

RESEARCHES ON EARLY EMBRYOGENESIS FROM TRANSYLVANIAN NAKED NECK AND PLYMOUTH ROCK HEN BREEDS

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Abstract

In Romania, the Transylvanian Naked Neck hen breed is considered to be an “endangered” population, reason for which we consider that a special attention should have been given until now. Plymouth Rock breed was imported for the first time to Romania from the Studler Company, France in 1969. This paper is aiming to perform a profound analysis of the development patterns of the neural tube in the two breeds, by measurements carried out at 30, 40, 50, and 60 hours of incubation. Observations show that the closure of the neural canal and its transformation into a tube follows an undulatory pattern, of which positive and negative curls are diametrically opposed in the two breeds, while the development speed during the whole studied period have a relative similar value between the two breeds. We estimate that the two breeds have a good combinative capacity, which recommend the utilization of these genetic materials to obtain hybrids for producing “peasant-type” chicken meat, very well-appreciated by the Europeans between the two World Wars.

Key words: embryos, Transylvanian Naked Neck, Plymouth Rock

INTRODUCTION

The Transylvanian Naked Neck hen breed became known in 1875, when a Transylvanian peasant presented a homogenous group of naked-necked hens in an exhibition in Vienna. After that, this breed was presented in several exhibitions such as Universal Exhibition in Paris in 1878, Poultry Exhibition in London in 1900 etc. Also, it is a fact that around 1875 the Naked Neck hen was found and well-appreciated in Transylvania, where some breeders started to raise it on rational basis and to make selection of this breed. These are the breeders we could owe the standard of the breed. Later, in year 1905, this standard was adopted and improved by the German Association of Transylvanian Naked Neck breeders from Silesia (Ștefănescu, 1956). Transylvanian Naked Neck breed has a special importance for our country that is why we should give it a special attention

within the management of animal genetic resources.

Plymouth Rock breed belongs to the American dual-purpose breeds, being formed in Massachusetts. In Europe, it was imported in 1880 in England and in 1882 in the Netherlands. In year 1969 Romania imported N and H lines from Studler Company, France and S and F lines from Shaver Company, Canada. Also, in year 1984 some lines were imported from Ross Company, England.

Plymouth Rock is a genetic improver breed, being the third in the world as importance and population number in the industrial aviculture. It is used almost exclusively as broiler hens.

The aim of this paper was to carry out development patterns of the neural tube during the early embryogenesis in order to achieve a more profound knowledge of these populations. The subsequent objective is to

obtain hybrids for producing “peasant-type” chicken meat that was very well-appreciated by the Europeans between the two World Wars.

MATERIALS AND METHODS

If morphological characteristics such as pellucid area, primitive line, embryo’s length during the first 60 hours of incubation grow and develop based on cell number increase, cell differentiation processes form the basis for neural tube development. Neural tube formation belongs with development of the Hansen nodule of the cephalic prolongation of which the anterior extremity ends with cephalic fold. Closure of the embryo’s neural groove from the anterior to the posterior extremity and its transformation into a tube is taking place following a certain pattern. After the age of 31 hours of incubation, the neural

canal “gives up” to be formed following the *zipper type pattern* and adopts the closure of the groove similar to closing up a book (B.Menkeș, Șandor, Elias (1965) and I.Vintilă (1968)).

The measurements carried out in order to establish the standards of the neural canal closure during the early embryogenesis in the two hen breeds were carried out on 16-embryos groups at the age of 30, 40, 50, and 60 hours of incubation. The method used was a special method developed in the Experimental Embryology Laboratory from the Timișoara Branch of the Romanian Academy.

RESULTS AND DISCUSSIONS

Time evolution of the neural tube dimensions in the two groups of embryos is presented in Table 1.

Table 1.
 Neural tube development in embryos belonging to the two hen breed [mm]

Embryo groups	Embryos age - hours of incubation			
	30	40	50	60
Plymouth Rock (NH)	1.11±0.05	4.97±0.027	8.39±0.06	8.44±0.065
Transylvanian Naked Neck	0.23±0.07	4.70±0.035	5.45±0.08	7.45±0.055
Differences	+0.88	+0.27	+2.94	+0.99

Analyzing data presented in Table 1 one could observe that time evolution of the neural tube development in the two groups of embryos are taking place following different patterns. In Plymouth Rock (NH) embryos the neural tube is already formed at the age of 30 hours of incubation along a distance of 1.11 mm. This suggests that this type of genetic structure is causing earlier processes of cell differentiation and growth compared to the Transylvanian Naked Neck embryos, which at the same age have the neural tube formed only on 0.23 mm long.

It is to be noticed the time interval between 30 and 40 hours of incubation, when the neural tube in Transylvanian Naked Neck breed has a high growth intensity of 4.47 mm. During the next interval, 40-50 hours of incubation, the Plymouth Rock embryos

show an intense development achieving 3.42 mm, while the Transylvanian Naked Neck embryos show a moderate development of only 0.75 mm. During the last studied interval (50 to 60 hours of incubation) the growth speed is reversed again. The Transylvanian Naked Neck embryos show a vigorous development of 2.0 mm compared to that of only 0.05 mm achieved by the Plymouth Rock embryos. By the end of the studied period of 60 hours, the Plymouth Rock embryos (NH) have an extra 0.99 mm in the neural tube development compared to the Transylvanian Naked Neck embryos.

In order to carry out a more profound analysis of the development patterns in the two breeds, the average speed of the neural tube formation during the studied time intervals are presented in Table 2.

Table 2.

Average speed of the neural speed formation in the two breeds [mm/hour]

Item	Age interval of embryos			
	30-40	40-50	50-60	30-60
Plymouth-Rock (NH)	0.386	0.342	0.005	0.244
Transylvanian Naked Neck	0.447	0.075	0.200	0.240
Differences	-0.061	+0.267	-0.195	+0.004

Data in Table 2 show that the neural tube formation in the two breeds have a similar average speed during the incubation period (30 to 60 hours). It is to be noticed that during the embryos' growth, the neural tube development is following an undulatory pattern, totally different from a genetic group to another.

If from 30 to 40 hours of incubation the neural tube formation in Transylvanian Naked Neck embryos is taking place with a high speed (0.447 mm/hour), during the next period, 40 to 50 hours, the average speed of the neural canal closure and tube formation decreases very much (0.075 mm/hour). Totally different is the case of the Plymouth Rock embryos. They show a relative similar average speed of the neural groove closure during the two incubation periods.

From 50 to 60 hours of incubation the situation is reversed again. The Transylvanian Naked Neck embryos show an increased average speed to 0.200 mm/hour, while in the Plymouth Rock embryos the speed is reduced to a minimum (0.005 mm/hour). When the overall speed of the neural tube formation was compared between breeds, a slight advantage (+0.004 mm/hour) was observed in the favor of the Plymouth Rock embryos.

CONCLUSIONS

As a result of the observations we could positively state that the differentiation and cell replication processes that contribute to the neural tube formation have an undulatory evolution pattern, the positive and negative curls of the curve being diametrically opposed in the two breeds.

Thus, it is to be noticed that the overall studied period development speed have a close value, which demonstrates that the Transylvanian Naked Neck breed have a vigorous embryo development following an own pattern.

If we add to these conclusions the other renowned qualities of the two breeds, as well as the estimation that both have a good specific combinative capacity, we could recommend utilization of these genetic materials to obtain hybrids for producing the "peasant-type" chicken meat, very well-appreciated by Europeans between the two World Wars.

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