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Performance of Some Productive Traits of Broiler Chickens as Affected by Different Landing in Closed Houses

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Abstract: The present study was conducted at Alatau-Kus Farm in Kazakhstan on broiler cross Ross-308 up to 42 days of age. Three different densities of planting 19, 21 and 23/m^2 were used. Body weights at different ages, livability percentages, carcass traits and chemical analysis of blood were estimated. The result showed that for closed system the density of 21/m was more efficient than other densities.

Key words: Closed system, body weight, livability, carcass traits, hematological parameters

INTRODUCTION

The purpose of broiler production is to obtain the maximum yield per unit area of poultry houses and labor at minimal cost. Bessei (2006) illustrated that stocking density is a key issue for the economical results of broilers production. He observed also that stocking density was ranged from <10 to >80 kg/m^2 floor space. Andrews (1972) reported highest stocking rates of >80 kg/m^2 in caged broilers. Shanawany (1988) and Grashorn and Kutritz tested maximum stocking densities of about 50 kg/m^2 in deep litter systems. There was no consistent trend of effect of stocking density on feed conversion rate (Bessei, 2006). Algers and Svedberg (1989) suggested that when stocking densities were from 10-35 kg/m^2 the incidence of dermatitis, leg problems and soiled plumage varied with humidity of the litter and ammonia concentration.

Many investigators obtained that in a large scale experiment with commercial farms using different strains, management systems and stocking densities, it was confirmed that the management condition such as litter quality, temperature, humidity and ammonia were more important than stocking density (Dawkins *et al*., 2004). Therefore, the present study was aimed to estimate changes in productivity of broilers chickens according to different stockings densities with estimating environmental conditions.

MATERIALS AND METHODS

The present experiment was conducted at Alatau-Kus Farm in Kazakhstan on broiler cross Ross-308 >42 days of age during 2012. Closed houses system was used at the previous farm. Three groups of broiler chickens with different densities of planting were used (Table 1).

The number of tested chicks per each group were 23240, 23280 and 23310 chicks for the first, second and third group, respectively. The birds of each group were housed in separated house thus, the effect of density on the environmental conditions within the house could be estimated. Birds in all houses were fed two diets the first one from 1-28 days of age and the second one from 29-42 days of age and birds fed *ad lib*. The composition of both diets were shown in Table 2.

The studied traits were body weight at different ages till slaughters age (42 days), heat tolerance traits (body temperature, respiration rate and pulse rate), livability rates at different ages and carcass traits from 100 birds from each house (dressing percentage, edible bone leans carcass percentages). Also, feed conversion (g Feed/g gain) for each house were calculated. Environmental conditions in each house (under the corresponding density) were recorded in order to determine the effect of birds density on moisture and ammonia concentration. Chemical blood analysis was estimated to obtain red and white blood cells and hemoglobin ratio. Data were statistically analyzed by using SPSS program.

Table 1: Scheme of broiler chickens densities

Ingredients	Planting density birds/m^2
1	19
2	21
3	23

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Table 2: The composition of experimental diets

Component	Diet 1 (From 1-28 days of age (kg))	Diet 2 (From 29-42 days of age (kg))
Corn	35.0	40.0
Grain	20.0	22.0
Barley	12.0	12.6
Sun flower	16.0	11.0
Fodder yeast	3.0	3.0
Fish meal	1.0	1.0
Meat meal	7.0	5.0
Grass meal	3.0	3.0
Bone meal	1.0	0.7
Shell	1.5	1.2
Premix	0.5	0.5
Total	100.0	100.0
Grude protein (%)	21.0	19.0
ME (kcal kg^{-1})	2820.0	2920.0
Calcium (%)	1.2	1.4
Phosphorus (%)	0.7	0.7
Sodum (%)	0.4	0.4

RESULTS AND DISCUSSION

Table 3 shown the effect of broiler densities on moisture content and ammonia concentration in each house (or each density) at different broiler ages of from 1-42 days. Insignificant effect of the studied densities were obtained with higher effect for 23 birds/m^2 than for 19 or 21 birds/m^2.

