INFLUENCE OF "OVOCAP" IN THE LAYING CAPACITY OF MALLARD (ANAS PLATYRRHYNCHOS)

ВЛИЯНИЕ НА "OVOCAP" ВЪРХУ НОСЛИВОСТТА НА ДИВАТА ПАТИЦА (ANAS PLATYRRHYNCHOS)

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ABSTRACT

The effect of OVOCAP preparation (based on capsaicin of Capsicum annuum) was tested on native mallards (Anas platyrrhynchos) reproduced on a farm and settled in various areas at a definite age. Treatment of the experimental mallards following a prescribed scheme has caused significant increase of the laying intensity – by 17,7 units above the control, as well as decrease of the forage consumption per egg.

KEY WORDS: capsaicin, OVOCAP, mallards, laying capacity.

РЕЗЮМЕ

Изпитано е действието на препарата OVOCAP (базиран на алкалоида capsaicin от червения пипер) върху фермено размножаваните и разселвани на определена възраст по различни местообитания диви патици (Anas platyrrhynchos). Третирането на опитните патици по определена схема е довело до съществено повишаване на интензивността на снасяне – със 17,7 пункта над контролните, а също и до снижаване на разхода на фураж за едно яйце.

КЛЮЧОВИ ДУМИ: capsaicin, OVOCAP, диви патици, носливост

РАЗШИРЕНО РЕЗЮМЕ

Дивата патица (Anas platyrrhynchos) за България е постоянна и прелетна птица [1], като зимата броят и достига до 200 000 екземпляра [2]. Зеленоглавката е прародител на домашната патица (Anas domestica) [3]. Освен грижата за поддържане равновесието в природата дивата патица (Anas platyrrhinchos) е и ловен обект, има вкусно месо, което още повече засилва интереса към търсене на средства за реализиране на репродуктивния й потенциал.

Целта на изследването е да се провери въздействието на OVOCAP върху носливостта при дивата патица (Anas platyrrhynchos) с оглед стимулиране на репродуктивността и на други видове птици.

Опитът беше проведен в базата на Ловно-рибарски съюз край гр. Костенец върху 1000 млади патици: контролна група – 580 женски и 215 мъжки и опитна група – 150 женски и 55 мъжки: полово съотношение (ж:м) – 2,7:1; отглеждане – във волиери, с достъп до воден басейн с непрекъснато постъпване на прясна течаща вода, целогодишно изложени на атмосферните условия. Навес има само на мястото, определено за хранене; хранене – със стандартни заводски смески; третиране – per os с фуража по 0,7 ml средно на глава, в два последователни дни, с интервал на третиранията през 28 дни в рамките на репродуктивния сезон.

Първо третиране – на 14 и 15 Февруари.

Основните продуктивни и репродуктивни показатели – определени по методиките за селскостопански птици [4]: носливостта – по броя на снесените яйца за репродуктивния период; интензивността на снасяне – по броя на снесените яйца за отделни периоди и като цяло за опитния период, в %. Яйцата се събираха и брояха ежедневно. Носливостта се отчиташе от пронасяне до приключване на опита.

От получените резултати се вижда, че активните съставки на препарата OVOCAP стимулират интензивността на снасяне при опитните патици с около 17,7 пункта над тяхните контроли. Тоест дивата патица (Anas platyrrhynchos) реагира в по-силна степен на въздействието на препарата в сравнение с ловния фазан, където интензивността на снасяне е повишена с 5 до 7 пункта [6]; домашната кокошка – с 8 пункта [8] и домашната пуйка – с 3,3 пункта [9]. По високата носливост при дивата патица и останалите диви и домашни видове птици се дължи вероятно, както на установената функционална хиперемия на по-голямата част на яйцепровода (яйчника и различните генерации яйцеклетки се откриват непроменени [7], така и на по-високата смилаемост на аминокиселините на фуража [8], което на свой ред обяснява и по-ниския разход на фураж за едно яйце.

