Agrociencia

CARCASS AND PARTS YIELD OF MEXICAN CRIOLLO AND SASSO CHICKENS RAISED IN CONFINEMENT OR GRAZING

Lisbeth **Avendaño-López**[1], Fernando **González-Cerón**[1*], Berenice **Hernández-Blancas**[2], Arturo **Pro-Martínez**[2], Sergio Iban **Mendoza-Pedroza**[2], Diego **Zárate-Contreras**[2]

[1]Universidad Autónoma Chapingo. Departamento de Zootecnia. Carretera México-Texcoco km 38.5, Texcoco, State of Mexico, Mexico. C. P. 56230.
[2]Colegio de Postgraduados Campus Montecillo, Programa en Recursos Genéticos y Productividad-Ganadería. Carretera México-Texcoco km 36.5, Montecillo, Texcoco, State of Mexico, Mexico. C. P. 56264.
* Author for correspondence: fgceron@colpos.mx

Citation: Avendaño-López L, González-Cerón F, Hernández-Blancas B, Pro-Martínez A, Mendoza-Pedroza SI, Zárate-Contreras DI. 2025. Carcass and parts yield of Mexican Criollo and Sasso chickens raised in confinement or grazing. **Agrociencia.** https://doi.org/ 10.47163/agrociencia.v59i4.3244

Editor in Chief:
Dr. Fernando C. Gómez Merino

Received: August 03, 2024.
Approved: June 11, 2025.
Published in Agrociencia: June 25, 2025.

ABSTRACT

The consumption of chicken meat (*Gallus gallus domesticus* L.) has gradually increased. Changes in economic and social development have changed consumer perceptions of the quality and safety of food in terms of animal welfare, resulting in the implementation of new alternative farming systems. This research was conducted at the poultry farm "El Horno" within the Valley of Mexico Experimental Field of the National Institute of Forestry, Agriculture, and Livestock Research (CEVAMEX-INIFAP) in 2022. The objective was to determine the carcass and parts yield of Mexican Criollo (CM) and Sasso (S) chickens raised in confinement or grazing conditions. Ninety-two birds (44 CM and 48 S), randomly distributed in both production systems, were used to obtain four replicates of the following combinations of bird genotype and production system: CM grazing, CM confinement, S grazing, and S confinement, with feed and water *ad libitum*. At 84 days of age, the birds were weighed individually per treatment and sacrificed by desensitizing them by cervical dislocation. The weight of the legs, thigh, breast, skin, muscle, and bone was evaluated separately for each piece. A completely randomized experimental design with a 2 × 2 factorial arrangement was used, with genotype and production system as main factors. Data were analyzed using PROC MIXED of SAS. Cold and hot carcass yield was higher in S birds compared to CM birds. The live weight recorded in S birds was 946 g higher compared to CM birds. It is concluded that S birds perform better in the main pieces (breast, leg, and thigh), as well as in their variables (skin, muscle, and bone), regardless of the production system to which they are subjected (grazing or confinement).

Keywords: *Gallus gallus domesticus* L. skin, muscle, bone, poultry, animal welfare.

INTRODUCTION

Poultry farming represents the most dynamic sector within the Mexican livestock industry, positioning the country as the fifth largest producer of poultry meat globally. Three primary poultry production systems are used nationwide: technified, semi-

technified, and backyard or family-based systems. Among these, the backyard system remains the most traditional and widely distributed across the country; however, its contribution to overall production is minimal (around 10 %) as it primarily serves subsistence purposes (SAGARPA, 2012).

In Mexico, chicken meat has become a staple dietary component due to its affordability and widespread acceptance as a nutritious and safe food source. Its culinary versatility further enhances its importance in daily household meals (Iruegas-Evaristo, 2011). Compared to meat from other species, chicken meat contains lower intramuscular fat, making it more easily digestible. Moreover, it possesses significant nutritional value, providing, on average, 20 % protein, comparable to beef, and approximately 9 % fat. It also contains essential minerals, including iron, zinc, phosphorus, and potassium, which are vital for human health (Moreiras *et al*., 2005).

