

Alternative methods for reducing heat stress in the practice of lake integrated table duck production

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Abstract

The research aims to develop an alternative, nature-like table duck production system, which supports the production of trade marks supplying for the highest consumers' demand. Further purpose was to develop effective feeding management and technology methods in order to avoid heat stress, to analyze the effects of tested methods on the production parameters of 49 and 70 days raised birds.

Introduction

Due to the general climate change of the Earth, the Hungarian climate has become extremely continental. In accordance to such trend, very hot, drought-like summers and long, cold winters were registered in the last 15, especially in the last 5 years. In the forthcoming decades, the similar extreme climate conditions will affect our animal breeding sector, as well.

The European and Hungarian agricultural sectors have been seriously touched by the series of long spells of hot weather.

In 2003, the loss of the Hungarian poultry breeders and processing industry was close to 20 billion HUF (approx. 74 million €). The deficit was generated by the persistent hot weather via decreasing the live weight gain of poultry.

The dog-days of summer and the long-lasting cold in winter encumber physiologically the free range stocks (duck and geese) and the non-temperature-conditioned stable raised stocks, as well, causing production losses. The direct effect of permanent low level feed consumption of poultry is the decrease in weight gain (10 -15 %).

Materials and methods

In the experiments duck raising technology of Szarvasi Kacsafarm Ltd., Hungary was applied. Choosing the heat stress protective methods, feeding behaviour of ducks was considered, namely, however, ducks fed *ad libitum* eat preferably in the early and late hours of the day. In addition, effects of using (A) shading devices, (B) heat conditioning and (C) twice-a-day feeding on the parameters of traditional and extended table duck production (raising till the age of 49 and 70 days) were analysed. In the experiments, hybrid *K94 Szarvas* was used, in 1:1 sex ratio. The raising process was divided into two sections: starter and finisher phases. The control groups in all experiments were fed *ad libitum* starter and finisher feeds. The pellet diameter of the control starter and the finisher feeds were 2 mm, 3mm respectively. The starter phase lasted in raising day 49 till the ducks have ingested 1 kg starter feed (till age of 12 days), while in the group of 70 days raising it lasted until birds had taken 2 kg of the same feed (till age of 18 – 20 days).

Scheme of experiment 1. (21- 49 days of age)

Groups	Treatment	Number of birds
<i>K (control)</i>	<i>Traditional</i>	<i>2 x 150</i>
<i>A</i>	<i>Shading device provided</i>	<i>2 x 150</i>
<i>B</i>	<i>Heat conditioned birds</i>	<i>2 x 150</i>
<i>C</i>	<i>Twice-a-day feeding</i>	<i>2 x 150</i>
<i>D</i>	<i>Shading device provided + twice a day feeding</i>	<i>2 x 150</i>

During the starter phase, traditional conditioning raising technology was applied, while in the finisher period access to lake was integrated. The research has included two experiments; from day 21 till day 49 (experiment 1.), respectively from day 21 till day 70 (experiment 2.). Both experiments were integrated with access to lake.

Scheme of experiment 2. (21- 70 days of age)

Groups	Treatment	Number of birds
<i>K (control)</i>	<i>Traditional</i>	<i>2 x 150</i>
<i>A</i>	<i>Shading device provided</i>	<i>2 x 150</i>
<i>C</i>	<i>Twice-a-day feeding</i>	<i>2 x 150</i>
<i>D</i>	<i>Shading device provided + twice-a-day feeding</i>	<i>2 x 150</i>

During the experiment periods daily temperatures were 30 -37 C° without any considerable rains.

The use of *shading device*: From the age of day 21 a semi-roofed shade device were provided, the density underneath the shade device was 5 ducks/m².

Twice-a-day feeding: within the post-raising period the feeders were open for one hour twice a day; between 7-8 in the morning and between 7-8 in the evening, respectively. Excluding these two periods of the day, no feed was provided.

