RESEARCHES CONCERNING THE PRODUCTION PERFORMANCES OF „ROSS-308" CHICKEN BROILERS, REARED IN FAMILIAL-TYPE FARMS

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Abstract

The paper presents the results of an experiment in chicken broilers husbandry, in accordance with the technological conditions required by the E.U. animals welfare regulations which will become compulsory since 2012, in al member states. 3000 ROSS-308 broilers were used as biological material, divided in 2 groups, as the applied technology imposed: Control group–LC (natural lighting, natural ventilation, access in grassy paddock, conventional feeders and water devices); Experimental group–LE (artificial microclimate, closed hall, automated equipments). Studied parameters: weight gain dynamics, average daily gain; feed intake, casualties dynamics, economic performances. At 42 days old, chickens weight reached 2.29 kg/broiler in LC and 2.45 kg/broiler in LE, compared to 2.65 kg/bird (hybrid standard). These performances where reached under certain acquired values for feed conversion 2.03 kg feed/kg gain in LC, respectively 1.94 kg feed/kg gain in LE, compared to 1.75 kg feed/kg gain (standard). Both technological versions brought revenue, although in LE (intensive system), revenue rate was 16.31% higher than that achieved by LC (familial type system). Therefore, a new settled familial microfarm could gain revenue from a 1500 chicken broilers rearing series even this one is lower than that achieved within the intensive rearing system.

Key words: chicken broiler, familial farms, gain, feed conversion, revenue

INTRODUCTION

Poultry husbandry represents a significant source in providing nutritional needs to population. Certain factors affecting quantitatively and qualitatively the poultry productions must be managed, in order to be able to rear fowl, under economic efficacy conditions. One of these factors is represented by the applied husbandry technologies. Many aviculture researches have been focused on this topic. The paper presents the results issued from an experiment which aimed to investigate certain technological systems used in broilers husbandry, in accordance with new European Union regulations on animals welfare. These should become compulsory from 2012 in all EU state members [2, 6]. Thus, two husbandry systems have been studied, in order to know their influence on broilers performance: the intensive system, adapted to familial farms (rearing at ground, on permanent litter, microclimate controlled hall, automated technological equipments) and the alternative husbandry system, which mixed artificial and natural microclimate factors and provided to broilers access outside the hall, into a grassy paddock [4].

MATERIAL AND METHOD

The researches have been carried out during April 1-May 12, 2009, within the „T.C.E. 3 Brazi S.R.L." company Piatra Neamț, Turtureşti farm. Two experimental groups have been established (LC and LE) each of the including at brooding 1500 "ROSS-308" chicken broiler. All groups were similarly fed with mixed feed (Starter=3010 Kcal/Kg EM, 23% PB; Grower=3175 Kcal/Kg EM, 21% PB; Finisher=3225 Kcal/Kg EM, 19% PB). Therefore, the experimental groups were represented by certain technological peculiarities, as given by the version of husbandry system (tab. 1).

Table 1 – Experimental factors provided to each investigated group

Technological parameters	Control group – LC	Experimental treatment – LE
Brooding density	16 broilers/m^2	14 broilers/m^2
Environment temperature (°C)	Artificially controlled, in order to comply the management guide	Artificially controlled, in order to comply the management guide
Relative air moisture (%)	According to the management guide	According to the management guide
Ventilation	Natural: admission by windows and doors; exhausting by roof chimneys	Artificial: forced admission and exhausting
Lighting	Natural + artificial lightning	Artificial lightning
Access in paddock	Yes	No
Feeding	In feeders, manual feeding	In Big Dutchman feeders, automated feeding
Water distribution	Vaccumatic water devices (starter) and valve-controlled (other periods)	Nipple type water lines
Heating	Suspended brooders, electrically powered	Air heaters, liquid gas powered

Certain parameters have been assessed, in order to investigate the productive adaptability of the broilers at the studied technological versions, as specialty literature [3, 7] specifies:

a) weight gain dynamics and the average daily gain;

b) feed consumption (average intakes and feed conversion rate);

c) flock casualties.

Body weight dynamics was assessed through weekly control weightings, run during the same day, at the same hour, from brooding till slaughtering, on a representative sample of 150 chickens/group. Other specific parameters were then calculated: average daily gain, and overall gain during technological periods or overall 42 days period.

The feed intake was weekly measured for each group. The acquired data served to algebraically calculate certain feed usage parameters: daily intake (g/day/chicken), whole intake and average individual intake/each feed recipe, feed conversion rate (kg feed/kg weight gain).

Health status of flock has been monitored across the experiment. Thus, any event that could induce casualties has been recorded. The casualties were expressed cumulated in absolute or relative values.

Mathematical computation relations complied with scientific literature methods. The data have been statistically processed then ANOVA Single Factor method has been applied in order to test the statistic significance of the differences between means.

RESULTS AND DISCUSSIONS

Both studied groups have been supervised by qualified veterinarian personnel, who recorded casualties and their reason.

