Scientific substantiation of the effect of insulin and estradiol SES on laying quail

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We do not aim to prove an analogy in the work of natural cybernetic hormones with work components, however, the bird's reaction to their impact spectrum of electromagnetic frequencies (SES) of estradiol and insulin in biological manifestations is similar to the reaction to the exogenous action of hormones themselves, which is described in a number of scientific works of the All-Union Agricultural Academy (1977), in the book "Hormones and Cell Reproduction" by OI Epifanova (1965) and in others scientific publications related to the study of hormones.

With greater contrast in productivity differences between layers, it is possible to more accurately establish the biological characteristics associated with these differences. Determination of the mass of organs after anatomical cutting of the bird revealed a number of distinctive features characteristic of the effects of estradiol and insulin.

The masses of the liver and ovary in relation to the live weight are indicators of the biological effectiveness of vithelogenic and folliculogenic functions, respectively, and the relative weight of the oviduct is the effectiveness of the formation of secondary shells of the egg, protein and shell.

In our studies, a decrease in the relative weight of the liver was noted in the insulin and estradiol group - 3.0% and 3.2%, respectively, while in the control - 3.8%. A decrease in the liver mass may be the reason that a high level of metabolic processes should be accompanied by intensive growth processes of a network of small blood vessels - nevascularization, which ensures rapid transport of yolk precursors synthesized in the liver to growing follicles (Table 1).

It is well known that the yolk precursors synthesized in the liver are transported through the bloodstream to the growing follicles. The most developed and severe were the ovaries in the birds of the second group - 4.7% g, or 15% more than in the control, this fact provides additional confirmation that an impact occurred, to which the ovary reacted in the first place. Strengthening the functions of the ovary determines the state of homeostasis, in which all organs work more intensively to ensure its increased productivity.

If we evaluate the general vithelogenic function of the liver through the ratio of the mass of the ovaries to the mass of the liver, it turns out that 1 gram of the liver without stimulation produces only 1.02 g of follicular mass, with the stimulation of the SES of estradiol - 1.46 g and the SES of insulin - 1.3 g. It is obvious that in the experimental groups there is a higher degree of conjugation between vithelogenic and folliculogenic functions of the liver and ovary compared with the control, which confirms our working hypothesis.

In addition to the ovary and liver, the oviduct plays an important role in ensuring high egg productivity, since it is there that the secondary shells of the egg are formed.
Layers of the second group had the largest relative mass of this organ - 6.3%, then - of the third group - 6.1 and, finally, the relative mass of the oviduct of the control group was only 5.1% (the difference was 23.5% and 19.6% , respectively).

In the third group, under the influence of SES insulin, no significant differences in the mass of the pancreas were obtained. We did not conduct morphological studies of the liver, but in the works of V.P. Radchenkov (1977), a morphological study of the pancreas showed that, under experimental conditions, the use of insulin does not lead to pronounced changes in the structure of the gland and hormonal balance in the body of animals.

Also, in quails of the experimental groups, an increase in the mass of the muscular stomach and intestines was noted, which should provide a larger area for absorption of nutrients in the feed and a more efficient consumption.

In the development of other organs, no significant changes were found between the control group and the experimental groups.

Table 1

Results of anatomical cutting of laying quails (n = 10)

Indicators	1 - control		2 - experience SES estradiol		3 - experience SES insulin	
	g% to w.m.		g% to w.m.		g% to w.m.	
Live weight, g	189.3 ± 2.6		179.3 ± 2.3 *		181.6 ± 2.0 *	
% to control	100		94.8		96.1	
Liver weight, g	7.2 ± 0.3	3.8	5.8 ± 0.2 **	3.2	5.5 ± 0.2 **	3.0
Heart mass, g	1.4 ± 0.09	0.7	1.3 ± 0.03	0.7	1.3 ± 0.06	0.7
Muscle mass stomach, g	3.7 ± 0.2	2.0	4.2 ± 0.1 *	2.4	3.8 ± 0.1	2.1
Glandular mass stomach, g	1.2 ± 0.07	0.6	0.8 ± 0.02 *	0,4	0.9 ± 0.1 *	0.5
Intestine weight, g	20.6 ± 0.9	10.9	21.6 ± 0.3	12.1	22.8 ± 0.9	12.6
Ovary weight, g	7.3 ± 0.2	3.9	8.4 ± 0.3 *	4.7	7.0 ± 0.3	3.9
Oviduct weight, g	9.6 ± 0.3	5.1	11.3 ± 0.3	6.3	11.0 ± 0.2	6.1
Pancreatic mass glands, g	0.78 ± 0.05	0,4	0.79 ± 0.04	0,4	0.84 ± 0.04	0.5
Mass ratio ovary to liver mass	1.01	1.02	1.45	1.46	1.27	1.30

