

EFFECTS OF SOME FEED ADDITIVES ON THE HEAT TOLERANCE OF GOOSE

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ABSTRACT

The aim of this experiment was to find out the viability of alleviating the effects of stress caused by hot summer weather with the help of adding vitamin C, vitamin D₃ and sodium bicarbonate to the feed of geese.

The egg production parameters were not altered significantly by adding vitamin C but the hatching results were improved upon ($P \leq 0,5\%$), and the production became more balanced.

The supplementation only with sodium bicarbonate was not effective. Using sodium bicarbonate together with vitamin D₃ the number of eggs/layers increased ($P \leq 0,5\%$) and the egg production was more balanced. The feed supplementation with sodium bicarbonate and vitamin D₃ did not alter the geese's hatching rate and the number of goslings.

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INTRODUCTION

In Hungary most of the goose stock are kept on free range. The areas of goose run are rarely shady so the birds suffer badly from the heat during the heat wave.

Propagation is one of the most important characteristic values in goose husbandry because it determines the efficiency of the production. The factors that characterise the propagation are: the number of eggs, fertility and hatchability (Bögre, 1981; Bogenfürst, 1992). The egg production is determined by five basic factors: persistency, intensity, lack of long break periods, hatching, and the early start of production (Pálffy, 1980; Bogenfürst, 1992). According to the heredity values these factors are mainly determined by outside effects, such as stress, heat stress.

The consequences of stress caused by high environmental temperature are manifolds in the domestic fowls. These are the decreased egg production (Ota,

1966; Miller and Sunde, 1975), the reduced fertility and hatchability (Avanzi and Mori, 1983), smaller eggs (Kohne and Jones, 1975 ; Molnár, 1990), thin and fragile egg shell (de Andrade et al., 1977; Molnár, 1989), increased susceptibility to diseases and increased mortality (Ross Breeders Ltd., 1980). According to our previous experiments the egg production, the fertility of geese did not reduce under tropical conditions (Molnár, 1989)

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Ascorbic acid acts as an electron donor in the hydroxylation reactions used in the biosyntheses of corticosteroids and catecholamines in the adrenal glands. Differential stressors (heat, cold, trauma, noise etc.) activate the system of hypothalamus-hypophysis-adrenal cortex which results increase in the secretion of corticotropin releasing factor (CRF), adrenocorticotrop hormone (ACTH) and glucocorticoids. The increased ACTH secretion causes decreasing in the ascorbic acid content in the cortex of adrenal gland (Wells and Wight, 1983). Therefore under heat stress we can compensate the missing ascorbic acid with adding surplus vitamin C and so help the geese to maintain the egg production in hot summer days.

Vitamin-D₃ regulates calcium and phosphorus metabolism, it facilitates their absorption and mobilisation. Therefore it exerts effect on eggshell quality and on the hatching results (Bogenfürst, 1992).

In the course of thermal panting the level of HCO₃⁻ decreases in blood serum so there is not enough CO₃²⁻ for the forming of strong eggshell. Feeding sodium bicarbonate (replacement of part of the supplemental dietary NaCl with NaHCO₃) may well improve the egg shell thickness

MATERIAL AND METHODS

The experiment was carried out on a southern Hungarian goose farm. Six groups of liver-type geese (Kunlúd) participated in the experiment. They were in free range keeping. There were no shaded area on the court of group III. the 20% of the courtyard was shaded in the group I. and II., 25% and 30% of the court was shaded in group V. and IV., respectively. Each group had the same synchronisation program for the laying period. The geese began to lay in June and July (Table 1.) and they terminated it in the second part of November.

The air temperature was very high during the laying period (Figure 1.)

In the experiment we compared the production parameters of group I and II with the data of group III because these groups began to lay at the same time and for this reason the group IV was compared with the group V.

The feed of group I., II., and IV were supplied with feed additives. Groups III and V. served as control groups (Table 1.).

