

Influence of estradiol diropionate (EDP) on the body growing birds

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Abstract. This scientific article outlines results of using the drug estradiol diropionate (EDP). The effect of the drug on the general condition, behavior, appetite, fatness, egg production, growth and development of birds was studied. Changes in all these directions manifest themselves differently depending on the dose and frequency of administration of the drug.

1 Introduction

According to the literature, it is known that estrogenic drugs (including EDP) are active substances and act in different directions. Even in small doses they strongly influence the organs of the female reproductive system, and in higher doses they also have a significant effect on the non-male reproductive system; when they are used, there are significant changes in the functional states and other physiological systems. But there is still very little data in the literature regarding the elucidation of this or that effect of EDP on the animal body; information about other estrogens cannot be fully used for EDP, since it, as an esterified (prolonged) steroid estrogen, has a slow and long-lasting effect[1-5].

In order to clarify the features of the effect of EDP on birds, it was necessary to establish the features of its effect depending on the dose of the drug, as well as on the species, sex and age of the animals, and on this basis, establish the minimum, optimal and maximum permissible doses of the drug. It is important to study the effect of the drug during long-term administration depending on the conditions of use.

Of greatest interest is a comprehensive study of the influence of EDP on the growing organism in different animal species[6-8].

The relevance of our chosen topic was determined by the fact that recently estrogenic drugs with a steroid structure (natural hormones and their derivatives) have often been used in practice, since they are safe compared to synthetic estrogens and have almost no side effects. All of the above once again confirms the need to study this very interesting drug[9-11].

However, although the effectiveness of the use and beneficial effect of estrogens on the amount of weight gain and other types of animal productivity is widely known, attempts to study the mechanism of their action are few. In addition, the optimal doses, frequency of administration, the best combinations and methods of their administration have not been

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sufficiently clarified. In this regard, the issue of widespread industrial use of estrogens remains controversial. Taking this into account, we carried out experiments to determine the growth effect of EDP in different doses on young pullets. In this case, we paid special attention to clarifying the relationship between changes in height and weight of animals.

Due to the fact that the considered problem of the use of estrogens in poultry farming has not been removed from the agenda, and also taking into account its practical importance, we conducted experiments to determine the peculiarities of the action of the steroid estrogen EDP in different doses on growing poultry for a comparative assessment of this action with the results established on animals other types.

2 Materials and methods

For the experiment, 28 hens of 3.5-4 months of age of the White Russian breed were selected. The experiments were carried out in a vivarium at the Department of Pharmacology and Toxicology of the Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnology.

The rabbits were received from the university's vivarium, and were also raised themselves in the department's vivarium. Poultry for the experiments was purchased and delivered to the Agalyk poultry farm in the Samarkand region.

Before the experiment, the birds were generally monitored for 10 days to record their health status and feed consumption. After this, the birds were individually weighed and examined for health and condition.

In order to test different doses and frequency of EDP administration, the pullets were divided into seven groups using the analog method. The birds in all groups were under the same conditions of care, maintenance and feeding. The diet was compiled according to the standards of the feeding department of the Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnology. During the day, the birds were fed three times and provided with water ad libitum. The temperature and humidity in the room during the experimental period were within the prescribed norm. Before the start of the experiment, the weight of the animals was determined. During the experiment, the live weight of the pullets was determined every tenth day.

In the experiments, the drug estradiol dipropionate was used in an oil solution, packaged as a 0.1% solution in 1 ml ampoules containing 1 mg (10,000 units) of EDP. The drug was administered intramuscularly on the left side of the chest from minimally effective to toxic doses. If it was necessary to administer small doses of the drug, the initial solution was diluted with sterile apricot oil. Doses of EDP, frequency of injections and intervals between injections are given in Table 1. The chickens were under the experiment for 40 days.

Table 1. Scheme of experiments.

No. groups	Quantity birds	EDP dose (IED/ h)		Multiplicity introduction	Intervals between injections (days)
1	4	Control		-	-
2	4	0.3		1	At the beginning of the experiment
3	4	0.3		5	5 days
4	4	2		1	At the beginning of the experiment
5	4	2		5	5 days
6	4	5 mg	On the bird	2	15 days
7	4	10 mg		2	1 day

Thus, when using EDP according to the scheme (Table 1), during the entire experimental period, each chicken received EDP in the following quantities: the second

group (average weight before the experiment was 1148.5 g) - 344.6 IU, the third (average weight 1008.7 g) - 1513.0 MED, fourth (average weight 1090 g) - 2180 MED, fifth (average weight 1120 g) - 11200 MED, sixth (average weight 935.0 g) - 100,000 MED and the seventh group (average weight before experiment 1020.0 g) - 200,000 MED. Throughout the entire experimental period, the general condition of the bird, appetite, behavior and other indicators were systematically monitored.