Екологичният препарат OVOCAP приложен per os с фуража води до повишаване на носливостта при фермено отглежданите диви патици (Anas platyrrhynchos), като ефектът се засилва след второто третиране.

Разхода на фураж за едно яйце е значително снижен, което се дължи на по-високата продуктивност на третираните с OVOCAP птици.

INTRODUCTION

OVOCAP is an ecological preparation (plant additive) based on the natural capsaicinoides of Capsicum annuum [5]. Capsaicin applied locally stimulated libido sexualis in women-volunteers, in aged men and men impotent on a psychogenetic basis (U.S. patent № 6039951, 2000) [14]. In an isolated rat womb capsaicin has caused transitory inhibition of the spontaneous contractions [18]. The excretion of the lutenizing (LH) and follicle-stimulating (FSH) hormone in rats has been tested [11]. Traurig et al. [11] followed out a normal period of pregnancy and a normal number of delivered young rats after neonatal treatment of the mothers. After prenatal treatment Perfumi and Sparapassi [15] did not establish characteristics of toxicity in the mother-rats and their progeny.

In experiments with poultry, capsaicin led to decreasing the cholesterol in the eggs [13]. The histological studies of domestic hens showed activation of the gladular epithelium and functional mucous hyperemia of the bigger part of the oviduct and strong blood supply of the vessels in the mucous propria of the stomach and intestines, activation of the integumentum and especially the gland epithelium of those organs, as well as of the surface glands of the stomach and the intestines [7]. The latter was probably the reason for the detected higher digestibility of the amino acids in experiments with geese [8] by methods modified by Penkov et al. [10], as well as for the higher laying capacity in the pheasants for hunting, domestic hens and domestic turkeys [9, 12].

Mallard (Anas platyrrhynchos) is a permanent and migratory bird [1] for Bulgaria, reaching up to 200 000 representatives in winter [2]. Mallard is a predecessor of the domestic duck (Anas domestica), [3]. Along with contributing to the preservation of the balance in nature, mallard (Anas platyrrhinchos) is also an object of hunting, having delicious meat that still more increases the interest in finding means of realizing its reproduction potential.

The aim of the study was to test the effect of OVOCAP on laying capacity of mallard (Anas platyrrhynchos) with the intention of stimulating the reproduction of other bird species.

MATERIAL AND METHODS

The experiment was conducted on the site of the Union of Hunters and Fishermen near the town of Kostenets, with 1000 young mallards: a control group of 580 females and 215 males, and, an experimental group of 150 females and 55 males, the sexual ratio of females to males being 2,7 : 1 (the sex ratio was equal in all groups). The fowls were raised volitionally, having an access to water ponds with constant flow of fresh running water and exposed to the atmospheric conditions throughout the year. The only shelter was put at the feeding place. The fowls were fed on standard enterprise mixture; the treatment applied per os with the forage by 0,7 ml per capita in average in two consecutive days with a 28-day interval between the treatments in the frames of the reproductive season [5]. Fist treatment was carried out on 14 and 15 February.

The major productive and reproductive indices were defined by the methods applicable for agricultural poultry [4], as follows: laying capacity – according to the number of eggs laid during the reproduction period; laying intensity – according to the eggs laid during separate periods and for the experimental period as a whole, in %. The eggs were daily collected and counted. Laying capacity was reported from the beginning of laying until the end of the experiment.