Table 1. Scheme of experiment

Group	Population (bird)		Start of laying period	Used additives		
	Layer	Gander		+200 mg vit. C/ kg feed	+500 NE vitamin D ₃ / kg feed	2,5 g sodium bicarbonate/ kg feed
I.	280	114	12. 07. 2000.	–	–	+
II.	210	40	05. 07. 2000.	–	+	+
III.	320	100	05. 07. 2000.	–	–	–
IV.	310	100	15. 06. 2000.	+	–	–
V.	280	60	15. 06. 2000.	–	–	–

During the experiment the following parameters were collected: daily maximum and minimum air temperature in the poultry house, and on the courtyard; the daily and the total egg production, data of fertility and hatchability, egg weight and other egg parameters. We didn't collect the feed consumption because of the large-scale technology. The feed consumption of the groups was 280-310 g daily in the hot period.

The calculations were made by Microsoft Excel for Windows. The data of the production, of the intensity and of the hatching were graphed and fitted, then χ^2 test was applied for fitting (Kérékgyártó et al., 1998). For homogeneity the equation of Füstös et al. (1989) was used.

RESULTS AND DISCUSSION

After the synchronisation the groups began the laying period at the expected date. The feed additives did not alter the start and the length of the egg production period.

Trial with vitamin C

Comparing the results of group IV. (with vitamin C) with the results of group V. we can see that the extra vitamin C exercise a positive influence on the production performance of geese (Table 2.). The layers in the group IV. produced more eggs and the hatching rate was significantly higher, than in the control group (V.) all the laying period (Figure 2). Therefore the laying geese, which could intake more vitamin C had more goslings than the control ones (21 and 13, respectively) during the hot summer time (Figure 3.).

The curve of production showed fluctuation in both groups, but these fluctuations were smaller in the group IV. (with vitamin C) than in the group V. and the production itself was more balanced with using vitamin C (Figure 1).

The average weight of eggs was smaller in the group IV., than in the V.

