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Determinación de la edad propicia para la gonadectomía en pollos criollos

Determination of the propitious age for gonadectomy in Creole chickens

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Data of the Article

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Resumen

El objetivo de la investigación fue determinar la edad propicia para mejorar los parámetros productivos en pollos criollos mediante la gonadectomía en la Provincia de Tungurahua, Ecuador. Se utilizó un diseño completamente al azar con tres tratamientos y un testigo, los resultados se sometieron a un análisis de varianza (ADEVA) para la separación de medias y la prueba de Tukey 5%, los factores en estudio fueron: T_1 (8), T_2 (9) y T_3 (10), semanas de edad castrados, y pollos sin castrar (testigo), (20 aves/tratamiento), con un periodo productivo posterior a la castración de 12 semanas. La ganancia de peso a las 12 semanas de la castración fue mayor en pollos intervenidos a las 8 semanas de edad, (343.6 g ave/semana, $p<0.05$). El menor consumo de alimento fue en la semana 3 post castración ($p<0.05$). Los gallos castrados a las 8 y 9 semanas registraron mejor conversión alimenticia (6.33 y 6.53, respectivamente) ($p<0.05$). El rendimiento a la canal fue superior en los gallos castrados con respecto al grupo control no castrado ($p<0.01$). La tasa de mortalidad fue mejor en el T_1 (8 semanas de edad) con 0%. Por tal motivo la aplicación de la técnica quirúrgica realizada a menor edad es la más recomendada.

Abstract

The objective of the research was to improve the productive parameters in Creole chickens through gonadectomy in the Tungurahua Province, Ecuador. A completely randomized design with three treatments and a control was used, the results were subjected to an analysis of variance (ADEVA) for the separation of means and the Tukey test of 5%, the factors under study were: T_1 (8), T_2 (9) and T_3 (10), castrated weeks of age, and uncastrated chickens (20 birds / treatment), with a productive period after castration of 12 weeks. Weight gain 12 weeks after castration was higher in chickens operated on at 8 weeks of age, (343.6 g bird / week, $p<0.05$). The lowest feed consumption was in week 3 post castration ($p<0.05$). Roosters castrated at 8 and 9 weeks had better feed conversion (6.33 and 6.53, respectively) ($p<0.05$). Carcass yield was higher in castrated roosters compared to the uncastrated control group ($p<0.01$). The mortality. It was better in T_1 (8 weeks old) with 0%. For this reason, the application of the surgical technique performed at of age is the most recommended.

Introduction

In our country, the inexperience in the production of commercial capon chickens, the surgical procedures required for this purpose are also unsafe, as well as the limited literature on castration. The poultry industry for the production of eggs generates large quantities of roosters that are discarded due to their uselessness for said activity, so the production of capons is considered a rational solution to the use of dual-purpose male chicks for fattening obtained as a result of sexing. of laid fitness pullets[1]. Capons are male chickens whose testicles have been surgically removed[2].

Castrated chickens, due to androgen deficiency, lose their masculine sexual characteristics, which cause changes in the immune capacity, promoting the accumulation of lipids in the body that improve the texture, juiciness, and flavor of the meat, compared to non-castrated chickens[3,4.] The bird's product of the crosses compared to the other groups have the highest weight and body variables. As for the Creole roosters, being the most numerous population, they are intermediate in their body proportions and with an average weight of 2.3 kg, which is equivalent to 74.4% of the roosters with cross lines[5].

Due to the hormonal changes that take place, the meat of the capons is infiltrated with fat, giving them tenderness and flavor that makes it highly valued. Furthermore, it is accepted that surgical caponization promotes an improvement in feed efficiency, which would justify its practical application[6].

Creole birds are the result of a spontaneous process of mixing between existing commercial breeds and backyard birds and have been constantly evolving ever since. Creole or mestizo chickens arrived in America with the conquerors on their first trips, and for more than 500 years they have demonstrated their productive adaptability to the conditions of the region[7]. Creole hens, by definition, are those typical of the place where they have developed their characteristics for their survival, and are classified as semi-heavy, since they do not correspond to the pattern of laying or fattening birds[8].