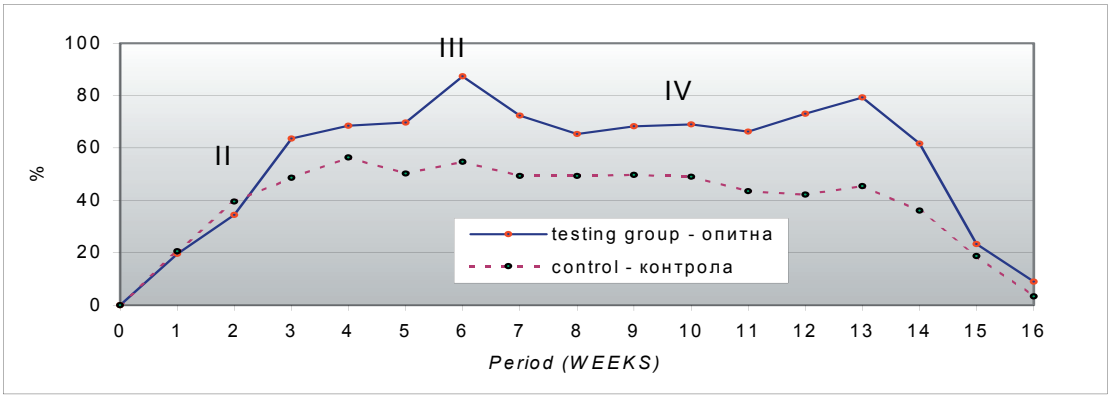

Figure 1. Laying intensity in mallard (Anas platyrrhynchos)

Table 1: Results from the experiment with mallard (Anas platyrrhynchos)

Indexes	Groups	
	Tested	Control
1. Tested in the experiment (n):		
- female	150	580
- male	55	215
2. Sex ratio	2,7:1	2,7:1
3. Mortality, %	1,5	1,6
4. Total eggs:	9622	26288
from commencement duck	64	45
- from forage duck	64,8	45,7
5. Feed conversion for 1 egg for 108- days layer cycle (with the fodder for the male):		
in g	218	308
in%	70,8	100

Table 1: Results from the experiment with mallard (Anas platyrrhynchos)

Period (week)	Eggs from commencement duck: Daily $\bar{X} \pm S\bar{X}$		Difference	For the period			Laying intensity		Reletion: tested to contr.
				Test	Contr.	To the contr			
	Tested group	Control group					Test	Contr.	%
I	0.196 ± 0.047**	0.205 ± 0.047**	-0.009	1.4	1.4		19.6	20.6	95
II	0.345 ± 0.042***	0.396 ± 0.019***	-0.005	2.4	2.8	-0.4	34.5	39.6	87
III	0.636 ± 0.015***	0.485 ± 0.023***	+0.151***	4.5	3.4	+1.1	63.6	48.6	131
IV	0.685 ± 0.021***	0.538 ± 0.009***	+0.147***	4.8	3.8	+1	68.5	56.4	127
V	0.692 ± 0.038***	0.501 ± 0.013***	+0.191***	4.9	3.5	+1.4	69.7	50.3	138
VI	0.862 ± 0.007***	0.544 ± 0.08***	+0.318***	6	3.8	+2.2	87.4	54.7	160
VII	0.714 ± 0.022***	0.494 ± 0.013***	+0.220***	5	3.4	+1.6	72.4	49.7	146
VIII	0.644 ± 0.018***	0.489 ± 0.015***	+0.155***	4.5	3.4	+1.1	65.3	49.3	132
IX	0.674 ± 0.024***	0.493 ± 0.012***	+0.182***	4.7	3.4	+1.3	68.3	49.7	137
X	0.681 ± 0.017***	0.483 ± 0.017***	+0.198***	4.8	3.4	+1.4	69	49	141
XI	0.654 ± 0.011***	0.429 ± 0.08***	+0.226***	4.6	3	+1.6	66.3	43.5	153
XII	0.721 ± 0.013***	0.416 ± 0.05***	+0.305***	5.1	2.9	+2.2	73.1	42.2	173
XIII	0.783 ± 0.08***	0.448 ± 0.014***	+0.335***	5.5	3.1	+2.4	79.3	45.5	174
XIV	0.609 ± 0.028***	0.355 ± 0.023***	+0.253***	4.3	2.5	+1.8	61.7	36.1	171
XV	0.230 ± 0.032***	0.184 ± 0.033**	+0.046	1.6	1.3	+0.3	23.3	18.8	124
XVI	0.089 ± 0.018**	0.033 ± 0.002***	+0.056**	0.3	0.1	+0.2	9	3.4	270
Total	0.594 ± 0.020***	0.420 ± 0.013***	+0.174***	64	45	+19	60	42.3	142

RESULTS AND DISCUSSION

The results presented on Table 1 show that from initial mallard 64 and 45 eggs were obtained by each fowl from the experimental and the control group, respectively, i.e. 19 eggs more were laid by each experimental mallard. Similar difference was also detected in egg production by forage (average) mallard: 64,8 and 45,7 eggs in average for the experimental and the control group, respectively (Table 2).