3 Results

3.1 The influence of EDP on the general condition of chickens

In the control group, throughout the entire experimental period, no noticeable deviations from the physiological norm were observed in all birds. Over the course of 40 days, the chickens of this group, as a rule, were vigorous, responded normally to external stimuli, had a good appetite, and their feather cover remained specifically shiny.

When EDP was administered at a dose of 0.3 IU/g once (second group), the drug did not cause any changes in the general condition of the pullets. After using EDP at a dose of 0.3 IU/g five times at intervals of 5 days after 3-5 injections (by the 10-15th day of the experiment), the chickens showed slightly greater mobility and a slight increase in the reaction to external stimuli.

Chickens of the fourth (EDP were injected once at a dose of 2 IED/g) and fifth groups (the drug was used five times at a dose of g) by the 4-7 th day of the experiment became more active, cheerful and mobile, their appetite increased. This condition, as well as the increased sensitivity of the birds, continued in the fourth group until the 7-10 th day, and in the fifth group until the 15-25 th day of the experiment. During this period, the poultry's growth and development significantly increased, the chickens were well-fed, their appetite noticeably improved (the crop was constantly full), and they were more mobile. The feather cover became more shiny (especially in hens of the fifth group), and the down became velvety.

When using EDP at a dose of 2 IED/h five times (fifth group), the hens' sexual activity intensified to some extent, they became restless, "groomed" and began to squeal to cover each other. After the specified period, the described signs of behavior in the chickens gradually disappeared and they became more balanced, and some of them moved less by the end of the experimental period, although they willingly responded to external stimuli; their appetite was good until the end of the experiment.

When EDP was administered at a dose of 10 mg per bird (sixth group), chickens became more mobile and restless from the very first days of the experimental period (on the 2-3rd day after the first injection of EDP at a dose of 5 mg). Their appetite increased significantly. By the 12-15th day of the experiment, they became even more active; due to increased sexual activity, attempts at "courtship" and pugnacity were noted. Such signs continued almost until the 25-30th day of the experimental period. In the second half of the experiment, i.e. Since the second injection of EDP, the birds' appetite has noticeably decreased. By the end of the experimental period, the birds became less active and their behavior more balanced. Water intake has increased. In all hens, the cloaca was enlarged, and the feces were mostly liquid. One hen first developed yellow spots on her feathers, then ruffled feathers, and until the end of the experiment she experienced general weakness.

After injection of EDP at a dose of 20 mg per bird (seventh group), the chickens were more alert, active and restless during the first 5-10 days of the experimental period. Vivid signs of increased sexual activity appeared: they became more pugnacious, noisy and often sought to "cover" one another. This state persisted until the 10-15th day of the experimental

period. Then the behavior of the birds changed sharply: weakness developed, the chickens became lethargic, inactive, often sat with a ruffled appearance, and their appetite worsened. By the second half of the experimental period, all hens had expanded the cloaca, one of them had a prolapse (prolapse) of the rectum and developed conjunctivitis, one of them, when taking blood (30th day of the experiment), had a fracture of the left wing, which indicated an increase fragility of bones (this was confirmed at the end of the experimental period during deboning of carcasses). In another chicken, at the end of the experimental period, a sharp general depression, limited mobility, and relaxation of the ligamentous apparatus were noted (when cutting the carcasses of killed chickens, this chicken was diagnosed with yolk peritonitis).

The chickens of this (seventh) group were noticeably lagging behind in growth and development. Their feathers became dull and ruffled. The pullets showed almost no resistance when catching them. A change in the elasticity of the skin was established: the skin became more tender and loose, feathers were plucked more easily than in control chickens. The fecal matter is liquid, the fluff around the cloaca is contaminated with feces.

3.2 Effect of EDP on the growth of birds

As already noted, every 10 days of the experimental period, chickens from all groups were individually weighed. The obtained data are shown in Tables 2 and 3 .

In the control (first group), the average weight gain per hen over the entire experimental period (40 days) was 396.6 ± 17.02 g. The same stability of weight gain throughout the entire experimental period was observed in hens when using EDP at a dose of 0.3 IED/h once, although in the end the weight gain in this experimental group was less than in the control group. The average weight gain per bird during the experimental period in this group was $387.5 + 22.72$ g, which is 9.1 g, or 230% lower, than in the control group. From the data in Table 26 it is clear that in the above two groups the growth of birds during all decades of the experimental period was almost the same, i.e. the growth rates did not differ at the beginning (the first decade) and at the end of the experimental period (the last fourth decade).