Heat conditioning: 4 days old ducklings were kept on 37 C° for 24 hours, with relative humidity of 65%, other conditions were *ad libitum* feed and water supply, persistent lighting regime. Heat conditioning of the ducklings was executed according to published Israeli heat conditioning method, developed for other poultry species.

Results

Experiment 1.

The control group was found to had the least feed consumption, the obtained slaughtering weight was the least in this group compared to the control one, as well. The control birds spent most of the time on water, hardly visited the feeders during the day. These birds ate the most at dawn.

While using *shading device*, production parameters have increased; the cumulated feed intake 4%, slaughtering weight 16% and feed conversion 108 %. Disadvantage of this technology might be the high investment required, in certain conditions it is even impossible to implement.

The *heat conditioning*, applied from age of 4 days has generated 7,1% higher live weight and 4% higher cumulated feed conversion rate in contrast with the control, but in the last two weeks of raising the weight gain has been retained, due to 4% drop in cumulated feed conversion rate in comparison with the control.

Twice-a-day feeding resulted in 19,6% higher slaughtering weight by the age day 49, than that of the control group. These treated birds took 13,3% more feed, while the cumulated feed conversion rate was 5,8 % better, than the control ducks. Birds were flocking at the feeding sites as the twice-a-day feeding periods were approaching. In contrast to duck feeding behaviour of visiting the water after having two – three mouthful of feed, such ducks went to the water after having five – six swallows.

Combining *shading device* and *twice-a-day feeding* has generated the best slaughtering weight by the age of day 49, however cumulated feed intake was 1,8 % less, than it was within the single *twice-a-day feeding* technology. Cumulated feed conversion rate was 9,6% less, than in the control, but 2,3% higher, than it was in single *shading device* application.

Group weighing did not make the biometric evaluations possible.

Experiment 2.

Experiment 2 has been done within the period of 21-70 days of age.

Single application of shading device increased feed intake by 2,8 %, generated 5 % higher slaughtering weight, than in control group. In accordance to such parameters, cumulated feed conversion rate of ducks has increased with 2,1 %.

2,9 % higher feed intake was registered due to the applied *twice-a-day feeding*, nevertheless at the age of 70 days live weight was 11,3% higher as compared to the control group, resulting 7,7% less feed conversion rate.

The combined application of *shading device* and *twice-a-day feeding* had significant increasing effect on production parameters. These ducks had 5,45% more feed intake, cumulated feed conversion rate was decreased with 8,8%, slaughtering weight at 70 days of age was 17,8% higher, than the same parameters in the control group.

Conclusion

The results of the experiments show that the analysed nature-like methods have considerable effect on the avoidance of heat stress. The application of *shading devices*, during hot summer within the technology of lake integrated table duck production till 49 and 70 days of age, as well, has ameliorate the effect on feed intake, slaughtering weight and feed conversion.

Considering the feeding behaviour of ducks, as they preferably eat in the early and late hours of the day instead of daytime hours, is also an effective method for avoiding negative effects of heat stress. Setting the *twice-a-day feeding* method into production made slaughtering weight considerably increased and feed conversion rate decreased in comparison with *ad libitum* feeding. Its disadvantage is that feeders have to be closable, the labour demand is higher, as well, than in *ad libitum* feeding systems. Further examinations are needed for harmonising the relation between stocks in production and the available size of feeders.

The combined application of the two methods – *shading device* + *twice-a-day feeding* – generated the best results in consideration raising ducks until the age 49 and 70 days, as well. Further calculations are needed for discovering how much of preference production would cover the occurred extra expenses. Within the Hungarian conditions, application of such methods is justified to be reasonable. Adaptation of them in production technology of other poultry species would be useful, as well.

Application of early-age-heat-conditioning has increased the production parameters of our experimental stocks until the age of 35 days, only. It is still to be discovered, why the method's effect is not persistent, while it is in other poultry species (chicken, goose). Adaptation of heat conditioning into duck production practice requires further analyses.

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