Clinical indicators of broiler body temperature (under the wings), heart and respiratory rate were determined which supported healthy birds. Changing these indicators may be reflect different technological stress, climate and other environmental conditions. The effect of broiler densities on tolerance of broiler birds was shown in Table 4. It is clear that there are no significant differences between groups or (densities) and these values were in agreement with that obtained by Soltan (1992) and Mahgoub (2000).

Table 5 showed the average of live body weights at different ages under different densities. It is clear that birds under density of 21 birds/m^2 have the highest body weights 1264.4, 1797.8 and 2216.0 g at 28, 35 and 42 days of age. The lowest body weights was noticed for 23 bird/m^2 (43) where it were 1239.7, 1749.6 and 1890.0 g at 28, 35 and 42 days of age. These average were in agree with those obtained by Soltan (1992), El-Homidan (1994) and El-Neny (2003). Data in Table 5 showed that the effect of planting density on the average performance of live weight of broiler chickens began to affect only at the age of 21 days. Similar finding was noticed by Meltzer (1980) and he found (10/m^2) density have highest body weight at the end of experiment. One of the most important trait in broiler production the live ability percentage.

Table 6 illustrated percentages of livability of broiler chickens under different densities. Data in Table 6

Table 3: Effect of broiler densities on moisture content and ammonia concentration at different ages

Age of birds (days)	Moisture content (%)			Ammonia (mg m^{-1})		
	G_1	G_2	G_3	G_1	G_2	G_3
1-7	39	40	39	-	-	-
8-14	58	70	65	-	-	-
15-21	65	68	70	7	5	10
22-28	70	70	70	8	6	13
29-35	70	72	41	10	8	16
36-42	75	75	75	13	12	17

G_1 = 19 birds/m^2, G_2 = 21 birds/m^2, G_3 = 23 birds/m^2

Table 4: Some physiological parameters of broiler chickens under different stoking densities

Groups	Temperature (°C)	Pulse rate (Pulse/min)	Respiratory rate (Motions/min)
G_1	41.0±0.24	195±10.2	34±1.3
G_2	40.9±0.09	200±11.3	33±1.2
G_3	40.9±0.19	190±8.90	33±1.6

G_1 = 19 birds/m^2, G_2 = 21 birds/m^2, G_3 = 23 birds/m^2

Table 5: Average body weights of broiler chickens at different ages under different stocking densities

Age of birds (days)	Densities		
	G_1 (19/m^2)	G_2 (21/m^2)	G_3 (23/m^2)
1	46.2±0.10	46.2±0.10	46.2±0.10
7	164.7±2.10	156.4±2.30	158.2±2.30
14	401.5±5.60	405.8±5.30	405.7±5.70
21	716.6±12.2	735.7±12.0	733.8±12.0
28	1263.0±24.0^a	1264.4±28.4^a	1239.7±23.7^b
35	1641.0±29.0^b	1797.8±29.2^a	1749.6±31.0^a
42	2010.0±34.0^b	2210.0±30.0^a	1890.0±35.0^c

$^{a-c}$Means have the same subscript in each raw were not differ significantly $p \leq 0.05$

suggested that the best results were obtained for livability percentage in group 1, however no significant differences were noticed. In general mortality rate were ranged from 10.7-11.4 for the first group (19 birds/m^2) and group 3 (23 birds/m^2) during 42 days of age these may be due to high mortality in the period of 36-42 days of age (about 4%). Table 7 obtained some carcass traits of 100 birds from each group of densities. Data in Table 7 showed that stock density of 21 birds/m^2 have higher and significant dressing percentage (75.5) than birds under stock density 19/m^2 and it was fast equal to birds under (23/m^2). These results were agree with those obtained by El-Homidan (1994) and El-Neny (2003). However, the number of red blood cells in group 2 and 3 were higher than in group 1 and this may be affected the quality of carcass. The hemoglobin content in group 2 was 2% higher than group 1 but both were less than birds in group 3. Group 2 have white blood cells count higher than birds in group 2 (0.02) and (0.40) than birds in group 3.

For costumer the weight of edible parts of whole carcass is important. Therefore, birds with 21/m^2 density have a good performance where weight the edible parts of whole carcass was 1449.2 g or 65.4 % from the live weight.

