



Evaluation of productive performances in Ross 308 and Cobb 500 hybrids

Simona Pascalau, Mirela Cadar, Camelia Raducu, Zamfir Marchis

Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania. Corresponding author: M. Cadar, mirucadar@yahoo.com

Abstract. In this experiment we have evaluated the productive performances of two broiler chicken genotypes, Ross 308 and Cobb 500 hybrids, raised in intensive system for a time-period of 42 days, in the same microclimate and feeding conditions. The body weight of chickens was established by weekly weighing, on entire research period, and the feed consumption and mortality were daily registered. The research results put into evidence a slightly superiority of body weight at delivery for Cobb 500 hybrid with 3.42% compared to Ross 308 hybrid. Also, the feed conversion index was in favor for Cobb 500 hybrid against Ross 308 hybrid, but the two registered values were very close.

Key Words: chicken broiler, comparative performances, feed conversion index, growth performance, feed conversion index.

Introduction. The poultry meat represents a basis component in human nutrition having an important plastic and energetic role, well defined for the human organism. The nutritive value of poultry meat is given by its protein richness and therefore by amino acids, by organoleptic features and energetic value (Usturoi 2008).

In last decades, in most countries is consumed a priori the poultry meat of broiler type, obtained by hybrids' breeding, specialized in meat production (Dinea 2008; Vacaru-Opris 2001; Oroian & Vlaic 2004). In this context, there were created hen hybrids with remarkable productive performances; in present in Romania the most used hybrids in poultry meat industry being the Ross 308 and Cobb 500. Ross 308 is a tetralinear hybrid, created by Ross Breeders firm from United Kingdom. High proportion of chest and calf of the legs from the carcass weight characterize this genotype. It is a pretentious hybrid as concerns the fodder quality, but is less pretentious to maintenance conditions (Van et al 2010). Cobb 500 is a tetralinear hybrid produced by Cobb Breeding Company from United Kingdom, being sexable at age of one day after primary remiges' development. It is characterized by a great chest weight and increased slaughtering efficiency. Compared to Ross 308 hybrid, Cobb 500 is pretentious to breeding conditions and less pretentious to fodder quality, and for that to express the genetic potential there must be provided the microclimate parameters at optimal level (Pasca et al 2008).

Material and Method. The studied biological material was represented by Ross 308 and Cobb 500 hybrids. The chickens were raised in intensive system, on floor, on bedding, in a meat chicken breeding farm from Alba County. The halls were identically as constructions and endowed with the same equipment, and were concomitantly populated with the two hybrids, with a density of 17 chickens/m². The chickens benefited of the same breeding system, identical microclimate and feeding conditions.

Weekly, during research period, on 100 chickens from each analyzed hybrids, were followed the next indices: body weight, in weekly dynamics; average daily, weekly and cumulated gain; feed consumption; feed conversion index; mortality. All obtained data were statistically processed for one-way variance analysis with Student test to evaluate the significant differences between studied groups for $p < 0.05$.

The microclimate parameters (temperature, humidity, air stream, carbon dioxide, ammonia and sulphuretted hydrogen concentrations) were provided considering the biological material demands, according to their age (Table 1).

Table 1

Microclimate parameters

<i>Specification</i>	<i>Age of chickens (days)</i>							
	<i>1</i>	<i>3</i>	<i>7</i>	<i>14</i>	<i>21</i>	<i>28</i>	<i>35</i>	<i>42</i>
Temperature (°C)	34	32	30	28	26	24	22	18-20
Humidity (%)		50-70				60-70		70
Air stream (m/s)				0.1 – 1				
CO ₂ (%)				0.04 – 0.26				
NH ₃ (mg/L)		0			0.1	0.012	0.014	0.022
H ₂ S (mg/L)				absent				

The halls' lighting was realized with fluorescence light bulbs, and the applied light program was differentiated on time-periods depending on chicken age. In the first two days was provided a continuous lightening of 24 hours with light intensity of 37 lux. Further, until the seven life days of chickens, the lightening program was of 23 hours/day, with light intensity of 36 lux. From the day 8 until slaughtering, the daily lightening program was of 18 hours with light intensity of 35 lux during 8-10 days period, 34 lux during 11-14 days period, 33 lux during 15-21 days period and 32 lux from 22 to 42 days. In the time-period when the lightening program duration was of 18 hours, the 6 hours of darkness were divided in 2 rounds, each of 4 respectively 2 hours.

