THE EFFECT OF FEEDING 0 DAY CHICKEN DURING TRANSPORTATION ON INTESTINAL DEVELOPMENT

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ABSTRACT

The great potential of early nutrition of chicken is proven. The effect could be heightened by the nutrition of zero day chicken during transportation from hatchery to farm. The influence of feeding during transit on the intestinal development was focused. Paper presents the comparison of lengths of villi and crypts between the fed and non-fed (reference) flocks. The statistically significant ($P<0.05$) improvement has been observed. Therefore feeding chicken during transport represents a way of early nutrition that successfully prevents chicken from starving and consequential yield decrease.

Key words: early nutrition, intestinal development, chicken transportation, broiler, Ross308, Cobb500

INTRODUCTION

The maximum yield does represent the main objective of breeding efforts of international poultry companies. The growth intensity is the important genetic selection characteristic and it is being provided by the feeding of young poultry. The requirement of maximal meat yield at minimal costs is placed considering breeding the broilers. The share of feeding on total expenditures per piece reaches 60 per cent. In order to satisfy mass demand, broilers are hatched at mass hatchery and then transported to the feeding farm. During the first day of the embryonic development proventriculus, gizzard and the middle part of the alimentary canal is formed from the mesoderm (Veselovský, 2001). At the fifth day the liver and the intestine development is progressed. However the 0 day chicken does not have sufficiently evolved digestive tract, thermoregulation nor immune system, therefore it could be threatened by unfavourable environmental conditions, the time period of the first week after the hatching plays vital role considering the flock viability and uniformity (Lilburn, 1998). Necessary demand for the energy and nutrients is covered by the residual yolk sac comprising 25 % of the hatch body weight (Khan, 2004). The new complex care chicken systems have been introduced to eliminate the environmental threats. Their main task is to sustain comfort conditions for chicken during the critical period and this way contribute to breeder's profit. These systems regularly utilize the early nutrition of day-old chicken with positive effect on the development of intestine especially during the interval of the first 6 days specific with the highest relative accretion (Lilburn, 1998). Useful impacts of early nutrition could be heightened by the feeding chicken during the transportation from hatchery to farm. I have decided to verify such a hypothesis by the conducting experiment under conditions of ordinary production.

MATERIAL AND METHODS

The effect of feeding 0 day chicken during transportation on intestinal development has been observed by the four times repeated comparison between two reference flocks – standard and nutritioned. Flocks of hybrids Ross308 and Cobb500 from Xavergen, a.s. hatchery were used. The nutritioned group of chicken were fed by substances with commercial labels of starter BR1 and prestarter ChickBoost. Chickens were transported from hatchery located in Habry to farms at Měnín (140 kilometres, 2 hours) or Beluša (285 kilometres, 4 hours), both groups under the same conditions at same time. The feed was inserted directly into the transportation boxes during the chicken counting and vaccination, just before the transport loading, both reference groups were handled regardless. The temperature and conditioning values were typical, the transportation space was lightened. The sample of the intestine of 3 centimetres was taken in the jejunum area behind the Meckel diverticulum after four days of chicken farming. The histology section was prepared by the method of paraffin fixation and staining by the hematoxylin – eosin stain. The sections were digitalized under the light microscope at magnification forty times the original size with the digital camera. The size of intestine villus and crypts were digitally measured subsequently using the photograph analysis program developed in MATLAB environment. Ten chickens were selected from each group, three sections per each chicken were prepared and approximately ten measurements per each section were made. The villus length was measured between the basis and the tip. The crypt length was measured from the lowest point of the crypt towards the fictional basis of the neighbouring villus (Maneewan, Yamauchi, 2003). The obtained data were statistically processed and the Student's two sample t-test was applied.

Fig. 1 – Digital villus measurement.

RESULT AND DISCUSSION

Following tables contains resulting dimensions of villi in micrometres and shows the comparison of standard and nutritioned flocks. The prolongation of the villi within the nutritioned flock was statistically significant as well as the enlargement of the crypts ($P<0.05$).

Tab. 1 – Lengths of villi [µm]

	Měnín I.		Měnín II.		Beluša	
	fed	standard	fed	standard	fed	standard
Number	74	82	52	75	43	68
Average	443^{A}	327^{B}	454^{A}	296^{B}	366^{A}	298^{B}
Range	421	493	372	272	537	248
Standard deviation	115	105	94	59	117	67

A,B – values indexed by the different letters are statistically significantly different

Tab. 2 – Lengths of crypts [µm]

	Měnín I.		Měnín II.		Beluša	
	fed	standard	fed	standard	fed	standard
Number	87	73	76	72	56	59
Average	9.6^{A}	5.8^{B}	10^{A}	4.8^{B}	6.8^{A}	3.9^{B}
Range	9.1	10.8	12.3	7.8	9.9	4.6
Standard deviation	2.2	2.7	2.4	1.6	2.3	1.1

A,B – values indexed by the different letters are statistically significantly different.

The experimental work has brought the evidence of more developed intestinal villi and crypts in the case of chickens fed during the transportation after four days. Kidd et al. (2007) mentions that, the final vital weight is significantly lowered by the postponed nutrition during the first early days. This hypotheses has been confirmed by the Noy and Pinchasov (1990) observing the positive effect of the providing feed and water as early as possible after the hatching on the future yield of chicken. There is a number of ways to technically provide early nutrition, the 'in ovo' nutrition is the most advanced among the others. This particular one has been studied by Kornasio et al. (2011), they have observed the significantly higher growth intensity of the nutritioned group of chicken compared to reference group. Another way is defined by the serving the feed immediately after the hatching, it has been observed by Bigot et al. (2003) or Kidd et al. (2007). The early nutrition stimulates the growth and development of the small intestine, particularly the resorptive capacity, contrary to the starving resulting in reduction of villi (Michael a Hodges, 1976, Moran, 1985). Although the providing of water itself does not have a large impact, it plays important role in the field of small intestine development if served sufficiently with feed together (Maiorka et al., 2003).

CONCLUSIONS

The nutrition of 0 day chicken during transportation from hatchery to farm represents alternative solution of early nutrition. This method should prevent chickens from starving and undesired consequential yield decrease. Results of described conducted work shows significant positive effect on chicken intestinal development. Nevertheless this solution introduces technical difficulties to producers.

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