The daily laying capacity after the second week followed a tendency of continuous increase in both groups, however, significant differences being observed between them: in the sixth week 0,862 ±0,007 eggs were obtained daily by an experimental mallard versus 0,544 ±0,080 eggs by a control one; in the twelfth week - 0,721 ±0,013 versus 0,416 ±0,050 eggs, in the thirteenth week - 0,783 ±0,080 and 0,448 ±0,014 eggs, respectively. The differences were highly significant ($p \leq 0,001$), for the periods mentioned being 0,318; 0,305 and 0,335, respectively, in favour of the experimental fowl.

At the end of the reproductive season, at the end of the experiment, respectively, the differences between the experimental and the control mallards significantly decreased, although they still remained statistically significant ($p \leq 0,01$).

0,594 ± 0,020 eggs in average were obtained daily by the experimental mallards versus 0,420 ± 0,013 eggs by the control, thus high statistical significance of 0,174 eggs ($p \leq 0,001$) being observed.

Laying capacity of the experimental fowl was 142 % compared to the control, in the peak (sixth week of the laying season) reaching up to 160 % and in the last quarter of the experiment – up to 171-174 %.

The laying intensity for the whole laying season in average was by 17,7 percentage units higher for the experimental group compared to the control one, i.e. 60 % versus 42,3 %, respectively (Table 2). The experimental group reached up to 87,4 % laying intensity during the peak, which was by 31 units above the control (56,4%). Laying intensity is presented graphically in Figure 1.

Although the experimental group as a whole manifested higher laying capacity compared to the control, in some periods (weeks) of the laying season some negative tendencies were observed. In the days of the first and second week the experimental group displayed statistically insignificant lower laying capacity.

A careful analysis showed that the depression in laying capacity coincided with the third and the fourth weeks after the first treatment. As it was carried out on 14 and 15 February, i.e. about 2 weeks before the beginning of laying, and the first and the second week of the laying season were in the period from 1 to 15 March, it means that those were exactly the third and the fourth week after treatment. After that period, the end of which coincided with the second treatment, a tendency of increased laying capacity in comparison with the control followed.

Points II; III and IV in Figure 1 show the period of

the second, the third and the fourth treatment of the experimental group. After the second treatment, point II – the end of the second and the beginning of the third week – an abrupt increase of the laying intensity was reported. Laying capacity of the control fowl also increased but not to such a degree.

Until the 28th day after the last treatment, at the end of the tenth and the beginning of the eleventh week of the laying season, the experimental mallards manifested much higher values in laying intensity compared to the control ones. However more treatments had not been planned and after the fourteenth week the laying intensity fell down very abruptly. That moment coincided with the end of the reproductive season of mallards, still the experimental fowls manifested significantly higher ($p \leq 0,01$) laying capacity in comparison with the control fowls until the end of the experiment – the sixteenth week. It means that 42 days after the last treatment there were significant differences between the treated and the untreated mallards.

During the experiment significant differences concerning mortality were not observed. From the experimental and from the control group the mallards that died were 1,5 % and 1,6 %, respectively (Table 1).

Forage consumption per obtained egg was almost 30 % lower in the experimental fowls - 218 g versus 308 g for the control ones (Table 1). It should be noted that for both groups the consumption was high due to the low sexual ratio of 2,7 : 1 (female : male mallards).