Table 2. Dynamics of live weight of chickens under the influence of EDP.

No. groups	Dose EDP (IED/h)	Multiplicity Enter nia	Average live weight of chickens (h) by day experience				Weight gain (h)	Attitude In control		Dosto-loyalty _ At P= 0.05	
			Before experience	10 d	20 d	30 d		40 d	%		(G)
1	Control		1138.4 _	1234.4 96.0	1338.4 _ 99.0	1431.4 98.0	1535.0 103.6	396.6±17.02	100.00	-	-
2	0.3 _	1	1148.5	1245.5 97.0	1353.7 108.2	1440.0 86.3	1536.0 96.0	387.5±22.72	97.70	-9.1	P >0.05
3	0.3	5	1008.7	1111.7 103.0	1230.0 118.3	1320.0 90.0	1421.3 101.3	412.6±23.16	104.03	+16.0	P >0.05
4	2	1	1090.0	1214.0 124.0	1345.7 131.7	1417.5 71.8	1510.3 92.8	420.3±1972	105.98	+23.7	P >0.05
5	2	5	1120.0	1260.0 140.0	1412.0 152.0	1557.5 145.5	1634.7 77.2	514.7±15.06	129.61	+118.1	P <0.02
6	5 mg	2	935.0	1086.2 151.2	1248.2 162.0	1318.0 69.8	1363.3 45.3	428.3±17.77	107.99	+31.7	P >0.05
7	10 mg	2	1020.0	1176.5 156.5	1255.0 78.5	1280.5 25.5	1335.5 55.0	315.5±7.59	79.55	-81.1	P <0.05

When using EDP at a dose of 0.3 IED/h five times at intervals of 5 days (third group), chickens for 40 days on average gave $412.6 + 23.16$ g of weight gain per bird, which is 16 g or 4, 03% more than in control. A slight stimulation of pullet weight gain was noted only in the second decade (the weight gain was 19.3 g, or 19.49% more than in the control), and in the remaining decades there were almost identical weight gains in hens of the experimental and control groups as a result of natural growth (Tables 2 and 3).

When using EDP at a dose of 2.0 IED/h once (fourth group) in chickens throughout the entire experimental period, the average weight gain per bird was 420.3 ± 19.72 g, which is 23.7 g, or 5.98% more than in the control group. In this group, in four decades, the weight gain was from the first to the fourth, respectively: 29.5; 31.3; 17.1; 22.1%. From the data in Table 3 it is clear that good stimulation of bird growth compared to the control occurred in the first and second decades, when the increase was 28 g, or 29.17%, and 32.7 g, or 33.03%, respectively, more than in the same periods in the control group. In the third decade, the growth rate of chickens decreased noticeably (26.2 g, or 26.73% less than in the control), and almost equaled the control in the last, fourth decade.

The established difference in the growth of chickens compared to the control turned out to be statically unreliable.

Of all the experimental groups, the most indicative of bird growth were chickens with five injections of EDP at a dose of 2 IED (fifth group). The average weight gain per bird by the end of the experimental period was 514.7 ± 15.06 g (the weight gain per ten days was 27.2, 29.5, 28.3 and 15.0%, respectively). This figure is 118.1 g or 29.61% more than in the control group. The resulting difference in weight gain of this group is statistically significant - $P < 0.02$ ($t=5.19$, which is closer to $P = 0.01$). The maximum weight gain with a large difference was established in the first three decades: in the first decade it was 44.02, or 45.83%, in the second - by 53.0 or 53.54% and in the third decade - by 47.5 g, or 48.47% more than in the same decades of the control group. In the last, fourth decade, the bird's growth decreased noticeably (it was 26.4 g or 25.48% less than in the control). In this group, the last injection of EDP was carried out on the 20th day of the experiment; its stimulating effect on growth occurred until the 30th day of the experiment, i.e. the beneficial effect of the drug on the organ of growing chickens continued for another 10 days after its last administration (Table 3).

Table 3. TableCaption.