The growth and performance of birds are determined by genotype, age, sex, diet, and environment. These factors help improve performance within production (Gordon and Charles, 2002). However, it is necessary to investigate the specific conditions that guarantee the optimal productive performance of the Mexican Criollo chicken compared to the breeds used in non-conventional production systems, such as the Sasso chicken. Matus-Aragón *et al*. (2021) evaluated the performance of Mexican Criollo chickens at 12 weeks of age and reported a higher carcass yield in males (1548.53 g) compared to females (872.72 g). In general, males showed higher weight and performance in most of the variables evaluated, except for breast, thigh, and wing. Dzungwe *et al*. (2022) reported that Sasso chickens yielded 1929 g at the same age, which was higher than Creole birds.

Although the general conditions of broiler production are known, the yield of the parts most valued by consumers (breast, legs, and thighs) is unknown, which is required to effectively utilize the poultry genetic resources in Mexico and commercialize them. Therefore, the current study assessed the carcass yield, its components, and the skin-muscle-bone relationship in Mexican Criollo and Sasso poultry, as well as how the rearing system affects these variables.

MATERIALS AND METHODS

Study site

The study was conducted at the facilities of the poultry farm "El Horno," located in the Valley of Mexico Experimental Field under the National Institute of Forestry, Agriculture, and Livestock Research (CEVAMEX-INIFAP), at 19° 48′ 95′′ N, 98° 89′ 42′′ W, and an altitude of 2250 m (Sangerman-Jarquín *et al*., 2009).

Animal management

A total of 92 birds were used, including 44 Mexican Criollo (CM) and 48 Sasso (S) chickens, which were randomly distributed in grazing (P) or confinement (C)

production systems, with four replicates each. A factorial arrangement of treatments (CMP, CMC, SP, and SC) was used. Birds in confinement were kept permanently in pens inside a natural environment poultry house with movable side curtains. Birds in the grazing system had access to a white clover (*Trifolium repens* L.) grazing for 8 h a day (9:00 am to 5:00 pm), and spent the rest of their time inside the house.

The chickens were housed in pens inside the house with dimensions of 1.1 × 1.4 m, and the floor was covered with 5 cm of shavings litter. Each pen was equipped with a hopper feeder (10 kg) and a 5 L drinker. From 35 to 56 days of age, the birds were fed a diet of 2550 kcal of metabolizable energy per kilogram and 17 % crude protein (PC); from 56 to 84 days of age, they were offered commercial balanced feed (minimum PC of 17.5 %, crude fat 4 %, minimum crude fiber of 4.5 %, maximum ash of 5.5 %, maximum moisture of 12 %, and nitrogen-free extract by difference of 55.5 %). Food and water were offered *ad libitum*.

Poultry processing

At 84 days of age, birds were weighed individually according to treatment on a digital scale (Ohaus Ranger® 3000 Counting Scale, Mexico) with a capacity of 15 kg. Subsequently, they were slaughtered in accordance with the Official Mexican Standard NOM-O33-ZOO-1995 (DOF, 1995) by dislocation at the level of the first cervical vertebra and the occipital condyle, followed by decapitation and exsanguination. Birds were scalded by being immersed in a container with hot water (45 s) at a temperature of 62 to 65 °C (González-Cortés *et al*., 2019).

Each bird was identified with a plastic tag attached to their tibia. To obtain the hot carcass (HC), the viscera were removed, and the legs were cut between the tibia and the metatarsus. Subsequently, the carcasses were placed in 200-L containers with cold water (<4 °C) for 16 h (Carciofi and Laurindo, 2007). Subsequently, the carcasses were removed from the water and placed on a table, where the excess water was removed by gravity (2 h); they were then weighed, and the cold carcass weight (CF) was determined.

Quartering and fleshing

The quartering process consisted of separating the main pieces (legs, thighs, and breast) and the minor pieces (wings, neck, shoulder, and breast bone) to obtain their weight separately. Once the weight was recorded, the skin was separated from the muscle and the bone from the muscle with the help of a knife, taking great care not to damage the material, in order to weigh the skin, bone, and muscle individually.

