ISAH 2005 - Warsaw, Poland
Vol 2

STOCKING DENSITY-RELATED WELFARE OF BROILER CHICKENS OF TWO COMMERCIAL STRAINS

Ewa Sosnowka – Czajka, Iwona Skomorucha, Eugeniusz Herbut

Department of Technology, Ecology and Economics of Animal Production, National Research Institute of Animal Production, 32 – 083 Balice, Poland

Key words: welfare, stocking density, commercial strains, productivity, broiler chickens

Introduction

One of the characteristics of large commercial broiler operations is the stocking density of birds per 1 m^2 area and the choice of appropriate genetic material to ensure rapid attainment of required weight gains and the best feed conversion possible (Skomorucha et al., 2004; Sosnowka-Czajka et al., 2003; Poltowicz and Wezyk, 2001). The available commercial lines of broiler chickens show good productivity but are highly sensitive to adverse environmental conditions. The welfare of birds kept at high stocking densities, especially during the final weeks of rearing, has raised many objections (Martrenchar et al., 2000).

Therefore, the aim of the present study was to identify the effect of stocking density on the welfare of broiler chickens from two different commercial strains, as expressed by their productivity.

Material and methods

The experiment was carried out at the Experimental Station of the National Research Institute of Animal Production in Chorzelow with two commercial lines of Hybro G and Hybro PN broilers, approximately 8 000 birds per replication.

Chickens of each commercial line were assigned to one of 3 groups at a stocking rate of 15, 17 and 19 birds/m^2 of production area. Chickens were reared on litter to 42 days of age and fed on an *ad libitum* basis with standard diets.

During the trial, body weights and mortality were monitored once a week. The European Production Index (EPI) was calculated from the production data obtained.

The results were analyzed statistically using analysis of variance and differences were estimated using Duncan's multiple range test.

Results

In both the Hybro G and Hybro PN lines, body weights were the lowest (difference highly significantly) in the birds kept in groups at a density of 19 birds/m^2 compared to the

groups stocked at a density of 15 and 17 birds/m^2 (Tab. 1). The highest feed intake per kg weight gain was found for the Hybro G line in the group kept at a density of 15 birds/m^2, being highly significantly greater than in the other groups in which birds were kept at higher stocking rates per 1 m^2 (Tab. 1). In the second commercial line, the best feed conversion was found for birds from the group managed at the lowest density per 1 m^2. It was significantly lower compared to the group managed at a density of 17 birds/m^2 and highly significantly lower compared to the group kept at a density of 19 birds/m^2.

Comparison of the two commercial lines for mortality and EPI showed lower mortality and higher EPI index for Hybro G broilers at a density of 19 birds/m^2 compared to Hybro PN broilers.

Discussion

Increasing the stocking density of birds per 1 m^2 area should help to improve the economic results of rearing and reduce production costs (Sosnowka-Czajka et al., 2003), but quite frequently this is a stress factor that compromises animal welfare (Makowski et al., 2004). Sokolowicz and Poltowicz (2002) report that productivity may indicate the welfare level of poultry. In our study we observed the body weight of both Hybro G and Hybro PN chickens to decrease together with the increase in stocking density from 15 to 19 birds/m^2. This is confirmed by the results of many studies which found a significant effect of stocking density on the body weight of broilers (Reiter and Bessei, 2000; Sosnowka-Czajka et al., 2003; Makowski et al. 2004; Skomorucha et al., 2004). Increasing the stocking density from 15 to 19 birds/m^2 had a negative effect on feed conversion per kg weight gain in Hybro PN broilers and increased their mortality by 2.88% at the highest stocking density compared to the density of 15 birds/m^2. In the Hybro G broilers, feed utilization decreased with the increasing density, and the highest mortality was observed for chickens kept at the lowest stocking density. A statistically significant decrease in feed intake by broilers as the stocking density increased from 12 to 18 birds/m^2 was also reported by Skomorucha et al. (2004), whereas Scholtyssek and Gschwindt-Ensinger (1983) found feed intake to increase by 36 g when the stocking density was increased from 29 to 25 birds/1 m^2.

In the studies of Sosnowka-Czajka et al. (2001), the increased stocking density was accompanied by decreased EPI index, reaching at a density of 18 birds/m^2 the lowest value of 225 for Hybro G and 212 points for Arbor chickens. In our own study, the EPI index was observed to decrease together with increased stocking density only in Hybro PN birds. In the

commercial line Hybro G, the highest EPI value was obtained by chickens reared at a density of 17 birds/m^2, and the lowest by those managed at a density of 15 birds/m^2.

