THE INFLUENCE OF FEED ENERGY AND PROTEIN LEVEL ON THE SLAUGHTER PERFORMANCE FOR "LOHMANN MEAT" HYBRID

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Abstract

In this paper was studied the influence of feed energy and protein levels on slaughtering efficiency and participation of the trenched parts in the whole carcass structure in „LOHMANN MEAT" hybrid sacrificed at 42 days old. At the three groups (control group-Lc, experimental groups Lexp.₁ and Lexp.₂) were given feed mixed with different level of energy and protein (Lc-standard hybrid, Lexp.₁-higher by 10% and Lexp.₂-lower by 10% compared to standard hybrid). Carcasses weight and the trenched parts in the whole carcasses structure was determined by gravimetric measurements. Statistical analaysis was performed with Microsoft Excel speedsheet application and analysis of variance by Mann Whitney test. The fresh carcasses at slaughtering efficiency had values from 77.26%- Lexp.₂ to 79.15%-Lexp.₁. After 24 hours of refrigeration, these values decrease by 1,28%-Lexp.₂, 1,42%-Lc and 1,43%-Lexp.₁. For participation of the trenched parts (breast, wings, thighs and shaks) in the whole carcasses structure, the group Lexp.₁ were registered the highest values, and the group Lexp.₂ the lowest values for the breast and the highest values for the other parts (head, neck, back and legs). The group Lexp.₁, which received feed with high protein energy-level, average values for the studied indicators were higher than Lc and Lexp.₂.

Key words: chicken meat, major carcass parts, slaughtering efficiency

INTRODUCTION

One of the most current problems of human nutrition, discussed and studied in wide circles of contemporary society, is the problem of protein nutrition and especially the current shortcomings in providing the body with proteins [4]. Meat is a commodity product obtained from animals. Poultry meat is part of the most important food for humans, having an important role in plastic and energy [18, 19].

In the context of economic globalization, the EU membership and the emergence of a competitive market, getting chicken meat with a high quality housing, commercial aspect of the carcasses and providing a competitive price are the essential conditions for development of poultry production in Romania .

Hybrids of chicken meat have specific nutritional requirements to achieve performance criteria [13, 14]. Feed rations must be balanced so as to ensure a proper balance energy/protein correlated with the stages of development of offspring. By ensuring an adequate feeding program to ensure maximum productive potential expression [14, 15, 11, 12].

Rations deficient in protein, even if not clearly reflected in the growth performance, impacting negatively on the carcass meat percentage [2, 3, 7, 8, 9, 17].

Hybrids of chicken meat "LOHMANN-MEAT" compared with other hybrids, are very sensitive to ration protein content [20]. A diet rich in protein quality improves carcass quality parameters meat and (slaughter yield and chemical composition) in hybrid „LOHMANN-MEAT" [1, 10, 13, 20].

This study aimed to influence the level of energy-protein feeding on performance to slaughter and cut portions of the main participation in the composition of the carcass, the hybrid „LOHMANN MEAT" sacrificed at 42 days old.

MATERIALS AND METHODS

Our research was conducted on broiler chicken belonging „LOHMANN MEAT" hybrid, slaughtered at 42 days. For this study, have made 3 (three) groups of chickens (males and females) comprising of a control group (Lc) and 2 (two) experimental groups (Lexp.$_1$ and Lexp.$_2$) reared in the same microclimate conditions. At the 3 (three) groups of chickens were given feed mixed with protein and energy levels differently as follows: Lc-protein and energy level as recommended by the company Aviagen for „LOHMANN MEAT" hybrid [20], Lexp.$_1$-protein and energy level 10% higher than firm Aviagen recommendations for „LOHMANN MEAT" hybrid and Lexp.$_2$-level protein and energy by 10% lower than recommendations Aviagen Company for „LOHMANN MEAT" hybrid. Depending on the age of chicks during growth (1-42 days) for each group were given three fodder recipes (starter, growing, finishing) (tab. 1) [19, 20].

Table 1-Features of the mixed feed recipes for chickens

Chicken group	Recipe features	Recipe type		
		starter 1-14 days	grower 15-35 days	finisher 36-42 days
Lc	Crude protein (%)	24.02	22.63	21.06
	M. E. (kcal/kg feed)	3041	3144	3190
	Energy : Protein ratio	126.60	133.00	151.50
Lexp.$_1$	Crude protein (%)	26.23	24.90	23.12
	M. E. (kcal/kg feed)	3270	3435	3490
	Energy : Protein ratio	124.70	137.95	150.00
Lexp.$_2$	Crude protein (%)	21.80	20.25	18.75
	M. E. (kcal/kg feed)	2860	2870	2890
	Energy : Protein ratio	131.20	141.70	154.10

The 42-day old chickens were slaughtered and the carcasses obtained was weighing were made chilling (24 hours at +4°C). The data obtained by weighing the carcasses at slaughter was calculated yield expressed as a ratio of fresh or cold carcass weight and live weight [4, 6, 19]. Yield carcasses at slaughter was calculated gutted with head, neck and legs. After cutting up the carcasses, gravimetric measurements were performed and determined participation of trenched parts in the whole carcass structure. The trenched parts in the carcass are: breast with bone and skin, thighs, shanks, wings and the remnants consists which of head, neck, back and legs.