Variables evaluated

Live weight (LW), hot carcass weight (HCW), cold carcass weight (CCW), total muscle weight (TMuscW), total bone weight (TBoneW), and total skin weight (TSkinW) were evaluated in all chickens.

In relation to the leg, total leg weight (TLgW), leg bone weight (LgBoneW), leg skin weight (LgSkinW), and leg muscle weight (LgMuscW) were recorded, and the yield of

total leg weight to live weight (TLgW-LW), to hot carcass (TLgW-HCW), and to cold carcass (TLgW-CCW) was calculated.

In relation to the thigh, total thigh weight (TThW), thigh bone weight (ThBoneW), thigh skin weight (ThSkinW), and thigh muscle weight (ThMuscW) were recorded, and the yield of total thigh weight to live weight (TThW-LW), to hot carcass (TThW-HCW), and to cold carcass (TThW-CCW) was calculated.

For breast, total breast weight (TBrW), breast weight of the minor breast (BrWminor), and breast weight of the major breast (BrWmajor) were recorded, while breast bone weight (BrBoneW) and breast skin weight (BrSkinW), and the yield of total breast weight to live weight (TBrW-LW), to hot carcass (TBrW-HCW), and to cold carcass (TBrW-CCW) were calculated.

Statistical analysis

The data for the variables studied were analyzed with the SAS MIXED procedure (SAS version 9.3; SAS Institute, Cary, NC, USA) under a completely randomized experimental design with a 2 × 2 factorial arrangement, with bird genotype and production system as main factors. The effect of each factor was considered significant at a value of $p \leq 0.05$. The adjusted means obtained were compared using Tukey's test.

RESULTS AND DISCUSSION

Carcass yield

Live weight (LW), hot carcass weight (HCW), and cold carcass weight (CCW) (Table 1) were higher in birds of the S commercial line compared to CM birds at 84 days of age. For LW, S birds had 946 g more compared to CM birds (2150 and 1204 g, respectively), the latter being higher than the 1158.46 g reported by Matus-Aragón *et al*. (2020) for CM birds at the same age. For HCW, the same trend continues in favor of the S line (68 %) in relation to CM birds (60 %).

Lower yields were recorded than those reported by Lorenzo *et al*. (2011), with S chickens (T-44) and CM birds exhibiting yields of 79.63 and 66 %, respectively, in comparison to other Creole birds. Similarly, lower values were observed for CCW (62 % for CM and 71 % for S), with higher percentages compared to HCW, which can be attributed to the cooling method used. It could be said that cooling by immersion in cold water causes a carcass weight gain (water absorption) of up to 6 %. Generally, the appearance of the carcass after chilling is better (Demirok *et al*., 2013).

Production system yield

Regarding the production system, no significant differences were observed ($p > 0.05$), with yields of 68.7 and 67.7 % in confinement and grazing, respectively. Similar results were reported by Paredes and Vásquez (2020), who obtained 68.4 % in confined Criollo birds, while Santos *et al.* (2014) obtained a carcass yield of 75 % with bare-necked birds in grazing.

Table 1. Adjusted means (± standard error) of variables associated with carcass yield of Mexican Criollo and Sasso chickens (*Gallus gallus domesticus* L.) raised in confinement or grazing conditions.

Factor	Level	LW (g)	HCW (g)	CCW (g)
GEN	CM	1204 ± 42[b]	722 ± 29[b]	755 ± 32[b]
	S	2150 ± 41[a]	1477 ± 29[a]	1530 ± 32[a]
SYST	CONF	1682 ± 41	1121 ± 28	1157 ± 31
	GRAZ	1671 ± 42	1078 ± 30	1129 ± 33
GEN × SYST	CM × CONF	1258 ± 56	773 ± 39	791 ± 43
	CM × GRAZ	1149 ± 61	671 ± 43	719 ± 47
	S × CONF	2106 ± 59	1469 ± 41	1522 ± 45
	S × GRAZ	2194 ± 59	1485 ± 41	539 ± 45
p-value	GEN	<0.0001	<0.0001	<0.0001
	SYST	0.8494	0.2959	0.5420
	GEN × SYST	0.0972	0.1565	0.3310

LW: live weight; HCW: hot carcass weight; CCW: cold carcass weight; GEN: genotype; SYST: production system; CM: Mexican Creole chicken; S: Sasso chicken; CONF: confinement raising; GRAZ: grazing-raised. [abc] Mean values per column with different letters between factors are statistically different ($p \leq 0.05$).