The fodder and water were provided ad libitum. There was used a phase nutrition divided in three stages: with fodder of starter type (crumb) in 1-10 days period, with growing fodder during 11-24 days and with finishing fodder during 25-42 days (Table 2).

Table 2

Characteristics of administered fodder

<i>Specification</i>	<i>U.M.</i>	<i>Starter</i>	<i>Grower</i>	<i>Finisher</i>
M.E.	kcal/kg	3038.00	3150.00	3200.00
Crude protein	%	22.50	21.00	19.00
Crude fat	%	6.00	6.50	6.96
Crude fiber	%	3.00	3.00	3.00
Lysine	%	1.40	1.24	1.00
Methionine	%	0.63	0.60	0.53
Methionine + Cystine	%	1.00	0.95	0.86
Treonine	%	0.94	0.81	0.73
Tryptophan	%	0.26	0.24	0.22
Calcium	%	1.10	0.91	0.85
Phosphorus	%	0.50	0.44	0.42
Sodium	%	0.18	0.17	0.17
Chlorine	%	0.24	0.21	0.21
Vitamin A	UI/kg	15000.00	12500.00	11250.00
Vitamin D ₃	UI/kg	5000.00	5000.00	5000.00
Vitamin E	mg/kg	80.00	60.00	55.00
Robenidine	mg/kg	33.00	-	-
Manduramicine	mg/kg	-	50.00	50.00

Achievement of high productions in the poultry farms depends in great measure by the health status of the utilized biological material. Therefore, the disease control (infectious and non-infectious diseases), the correct application of vaccination program and other sanitary-veterinary actions intended to provide chickens health, all these lead to obtain

the expected productions (Marcu et al 2013). The sanitary-veterinary, immune-prophylactic and medical applied program is shown in Table 3.

Table 3

The sanitary-veterinary, immune-prophylactic and medical program

<i>Period (days)</i>	<i>Medication/Action</i>
1-3; 9-13	Probiotic for stabilization of intestinal flora
2-7	Amino acids and vitamins (anti-stress)
9	Vaccine against infectious bronchitis and pseudo-fowl pest
14	Vaccine against infectious bursitis
15-20	Vitamin and Selenium complex (anti-stress)
22	Vaccine against pseudo-fowl pest
23-28	Amino acids and vitamins (anti-stress)
29-31; 34-37; 40-42	Acidifier

Results and Discussion. Analyzing the body weight evolution in weekly dynamics, in the time-period from 1 day to 42 days (Table 4) it can be observed a normal evolution with an ascendant trend (Figure 1). At age of 1 day, the chickens' weight was almost identical with 42.15 ± 0.16 g in Ross 308 hybrid and 42.17 ± 0.17 g in Cobb 500 hybrid respectively, with a difference of 0.02 g that is statistically insignificant. Further on, at 7, 14, 21, 28, 35 and 42 days were registered superior values of this trait in favor of Cobb 500 hybrid, in all analyzed periods. Thus, at 7 days the body weight difference was of 8.21 g, at 14 days 10.98 g and 30.33 g when the chickens had 21 days. In the next three weeks the differences were more pronounced, 58.88 g at 28 days and 63.56 g at 35 days, while at 42 days was established a difference of 78.56 g. These differences are statistically insured for significance limit of 0.1%.