It has been confirmed that various factors affect the bodyweight of the capon, which influences the age of castration and slaughter, genetic line, and the level of nutrition[9]. Generally, chickens of heavy breeds are hatched at an early age, but slow-developing chickens are hatched after six weeks of age, so the tunica albuginea becomes more resistant, generating difficulties for the removal of the testicles, which consequently, capon chickens gain less weight than non-castrated chickens during the first weeks after caponization[10,11]. However, they achieve greater weight at 18 or more weeks of age, also showing a greater effect on the quality of the meat[12].

When evaluating the effect of caponization in broilers (Hubbard line) and laying chickens (Hyline Brown line) on weight, they indicate that the zootechnical parameters achieved are acceptable (live weight, weight gain, feed consumption, feed conversion, carcass weight) at least in the fattening line showed significant differences in the bodyweight of caponized and non-caponized chickens during the 11th week. A greater weight gain was observed by caponized birds[13]. It should not be forgotten that broad-spectrum antibiotics, administered at preventive doses, are intended to hinder and prevent the progress of infections that may be caused during the

intervention and not cure specific diseases that birds already suffered from previously or that may suffer in the future[14].

The total or partial absence of testes affected the ratios of erythrocytes: plasma, in whole chickens there was a very significant increase in hematocrit during fattening, dependent on the hormonal action measured indirectly at slaughter by weighing the gonads[14]. During the first eight days, the capons are carefully monitored, since in certain cases they may suffer some pathologies after the postoperative period that may have their origin in the castration process such as: intercostal hernia, subcutaneous emphysema, ruptured ribs, septic complications (colibacillosis, staphylococci), sudden death, and lameness[15]. This study aims to apply new management techniques that improve the efficiency of productive parameters such as gonadectomy in Creole chickens.

Materials and methods

The study was carried out in the province of Tungurahua, Pelileo canton, Huambaló parish, Ecuador. The area has an average temperature of 13.4 ° C and a relative humidity of 64%. Only Creole male pirocas were selected for castration, which were provided by the Huambaló poultry farm previously selected and examined, (mongrel roosters with bare neck), strong, vigorous, healthy and homogeneous. The birds were subjected to a 36-hour fast[16], prior to castration, and were administered vitamin K orally (dose = 1 L x 1000 L H2O), (0.3 mL of vitamin K per 1 L of water). VECOL Laboratory, 80 birds were used that were distributed in four treatments T1, T2. T3 and T0 according to age at castration (8, 9 and 10 weeks), leaving a group without castration as a control. In the postoperative period, a broad spectrum antibiotic was used as a preventive measure (Oxytetracycline® via IM, in doses of 1 mL x 10 kg of LW)[14].

The feed was supplied according to the age of the birds: initial (1-28 days), growth (29-42 days) and fattening (43 days onwards). The food and the residues were weighed with a CAMRY® digital scale, of 5 kg capacity and 1 g of precision, to determine the voluntary consumption, the water was supplied at will.

For the surgical technique, we proceeded as follows using a scalpel or knife, a one-inch incision is made through the skin and other tissues between the two posterior ribs, The abdominal air sac is pierced with a sharp hook to expose internal organs. Both testicles must be removed from the incision made, the lower or left testicle is removed first. The testicles are grasped with forceps and then twisted to free them from the connective tissue while slowly pulling from where it is attached[17]. Care must be taken not to break the major blood vessels located between the two testicles, the right upper testicle is similarly removed. A heated electrical equipment with cauterizer is available for incision of the skin and removal of the testicles. It prevents excessive bleeding.

The rib expander is removed and the bird relaxes, allowing the skin and thigh muscle to snap back into place. Once the chicken is released, the incision should close without the need for sutures or bandages, the castration from clamping to release was 7 min/bird.

The initial weight of each bird was recorded before castration with the scale indicated above and then every week at the same time to determine the weight gain (difference between the final and initial weight) per treatment. The birds were slaughtered and slaughtered 12 weeks after castration, so the age of the slaughtered birds was 20 to 22 weeks, the

carcass performance was determined (percentage relationship between the slaughtered bird's weight and live weight)[14]. Mortality was determined based on the number of birds found dead and those that remained alive.

A completely randomized design with four treatments (20 birds/treatment) was used. The coefficients of variation were calculated and to determine statistical differences between treatments, the Tukey test was used at 1 and 5%.