Leg yield

For leg yield, significant differences ($p \leq 0.05$) were observed among the bird genotypes (Table 2), with values of 9.8 and 10.2 % in relation to live weight for CM and S, respectively. The values reported exceed those documented by Lorenzo *et al*. (2011), who recorded a leg yield of 4.07 % in Sasso T-44 birds, compared to 4.22 % for the native Moss bird. Their components (skin, muscle, and bone) followed the superior trend in the S strain, with 6.7, 66.7, and 26.2 %, respectively, compared to CM with 5.9, 61.8, and 32.2 %. On the contrary, the results of this research are lower than those obtained by Ángeles-Coronado *et al*. (2013) for creole birds, who obtained leg yields of 13.5 to 16.6 %.

Thigh yields

In CM birds, the thigh yield was 10.8 % in relation to live weight, whereas in S birds it was 10.5 %, indicating a statistically significant difference ($p \leq 0.05$). Consequently, the skin, muscle, and bone components followed the trend in favor of the S line (Table 3), obtaining lower values for thigh yield compared to those reported by Lorenzo *et al*. (2011), who found a thigh yield of 15.9 % in Sasso T-44 birds, while for the native Moss bird, a value of 13.5 % was obtained. Similarly, the values found in this study are lower than those obtained by Sanka *et al*. (2021), who reported a thigh yield of 17 % in Sasso chickens, below the Kuroiler hybrid with 17.4 %.

Table 2. Adjusted means (± standard error) of variables associated with leg performance of Mexican Criollo and Sasso chickens (*Gallus gallus domesticus* L.) raised in confinement or grazing conditions.

Factor	Level	TLgW (g)	LgBoneW (g)	LgMuscW (g)	LgSkinW (g)	TLgW-LW (%)	TLgW-HCW (%)	TLgW-CCW (%)
GEN	CM	118 ± 6^{b}	38 ± 2^{b}	73 ± 4^{b}	7 ± 1^{b}	0.097 ± 0.003	0.164 ± 0.004	0.158 ± 0.005
	S	221 ± 6^{a}	58 ± 2^{a}	148 ± 4^{a}	15 ± 1^{a}	0.103 ± 0.003	0.151 ± 0.004	0.145 ± 0.005
SYST	CONF	172 ± 5	49 ± 2	112 ± 4	11 ± 1	0.100 ± 0.003	0.155 ± 0.004	0.153 ± 0.005
	GRAZ	167 ± 6	47 ± 2	109 ± 4	11 ± 1	0.100 ± 0.003	0.159 ± 0.004	0.151 ± 0.005
GEN × SYST	CM × CONF	123 ± 8	40 ± 3	76 ± 5	7 ± 1	0.097 ± 0.004	0.160 ± 0.006	0.161 ± 0.007
	CM × GRAZ	113 ± 8	37 ± 3	69 ± 6	7 ± 1	0.097 ± 0.004	0.167 ± 0.006	0.156 ± 0.007
	S × CONF	221 ± 8	59 ± 3	147 ± 5	15 ± 1	0.104 ± 0.004	0.150 ± 0.006	0.145 ± 0.007
	S × GRAZ	221 ± 8	57 ± 3	149 ± 5	15 ± 1	0.102 ± 0.004	0.151 ± 0.006	0.146 ± 0.007
p-value	GEN	<0.0001	<0.0001	<0.0001	<0.0001	0.0854	0.034	0.077
	SYST	0.5217	0.3925	0.6530	0.8282	0.7898	0.473	0.234
	GEN × SYST	0.5163	0.8899	0.4275	0.6854	0.6920	0.587	0.309

TLgW: total leg weight; LgBoneW: leg bone weight; LgMuscW: leg muscle weight; LgSkinW: leg skin weight; TLgW-LW: total leg weight yield to live weight; TLgW-HCW: total leg weight yield to hot carcass; TLgW-CCW: total leg weight yield to cold carcass; GEN: genotype; SYST: production system; CM: Mexican Creole chicken; S: Sasso chicken; CONF: confinement rearing; GRAZ: graze rearing. ^{abc} Mean values per column with different letters between factors are statistically different ($p \leq 0.05$).