No. groups	Average live weight of chickens at the beginning of the experiment (head)	Difference in weight gain of experimental chickens compared to control by days of experiment																The average live weight of the chicken at the end of experiment (head)	A total (head)		
		10-d				20-d				30-d				40-d							
		Increase		Decrease		Increase		Decrease		Increase		Decrease		Increase		Decrease					
		R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%				
1	1138.4	96.0	-	-	-	99.0	-	-	-	98.0	-	-	-	103.6	-	-	-	1535.0	396.6 ± 17.02		
2	1148.5	97.0	1.0	1.04	-	108.2	9.2	9.29	-	86.3	-	-	11.7	11.94	96.0	-	7.6	7.34	1536.0	387.5 ± 22.72	
3	1008.7	103.0	7.0	7.29	-	118.3	19.3	19.49	-	90.0	-	-	8.0	8.16	101.3	-	2.3	2.22	1421.3	412.6 ± 23.16	
4	1090.0	124.0	28.0	29.17	-	131.7	32.7	33.03	-	71.8	-	-	26.2	26.73	92.8	-	10.8	10.42	1510.3	420.6 ± 19.72	
5	1120.0	140.0	44.0	45.83	-	152.0	53.0	53.54	-	145.5	47.5	48.47	-	77.2	-	-	26.4	25.48	1634.7	514.7 ± 15.06	
6	935.0	151.2	55.2	57.50	-	162.0	63.0	63.64	-	69.8	-	-	28.2	28.78	45.3	-	58.3	56.27	1363.3	428.3 ± 17.77	
7	1020.0	156.5	60.5	63.02	-	78.5	-	-	20.5	20.7	25.5	-	-	72.5	73.98	55.0	-	48.6	46.91	1335.5	315.5 ± 7.59

When injecting EDP at a total dose of 10 mg per seat (group), the weight gain in pullets during the experimental period was 420.131.7 g, which is 31.7 g (7.99%) more than the weight gain of birds in the control group. The data obtained over ten days (see Table 2) indicate that the growth rate of chickens fluctuated significantly.

Large growth rates of hens in the first two decades (35.3 and 37.7%, respectively), during which the birds gained weight by 55.2 g, or 57.5%, and 63.0 g, 63.64%, respectively, more than in the control group chickens. In the third and fourth decades, there was a significant decline in bird growth (gain was 16.3 and 10.5%, respectively); the average weight gain of chickens was 28.2 g, or 26.70% and 58.3 g, or 56.27% , respectively, less than in the control. The chickens of this group received the last (second) injection of EDP (two 5 mg doses) on the 15th day of the experiment, and the stimulating drug for the growth and development of birds continued for only the first 20 days (two decades); Subsequently, the effect of the drug on the body led to inhibition of bird growth.

Obviously, the first injection was favorable for the growth of the bird, while the second caused a noticeable depression in the rate of weight gain of the bird.

The established difference between the control group in the growth of birds (an increase of 7.99%) in the sixth group is statistically insignificant ($P > 0.05$, $t = 1.88$).

Of all the groups, the hens of the seventh experimental group had the least weight gain, which received 20 mg of EDP per bird over the entire period of the experiment. The chickens of this group during the entire experimental period gave 315.5 + 7.59 g of weight gain, which compared to the control is 79.55%, i.e. less by 81.1 g or 20.45%. The difference with the control (decrease) in the growth of birds of the seventh group is statistically significant $P < 0.05$ ($t = 4.35$, i.e. closer to $P = 0.02$).

In this group, different fluctuations in bird growth were noted. In the first ten days, the greatest stimulation of growth occurred (gain was 49.6%), where the average gain of chickens was 60.5 g, or 63.02% more than in the control and in any other experimental group during this period. Starting from the second decade, the growth rate of chickens decreased sharply, and the weight gain in the last three decades was respectively: 24.9; 8.1 and 17.4%. In the second decade, the growth of chickens was less by 20.5 g (20.71%), in the third - 72.5 g (73.98%) and in the fourth decade - by 48.6 g (46.91%) than in control. Thus, starting from the second decade, inhibition of bird growth was registered. The maximum decrease in the rate of weight gain was noted in the third decade. Therefore, EDP at a dose of 20 mg per bird adversely affects the growth and development of the bird. Judging by the data on changes in the growth of chickens over time (see Tables 2 and 3), in all experimental groups in the first ten days there was a natural increase in growth: the higher the dose of EDP, the greater the growth of the bird. The same pattern existed in the second decade, with the only exception being the seventh group, where a sharp decline in growth rates was noted.

In the third decade, the growth rate of chickens in almost all experimental groups decreased significantly, and only at a dose of 2 IED/h five times (fifth group) did a noticeable gain in chickens remain compared to the control. In the fourth decade, the growth rates of experimental chickens had large fluctuations and were reduced relative to the control group.

