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AVIAN EMBRYO AS AN EXPERIMENTAL MODEL

M. W. Lis, Dr. hab., J. Niedziółka, Dr. hab., prof., K. Pawlak, Dr. hab.,
K. Trzeciak, M. Trela, B. Tombarkiewicz, Dr. hab.
rzlis@cyf-kr.edu.pl

Institute of Veterinary Science University of Agriculture,
Department of Veterinary, Animal Reproduction and Welfare, Kraków, Poland

Avian embryo development is the outcome of the biological value of eggs and the incubation parameters. Egg composition reflects, to a certain extent, the laying hen's diet and living environment. Therefore, a decrease in the biological value of eggs may result from nutritional deficiency or poisoning due to the accumulation of embryotoxic and teratogenic substances (persistent organic pollutants, heavy metals, drugs etc.).

In terms of animal science, veterinary and toxicological studies, it is highly significant that *in ovo* development is free of the ontogenic biochemical effect of the mother, which is the case with *in utero* development in mammals. In the avian egg, due to the lack of placenta, all substances can only be deposited until shell formation. At the same time, the egg's chemical composition is extremely conservative as regards the content of many components (e.g. amino acids) and can be modified through mother's nutrition only for some of them (e.g. vitamins and minerals). For this reason, oral administration of the analysed substance to the layer does not guarantee that the assumed dose will reach the egg. This is made possible, however, through *in ovo* injection.

Avian embryos are easy to breed, inexpensive and relatively resistant to *in ovo* manipulation therefore there are a recognized model (*in ovo* model) in embryological, genetic, endocrinological microbiological, immunological, pharmacological and medical research. In terms of animal science, veterinary and toxicological studies, it is highly significant that *in ovo* development is free of the ontogenic biochemical effect of the mother, which is the case with *in utero* development in mammals.

This procedure can be performed at different stages of embryo development, from diapause (prior to setting of eggs in an incubator) until the time preceding hatching. This makes it possible to determine the action of a given substance depending on the developmental degree of organs, tissues and the endocrine and nervous systems. When studying the embryotoxic effects, *in ovo* injection should be performed as early during embryogenesis as possible. In turn, to investigate the effect of a given substance on the hatching process and/or postembryonic development, this procedure should be performed shortly before hatching. During this period, not only nutrients and their metabolites (carbohydrates, amino acids) but also vitamins, hormones, antioxidants, pro- and prebiotics can be administered *in ovo* for the purpose of stimulating the chick's postembryonic development.

In conclusion, avian embryo can be a useful model in embryological, physiological and ecotoxicological researches. For this reason, it can be expected that in the future results of these experiments would find practical application in poultry breeding and human and veterinary medicine.