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INFLUENCE OF PHOTOPERIODIC INTERVALS ON BIOCHEMICAL AND REPRODUCTION TRAITS IN BROILER RABBITS POPULATIONS

Rafay, J.

Research Institute of Animal Production, Hlohovská 2, Czecho-Slovakia

Introduction

Seasonal system of reproduction developed in the course of evolution in wild populations of multiparous animals with short generation interval. Populations in which the seasonal reproduction activity changed to round-the-year one were created by means of gradual domestication and subsequent selection for production purposes. However, there exists practical proof of seasonal influence which decrease reproduction efficiency in commercial herds.

It is methodically complicated to determine the extent of influence of external factors on biological traits of the individual and population influenced with cross adaptations. In climatic conditions of temperate zone changes the natural length of light-phase of day during the year within the span of 33 % circadian cycle.It is possible to compare reactions of animals kept in evoked photoregimes with reactions in natural light conditions and to determine the share of light percepts in excitation of hypothalamus and pituitary complex, endocrine glands and other regulation systems which influence vital functions of organism.

Marked interest in intensive rabbit rearing during the last year initiated more detailed study of zootechnical conditions which increase meat efficiency of rabbits. The greater part of concentrated rabbit herds is projected for round-the-year operation with the possibility to regulate microclimatic factors of the environment for the economic reasons. Hitherto practical experience of breeders give evidence of great differences in reproduction in autumn and winter months compared with spring and summer periods of the year. Therefore are the problems of photoregime influence upon the rabbit very interesting because of practical applications and theoretical contributions.

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Materials and Methods

Population of the New Zealand White rabbit was divided into two groups with 25 females and 5 males at the age of 6 months in each group. Animals were kept in all-mesh cages in semi-air-conditioned hall with ad libitum pelleted fodder mixture feeding. First group of animals was situated in breeding hall which was isolated from daylight. The hall was illuminated by filament lamps in such a way that the lowest intensity of lighting was 8 lux on the bottom of cage. Regulation of illumination made it possible that the total length of light percepts in animals was 16 hours in this group. The rest of the cycle (8 hours) spent the animals in total darkness. The second group of animals was situated in the part of hall with daylight and the natural intervals corresponded approximately to 48° n.l. Experiment began on 21.September and animals were mated within 5 days since the begin of experiment. Samples of venous blood were taken after four months for determination of biochemical traits (total lipids, total proteins, cholesterol, triglycerides, ALT, AST, LDH, glucose), and they were evaluated together with reproduction records (size of the first three litters, conception in the first three matings). Basic variance and statistical values were supplied with tests of mean differences significance (t-test).

Results and Discussion

Tab. 1 gives low mean and standard deviation of observed biochemical traits in blood of rabbits of both groups. In regard to high natural variability of these traits within the population is the observed variability the concequence of homogeneous choice of animals, of their good clinical state, and of balanced production environment. With the exception of concentration of total lipids were all mean differences between the trial and control group significant or highly significant. We noticed higher concentrations of cholesterol, triglycerids, AST, LDH and glucose in the group with regulated light phase.

Total proteins in blood have many important functions to which belong their presence in regulation of osmotic pressure, pH and balance of electrolytes in blood, and together with total lipids, cholesterol and triglycerides they are important signs of function of metabolism.

Enzymes from the group of transaminases catalyze the metabolic reactions of amino acids.

The level of glucose in blood represents flexible sign of energetic metabolism.

The nuclei of hypothalamus together with sympathetic nerves and corticosteroid hormones regulate its release to peripheric blood system.

The traits of reproduction efficiency (Tab.2) were observed in addition. It is clear from results the difference between average size of successive litters in both groups is insignificant. However, in all cases were litters of higher size observed in the group with regulated lighting programme. Similarly showed the evaluation of mating success there was higher share of pregnant females noticed in the experimental group.

In conclusion is stated that in determined methodic conditions the length of light phase of day influences highly significantly the concentrations and activities of chosen biochemical traits, and it rises insignificantly the basic traits of reproduction.

Table 1

Means, standard deviation and significance of means difference of biochemical traits

trait	unit	photoregime (n=25) x ± s	control (n=25) x ± s	d^t
Total proteins	$(g.l^{-1})$	49.40± 5.42	53.04± 3.56	-3.64^+
Total lipids	$(g.l^{-1})$	2.25± 0.39	3.13± 0.48	0.12^-
Cholesterol	$(mmol.l^{-1})$	4.66± 0.64	4.03± 0.30	0.63^+
Triglycerids	$(mmol.l^{-1}$	2.61± 0.40	2.06± 0.25	0.56^+
ALT	$(nkat.l^{-1})$	356.32±21.12	555.36±26.39	-199.04^+
AST	$(nkat.l^{-1}$	406.20±41.47	355.08±14.28	51.12^+
LDH	$(nkat.l^{-1}$	49.16± 6.07	30.00± 2.27	19.16^+
Glucose	$(g.l^{-1})$	10.76± 2.01	7.80± 1.58	2.96^+

Table 2

Means, standard deviation and significance of means differences of reproduction traits

trait	photoregime (n = 22) x ± s	control (n = 21) x ± s	d^t
conception rate			
after 1^{st} mating	5.92±2.49	5.12±3.09	0.80^-
after 2^{nd} mating	6.60±2.66	5.28±3.20	1.32^-
after 3^{rd} mating	5.84±2.38	4.96±2.94	0.88^-
size of 1^{st} litter	79.5	70.2	9.3
size of 2^{nd} litter	81.0	75.8	5.2
size of 3^{rd} litter	80.7	74.9	5.8