Table 3. Adjusted means (± standard error) of variables associated with thigh performance of Mexican Criollo and Sasso chickens (*Gallus gallus domesticus* L.) raised in confinement or grazing conditions.

Factor	Level	TThW (g)	ThBoneW (g)	ThMuscW (g)	ThSkinW (g)	TThW-LW (%)	TThW-HCW (%)	TThW-CCW (%)
GEN	CM	130 ± 7^{b}	27 ± 1.374^{b}	88 ± 5^{b}	14 ± 1^{b}	0.111 ± 0.005	0.191 ± 0.010	0.184 ± 0.010
	S	225 ± 7^{a}	41 ± 1.368^{a}	169 ± 5^{a}	25 ± 1^{a}	0.105 ± 0.005	0.152 ± 0.009	0.146 ± 0.010
SYST	CONF	180 ± 7	34 ± 1.340	130 ± 5	19 ± 1	0.110 ± 0.005	0.170 ± 0.009	0.167 ± 0.009
	GRAZ	175 ± 7	34 ± 1.4	127 ± 5	19 ± 1	0.106 ± 0.005	0.172 ± 0.010	0.163 ± 0.010
GEN × SYST	CM × CONF	135 ± 10	27 ± 2.0	90 ± 7	14 ± 1	0.112 ± 0.007	0.187 ± 0.013	0.186 ± 0.013
	CM × GRAZ	126 ± 11	26 ± 2.0	87 ± 8	13 ± 1	0.111 ± 0.007	0.195 ± 0.014	0.182 ± 0.014
	S × CONF	225 ± 10	41 ± 2.0	170 ± 7	24 ± 1	0.108 ± 0.007	0.154 ± 0.014	0.150 ± 0.013
	S × GRAZ	224 ± 10	41 ± 2.0	167 ± 7	26 ± 1	0.102 ± 0.007	0.150 ± 0.013	0.145 ± 0.013
p-value	GEN	<0.0001	<0.0001	<0.0001	<0.0001	0.355	0.005	0.006
	SYST	0.6096	0.990	0.6677	0.745	0.647	0.894	0.756
	GEN × SYST	0.6957	0.728	0.9840	0.487	0.720	0.646	0.986

TThW: total thigh weight; ThBoneW: thigh bone weight; ThMuscW: thigh muscle weight; ThSkinW: thigh skin weight; TThW-LW: total thigh weight yield to live weight; TThW-HCW: total thigh weight yield to hot carcass; TThW-CCW: total thigh weight yield to cold carcass; GEN: genotype; SYST: production system; CM: Mexican Creole chicken; S: Sasso chicken; CONF: confinement rearing; GRAZ: graze rearing. ^{abc} Mean values per column with different letters between factors are statistically different ($p \leq 0.05$).

Breast yield

The breast muscle was divided into two sections: pectoralis major (BrWmajor) and pectoralis minor (Table 4). A yield of 15.2 % was obtained in CM birds, while S birds yielded 17.9 %, showing a difference between genotypes in favor of the commercial S strain, which can be attributed to the genetic improvement of slow-growing strains for this type of production, improving their carcass yield and meat-to-bone ratio (Brackenbury and Williamson, 1989) compared to CM birds.

The results are higher than those reported by Pavlovski *et al*. (2009), who observed a yield of 13.5 to 13 % in native Naked Neck birds at 98 days of fattening age, and Miguel *et al*. (2008), who reported a yield of 18.6 to 16 % in Sasso strain birds at 105 days of age.

Total skin and muscle yield

Total skin and muscle yield values in relation to live weight were found for CM birds to be 2.9 and 23.8 %, respectively (Table 5), whereas S birds yielded 3.4 and 27.7 %. A small difference was found in both variables in favor of the S strain. The data presented

Table 4. Adjusted means (± standard error) of variables associated with breast performance of Mexican Criollo and Sasso chickens (*Gallus gallus domesticus* L.) raised in confinement or grazing condition.

