

# FOSTERING SUSTAINABLE PRACTICES IN INDIGENOUS SLOW-GROWING CHICKEN PRODUCTION: DESIGN OF A REDUCED-SOY DIET FORMULATION

Noemí Echegaray<sup>1</sup>, Lucio Garcia<sup>1</sup>, Luis Vázquez<sup>1</sup>, Ruben Agregán<sup>1</sup>, Jose M. Lorenzo<sup>1,2\*</sup>

<sup>1</sup>Centro Tecnológico da Carne, Parque Tecnológico de Galicia, San Cibrao das Viñas, 32900, Ourense, Spain

<sup>2</sup>Área de Tecnoloxía dos Alimentos, Facultade de Ciencias, Universidade de Vigo, 32004, Ourense, Spain

\*Corresponding author email: [jmlorenzo@ceteca.net](mailto:jmlorenzo@ceteca.net)

## I. INTRODUCTION

The widespread use of soy in animal feed is driven by its high protein content and favorable amino acid profile [1]. However, the expanding cultivation of this leguminous crop is linked to deforestation, soil degradation, wildlife habitat destruction, and loss of natural grasslands [2], prompting global concerns in the animal feed production sector. On the other hand, increasing consumer awareness of animal welfare is driving demand for products from traditional farming practices. Additionally, slow-growing and native breeds like 'Galiña de Mos' are gaining popularity in the meat market [3]. These factors emphasize the urgent need to explore environmentally friendly feed formulations for free-range animals while maintaining high meat quality. Thus, this study aims to evaluate the impact of reduced-soy feed on the chemical composition and physicochemical parameters of the 'Galiña de Mos' breed.

## II. MATERIALS AND METHODS

To achieve this goal, 46 'Galiña de Mos' chickens (32 males and 14 females) were randomly divided into two groups of 23 animals each (16 males and 7 females) after being fed a commercial starter feed for 75 days. One of these groups was fed a commercial feed containing corn and soy, while the other group received a custom feed with additional ingredients such as wheat (10%), peas (6%), rapeseed (3%), and flaxseed (1%), reducing soy content. The feeding period lasted 118 days and took place outdoors. Analyses were performed on the right breast of 15 representative samples from each group. Moisture, protein (Kjeldahl N  $\times$  6.25), and ash were measured following ISO standards, while fat content was determined using the American Oil Chemists' Society (AOCS) procedure. Meat quality analysis included pH measurement (after 24 h), color evaluation, water holding capacity (WHC) and texture (Warner-Bratzler test), as described by Pateiro et al. [4]. Additionally, the obtained results were evaluated using one-way ANOVA with SPSS package version 23.0 (IBM SPSS, Chicago, IL, USA).

## III. RESULTS AND DISCUSSION

Although diet can significantly influence the chemical composition of poultry meat [3], this trial observed that no parameters were significantly ( $P > 0.05$ ) affected by the diet supplied to the 'Galiña de Mos' breed, except for ash content in roosters, which was significantly ( $P < 0.01$ ) higher in the control group (Table 1).

Table 1 – Influence of reduced-soy feed on the chemical composition of breast meat in the native breed 'Galiña de Mos' (values expressed as mean  $\pm$  standard error).

	Males			Females		
	Control feed	Reduced-soy feed	Sig.	Control feed	Reduced-soy feed	Sig.
Moisture (%)	74.65 $\pm$ 0.59	74.59 $\pm$ 0.50	ns	73.52 $\pm$ 0.39	73.95 $\pm$ 1.12	ns
Intramuscular fat (%)	0.10 $\pm$ 0.12	0.07 $\pm$ 0.04	ns	0.30 $\pm$ 0.35	0.47 $\pm$ 0.61	ns
Protein (%)	23.96 $\pm$ 0.71	24.18 $\pm$ 0.52	ns	24.8 $\pm$ 0.25	24.42 $\pm$ 0.59	ns
Ash (%)	1.13 $\pm$ 0.03	1.19 $\pm$ 0.04	**	1.20 $\pm$ 0.01	1.2 $\pm$ 0.03	ns

Sig: significance: \* ( $P < 0.05$ ); \*\* ( $P < 0.01$ ); \*\*\* ( $P < 0.001$ ); ns: no significant difference

This lack of significant effect could be attributed to the formulation of the reduced-soy feed, which was designed to closely match the proximal composition found in commercial feeds. Similarly, the content of essential amino acids for birds, such as lysine and methionine, was adjusted to mirror those of commercial formulations. As a result, bird metabolism appeared unaffected, maintaining consistent muscle composition regardless of the diet provided. Concerning pH (Table 2), the diet significantly affected its value in both sexes. Specifically, the reduced-soy feed provided breasts with a significantly ( $P < 0.01$ ) lower pH. On the contrary, the feed supplied to roosters and hens did not significantly ( $P > 0.05$ ) affect any of the color parameters (Table 2). The same trend of no significant ( $P > 0.05$ ) effect was found for WHC and shear force, as the diet did not appear to affect these breast quality parameters (Table 2).

Table 2 – Influence of reduced-soy feed on the physicochemical parameters of breast meat in the native breed 'Galiña de Mos' (values expressed as mean  $\pm$  standard error).

	Males			Females		
	Control feed	Reduced-soy feed	Sig.	Control feed	Reduced-soy feed	Sig.
pH	5.90 $\pm$ 0.09	5.78 $\pm$ 0.11	**	5.85 $\pm$ 0.07	5.72 $\pm$ 0.02	**
Color parameters						
L*	53.58 $\pm$ 3.70	58.00 $\pm$ 4.92	ns	57.05 $\pm$ 1.47	54.81 $\pm$ 0.75	ns
a*	-0.51 $\pm$ 0.53	-0.76 $\pm$ 1.28	ns	0.28 $\pm$ 1.63	-0.99 $\pm$ 1.69	ns
b*	11.81 $\pm$ 2.11	11.46 $\pm$ 1.70	ns	13.01 $\pm$ 1.80	10.35 $\pm$ 1.68	ns
Water holding capacity (%)	15.85 $\pm$ 2.26	13.38 $\pm$ 2.45	ns	16.81 $\pm$ 2.23	14.35 $\pm$ 1.95	ns
Shear force (N/ cm <sup>2</sup> )	13.29 $\pm$ 1.98	20.98 $\pm$ 8.86	ns	25.80 $\pm$ 9.67	20.09 $\pm$ 7.61	ns

Sig: significance: \* ( $P < 0.05$ ); \*\* ( $P < 0.01$ ); \*\*\* ( $P < 0.001$ ); ns: no significant difference

#### IV. CONCLUSION

The implementation of reduced-soy feed for the native 'Galiña de Mos' breed yielded insignificant alterations in both the chemical composition and physicochemical parameters. This underscores the availability of sustainable alternatives to soy, mitigating its adverse environmental impacts in feed formulation, without compromising meat quality.

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