Results

With regard to weight gain, there were no differences between treatments in the first nine weeks after castration; However, at week 12, a greater weight gain ($p < 0.05$) was observed in the birds castrated at 8 weeks (343.6 g/bird) than in the other experimental groups (table 1). When applying the Tukey test at 5% for the variable total weight gain, in which there are no statistically significant differences between the mean of the treatments. Castration at a younger age (8 weeks) there is greater weight gain.

Table 1 Weight gain (g) in Creole chickens hatched at three ages (Ecuador)

Treatments (weeks)	Post-castration weight gain (weeks)			
	3	6	9	12
8	450.2[a]	365.3[a]	382.8[a]	343.6[a]
9	432.2[a]	388.1[a]	264.2[a]	293.1[ab]
10	334.0[a]	378.0[a]	254.8[a]	232.5[b]
Without castrating	503.6[a]	443.6[a]	315.4[a]	267.4[b]
CV (%)	22.6	12.7	24.4	11.4
EEM	48.6	25.0	37.0	16.2

a.b Means with different letters between columns differ significantly ($p < 0.05$). CV: coefficient of variation; SEM: standard error of the mean

Table 2 Feed consumption in Creole chickens raised at three ages (Ecuador)

Treatments (weeks)	Post-castration feed consumption (weeks)			
	3	6	9	12
8	1466.8[b]	1832.3[a]	2086.1[a]	2160.2[a]
9	1643.2[a]	1899.8[a]	1677.8[a]	1905.6[a]
10	1793.4[a]	1950.5[a]	1654.4[a]	1722.7[a]
Without castrating	1676.8[a]	1950.6[a]	1977.9[a]	2042.8[a]
CV (%)	5.0	3.2	16.1	13.1
EEM	41.2	31.0	148.8	128.0

a.b Means with different letters between columns differ significantly ($p < 0.05$). CV: coefficient of variation; SEM: standard error of the mean

Chickens castrated at eight weeks exhibited the lowest feed intake at three weeks after castration compared to the other experimental groups ($p < 0.05$); however, there were no differences between groups in the following weeks (Table 2). The feed conversion showed significant differences between treatments ($p < 0.05$) at week 12 post-castration, the highest value being found in the non-castrated and castrated chickens at 10 weeks of age (table 3).

The yield to the carcass was statistically higher in T_1, T_2 and T_3, differing from T_0 (uncastrated group) which showed the lowest yield, this is due to the lipogenic process that occurs in its tissues, the capon develops more its muscle masses , that is, there is a substitution of fat for protein (table 4). The highest mortality was registered in the group of chickens castrated at 10 weeks (25.0%), followed by the group castrated at 9 weeks (16.7%). No

deaths were recorded in the neutered group at 8 weeks or in the control group, Figure 1.

Table 3 Feed conversion in Creole chickens raised at three ages (Ecuador)

Treatments (weeks)	Post-castration feed conversion (weeks)			
	3	6	9	12
8	3.33[a]	5.10[a]	5.60[a]	6.33[b]
9	4.28[a]	4.93[a]	6.35[a]	6.53[b]
10	5.58[a]	5.28[a]	6.48[a]	7.43[a]
Without castrating	3.33[a]	4.45[a]	6.58[a]	7.58[a]
CV (%)	26.47	12.35	10.66	5.36
EEM	0.55	0.30	0.33	0.19

a.b Means with different letters between columns differ significantly ($p < 0.05$). CV: coefficient of variation; SEM: standard error of the mean

Discussion

Surgical castration reported the following results: 60 Creole chickens were used at 8 weeks of age), it was better in postoperative recovery, García-Martin[13] mentions similar results, which in the post-operative period can be overcome without any loss, and to mention some, derived from birds that have suffered an accident during the intervention or that have not been able to overcome the stress of the process.

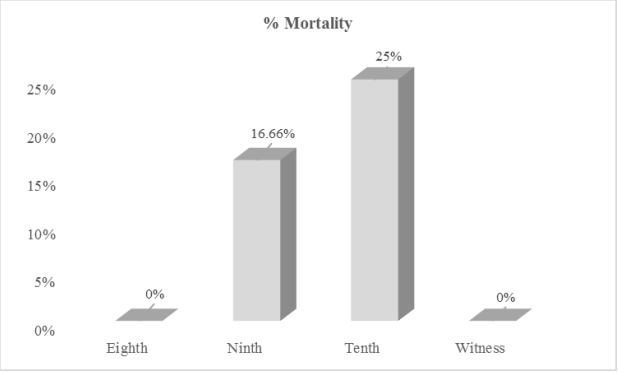
Table 4 Carcass yield (%) in Creole chickens hatched at three ages (Ecuador)