Raw data obtained were processed by methods of biostatistics with Microsoft Excel application. To test the statistical significance of differences studied character was used analysis of variance Mann Whitney test of MINITAB 14 program [5, 16].

REZULTS AND DISCUSSION

Following gravimetric measurements performed it was observed that the values for hot carcass weight (after slaughter) limits ranged from 1599.20 g (Lexp.$_2$) to 1912.33 g (Lexp.$_1$) (tab. 2). The coefficient of variation showed a good uniformity of the flock studied (CV=8.50 to 10.39%), and the calculation of variance analysis showed the presence of highly significant statistical differences ($p \leq 0.001$) averages obtained between Lexp.$_2$ group to Lexp.$_1$ group, but also between the control group (Lc) to Lexp.$_2$ group, both before and after chilling.

Applying the formula to return to slaughter were obtained values of this indicator for both moments of measurement (hot and chilled carcass). Thus, it is noted that the average values obtained from measurements taken immediately after slaughter are higher compared to the yield calculated on the carcasses chilled at slaughter [19]. The data presented in tab. 2, it follows that the Lexp.$_1$ group have achieved the highest values for yield at slaughter ($\bar{x}$ =79.15±0.42% on hot carcasses and $\bar{x}$ =77.73±0.42% chilled carcasses), while in Lexp.$_2$ group have recorded the lowest values for both moments of measurement ($\bar{x}$ =77.26±0.36% after slaughter and $\bar{x}$ =75.98±0.37% after chilling) [12].

Table 2-Slaughtering efficiency for chickens in the three groups studied

Specificare	Control group (Lc) (n=30)	Group Lexp.$_1$ (n=30)	Group Lexp.$_2$ (n=30)
Live weight $\bar{x} \pm s\bar{x}$ (g)	2357.20±29.92	2412.50±33.31	2067.50±30.36
CV%	4.08	5.22	5.87
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$		
Hot carcass weight $\bar{x} \pm s\bar{x}$ (g)	1844.81±28.65	1912.33±36.29	1599.2±26.14
CV%	8.51	10.39	8.95
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$		
Yield at slaughter on fresh $\bar{x} \pm s\bar{x}$ (%)	78.20±0.32	79.15±0.42	77.26±0.36
CV%	2.24	2.94	2.59
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$		
Chilled carcass weight $\bar{x} \pm s\bar{x}$ (g)	1818.47±28.20	1885.23±35.69	1578.69±25.89
CV%	8.50	10.37	8.98
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$		
Yield at slaughter on cold $\bar{x} \pm s\bar{x}$ (%)	76.77±0.31	77.73±0.42	75.98±0.37
CV%	2.21	2.94	2.64
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$		

MANN WHITNEY test: NS- no significant differences $p>0.05$; * significant differences $p\leq0.05$; ** distinguished significant differences $p\leq0.01$; *** high significant differences $p\leq0.001$

For the control group (Lc), satisfactory results were obtained for this indicator, with an average value 78.20±0.32%, where the assessment was done immediately after slaughter, while, after chilling, resulted in slightly lower yield ($\bar{x}$ =76.77±0.31%). The coefficient of variation had values from 2.24% in control group (Lc) to 2.94% in Lexp.$_1$ group and revealed a good uniformity of the herd studied. For both times of measurement of the yield at slaughter, following calculation of analysis of variance, were found statistically significant differences ($p\leq0.05$) average values obtained in controls group (Lc) compared to Lexp.$_2$ group and distinguished significant differences ($p\leq0.01$) between Lexp.$_1$ group and Lexp.$_2$ group.

Values obtained in this experiment were at the upper limit of the range specified by the company Aviagen for hybrid „LOHMANN MEAT", which ensures the achievement of values 69-73% for the slaughtering efficiency for carcasses at completely drawn [20].

Is shown in tab. 3 weight parts cut and participation of the trenched parts in whole carcasses structure.

Data presented in this table are shown on a breast with bone and skin proportion of participation in the whole carcasses structure: 28.46% in Lexp.$_1$ group, 27.78% in control group (Lc) and 26.18% in Lexp.$_2$ group. The coefficient of variation (less than 5.5%) showed very good uniformity for this character. Following calculation of the variance analysis, revealed the presence of highly significant statistical differences ($p\leq0.001$) between average values obtained from the Lexp.$_2$ group compared with control group (Lc) and from Lexp.$_1$ group to Lexp.$_2$ group.

For thighs the participation in the whole carcass structure: 15.39% in Lexp.$_2$ group, 15.97% in control group (Lc) and 16.15% in Lexp.$_1$ group.