Factor	Level	TBrW (g)	BrBoneW (g)	BrWminor (g)	BrWmajor (g)	BrSkinW (g)	TBrW-LW (%)	TBrW-HCW (%)	TBrW-CCW (%)
GEN	CM	184 ± 10^{b}	44 ± 3^{b}	33 ± 2^{b}	93 ± 6^{b}	14 ± 1^{b}	0.152 ± 0.006	0.256 ± 0.009	0.247 ± 0.009
	S	385 ± 10^{a}	74 ± 3^{a}	71 ± 2^{a}	209 ± 6^{a}	32 ± 1^{a}	0.181 ± 0.006	0.263 ± 0.009	0.254 ± 0.009
SYST	CONF	294 ± 10	61 ± 3	54 ± 2	157 ± 6	21 ± 1	0.170 ± 0.006	0.261 ± 0.009	0.256 ± 0.009
	GRAZ	275 ± 10	56 ± 3	49 ± 2	144 ± 6	25 ± 1	0.163 ± 0.006	0.258 ± 0.009	0.245 ± 0.009
GEN × SYST	CM × CONF	195 ± 14	49 ± 4	34 ± 3	98 ± 8	13 ± 2	0.153 ± 0.008	0.253 ± 0.012	0.252 ± 0.013
	CM × GRAZ	173 ± 15	39 ± 4	32 ± 3	87 ± 9	15 ± 2	0.150 ± 0.008	0.260 ± 0.013	0.241 ± 0.014
	S × CONF	393 ± 14	74 ± 4	75 ± 3	215 ± 8	30 ± 2	0.187 ± 0.008	0.269 ± 0.013	0.260 ± 0.013
	S × GRAZ	377 ± 14	73 ± 4	66 ± 3	202 ± 8	35 ± 2	0.175 ± 0.008	0.258 ± 0.013	0.250 ± 0.013
p-value	GEN	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	0.557	0.558
	SYST	0.181	0.167	0.085	0.145	0.061	0.373	0.871	0.443
	GEN × SYST	0.867	0.206	0.336	0.877	0.292	0.562	0.511	0.985

TBrW: total breast weight; BrBoneW: breast bone weight; BrWminor: minor breast weight; BrWmajor: major breast weight; BrSkinW: breast skin weight; TBrW-LW: total breast weight yield to live weight; TBrW-HCW: total breast weight yield to hot carcass; TBrW-HCW: total breast weight yield to live weight; TBrW-HCW: total breast weight yield to cold carcass; SYST: production system; GEN: genotype; SYST: production system; CM: Mexican Criollo chicken; S: Sasso chicken; CONF: confinement rearing; GRAZ: graze rearing. ^{abc} Mean values per column with different letters between factors are statistically different ($p \leq 0.05$).

Table 5. Adjusted means (± standard error) of variables associated with carcass yield of Mexican Criollo chicken and Sasso chickens (*Gallus gallus domesticus* L.) raised in confinement or grazing conditions.

Factor	Level	TMuscW (g)	TBoneW (g)	TSkinW (g)
GEN	CM	287 ± 14[b]	109 ± 5[b]	35 ± 2[b]
	S	596 ± 14[a]	172 ± 5[a]	73 ± 2[a]
SYST	CONF	453 ± 14	144 ± 5	52 ± 2
	GRAZ	430 ± 15	137 ± 5	55 ± 2
GEN × SYST	CM × CONF	298 ± 19	116 ± 7	34 ± 3
	CM × GRAZ	275 ± 21	102 ± 7	35 ± 3
	S × CONF	607 ± 20	173 ± 7	69 ± 3
	S × GRAZ	584 ± 20	172 ± 7	76 ± 3
p-value	GEN	<0.0001	<0.0001	<0.0001
	SYST	0.258	0.296	0.238
	GEN × SYST	0.999	0.425	0.293

TMuscW: total muscle weight; TBoneW: total bone weight; TSkinW: total skin weight; GEN: genotype; SYST: production system; CM: Mexican Creole chicken; S: Sasso chicken; CONF: confinement rearing; GRAZ: graze rearing. [abc] Mean values per column with different letters between factors are different ($p \leq 0.05$).

is consistent with what was stated by Franco *et al*. (2012) regarding the yield for skin that was obtained (0.96 and 1.34 %) in favor of Sasso birds, contrary to meat (11.42 and 9.6 %; $p < 0.001$), which was higher in samples of Moss hens.

