

THE EFFECT OF SYNTHETIC SOUND ON THE SPEED OF THE HATCHING AND THE MORTALITY OF CHICKEN DURING INCUBATION

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In the work the influence of synthetic sound stimulation during incubation on the speed of the hatching as well as on their mortality during that period was observed. In the experiment, the Ross hybrid chicken set eggs were used. They were hatched in two hatcheries. The eggs of the first hatchery (control groups "Ka", "Kb", "Kc") were not sound stimulated. In the other hatchery the set eggs were stimulated by the "knocking" sound from an electronic sound generator (experimental groups "a", "b", "c"). For the stimulation, the sound with intensity 15–30 dB and frequency 4–10 Hz was applied from the eighteenth day of incubation. The beginning of beakclapping (490.00 ± 4.12 hours), the whole group beakclapping time (9.25 ± 3.68 hours) and the whole group hatching time (499.25 ± 3.68 hours) were shortest in the experimental group "a". Also in the other experimental groups "b" and "c", with sound stimulation the beginning of beakclapping, beakclapping time and hatching time were shorter when compared with respective control groups without sound stimulation. The highest hatchability ($95.83 \pm 1.21\%$) was observed in the experimental group "b". The synthetic sound did not have any negative effect on the hatching process.

sound stimulation; synthetic sound; chicken; hatching; mortality

INTRODUCTION

Beakclapping is the first instinct that birds show. The number of sound signal produced by birds at beakclapping has been exactly determined. The problems of the application of a sound stimulation of the bird embryos was discussed by several authors which in experiments, with the influence of a sound stimulation on chicken hatching, used varied time for beginning of a stimulation. Martin and Mooses (1995) observed the influence of a sound stimulation on chicken embryo in the first three days of incubation.

Glazev (1990) started stimulation after 18.5 days of incubation. Veterány et al. (1998) started stimulation after the 19th day of incubation, Vince and Toosey (1980) after the 20th day of incubation. The usual way of stimulation was to use the tape recorders with recorded signal of mothers calling her youngs for food or the sound of the youngs themselves. Some experiments showed that the youngs from the sound stimulated embryos beakclap from the eggs faster and their yolk sac gets absorbed faster as well, which decreases the number of infectious diseases (Šliškovič, 1984). The aim of our experiment was to determine the influence of the artificial sound stimulation from an adjustable electronic generator on chicken embryo - ROSS breed.

MATERIAL AND METHOD

The fattening type chicken hybrid Ross set eggs of the parental group aged 33–48 weeks were used in the experiment. The three weight groups were created. Each group contained 860 set eggs. Total number of tested eggs was 2580. The set eggs were hatched in the two BIOS MIDI SEDLČANY type hatcheries with the capacity of 336 eggs. In the first hatchery, control groups (Ka, Kb, Kc) with no sound stimulation were hatched, while in the second hatchery the sound stimulated experimental groups (a, b, c) were hatched. The loudspeakers of an electronic sound generator were placed into the hatchery on the eighteenth day of incubation. At the time of their placement into the hatchery the loudspeakers were producing the “knocking” sound with the intensity 15 dB and frequency 10 Hz. On the nineteenth day of incubation the electronic sound generator was set on the 20 dB of intensity and frequency 7 Hz, on the twentieth day the loudspeakers were producing sound with the 25 dB of intensity and 5 Hz of frequency and, on the twenty first day of incubation the set eggs were stimulated by a synthetic sound with the intensity 30 dB and frequency 4 Hz. Incubation of control and experimental groups took place during the same time in all experiments. During hatching the following data were observed in the sixty-minute intervals: the beginning of beakclapping, the whole group beakclapping time, the whole group hatching time, hatchability as well as embryonic mortality.

The results given in the tables are based on five experiments. They served for the calculation of basic variative-statistical indicators. The differences between experimental and control groups as well as between experimental and control groups themselves were tested by the Student *t*-test.