Treatments (weeks)	Performance (%)
8	75.1[a]
9	74.4[a]
10	72.2[a]
Without castrating	63.6[b]
CV (%)	2.2

a.b Means with different letters between columns differ significantly ($p < 0.01$). CV: coefficient of variation

Regarding the weight gain in week 12 compared to weeks (9 and 10), it was better, so it is assumed that at a younger age (8 weeks) there is greater weight gain. In this way the animals recover faster and begin to gain weight, due to the condition (neutered). According to Castelló[14], thanks to an improvement in the lipogenic process that occurs in its tissues, the capon develops more its muscle masses, that is, there is a substitution of fat for protein and the little fat that is deposited does so in the right place. Similarly, Calik et al.[18] observed significant differences between capons and whole roosters from 16 weeks of age. In this context, Chen et al.[19] mention that early caponization significantly increases the live weight of capons at 16 weeks of age. According to Farreny & Ferre[16], castration performed at a younger age (8 weeks) improves the feed conversion rate. The late effect of castration on weight gain is surely due to the period required by the birds to recover from the invasive process to which they were subjected[20]. In this sense, Muriel-Duran[21] mentions the importance of quickly overcoming the stress of the castration procedure to obtain better results.

Figure 1 Percentages for the mortality variable



The lower feed intake observed in the chickens castrated at 8 weeks of age (table 2) was probably due to the post-surgical stress of castration. However, consumption leveled off in subsequent weeks, being similar to that of the other experimental groups. On the other hand, these differences in consumption due to the effect of castration have not been observed[4,20,22,23]. This variability in food consumption is probably due to various factors, including the genetic line and the place of origin of the chickens[4,17,25].

The feed conversion was presented at week 12 post-caponization in chickens castrated at 8 and 9 weeks of (table 3) is due to the greater efficiency of the chicken to convert the feed into meat, product of castration, however, These results do not agree with other studies, no significant differences were found on feed conversion[6,12,22,26].

The lower mortality rate (figure 1) in chickens castrated at 8 weeks of age was consistent with the results of Rikimaru et al.[27], who did not witness deaths in chickens castrated at an early age (3 and 8 weeks). On the other hand, the higher yield to the carcass of the castrated chickens (8 weeks) with a 75.1% yield over the whole chickens was due to the progressive decrease in the male sexual characteristics of the chickens and to the greater weight gain observed in the This study, obtaining similar values14, at the end of the rearing of capon chickens obtained a yield of 82%. Carcass performance was statistically higher in results that coincide with those reported by other authors[2,3,12,28]. On the other hand, the lower mortality rate in chickens castrated at 8 weeks of age was consistent with the results of Rikimaru et al.[27], who did not witness deaths in chickens castrated at an early age (3 and 8 weeks), which decreases the time of castration and significantly improves the decrease in daily weight gain after castration, allowing efficient production of slow-growing capon and meat type in the early stages of development.

In the feasibility study for the creation of a Company dedicated to the breeding and commercialization of capon and pulard chickens, in the city of San Gabriel, Province of Carchi, it mentions that the raising and commercialization of organic chickens (capon and pulard) will be of vital importance to undertake productive activities, in the city of San Gabriel and in the province of Carchi, through the efficient use of resources, providing healthy and good quality products to the consumer at an adequate cost[29].

According to the results obtained in the different ages in which the study was carried out, it was established that the best age for gonadectomy is 8 weeks, allowing the productive parameters such as weight gain, conversion and performance to the carcass to be more effective. In the weight gain recorded at 12 weeks, the chickens from the T_1 treatment reached the highest average (343.6 g); while the chickens of treatment T_3 reached the lowest average (232.5.g).

Gonadectomy improves carcass performance, and in a higher percentage in birds operated on surgically at 8 weeks, mortality decreases and production costs, it was determined that birds castrated at 8 weeks presented better profitability.

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The investigation was carried out in the province of Tungurahua and has no conflicts of interest.

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Ethical aspects

The institutional ethics committee for the use of experimental animals was built under a regulation established within the Faculty of Agricultural Sciences whose members are teachers and students. Furthermore, the present study has met the ethical standards for handling animals in research work.

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