípus közötti kölcsönhatások, *abrákfogyasztó háziállat fajokban. Állattenyésztés és Takarmányozás* 1987, 36(2), 97-114
5. Bodó, I., A géntartalékok megőrzése az állattenyésztésben, *Akadémiai doktori disszertáció*, 1991, 11-34, 149-155
6. Mártha, Zs., A magyar tyúk nemesítésének első időszaka. *A Magyar Mezőgazdasági Múzeum Közleményei, Mezőgazdasági Múzeum, Budapest, 1962, 63-83*
7. Báldy, B., *A Baromfi tenyésztése. Mezőgazdasági Kiadó, Budapest, 1957, 370*
8. Hays, F. A., és Klein, G. T., *Poultry Breeding Applied*, Watt Publishing Co., 1952, 250
9. Sófalvy, F., A kendermagos magyar tyúk és a kopasznyakú tyúk egyes mendeli tulajdonságainak öröklődése. *Őshonos és honosult háziállatfajtáink genetikai sajátosságai. Kutatási jelentések, Kaposvár, 1986, 121-128*
10. Sófalvy, F., *Őshonos kendermagos tyúkkállomány génesztés nélküli megőrzése. Tessedik Sámuel Tiszántúli Mezőgazdasági Tudományos Napok, Szarvas, 1990, 77-78*
11. Sófalvy, F., *A kendermagos magyar tyúk növendék és kifejlett kori élőtömegének alakulása, Tiszántúli Mezőgazdasági Tudományos Napok, DATE Állattenyésztési Főiskolai Kar, Hódmezővásárhely, 1995, 11, 288-289*
12. Kiss, I., *A kendermagos magyar tyúk tojástermelése. Szakdolgozat. Hódmezővásárhely, 1994*