I. Indicators of chicken eggs hatching

Indicators	Units	Ka 1st control group	a 1st experimental group	Kb 2nd control group	b 2nd experimental group	Kc 3rd control group	c 3rd experimental group
Weight of eggs	gram	50–58	50–58	59–66	59–66	67–74	67–74
Number of incubated eggs	pieces	430	430	430	430	430	430
Average number of incubated eggs per experiment	pieces	86 ± 3.15	86 ± 3.15	86 ± 3.15	86 ± 3.15	86 ± 3.15	86 ± 3.15
Beginning of beakclapping	hours	502.50 ± 1.94	490.00 ± 4.12 ^{++Kaa}	501.25 ± 1.86	495.25 ± 3.88 ^{++Kbb}	500.50 ± 1.32	498.00 ± 3.57
All group beakclapping time	hours	11.75 ± 0.40	9.25 ± 1.45 ^{++Kaa}	13.75 ± 0.74	11.25 ± 1.23 ^{++Kbb}	12.75 ± 1.13	11.75 ± 0.43
Hatching time	hours	513.75 ± 1.28	499.25 ± 3.68 ^{++Kaa}	515.00 ± 0.68	506.50 ± 4.32 ^{++Kbb}	513.25 ± 2.04	509.75 ± 2.68 ^{++ac}
Hatchability	percentage	91.31 ± 1.83	91.80 ± 1.95	93.44 ± 1.76	95.83 ± 1.21	91.01 ± 3.15	95.78 ± 0.94

⁺ *P* < 0.05; ⁺⁺ *P* < 0.01

II. Indicators of mortality at chicken hatching

Indicators	Units	Ka 1st control group	a 1st experimental group	Kb 2nd control group	b 2nd experimental group	Kc 3rd control group	c 3rd experimental group
Infertile eggs	percentage	3.47 ± 0.48	3.41 ± 1.86	1.41 ± 1.78	1.43 ± 0.89	2.32 ± 1.25	1.42 ± 0.45 ^{+ac}
Dead embryos with developed yolk sac blood circulation	percentage	1.97 ± 1.12	0.00 ^{+Kaa}	0.26 ± 0.43 ^{+Kakb}	1.42 ± 0.97 ^{+ab}	1.20 ± 1.92	0.33 ± 0.62
Dead embryos with alanto- chorionic blood circulation	percentage	0.54 ± 0.61	1.73 ± 1.12	2.48 ± 2.05	0.60 ± 0.60	2.55 ± 1.02 ^{+Kakc}	0.26 ± 0.52 ^{+Kcc}
Dead embryos with udragged yolk sac	percentage	1.30 ± 0.95	0.51 ± 0.98	1.78 ± 1.98	0.41 ± 1.15	1.14 ± 0.92	0.88 ± 1.71
Dead embryos in the reverse position	percentage	0.84 ± 1.11	1.38 ± 1.23	0.58 ± 0.62	0.31 ± 0.48	0.88 ± 1.02	0.45 ± 0.51 ^{+bc}
Dead embryos in the irregular position	percentage	0.28 ± 0.62	0.87 ± 0.91	0.00	0.00	0.60 ± 0.54	0.58 ± 0.41
Prolapse of cerebrum	percentage	0.29 ± 0.93	0.31 ± 1.12	0.21 ± 0.43	0.00	0.29 ± 0.60	0.33 ± 0.29