4 Discussion

According to the literature, it is known that estrogenic drugs (including EDP) are active substances and act in different directions. Even in small doses they strongly influence the organs of the female reproductive system, and in higher doses they also have a significant effect on the non-male reproductive system; when they are used, there are significant changes in the functional states and other physiological systems. But there is still very little data in the literature regarding the elucidation of this or that effect of EDP on the animal body; information about other estrogens cannot be fully used for EDP, since it, as an esterified (prolonged) steroid estrogen, has a slow and long-lasting effect.

Considering the importance of the above tasks, we undertook a study of the pharmacological action of EDP.

The relevance of our chosen topic was determined by the fact that recently estrogenic drugs with a steroid structure (natural hormones and their derivatives) have often been used in practice, since they are safe compared to synthetic estrogens and have almost no side effects.

Some estrogens are used to speed up and fatten animals. In this regard, it was considered appropriate to check whether EDP has a growth effect; experiments were carried out on young chickens. They were used in different doses, with different frequency

of administration. The birds' growth rates, general condition, development of internal organs, and skin condition were taken into account.

Experiments have shown that EDP in small doses (0.3 mg once) does not cause any significant changes in the general behavior of pullets. From repeated injections of small doses and from a single injection of medium doses (2 IED/h), mobility increases, sensitivity is activated by external irritation, and the general condition and fatness of chickens improves. With repeated injections of medium doses, some anxiety and activation of sexual reflexes are sometimes noted, but these phenomena do not adversely affect the growth and development of growing experimental animals.

With large doses (20 mg), during the first 5-10 days the gait becomes very mobile and restless; their sexual reflexes and sensitivity to external irritations sharply increase. After this, the chickens soon become stiff and immobile, their reaction to external irritations worsens, their appetite decreases, redness and yellowness of the conjunctiva are often noted, the ligamentous apparatus relaxes, general weakness develops, and the bird is significantly retarded in growth and development. The feather cover becomes dull and ruffled.

In small doses, EDP does not have a significant effect on the growth and development of birds, but in medium doses it significantly stimulates their growth rate. The most beneficial dose is 5 mg per bird (increase in weight gain over 40 days by 12.4%, growth by 28.8%).

A study of the effect of EDP on the growth and development of birds shows that the growth-accelerating effect of EDP mainly manifests itself in the first 20-30 days from the start of drug administration, and then slows down somewhat.

Large doses of EDP (20 mg per bird) significantly inhibit the growth and development of birds (by 40 days the growth retardation is not 19-20.45%). Medium doses of EDP not only accelerate the growth and development of chickens, but also increase the deposition of fat in the body of the bird. There is a lot of it in the internal organs. deposited in the muscle tissue of the chest, even more in muscle tissue.

5 Conclusion

- EDP is a substance that actively influences the general condition, behavior, appetite, fatness, egg production, growth and development of pullets. Changes in all these directions manifest themselves differently depending on the dose and frequency of administration of the drug.
- EDP in small doses (0.3 IED/h below) does not cause any significant changes in the general behavior of pullets. From repeated injections of small doses and from a single injection of medium doses (2 IED/h and above), mobility increases, sensitivity to external stimuli is activated, and the general condition, appetite and fatness of chickens improves. With repeated injections of medium doses, some anxiety and activation of sexual reflexes are sometimes noted, but this phenomenon negatively affects the growth and development of growing pullets. With large doses (20 mg), during the first 5-10 days the pullets become very mobile and restless; their sexual reflexes and sensitivity to external irritations sharply increase, their appetite decreases, redness and yellowness of the conjunctiva are often noted, the ligamentous apparatus relaxes, general weakness develops, and the bird is significantly retarded in growth and development. The feather cover becomes dull and ruffled.
- The effect of the drug on poultry weight gain is significantly affected. In small doses, EDP does not have a significant effect on the growth and development of pullets, but in medium doses it significantly stimulates their growth rate. The most favorable dose is 5 mg per bird (increase in weight gain over 40 days by 12.4%), five-time administration

of 2 IED/h (increase in weight gain by 23.1-29.61%), or 1 mg EDP in combination with 10 mg progesterone (increase by 28.3%). A study of the effect of EDP on the growth and development of birds shows that the growth-accelerating effect of EDP mainly manifests itself in the first 20-30 days from the start of drug administration, and then slows down somewhat. Large doses of EDP (20 mg per bird) significantly inhibit the growth and development of birds (in 40 days they are stunted by 19.7 - 20.45%).

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