When comparing both commercial lines for productivity at the same stocking density per 1 m^2, it was observed that at the lowest density of 15 birds/m^2, Hybro PN broilers were characterized by the highest body weight, lower feed intake and lower mortality (difference highly significant). For higher stocking densities per 1 m^2, better production parameters were obtained by Hybro G birds, as reflected in the higher EPI index compared to Hybro PN birds.

Conclusion

Analysis of the results showed that increasing the stocking density from 15 to 19 birds/m^2 of floor area had a negative effect on the living comfort of Hybro PN broilers, which scored 71 fewer points for EPI than those kept at a density of 15 birds/m^2. Also compared with Hybro G birds, they were characterized by poorer productive results at the highest stocking density per 1 m^2 area. It can thus be concluded that Hybro G broilers are more tolerant than Hybro PN birds to compromised welfare related to the stocking density per 1 m^2 area.

It must be pointed out, however, that with lower density of birds per 1 m^2 area, which ensures higher welfare levels, broiler chickens of the Hybro PN commercial line showed better productivity compared to Hybro G chickens.

References:

1. *Makowski W., Kleczek K., Murawska D. (2004): Effect of stocking density on the slaughter value of broiler chickens. Scientific Pedagogical Publishing, Ceske Budějovice 2004 r., 215 – 217.*
2. *Martrenchar A., Huonnic D., Cotte J. P., Boilletot E., Morisse J. P. (2000): Influence of stocking density, artificial dusk and group size on the perching behaviour of broilers. Brit. Poultry Sci., 41: 125 – 130.*
3. *Poltowicz K., Wezyk S. (2001): Wyniki produkcyjne oraz ocena wydajnosci rzeznej i jakosci miesa pieciu zestawow komercyjnych kurczat brojlerow. Wyniki Oceny Uzytkowosci Drobiu, IZ, 29: 69 – 80.*
4. *Reiter K., Bessei W. (2000): Einfluss der Besatzdichte bei Broilern auf die Temperatur in der Einstreu und Tierbereich. Arch. Geflügelk., 64: 204 – 206.*
5. *Scholtyssek S., Geschwindt – Ensinger B. (1983): Leistungsvermögen einschliesslich Befiederung und Belastbarkeit von Broilern bei unteriedlicher Besatzdichte in Bodenhaltung. Arch. Geflügelk., 47: 3 – 8.*
6. *Skomorucha I., Sosnowka – Czajka E., Herbut E. (2004): Effect of stocking density on production effects and welfare of broiler chickens. Ann. Anim. Sci., Suppl., 1: 129 – 131.*
7. *Sosnowka – Czajka E., Herbut E., Rychlik I., Poltowicz K. (2001): Wplyw obsady i genotypu na produkcyjnosc kurczat brojlerow. IX Sympozjum Drobiarskie „Rozwoj produkcji drobiarskiej oraz zadania sluzby weterynaryjnej w aspekcie integracji z Unia Europejska" Streszczenia referatow i doniesien, Polanica Zdroj, 7 – 9 09. 2001 r., 57 – 59.*
8. *Sosnowka – Czajka E., Herbut E., Skomorucha I. (2003): Wyniki odchowu kurczat brojlerow dwoch linii towarowych i oplacalnosc produkcji w zaleznosci od obsady. Rocz. Nauk. Zoot. Supl., 17: 557 – 560.*
9. *Sokolowicz Z., Poltowicz K. (2002): Effects of age and stocking density on layer welfare. Ann. Anim. Sci., Suppl., 1: 79 – 83.*

Tab. 1. Productivity of 42-day-old broiler chickens

Item	Hybro G			Hybro PN		
	Stocking density (birds/m^2)					
	15	17	19	15	17	19
Body weight (g)	2155 Aa X	2141 Ab X	2093 B X	2186 A Y	2067 B Y	1908 C Y
Feed intake per kg body weight (g)	1.65 A X	1.59 B x	1.58 B X	1.56 Bb Y	1.66 a y	1.69 Ab Y
Mortality (%)	3.92	1.73	2.55	2.30	1.52	5.18
EPI	298	315	307	327	292	256

a,b, A, B – significant differences within one commercial line

x,y, X, Y- significant differences within one stocking density

a,b, x,y – values marked with different letters differ significantly ($p \leq 0.05$)

A, B, X, Y - values marked with different letters differ highly significantly ($p \leq 0.01$)