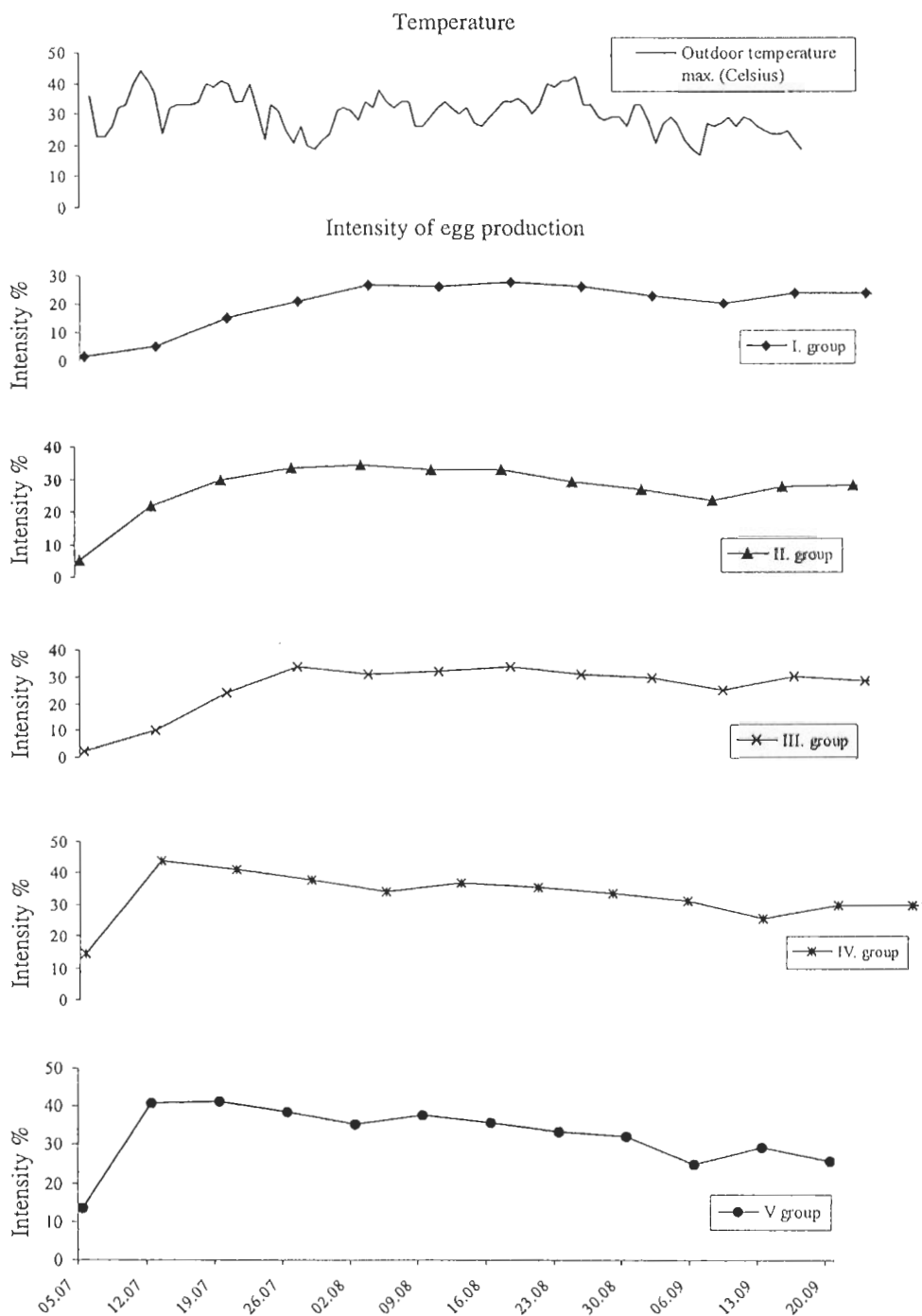


Figure 1. Intensity of egg production

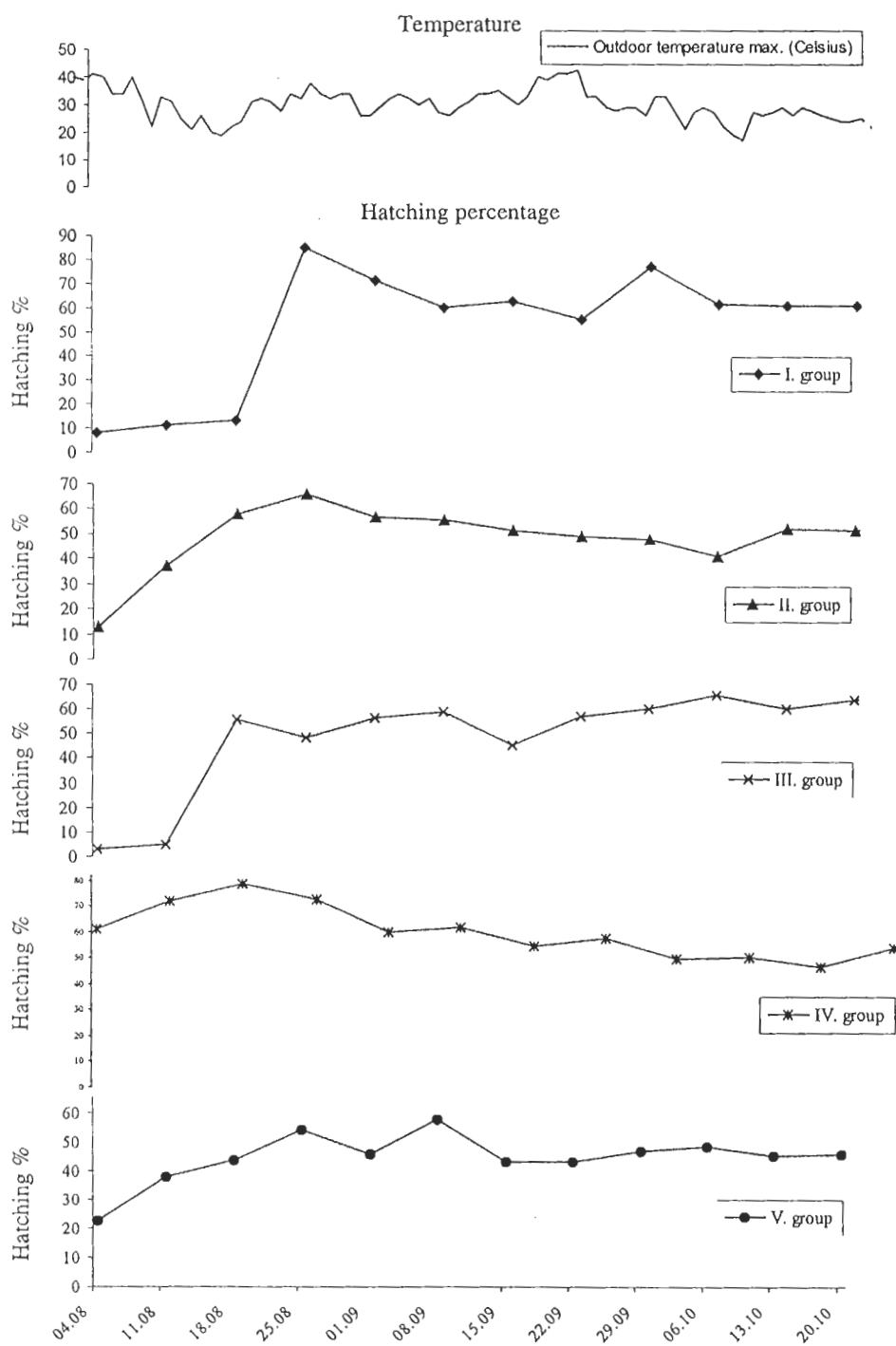


Figure 2. Hatching percentage

Table 2. Effect of different feed additives on the production of laying geese during the summer laying period

Group	I.	II.	III.	IV.	V.
Used feed additive*	Sodium bicarbonate	Vitamin D ₃ + Sodium bicarbonate	–	Vitamin C	–
Average daily feed consumption (g/goose)	300	300	300	300	300
Sex ratio (Gander/layers)	1/3	1/5	1/3	1/3	1/5
Total egg production	9 798	10 078	13 958	15 495	13 399
Eggs/layer	35 **	48 **	44	50	48
Intensity of egg production (%)	23	29	29	32	31
Fertility (%)	74	62	73	69	60
Hatching rate (%)	57 **	50 **	53	60 **	46
Goslings/layer	16	15	17	21**	13
Aver. egg weight (g)	179,7	182,1	189,7	174,6	180,8

* doses in Table 1.

** $P \leq 0,5\%$

Trial with sodium bicarbonate and vitamin D₃

The geese of group I (sodium bicarbonate) began to lay two weeks later than the II (sodium bicarbonate + vitamin D₃) and the control (III). This fact should have been played an important part in the total egg production.