Table 4

Average and dispersion indices for body weight (g)

<i>Age (days)</i>	<i>Genetic structure</i>	<i>n</i>	$\bar{x} \pm s\bar{x}$	<i>s</i>	<i>V%</i>	<i>t</i>	<i>d</i>
1	Ross 308	100	42.15 ± 0.16	1.58	3.76	0.089	0.02
	Cobb 500	100	42.17 ± 0.17	1.57	3.73		
7	Ross 308	100	180.38 ± 0.58	5.87	3.26	10.673	8.21
	Cobb 500	100	188.59 ± 0.49	4.96	2.63		
14	Ross 308	100	449.19 ± 1.53	15.29	3.40	4.531	10.98
	Cobb 500	100	460.17 ± 1.89	18.79	4.08		
21	Ross 308	100	824.95 ± 4.14	41.45	5.02	5.462	30.33
	Cobb 500	100	855.28 ± 3.69	36.94	4.32		
28	Ross 308	100	$1,328.53 \pm 6.51$	65.08	4.89	6.362	58.88
	Cobb 500	100	$1,387.41 \pm 6.57$	65.77	4.74		
35	Ross 308	100	$1,822.19 \pm 6.01$	60.07	3.29	6.167	63.56
	Cobb 500	100	$1,885.75 \pm 8.37$	83.74	4.44		
42	Ross 308	100	$2,219.19 \pm 6.01$	60.07	2.71	7.623	78.56
	Cobb 500	100	$2,297.75 \pm 8.37$	83.74	3.64		

ns – insignificant, *** - highly significant.

Comparatively to our data, Marcu et al (2013) obtained in Ross 308 hybrid at 14 days less body weight with -8.95% (409.00 g) and in Cobb 500 hybrid with -10.68% (411.00 g), but at 35 days they obtained in Ross 308 hybrid higher body weight with $+8.77\%$ (1,982 g) and in Cobb 500 hybrid with $+5.53\%$ (1,990 g).

At the end of the breeding cycle, we obtained a body weight in Ross 308 hybrid of $2,219.19 \pm 6.01$ g, and $2,297.75 \pm 8.37$ g for Cobb 500 hybrid (Figure 1). At 42 days,

Marcu et al (2013) obtained in Ross 308 hybrid a final body weight of 2,598 g (+4.88%) and in Cobb 500 hybrid 2,648 g (+9.5%). These data may be different because of bad accommodation to starter and grower fodder and optimal for the finisher fodder. When the chickens were reared in cages (Hascik et al 2010), the average body weight was significantly reduced such as: in Ross 308 hybrid at 7 days with -41.09% (106.25 g), at 14 days with -34.0% (296.45 g) and at 35 days with -9.74% (1,644.70 g); in Cobb 500 hybrid at 7 days with -41.43% (110.45 g), at 14 days with -34.59% (301.00 g) and at 35 days with -13.61% (1,629.15 g).