Table 6: Number of live birds and average livability of broiler chickens at different ages under different densities

Age of birds (days)	Densities: No. chicks (23240) G_1 19/m^2		No. chicks (23280) 21/m^2		No. chicks (23310) 23/m^2	
	No.	Livability (%)	No.	Livability (%)	No.	Line ability (%)
1-7	23045.0	99.1	23082.0	99.1	23080.0	99.0
8-14	22762.0	98.8	22792.0	98.7	22772.0	98.6
15-21	22397.0	98.4	22407.0	98.3	22391.0	98.3
22-28	21992.0	98.2	21982.0	98.1	21956.0	96.0
29-35	21517.0	97.8	21492.0	97.7	21471.0	97.8
36-42	20832.0	96.8	20792.0	96.8	20667.0	96.2
Total 1-42	89.6		89.3		88.7	

Table 7: Effect of broiler chickens densities on some carcass traits

Traits	Densities: G_1 (19/m^2)	G_2 (21/m^2)	G_3 (23/m^2)
Live body weight before slaughter (g)	2010.0^b	2216.0^a	1890.0^c
Weight of eviscerated carcass (g)	1467.3^b	1673.5^a	1409.9^b
Dressing % from live weight	73.0^b	75.5^a	74.6^a
Weight edible parts of whole carcass (g)	1286.4^b	1449.2^a	1188.8^c
Percentage of edible parts of whole carcass percentage from live weight	64.0^a	65.4^a	62.8^b
Weight of muscles (bone leans meat)	928.5^a	924.5^a	912.0^b
Percentage of muscles (bon leans meat from live weight	46.2^a	41.7^b	48.3^a
Grading of meat			
Carcass percentage of Category 1	75.0^a	81.0^a	65.0^b
Carcass percentage of Category 2	25.0^a	19.0^b	35.0^a

$^{a-c}$Means within each raw having different superscript are significantly different at $p \leq 0.05$

Then, birds with low density 19/m^2 have 1286.4 g as weight of edible parts of carcass and it is presented 64% from the live weight. Another important indicator is the weight of bone leans meat. The same trend was noticed where birds under the density of 19 or 21/m^2 have higher muscles weight than birds under (23/m^2) density (Table 7).

From the quality view of for meat and to grading carcasses and according Kazakhstanic roles two categories were used as obtained in Table 7. The birds under (21/m^2) density have 81% of carcasses under Category 1 and 19% under Category 2 and birds under (19/m^2) density lave 75% of carcasses with Category 1 and 25% with Category 2. High density (23/m^2) have lower percentages of carcasses (65%) under Category 1 and 35% under Category 2.

Category 1: Means the muscles of carcasses were well developed. There were deposits of hypodermic fat on the chest and abdomen. The keel breast bone did not pick out on the carcasses and it was not abnormal. No damage was found and the carcasses have a shiny with no patches in skin. The yellow color of carcasses was showed.

Category 2: Carcasses of this category have a small deposits of hypodermic fat on the chest and abdomen.

Table 8: Chemical analysis of some hematological parameters of broiler blood chickens at 42 days of age

Traits	Densities: G_1 (19/m^2)	G_2 (21/m^2)	G_3 (23/m^2)
Red blood cells 1012	3.1±0.09	3.3±0.09	3.4±0.2
White blood cells 109	24.3±0.03	24.1±0.30	23.9±0.3
Hemoglobin (g L^{-1})	98.0±0.54	100.0±0.60	102.0±0.1

The muscles of carcasses were developed satisfactorily. The keel breast bone stand out a little bit. Carcasses were frosted with lack luster. The color of carcasses were ranged from white yellow to pale yellow. All of these trends suggested that producers must be used one of the two densities 19 or 21/m^2 under clossed system or houses.

Table 8 showed the hematological parameters of blood of broiler chickens under different stocking densities at 42 days of age. The major physiological function is to supply blood cells and tissues of the body with essential nutrients and oxygen. Data in Table 8 showed no significant differences between all stocking densities for white and red blood cells counts or Hemoglobin concentration. Similar finding was noticed by El-Homidan (1994) and El-Neny (2003) in broilers.

CONCLUSION

In closed house system under Kazakhstanic conditions, the efficient densities were 21/m^2 then 19/m^2. Carcasses from these densities have higher percentages of a good carcass under Category 1 and these finding leads to high price of such carcasses with a high quality.

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