It was found that casualties occurred in high frequency during the 1st week of chickens life, all of them being produced by technical reasons, no epidemiological reasons being observed. Across the whole growing period, flock casualties reached 2.20% in control group (33 broilers), respectively 1.90% in LE (28broilers). Despite the recorded casualties, liveability values were found within the standard variation interval of ROSS-308 hybrid (96-97% at 42 days).

Data related to body weight are briefly presented in tab. 2.

Thus, during brooding, chickens average weight was found between 40.76±0.22g (LC) – 41.20±0.32g (LE). Variation coefficient indicated good uniformity of the day old chickens, fro the analysed trait.

Table 2-Body weight dynamics of studied chickens

Chickens age	LC (n=150)		LE (n=150)	
	$\overline{X} \pm S_{\overline{x}}$ (g)	V%	$\overline{X} \pm S_{\overline{x}}$ (g)	V%
Brooding	40.76[a]±0.22	1.21	41.20[c]±0.19	1.75
7 days	150.14[a]±2.11	3.14	157.54[c]±0.74	1.06
14 days	376.77[a]±4.84	2.87	400.71[c]±3.96	2.21
21 days	740.54[a]±9.67	2.92	788.19[d]±5.29	2.35
28 days	1212.41[a]±32.12	5.92	1293.20[b]±18.23	3.15
35 days	1749.13[a]±45.09	6.12	1863.62[b]±38.23	4.59
42 days	2298.98[a]±58.05	6.59	2451.95[b]±46.77	5.74

ANOVA test – between groups: [ab] significant ($\hat{F}$>F. Tab. α 0.05 at 1;296 DF); [ac] distinguished significant ($\hat{F}$>F. Tab. α 0.01 at 1;296 DF); [ad] highly significant ($\hat{F}$>F. Tab. α 0.001 at 1;296 DF)

Groups became different as body development after 1st week of life, LE group having 5% better performances. Distinguished statistical significance occurred between groups. Uniformity also began to decrease. When chickens turned 2 weeks old, live weight average values reached 376.77±4.74g (LC) – 400.71±3.96g (LE). Statistical analysis revealed distinguished significant differences between compared means. These differences became more obvious during growing, the LE chickens achieved best results; thus, at 28 days old, values varied between 1212.41±32.12 g (LC) and 1293.20±18.23% (LE). Uniformity was lower in control group, while chickens from the experimental group proved to have the most homogenous results. The differences between control and LE groups were statistically significant. Similar situation occurred after 42 days, when average weight reached 2298.98±58.05g in control group and 2451.95±46.77g in LE group. Lowest variation coefficient was calculated for LE chickens (5.74%), while ANOVA test revealed significant differences between LC and LE means.

Besides this, the average daily gain values have been calculated, for each week or technological period (tab. 3).

Table 3-Average daily gain of studied chickens

Studied period	LC (g/chicken/day)	LE (g/chicken/day)	Difference to control group (%)
1-7 days	15.63	16.62	+1.063
8-14 days	32.38	34.74	+1.073
15-21 days	51.97	55.35	+1.065
22-28 days	67.41	72.14	+1.070
29-35 days	76.67	81.49	+1.063
36-42 days	78.55	84.05	+1.070
Starter (1-14 days)	24.00	25.68	+1.070
Grower (15-30 days)	61.56	65.66	+1.067
Finisher (31-42 days)	78.10	83.4	+1.068
1-42 days	53.77	57.40	+1.067

The results showed a linear ascendant trend, varying from 15.63 g/individual/day (LC)-to 16.62g/individul/day (LE) during starter period, respectively from 78.10 g/individual/day till 83.4 g/individual/day (LC-LE) during finishing period. Across the entire periods (42 days), the average daily gain was calculated at 53.77 g/individual/day (LC), respectively at 57.40 g/individual/day (LE). The LE chickens performances were 1.7% better, almost in all situations, than the LC group broilers.

These values were also lower than those specified into the management guide, with minimal values in control group. This situation could due to the short daily lighting schedule, consequently to lower feed intake levels in control group broilers, similar situation being also observed in other researches [5]. Feed consumption has been

weekly assessed, for each group then the average individual intake and the feed conversion rate have been calculated, basing on those data. The details are presented in table 4.