+ $P < 0.05$

RESULTS AND DISCUSSION

The total results of the experiment with sound stimulation indicate that the chicken first started to beakclap after 490.00 ± 4.12 hours in the experimental group "a", in which the set eggs weighting 50–58 g were applied (Table I). The whole group beakclapping time (9.25 ± 3.68 hours) and the whole group hatching time (499.25 ± 3.68 hours) were the shortest in this group as well. The differences were evident ($P < 0.01$) when compared with control group "Ka", without sound stimulation, in which chicken started to beakclap after 502.50 ± 1.94 hours, the whole group beakclapping time took 11.75 ± 0.40 hours and chicken were hatched only after 513.75 ± 1.28 hours of incubation. Also in the other two experimental groups with sound stimulation, "b" with the set eggs weight of 59–66 g and "c" with the set eggs weight 67–74 g, the beakclapping started sooner (after 495.25 ± 3.88 and 498.00 ± 3.57 , respectively). The whole group beakclapping time (11.25 ± 1.23 and 11.75 ± 0.43 , respectively) as well as the whole group hatching time (506.50 ± 4.32 and 509.85 ± 2.68 hours of incubation) were shorter when compared with respective control groups "Kb" and "Kc". These results correspond with the results reported by Glazev (1990) and Veterány et al. (1998). With the artificial sound stimulation the hatching process began sooner with the set eggs with lower weight (50–58 g) than with the set eggs with higher weight (59–66 g and 67–74 g). This is caused by the fact that in the higher weight set eggs the distribution of individual egg components is changed in favour of the white and shell (Burley, Vadehra, 1989), what results, in our opinion, in the greater sound isolation of the embryo and thus weaker perceptivity to the stimulating sound coming from an electronic sound generator. On the other hand, in the groups with no sound stimulation ("Ka", "Kb", "Kc") the time of hatching was very similar for all weight groups, the chicken from the heavier set eggs hatched, though, a little bit sooner than the other ones. This is confirmed also by the results of Smirnov et al. (1997), Wilson (1991), and Burke (1992).

In the experiments no marked embryonic mortality in the case of the higher weight set eggs was observed, what contradicts the findings of Robinson et al. (1988). Since no decisive differences in the embryonic mortality between the experimental and control groups were observed (Table II), it can be inferred that in this experiment the artificial sound stimulation had a negative impact neither on the embryonic mortality, nor on the hatching of the insufficiently developed chickens. The highest hatchability ($95.83 \pm 1.21\%$) was observed in the experimental group "b", while the lowest hatchability was ($91.01 \pm 3.15\%$) in the control group "Kc".

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VETERÁNY, L. – HLUCHÝ, S. – WEIS, J. (Slovenská poľnohospodárska univerzita, Nitra, Slovenská republika):

Účinok syntetického zvuku na rýchlosť liahnutia a úmrtnosť kurčiat počas inkubácie.

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V práci sme sledovali vplyv stimulácie syntetickým zvukom na rýchlosť liahnutia a úmrtnosť kurčiat počas inkubácie. Pre pokus sme použili násadové vajcia sliepok hybridu ROSS, ktoré sme inkubovali v dvoch liahňach. Vajcia v prvej liahni (kontrolné skupiny „Ka“, „Kb“, „Kc“) neboli zvukovo stimulované. V druhej liahni vajcia boli stimulované „klopkavým“ zvukom z elektronického generátora (pokusné skupiny „a“, „b“, „c“). Na stimuláciu sme použili zvuk s intenzitou 15-30 dB a frekvenciou 4-10 Hz, pričom sme embryá kurčiat stimulovali od 18. dňa inkubácie. Začiatok kľuvania (po 490,00 ± 4,12 hodín), čas kľuvania (9,25 ± 3,68 hodín) a liahnutie (499,25 ± 3,68 hodín) boli najkratšie v pokusnej skupine „a“. Taktiež v druhých

dvoch pokusných skupinách „b“ a „c“ bol pozorovaný skorší začiatok kľuvania, čas kľuvania a liahnutia v porovnaní s príslušnými kontrolnými skupinami. Najvyššia liahnivosť (95,83 ± 1,21 %) bola pozorovaná v pokusnej skupine „b“. Syntetický zvuk nepôsobil negatívne na liahnutie sa kurčiat.

zvuková stimulácia; syntetický zvuk; kurča; liahnutie; úmrtnosť

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