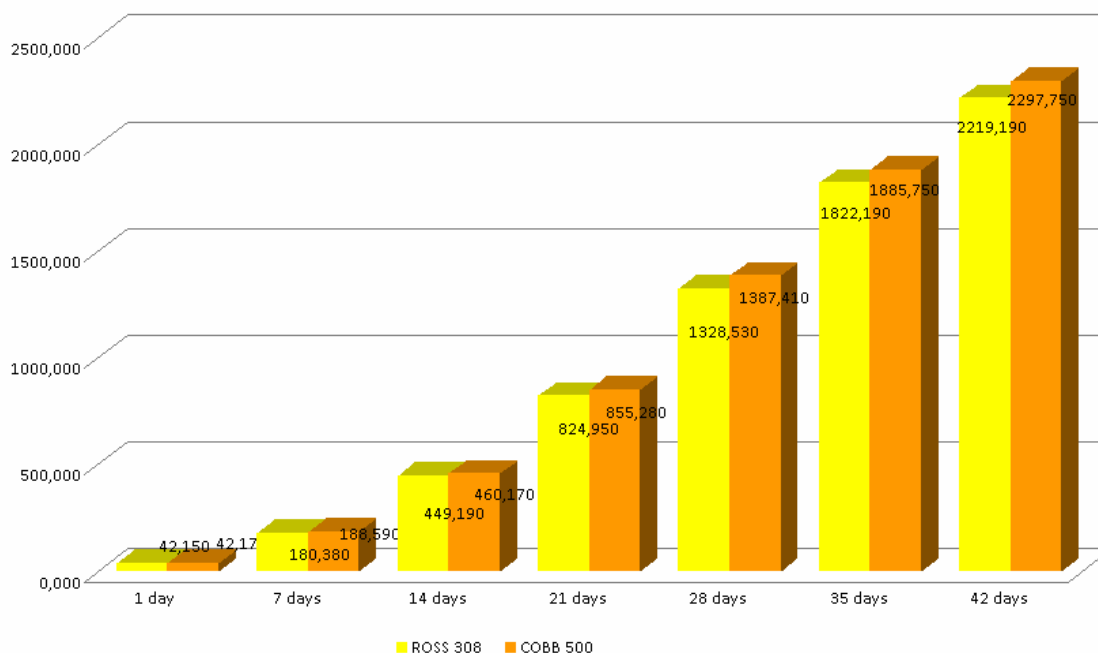


Figure 1. Dynamics of body weight.

In both analyzed hybrids, the weekly average gain had an ascendant evolution for 1-28 days period, after that in the last two weeks this indicator registered more reduced values. Body weight accumulations during 1-7 days were of 138.23 g in Ross 308 hybrid and 146.42 g in Cobb 500 hybrid, evolving to 504.58 g in Ross 308 hybrid and 532.13 g in Cobb 500 hybrid during 21-28 days period. In time-period between 28 and 35 days, the weekly gain registered descendant values of 493.66 g in case of Ross 308 hybrid and 498.34 g in Cobb 500 hybrid. The same direction was also maintained in the last week (35-42 days), when the values of this indicator were of 397.00 g (Ross 308) and 412.00 g (Cobb 500). During the entire period of research, the greatest value of weight gain was registered in Cobb 500 hybrid with 2,297.75 g, while Ross 308 hybrid accumulated a weight gain of 2,219.19 g (Figure 2).

Comparatively to our data, Ciurescu & Grosu (2011), during 1-42 days, obtained better results for average daily gain in Ross 308 hybrid with +12.0% (58.05 g/day) and in Cobb 500 hybrid with +5.32% (56.55 g/day), while Marcu et al (2013), for the same time-period, obtained the best results in Ross 308 hybrid with +17.40% (60.85 g/day) and in Cobb 500 hybrid with +15.57% (62.05 g/day).

The feed conversion index, calculated for the entire period, had sensible different values of 1.88 kg fodder/kg gain in Ross 308 hybrid and 1.84 kg fodder/kg gain in Cobb 500 hybrid (Table 5). Comparatively to our data, Ciurescu & Grosu (2011) obtained significantly lower feed conversion index in Ross 308 hybrid with -5.32% (1.78 kg fodder/kg gain) and less different in Cobb 500 hybrid with +0.54% (1.85 kg fodder/kg gain), while Marcu et al (2013) obtained significant differences in Cobb 500 hybrid with -8.91% (1.676 kg fodder/kg gain) and in Ross 308 hybrid with -5.85% (1.770 kg fodder/kg gain).