Table 4-Data related to feed consumption

Notice		U.M.	LC	LE
Starter (1-14 days)	Average flock size/period	chickens	1486.93	1488.21
	Intake/period/group	kg	791.41	805.27
	Average individual intake/period	g	532.25	541.10
	Average daily intake/period	g/chicken/day	38.02	38.65
	Average weight gain/chicken	kg	0.336	0.360
	Feed conversion rate	kg feed/kg gain	1.58	1.51
Grower (15-30 days)	Average flock size/period	chickens	1476.38	1481.81
	Intake/period/group	kg	2697.98	2762.31
	Average individual intake/period	g	1827.44	1864.14
	Average daily intake/period	g/chicken/day	114.21	116.51
	Average weight gain/chicken	kg	0.985	0.985
	Feed conversion rate	kg feed/kg gain	1.86	1.89
Finisher (31-42 days)	Average flock size/period	chickens	1470.00	1473.75
	Intake/period/group	kg	3276.44	3352.63
	Average individual intake/period	g	2228.87	2274.90
	Average daily intake/period	g/chicken/day	185.74	189.58
	Average weight gain/chicken	kg	0.937	1.001
	Feed conversion rate	kg feed/kg gain	2.38	2.27
Whole period (1-42 days)	Average flock size/period	chickens	1478.07	1481.64
	Intake/period/group	kg	6782.21	6934.30
	Average individual intake/period	g	4588.56	4680.14
	Average daily intake/period	g/chicken/day	109.25	111.43
	Average weight gain/chicken	kg	2.258	2.411
	Feed conversion rate	kg feed/kg gain	2.03	1.94

Certain aspects issued when feed intake was assessed per technological periods (tab. 4):

- during starter period (1-14 days), broilers in control group consumed 38.02 g feed/chicken/day, while those from the experimental group had an average individual intake of 37.73 g.

- during growing period, feed intake improved, oscillating between 114.21 g/broiler/day (LC) and 116.51 g/broiler/day (LE);

- during finishing period highest feed intake levels were observed, because the daily average intake were situated within the 185.74-189.58 g/broiler (LC – LE) range.

- overall exploitation period, 6782.21 kg feed were consumed by the control group, respectively 6934.30 kg feed by LE, which meant daily intakes of 109.25 g/chicken (LC) ...111.43 g/chicken (LE).

Compared with the theoretical feed quantity to be ingested during 1-42 days period (4.64 kg – management guide specification) [7], the average calculated values were either lower (4.58 kg feed – LC), or slightly higher (4.68 kg – LE).

Besides these, best performances related to feed conversion (FCR) were obtained in LE group, whose chickens grew faster. Thus, per entire period of 42 days, FCR was calculated at 1.94 kg feed/kg gain in LE chickens, respectively over 2 Kg feed/Kg gain in control group. These performances were poorer than the one specified in the broiler management guide (FCR=1.75 kg feed/kg gain) [8].

More appropriate adjustment of microclimate parameters, especially of temperature and a right ration temperature/air moisture could contribute in feed intake decreasing, therefore in economic efficacy improvement, knowing that almost 70-75% from production costs are given by poultry feeding [1, 3].

Whole production costs (husbandry+slaughtering) reached 13593.88

RON in LC, respectively 13957.6 RON in LE (+2.6% compared to control group).

Finally, the achieved revenue counted 4328.36 RON/LC and 6887.02RON/LE; therefore, revenue rate was 16.31% higher in experimental group, compared to control.

CONCLUSIONS

Certain conclusions issued from the analysis of performances achieved by "ROSS-308" broilers, reared within two technological versions: LC-familial type and intensive-LE):

- flock liveability was found within the 97.8% (LC) – 98.1% (LE) range;
- growing speed was slower than management guide specifications. At 42 days old, live weight reached 2.29 kg/broiler (LC) and 2.45 kg/broiler (LE), compared to 2.65 kg (standard);
- feed conversion ratio varied between 2.03 kg feed/kg gain (LC) and 1.94 kg feed/kg gain (LE), compared to just 1.75 kg feed/kg gain, as broilers producers recommend;
- both version of husbandry system proved to be economically efficient, although LE revenue rate was 16.31 % higher than that calculated in control group.

Basing on the previously presented data, it could be stated that a familial micro-farm that supposes minimal investments could generate revenue from a rearing series comprising 1500 broilers, even if this is lower than the values achieved within the intensive husbandry systems.

REFERENCES

[1] Ciolpan Şt.: Sistemul intensiv de creştere a păsărilor, Edit. Princeps, Iaşi, 2007.

[2] Guemene D., Faure J. M.: Productions avicoles, bien être et législation européenne, rev. INRA Prod. Anim., 2004, 17:59-68.

[3] Pop I.M., Halga P., Avarvarei Teona: Nutriția și alimentația animalelor, Edit. Tipo Moldova, Iași, 2007.

[4] Popescu-Micloşan Elena, Lungu S.: Adăposturi şi utilaje pentru creşterea păsărilor de curte, Edit. Agrotehnică, Bucureşti, 2007.

[5] Rodenburg, T.B.; Coenen, E.; Harn, J. van; Lenskens, P.; Ruis, M.A.W.: Behavioural activity of fast and slow growing broilers, Wageningen Academic Press, 2004, http://library.wur.nl/WebQuery/wurpubs/lang/338854.

[6] Turner J., Garces L., Smith W.: The welfare of broiler chickens in the European Union, Compassion in World Farming Trust, Petersfield, UK, 2004.

[7] Usturoi M.G.: Creşterea Păsărilor, Editura „Ion Ionescu de la Brad", Iaşi, 2008.

[8] Vacaru–Opriş I. şi col. Sisteme şi tehnologii de creştere a puilor de găină pentru carne, Editura Ceres, Bucureşti, 2005.