The biochemical composition of blood makes it possible to give an objective assessment of both the general condition of the bird and to predict the development of the adaptation process. The biochemical composition of blood at the beginning and at the end of the experiment is presented in Table 2.

table 2

Biochemical parameters of the blood composition of laying quails (n = 10)

Indicators	To the beginning experience	At the end of the experiment		
		1 - control	2 - SES experience estradiol	3 - SES experience insulin
Hemoglobin, g / l	108.5 ± 3.8	112.7 ± 1.2	157.7 ± 2.4 ***	134.7 ± 6.9 *
Total protein, g / l	31.8 ± 1.8	67.7 ± 0.9	70.0 ± 2.2	44.3 ± 0.8
Albumin, g / l	16.7 ± 1.2	47.0 ± 3.1	44.0 ± 3.5	29.3 ± 1.3 *
Globulins, g / l	15.1 ± 1.2	20.7 ± 0.8	26.0 ± 1.6	15.0 ± 0.7
A / G	1,3	2,3	1.7	2.0
Glucose, mol / l	18.9 ± 0.6	12.3 ± 0.8	12.3 ± 1.1	8.6 ± 0.0 **

To assess the respiratory function and the level of oxygen supply to the tissues, we studied the hemoglobin level in the blood of quails. As evidenced by the above data, the highest hemoglobin level was noted in the second group and amounted to 157.7 g / l, in the third group hemoglobin was 134 g / l, while in the control group this indicator was at the lower limit of the norm for an adult bird and amounted to 112. 7 g / l, the difference is significant. Also, in the second group, which received the effect of SEP estradiol, the highest level of total protein in the blood - 70.0 g / l. The combination of an increased level of total protein with high hemoglobin suggests that in this group the bird was distinguished by a more intense level of metabolic processes than the bird in the control group.

A distinctive feature of the biochemical composition of the blood of quails under the influence of SES insulin (as in broilers) is a decrease in glucose levels. As you know, insulin accelerates the transport of glucose and amino acids from the blood to the tissue, which is clearly demonstrated in studies of the biochemical composition of blood.

The A / G ratio in the experimental groups tends to increase the globulin fraction, to a greater extent in the estradiol group.

When analyzing the biochemical composition of quail carcasses (Table 3), there is a decrease in the protein content in the second and third groups by 8.6% and 6.4% (per natural substance) in comparison with the control. In the experimental groups, especially in the estradiol group, there was a significant decrease in the fat content of the carcass (up to 65% on dry matter).

Table 3

Biochemical composition of quail carcasses (n = 10)

Indicators	1 - control	2 - SES experience estradiol	3 - SES experience insulin
Moisture,%	72.7	72.9	72.5
Protein,%			
abs. dry	85.6	79.7	80.1
natures. in	23.4	21.6	22.0
Fat,%			
abs. dry	15.0	13.3	9.1
natures. in	4.1	3.6	2.5
Ash,%			
abs. dry	5.3	7.0	5.0
natures. in	1.4	1.9	1.4

As noted visually, and also confirmed by primary zootechnical analysis, the droppings of the experimental groups were drier - 65.9% and 68.8%, in the control - 71.4% moisture.

In the balance experiment, the number of droppings per day per 1 head, recalculated for absolutely dry matter, was distributed as follows: in the control group - 9.4 g, in the estradiol group - 10.6 and in the insulin group - 9.1.

The protein content in the litter of the experimental groups was 2.5–3.4% lower than in the control table. 4).

The fat content in the litter of the experimental groups was higher than in the control by 1.68 and 1.97%, respectively. This fact suggests that fat absorption in these groups was less efficient, and may be one of the explanations for the decrease in carcass fat.

Table 4

Biochemistry of quail droppings (for absolutely dry matter)

Indicators	1 - control	2 - experience of SES estradiol	3 - experience of SES insulin
Litter per bird / day, g	9.4	10.6	9.1
Moisture	71.4	65.9	68.8
Protein	48.0	46.8	46.4
Fat	1.4	1.7	1.9
Cellulose	4.61	5.60	4,00
Ash	25.12	26.42	23.21
Ca	16.5	17.8	15.4
R	1,3	1.4	1,3

Fiber content in the SES exposure group and nsulin is somewhat lower and characterizes the best assimilation of feed. In the SEP group of estradiol, the fiber content is higher than in the control, i.e. lower its digestibility.

There were no differences in the indicators of mineral metabolism.