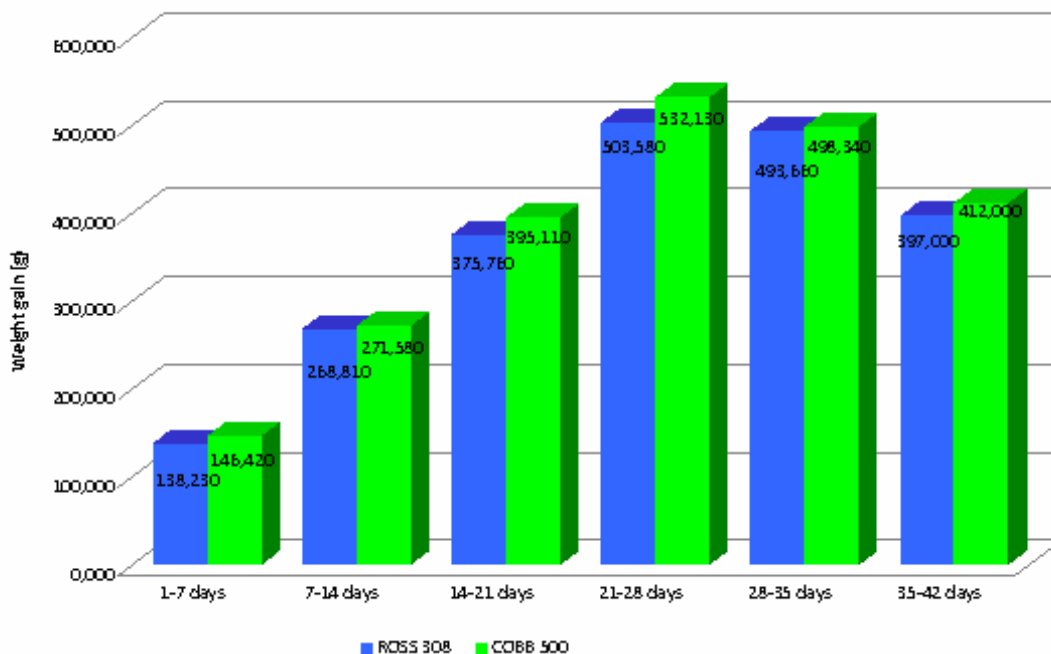


Figure 2. Dynamics of weight gain.

Comparatively to Ross 308 and Cobb 500 broiler performances objectives (www.aviagen.com; www.cobb-vantress.com) our results were inferior for Ross 308 with -4.56% to -20.99% for body weight during 1-42 days and for Cobb 500 with $+1.90\%$ to -19.59% for the same indicator and time-period. The average daily gain on entire period (1-42 days) was significant inferior given to standard performances in Ross 308 with -45.44% and in Cobb 500 with -21.09% , and the feed conversion index was inferior in Ross 308 with $+11.44\%$ and in Cobb 500 with $+9.85\%$. These results emphasized once again the importance of fodder composition and optimal breeding conditions, all these varying from country to country.

Table 5

Values of performance parameters

Specification	Ross 308	Cobb 500
Initial body weight (g)	42.15	42.17
Final body weight (g)	2,219.19	2,297.75
Total gain (kg)	2.177	2.255
Average daily gain (g)	51.83	53.69
Total feed consumption (kg)	4.096	4.147
Feed conversion index (kg fodder/kg gain)	1.88	1.84
Viability (%)	100	99

Conclusions. The productive parameters followed in this study indicated a superiority of Cobb 500 hybrid, which had greater body weight, higher weight gain with better feed conversion index, in the mentioned feed and maintenance conditions.

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Authors:

Simona Pascalau, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnologies, Mănăștur Street No. 3-5, 400372, Cluj-Napoca, Romania, e-mail: simona_pascalau@yahoo.com

Mirela Cadar, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnologies, Mănăștur Street No. 3-5, 400372, Cluj-Napoca, Romania, e-mail: mirucadar@yahoo.com

Camelia Raducu, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnologies, Mănăștur Street No. 3-5, 400372, Cluj-Napoca, Romania, e-mail: craducu2001@yahoo.com

Zamfir Marchis, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnologies, Mănăștur Street No. 3-5, 400372, Cluj-Napoca, Romania, e-mail: zamfirmarchis@yahoo.com

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