EXPLORING SUSTAINABLE FEEDING SOLUTIONS FOR THE NATIVE 'PORCO CELTA' BREED WITH LOCAL RESOURCES INCLUSION

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I. INTRODUCTION

The increasing competitiveness in the meat market has generated a growing need to produce highquality products. In this context, the recovery of native breeds like 'Porco Celta' plays a crucial role. Despite its slower growth, this breed provides excellent meat quality while allowing for the preservation of genetic heritage and biodiversity, making it a valuable option for discerning consumers [1]. Additionally, the use of native breeds is often associated with extensive production systems and traditional feeding practices that respect the environment due to its lower environmental footprint and reduced impact on local ecosystems [2]. Therefore, our work focuses on developing feed for slowgrowing pig breeds such as 'Porco Celta', utilizing local raw materials. This approach aims to reduce dependence on ingredients such as soy, whose cultivation is linked to deforestation, soil degradation, wildlife habitat destruction, and loss of natural grasslands [3], while ensuring that meat quality is not compromised using locally sourced ingredients that are more environmentally friendly.

II. MATERIALS AND METHODS

To conduct this research, 20 'Porco Celta' pigs were used after a prior 3-month feeding period with a starter feed. The animals were randomly divided into two groups: a control group of 10 pigs (5 males and 5 females) fed a commercial diet consisting of barley, soy, wheat, and corn; and a group of 10 pigs (4 males and 6 females) fed a formulation composed of corn (27%), wheat (21%), peas (20%), soy (11%), starch bran (10%), rapeseed (6%), and flaxseed (1%). The fattening period lasted for 7 months under extensive regimen. All analyses were conducted on the *Longissimus dorsi* (LD) muscle. Moisture, protein (Kjeldahl N × 6.25), and ash were determined following ISO standards, while fat content was assessed using the American Oil Chemists' Society (AOCS) procedure. Meat quality analysis, including pH and color measurement (24 h post-slaughter), water holding capacity (WHC), and texture analysis (Warner-Bratzler test), was performed following the methodology described by Pateiro et al. [4]. To assess the effects of feeding regimen and the potential interaction between feeding and sex, an analysis of variance (ANOVA) was performed using the General Linear Model (GLM) procedure in SPSS version 23.0.

III. RESULTS AND DISCUSSION

As indicated in Table 1, the diet provided to 'Porco Celta' had no significant effect (P > 0.05) on the chemical composition of the LD muscle, except for the moisture content in females, which was significantly higher (P < 0.01) in pigs fed the reformulated diet with increased incorporation of local raw materials.

Table 1 – Effect of a reformulated diet on the chemical composition of 'Porco Celta' *Longissimus dorsi* muscle (values expressed as mean ± standard error)

(I	/						
	Ma	ales	Females				-
	Control diet	Reformulated diet	Sig.	Control diet	Reformulated diet	Sig.	DxS
 Moisture (%)	72.10 ± 1.12	75.59 ± 0.35	ns	69.73 ± 1.23	71.74 ± 1.40	**	ns
Intramuscular fat (%)	4.01 ± 1.52	3.27 ± 0.46	ns	6.97 ± 1.83	4.12 ± 2.21	ns	ns
Protein (%)	22.72 ± 0.52	23.29 ± 0.26	ns	22.11 ± 0.91	22.97 ± 1.11	ns	ns
 Ash (%)	1.14 ± 0.03	1.16 ± 0.02	ns	1.15 ± 0.06	1.19 ± 0.07	ns	ns

Sig: significance: ** (P < 0.01); ns: no significant difference; DxS: interaction of diet and sex.

This finding is significant, considering that monogastric animals like pigs often experience alterations in muscle composition, particularly in fat content, when their diet is modified [5]. However, in this trial, despite modifications to the raw materials used in the reformulated feed, its proximal composition closely resembled that of the commercial feed, including similar concentrations of essential amino acids. Consequently, animal metabolism can remain largely unaffected. As observed in Table 2, the pH was significantly (P < 0.01) affected by the diet only in females, where the reformulated diet increased its value. Similarly, the L* parameter was significantly (P < 0.01) affected by the diet only in females. Specifically, the LD muscle from the reformulated diet showed the lowest L* values, suggesting less luminosity in the meat. As for the a* parameter, the reformulated diet in this case significantly (P < 0.01) affected males, who exhibited lower a* values, implying less redness in the meat. Both sexes exhibited a consistent pattern with the reformulated diet regarding the b* value, demonstrating a notable decrease in this parameter. Contrary, WHC and shear force were not affected by the diet, suggesting that both diets provide meat with similar juiciness and texture.

	Ma	Females				-	
	Control diet	Reformulated diet	Sig.	Control diet	Reformulated diet	Sig.	DxS
рН	5.58 ± 0.13	5.67 ± 0.11	ns	5.42 ± 0.08	5.66 ± 0.11	**	ns
Color parameters							
L*	48.64 ± 0.45	48.19 ± 1.91	ns	54.22 ± 5.42	47.79 ± 3.07	**	ns
a*	5.21 ± 1.06	2.60 ± 0.60	**	3.00 ± 1.28	2.80 ± 10.21	ns	ns
b*	12.17 ± 0.68	9.87 ± 0.32	**	11.87 ± 0.91	10.21 ± 1.29	**	ns
Water holding capacity (%)	23.42 ± 4.09	24.52 ± 2.65	ns	25.12 ± 3.84	22.24 ± 3.46	ns	ns
Shear force (N/ cm ²)	47.23 ± 14.14	47.27 ± 9.01	ns	35.87 ± 10.00	51.46 ± 9.57	ns	ns

Table 2 – Effect of a reformulated diet on the physicochemical parameters of 'Porco Celta' *Longissimus dorsi* muscle (values expressed as mean ± standard error)

Sig: significance: ** (P < 0.01); ns: no significant difference; DxS: interaction of diet and sex.

IV. CONCLUSION

The reformulated diet with higher inclusion of local raw materials had minimal impact on the chemical composition of LD muscle of 'Porco Celta', as well as in its WHC and texture. However, the color parameters of the meat were affected overall, highlighting the need for future sensory evaluations in this aspect to ensure proper consumer acceptance.

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