When comparing the qualitative and quantitative parameters of the litter in the third group, it becomes obvious that the effect of SES insulin promoted a better assimilation of feed, including fiber.

In the SEP group of estradiol, there was an increase in the amount of droppings, but with a lower protein content.

Calculation of the efficiency of using feed protein, given in table. 5, confirms the fact of more efficient utilization of feed protein by poultry of the third group, where the protein is assimilated 54.75%, in the control only 43.85%. In the second group, protein was absorbed less efficiently by 41.15%.

Table 5

Efficiency of use of feed protein (on absolutely dry matter)

Indicators	one - the control	2 - SES experience estradiol	3 - experience of SES insulin
Consumed:			
feed, kg	72.20	72.20	72.20
protein, kg	20.29	20.29	20.29
Highlighted			
litter, kg	23.62	26.28	23.17
protein, kg	11.52	12.16	9.28
Assimilated Protein			
Kg	8.77	8.23	10.95
%	43.85	41.15	54.75

Our results on the effect of estradiol SES on the efficiency of nitrogen utilization are consistent with studies on the effect of various steroid hormones on nitrogen retention in the body and possible changes in nitrogen balance. [Johnson,
O, Shea, 1969; Wimnay, Mya-Tu, 1974; Hervey et al. 1981 Alain 1985; Forbes, 1985]. The nitrogen retention in the body did not exceed 23% and did not depend on gender, age, nutrition and physical activity.

However, when studying the effect of insulin on metabolism and productivity at the All-Russian Research Institute of Physiology, Biochemistry and Nutrition of Farm Animals, it was found that when the body was exposed to insulin in experimental animals, a clear anabolic effect was found, which manifested itself in an increase in the biosynthesis and retention of protein in tissues.
Average daily weight gain in animals, including poultry, increased by 15-25% (Radchenkov, 1977).

Table 6

Biochemical composition of eggs

Indicators	1 - control	2 - SES experience estradiol	3 - SES experience insulin
Moisture,%	74.6	72.09	72.91
Protein,			
% abs. dry	47.38	43.64	45.85
natures. in	12.29	12.18	12.42
Fat,%			
abs. dry	39.72	43.12	40.48
natures. in	10.30	12.03	10.97
Carotene, mg / kg	2.98	3.98	3.47

Analysis of the biochemical composition of eggs showed a decrease in the protein content (43.6% in the control, 47.4%), an increase in the content of fat and carotene in eggs obtained under the influence of estradiol HES. Under the influence of SES insulin, there is also a decrease in protein and an increase in carotene, but to a lesser extent than in the second group (Table 6).

Table 7 shows the calculation of the conversion of utilized protein to egg protein. Analysis of the data shows that poultry under the influence of SEP estradiol uses 17.7% of the assimilated protein for egg production, in the control only 11.6%, the difference is 34.4%. The conversion of feed protein to egg protein in this group is 7.3%, in the control - 5.1%.

The poultry of the third group uses the assimilated protein for egg production also more efficiently than in the control - 12.4%, but much less efficiently than in the second group.

Table 7

Conversion of feed protein and assimilated protein to egg protein

Indicators	1 - control	2 - SES experience estradiol	3 - SES experience insulin
Assimilated Protein			
Kg	8.77	8.23	10.95
%	43.85	41.15	54.75
Produced by egg mass, kg	2.15	3.35	2.97
Protein egg mass, kg	1.02	1.46	1.36
Conversion of digested protein to egg protein:			
kg / kg	8.60	5.64	8.05
%	11.6	17.7	12.4
Conversion of feed protein to egg protein:			
kg / kg	19.8 13.9 14.9		
%	5.1 7.3 6.8		

Thus, summing up the analysis of the productivity of laying quails, the results of a biochemical study of blood, carcasses, eggs and balance experience, the following conclusions can be drawn:

1. An increase in egg productivity under the influence of ESP of estradiol occurs after by enhancing the vithelogenic function of the liver, the starting point of which is to enhance the function of the ovary of birds.

2. Material support for increasing productivity is due to more effective redistribution of energy and nutrients - increasing the conversion of assimilated protein into egg protein by 53%, enhancing metabolic processes and reserves of the poultry itself - reducing the live weight of poultry by 4.1%, reducing the level of protein in the carcass by 8.6%.

3. An increase in productivity under the influence of SES insulin occurs due to more effective use of feed nutrients and its utilization into products, as well as enhancing metabolic processes.

4. It is likely that the combined effect of the SES of insulin and estradiol will give more significant and lasting effect, as the bird will use feed more efficiently and have a high exchange rate for egg production.

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