

# AGE DYNAMICS OF THE IRON AND COPPER CONTENT IN THE LIVER AND YOLK SAC OF CHICK EMBRYOS

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The age dynamics of the iron and copper content in the liver and yolk sac of 9-, 11-, 13-, 15-, 17-, and 20-day chick embryos of the Russian White breed was studied. With the development of the embryo the iron content in the liver (calculated per wet weight of tissue) rises from 3.436 mg % in 9-day to 7.098 mg % in 20-day embryos and the copper content rises from 0.582 to 1.296 mg %. The content of these elements in the yolk sac falls toward the end of incubation: iron from 4.81 mg % in 9-day to 2.46 mg % in 20-day embryos and copper from 0.298 to 0.224 mg %.

Throughout the period of embryonic development, bird embryos obtain iron and copper, which are required in the formation of various compounds, respiratory proteins, and enzymes, from the white and yolk of the egg, while mammalian embryos obtain these elements from the mother [3, 4, 9, 10]. Provision is thereby made for the formation of vital physiological and biochemical processes responsible for the normal development of the embryo and fetus.

Investigations have shown [1, 4-6, 8, 12, 14, 15] that the content of iron and copper in the fetal liver of man, sheep, and pigs increases with age. Accumulation of iron in the yolk sac of rabbit embryos has been described in the early stages of development [3] and an increase in the content of these elements in the body of chick embryos has been found [7, 11].

However, no investigation into the content of these trace elements in the liver and yolk sac in connection with the changeover between hematopoietic organs during embryogenesis in birds could be found in the accessible literature.

TABLE 1. Content of Iron and Copper in Liver and Yolk Sac of Chick Embryos (in mg 1 of wet weight)

Test object	Age (in days)	Number of samples	Iron		Age (in days)	Copper	
			$M \pm m$	$\pm \sigma$		$M \pm m$	$\pm \sigma$
Liver	9	8	3,436 $\pm$ 0,101	0,287	8	0,582 $\pm$ 0,025	0,079
	11	8	7,331 $\pm$ 0,158	0,449	9	0,623 $\pm$ 0,031	0,093
	13	10	6,005 $\pm$ 0,238	0,754	9	1,122 $\pm$ 0,025	0,073
	15	10	6,260 $\pm$ 0,071	0,225	10	1,164 $\pm$ 0,013	0,041
	17	10	5,095 $\pm$ 0,209	0,662	10	1,591 $\pm$ 0,044	0,141
	20	12	7,098 $\pm$ 0,259	0,899	12	1,296 $\pm$ 0,039	0,135
Yolk sac	9	10	4,81 $\pm$ 0,135	0,43	10	0,298 $\pm$ 0,004	0,012
	13	15	7,72 $\pm$ 0,269	1,05	13	0,283 $\pm$ 0,012	0,043
	15	10	2,15 $\pm$ 0,107	0,34	10	0,165 $\pm$ 0,005	0,018
	17	10	0,778 $\pm$ 0,049	0,16	10	0,248 $\pm$ 0,008	0,026
	20	10	2,46 $\pm$ 0,0128	0,41	12	0,224 $\pm$ 0,008	0,026

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The object of this investigation was to study the dynamics of the iron and copper content in the liver and yolk sac during development of chick embryos.

#### EXPERIMENTAL METHOD

The investigations were carried out on chick embryos of the Russian White breed incubated at the Rostov-on-Don Poultry Factory. The liver and yolk sac of 9-, 11-, 14-, 15-, 17-, and 20-day embryos were dried and incinerated in porcelain crucibles in a muffle furnace at 450-500°C. To quicken the incineration the samples were moistened with two or three drops of distilled concentrated nitric acid, and quantitative estimations of iron and copper were carried out by Babenko's method [2, 13]. The numerical results were subjected to statistical analysis.

#### EXPERIMENTAL RESULTS

The results of the investigations are given in Table 1.

Changes in the iron and copper content in the liver and yolk sac of the embryos at the above periods of development were statistically significant ( $P < 0.01$ ) except for those obtained by comparing the iron content in the liver of 13- and 15- day embryos, the copper content in the liver of 9- and 11- and 13- and 15-day embryos, and the copper content in the yolk sac of 9- and 14-day embryos.

These results show that the content of iron and copper undergoes distinct age changes with a general tendency toward an increase in the liver and a decrease in the yolk sac during development of the embryo.

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