The number of eggs/layer was less significantly ($P \leq 0,5\%$) in the group I (sodium bicarbonate) but it was higher ($P \leq 0,5\%$) in the group II (sodium bicarbonate + vitamin D₃) than in the control group. The egg production was more balanced in the group II because the fluctuation of the air temperature did not affect the laying curve so much (*Figure 1.*).

The feed supplementation with sodium bicarbonate and vitamin D₃ did not alter the geese's hatching rate and the number of goslings (*Figure 2., 3.*).

The results of egg weight did not support our idea, namely the egg weight, and the weight of eggshell increase by using sodium bicarbonate and vitamin D₃.

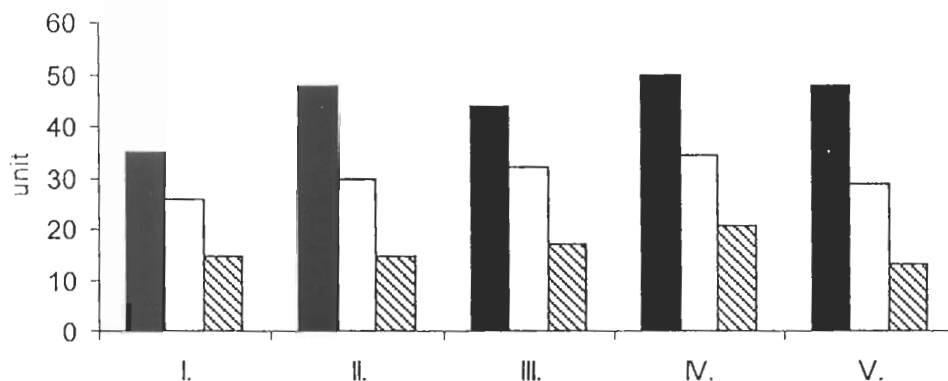


Figure 3. Effect of different feed additives on the egg-, fertile egg-, gosling production of laying geese during the summer laying period

According to the data of production and of hatching we can suggest to supplement with vitamin C and sodium bicarbonate together with vitamin D₃ the laying geese's feed during the hot summer to avoid or to decrease some negative effect of heat stress.

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