Table 3-Participation of the trenched parts in whole carcasses structure chickens from the three groups studied

Specification	Control group (Lc) (n=30)			Group Lexp.$_1$ (n=30)			Group Lexp.$_2$ (n=30)		
	$\bar{x}$	$\pm s\bar{x}$	CV%	$\bar{x}$	$\pm s\bar{x}$	CV%	$\bar{x}$	$\pm s\bar{x}$	CV%
Mass of carcass after refrigeration (g)	1818.47	28.20	8.50	1885.23	35.69	10.37	1578.69	25.89	8.98
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
Mass of breast with bone and skin (g)	506.41	11.38	12.31	537.17	11.87	12.10	413.17	7.84	10.39
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
% of carcass	27.78	0.28	5.44	28,46	0,20	3,89	26,18	0,26	5,45
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
Mass of wings (g)	167.59	4.24	13.84	175.10	4.80	15.03	142.02	3.24	12.49
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
% of carcass	9.18	0.10	5.93	9.25	0.10	5.63	8.98	0.10	6.29
Statistical significance	NS								
Mass of thighs (g)	290.41	5.11	9.64	304.07	5.53	9.96	243.46	3.12	7.02
Statistical significance	***Lc-Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
% of carcass	15.97	0.13	4.59	16.15	0.11	3.79	15.39	0.07	2.65
Statistical significance	**Lc- Lexp.$_2$; *** Lexp.$_1$-Lexp.$_2$								
Mass of shanks (g)	250.80	4.08	8.91	258.65	5.56	11.77	215.58	3.11	7.90
Statistical significance	***Lc- Lexp.$_2$; Lexp.$_1$-Lexp.$_2$								
% of carcass	13.83	0.36	14.06	13.94	0.40	15.89	13.76	0.32	12.74
Statistical significance	NS								
Back, heat, neck and legs (g)	603.28	9.08	8.24	610.23	12.97	11.64	564.23	14.42	14.00
Statistical significance	*Lexp.$_1$-Lexp.$_2$; **Lc-Lexp.$_2$;								
% of carcass	33.23	0.34	5.57	32.36	0.31	5.31	35.65	0.48	7.35
Statistical significance	**Lc-Lexp.$_2$; ***Lexp.$_1$-Lexp.$_2$								

MANN WHITNEY test: NS- no significant differences $p>0.05$; * significant differences $p\leq0.05$;
** distinguished significant differences $p\leq0.01$; *** high significant differences $p\leq0.001$

Following calculation of the variance analysis, statistical differences were distinguished significant ($p \leq 0.01$) between mean values obtained in controls group (Lc) compared to Lexp.$_2$ group and high significant differences ($p \leq 0.001$) between Lexp.$_2$ group compared Lexp.$_1$ group.

For shanks the participation in the whole carcass structure between 13.76 to 13.94%. The highest values (13.94%) were recorded in sample Lexp.$_1$ group, while, in Lexp.$_2$ group have obtained the lowest values (13.76%). After applying the test of analysis of variance, no differences were found statistically.

For other components of the carcasses were achieved participation averages between 8.98 to 9.18% for the wings and between 32.36 to 35.65% for the remnants (head, neck, back and legs). In Lexp.$_1$ group were recorded the highest values for participation in the whole carcass structure wings ($\bar{x}$ =9.25±0.10%) and lowest values for remnants ($\bar{x}$ =32.36±0.31%). If Lexp.$_2$ group, were the highest values obtained for participation in the whole carcass structure for remnants ($\bar{x}$ =35.65±0.48%) and lowest values for the ratio wings ($\bar{x}$ =8.98±0.10%).

If we compare the two groups Lexp.$_2$ and Lexp.$_1$ with the control group (Lc), in terms of participation of trenched parts in the whole carcass structure, then we see that there are differences in both plus and minus. Thus, the Lexp.$_1$ group recorded were higher for breast (+0.68%), thighs+shanks (+0.29%) and wings (+0.07%), while the proportion remnants of participate in the carcass was 0.87% lower compared with the control group. In the Lexp.$_2$ group were recorded lower values for the breast (-1.60%), thighs+ shanks (-0.65%) and wings (-0.29%), while the proportion remnants of participation in the whole carcass structure was 2.42% higher compared with the control group.

CONCLUSIONS

Slaughtering efficiency, calculated on fresh carcasses, had values between 77.26 to 79.15%, while the carcasses after chilling, the value of this parameter was reduced between 1.28 to 1.43%.

At the Lexp.$_1$ group, which received rations with high protein and energy level, average values for slaughtering efficiency (hot and cold) were higher than group control and Lexp.$_2$ group.

At Lexp.$_2$ group, which benefited of the rations with energy and protein of the low level, average values for yield at slaughter (hot and cold) were lower compared to: control group (Lc) and Lexp.$_1$ group.

Participation of the trenched parts from the whole carcass structure (breast, thighs, shanks, wings) in Lexp.$_1$ group of have registred the highest values and the lowest values in Lexp.$_2$ group.

At the Lexp.$_1$ group, which received mixed fodder with high energy and protein level, the average values for the indicators studied were higher than at the control group (Lc) and the Lexp.$_2$ group.

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