On the other hand, according to the production system to which they were subjected, no significant difference was observed. Skin yield was 3 % in both grazing and confinement, while muscle yield was 27 % in grazing and 25 % in confinement, with results that are very similar and statistically insignificant.

Total bone yield

Regarding the production system, values of 8.6 % were obtained for the confinement system and 8.1 % for the grazing system, with no significant differences. Regarding the bone variable (Table 5), independently of the main pieces, values were obtained for the CM birds of 9 % and for S of 8 % in relation to the total weight. There was no significant difference between genotypes, which can be attributed to the fact that CM birds are an unimproved line and nutrients are used by them for survival, in this case, having a more resistant bone system, a product of genetic selection that has been carried out for many years in the commercial Sasso line (Aman *et al*., 2017). Similarly, the results agree with those obtained by Muriel-Durán *et al*. (1997), who evaluated Spanish birds and crosses of specialized lines for meat at 89 days of age, raised in a grazing system, where a bone yield of 5.8 % was obtained.

CONCLUSIONS

Birds of the Sasso commercial line showed better productive performance compared to the Mexican Criollo in terms of live weight and overall carcass yield and its main parts (leg, thigh, and breast) at 84 days of age. Mexican Criollo and Sasso birds performed similarly, regardless of the production system they were subjected to (grazing or confinement). Furthermore, they showed no significant difference in bone weight, regardless of the production system.

REFERENCES

Aman G, Bangu B, Bereket Z, Desta G, Abiti T, Edget A, Hamid J. 2017. Production performance of Sasso (distributed by ethio-chicken private poultry farms) and Bovans brown chickens breed under village production system in three agro-ecologies of Southern Nations, Nationalities, and Peoples Regional State (SNNPR), Ethiopia. International Journal of Livestock 8 (9): 145–157. https://doi.org/10.5897/ijlp2017.0391

Ángeles-Coronado IA, Jerez-Salas MP, Pérez-León MI, Villegas-Aparicio Y. 2013. Efecto de *Portulaca oleracea* y *Lolium perenne* en la carne de gallina criolla. Revista Mexicana de Ciencias Agrícolas 6: 1221–1229. https://doi.org/10.29312/remexca.v0i6.1285

Brackenbury JH, Willianson ADB. 1989. Treadmill exercise training increases the oxidative capacity of chicken iliotibialis muscle. Poultry Science 68 (4): 577–581. https://doi.org/10.3382/ps.0680577

Carciofi BAM, Laurindo JB. 2007. Water uptake by poultry carcasses during cooling by water immersion. Chemical Engineering and Processing: Process Intensification 46 (5): 444–450. https://doi.org/10.1016/j.cep.2006.05.020

Demirok E, Veluz G, Stuyvenberg WV, Castañeda MP, Byrd A, Alvarado CZ. 2013. Quality and safety of broiler meat in various chilling systems. Poultry Science 92 (4): 1117–1126. https://doi.org/10.3382/ps.2012-02493

DOF (Diario Oficial de la Federación). NORMA Oficial Mexicana NOM-033-ZOO-1995, sacrificio humanitario de los animales domésticos y silvestres. Gobierno de México. Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación. Ciudad de México, México.