The results obtained showed that the active ingredients of OVOCAP stimulated the laying intensity of the experimental birds by about 17,7 units in comparison with the control. Mallards (Anas platyrrhynchos) reacted to a greater degree to the effect of the preparation than the hunting pheasants, for which the laying intensity was increased by 5 to 7 units [6]; for domestic hen – by 8 [8] and for domestic turkeys – by 3,3 [12]. The higher laying capacity of mallards and of the rest of the wild and domestic bird species was probably due to the established functional hyperemia of the bigger part of the oviduct (the ovary and the different generations of ovuli remained the same), [6], as well as to the better digestibility of the amino acids in the forage [8] that explained the lower forage consumption per egg.

CONCLUSIONS

The ecological preparation OVOCAP applied per os with the forage increased the laying capacity of mallards (Anas platyrrhynchos) raised on a farm, the effect being further speeded up after the second treatment.

Forage consumption per egg was significantly reduced due to the higher productivity of the birds treated with OVOCAP.

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DISCUSSION

The derived equation of limit state of water balance equilibrium proved, that the characteristics of Planck's radiant constants C_1 and C_2 have much wider effect and can be used as operators which, in this case, limit values of individual quantities of water balance. We managed to prove clearly, that a key problem on Earth mainland consists in insufficient transpiration as a controlling quantity of water balance, on which the other quantities are depended. Particularly notable is a ratio regulation expressed by the relation:

$$\frac{hstr}{hsp} = \left(\frac{hsev}{hso}\right)^2$$

It enables to calculate individual quantities of water balance. Using the principle of symmetry and invariance it has been proved, that the state of limit water balance equilibrium is invariant, presents its maximal stability and enables comparison with the present state of water balance in global scale as well as on individual catchments. The deficits, evaluated in comparison of the present and the limit balance then proved, that water balance on Earth mainland is disturbed and needs to increase the influence of the controlling quantity – transpiration by 11.31 thousand km^3, that is by 25.73 % as compared with equilibrium state. Similarly, in underground water supplies, above 7 thousand km^3 water lack.

A very interesting situation becomes evident in water balance on the studied catchments. Comparison of two decades in time length of fifty years showed, that the volume of precipitation decreased by 22 mm. Consequently, also quantities of water balance decreased, but in both decades the water balance equilibrium is disturbed. Similarly, on the other streams, evaporation enormously prevails transpiration, which results in all cases in high runoff, which prevails the volume of underground waters. Calculations, which we realized on Volyňka and Blanice catchments at groundwater body saturation (state, which we characterized as a relative water balance equilibrium - Rb) (table 4) then proved, that (as a result of groundwater body saturation) the deficit of all quantities decreases substantially in comparison with normal measured 10 year average. On Blanice, hstr is even quite well balanced. This state was

Symbols and indications used in the work

Použité symboly a označení

Symbol	Meaning	Význam
P	catchment area in km^2 or ha	plocha povodí v km^2 nebo v ha
C_1	characteristic of the 1st radiant Planck's constant 3.74	1. vyzařovací charakteristika konstanty Planckovy 3,74
C_2	characteristic of the 2nd radiant Planck's constant 1.4388	2. vyzařovací charakteristika konstanty Planckovy 1,4388
k	characteristic of the Boltzman constant 1.380	charakteristika Boltzmannovy konstanty 1,380
hs	precipitation quantity in mm	množství srážek v mm
hsevtr	evapotranspiration in mm	celkový výpar (evapotranspirace) v mm
hstr	transpiration in mm	transpirace v mm
hsev	evaporation in mm	evaporace v mm
hsp	underground waters in mm	podpovrchové vody v mm
hso	runoff in mm	odtok v mm
q	discharge in estuary of water streams in m^3.s^{-1}	průtok v ústí vodních toků v m^3.s^{-1}
Rb	relative water balance	relativní vodní bilance
Mb	state of limit equilibrium of water balance	mezní stav rovnováhy vodní bilance
h	characteristic of universal Planck's constant 6.624	charakteristika univerzální konstanty Planckovy 6,624
c	velocity of light 2.9979 . 10^8 m.s^{-1}	rychlost světla 2,9979 . 10^8 m.s^{-1}