Dzungwe JT, Tozo K, Chrysostome C. 2022. Growth performance, mortality and carcass yield evaluation of pure and reciprocal crosses between Sasso and Wassache chickens. Tropical Animal Health and Production 54 (5). https://doi.org/10.1007/s11250-022-03272-x

Franco D, Rois D, Vázquez JA, Lorenzo JM. 2012. Comparison of growth performance, carcass components, and meat quality between Mos rooster (Galician indigenous breed) and Sasso T-44 line slaughtered at 10 months. Poultry Science 91 (5): 1227–1239. https://doi.org/10.3382/ps.2011-01942

González-Cortés N, Reyes-Pérez R, Jiménez-Vera R, Guzmán-Ceferino J, Estrada-Lievano JM. 2019. Rendimiento de la canal de pollos (*Gallus gallus domesticus* L.) sometidos a pastoreo con *Canavalia ensiformis* L. Agro Productividad 12 (4). https://doi.org/10.32854/agrop.v0i0.1195

Gordon SH, Charles DR. 2002. Niche and organic chicken products: Their technology and scientific principles. Nottingham University Press: Nottingham, UK. 320 p.

Iruegas-Evaristo LF. 2011. El pollo en México. El Economista, 12 de abril de 2011. https://www.eleconomista.com.mx/opinion/El-pollo-en-Mexico-20110411-0006.html (Retrieved: February 2025).

Lorenzo JM, Rois D, Purriños L, Rivero J, Fernández M, Franco D. 2011. Efecto de la raza (Mos vs. Sasso T-44) sobre las características de la canal de gallos criados en libertad. Actas Iberoamericanas de Conservación Animal 1: 218–221.

Matus-Aragón MÁ, González-Cerón F, Salinas-Ruiz J, Sosa-Montes E, Pro-Martínez A, Hernández-Mendo O, Cuca-García JM, Chan-Díaz DJ. 2021. Productive performance of Mexican Creole chickens from hatching to 12 weeks of age fed diets with different concentrations of metabolizable energy and crude protein. Animal Bioscience 34 (11): 1794–1801. https://doi.org/10.5713/ab.20.0682

Miguel A, Ciria J, Asenjo B, Calvo L, Gómara A, Francesh A. 2008. Comparación del crecimiento y la canal de diferentes tipos genéticos de pollos criados en régimen semiextensivo en la provincia de Soria. Información Técnica Económica Agraria 104 (3): 381–398.

Moreiras O, Carbajal A, Cabrera L, Cuadrado M. 2005. Tablas de composición de alimentos. Editorial Pirámide: Madrid, España.

Muriel-Durán A, Solana-Ramos J, Cancho-Alfonso M. 1997. Resultados productivos, Rendimiento y composición de la canal de dos cruces de pollos de carne criados en libertad. Archivos de Zootecnia 175 (46): 240.

Paredes M, Vásquez B. 2020 Crecimiento, características de carcasa, peso de órganos internos y composición proximal de carne de seis genotipos de pollos criados en la región Andina del norte peruano. Scientia Agropecuaria 11 (3): 365–374. https://doi.org/10.17268/sci.agropecu.2020.03.08

Pavlovski ZŠ, Lukić M, Vitorović D, Petričević V, Milošević N. 2009. Naked neck chicken of Serbian and foreign origin: Carcass characteristic. Biotechnology in Animal Husbandry 25 (5–6): 1023–1032.

SAGARPA (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación). 2012. Situación actual y perspectiva de la producción de carne de pollo en México. 2000. Ciudad de México, México. 25 p.

Sangerman-Jarquín DMJ, Espitia-Rangel E, Villaseñor-Mir HE, Ramírez-Valverde B, Alberti-Manzanares P. 2009. Estudio de caso del impacto de la transferencia de tecnología en trigo del INIFAP. Agricultura Técnica en México 35 (1): 25–37.

Sanka YD, Mbaga SH, Mutayoba SK, Katule AM, Goromela SH. 2021. Evaluation of growth performance of Sasso and Kuroiler chickens fed three diets at varying levels of supplementation under semi-intensive system of production in Tanzania. Tropical Animal Health and Production 52 (6): 3315–3322. https://doi.org/10.1007/s11250-020-02363-x

Santos M, Lon-Wo E, Savón L, Herrera M. 2014. Comportamiento productivo de pollos cuello desnudo heterocigotos en pastoreo, con diferentes espacios vitales y harina de hojas de *Morus alba* en la ración. Revista Cubana de Ciencia Agrícola 3 (48): 265–269.