



Effects of different olive cakes inclusion in the diet of the Bísaros pigs on the chemical composition and fatty acids profile of Biceps femoris muscle

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INTRODUCTION



The European Union (EU) accounts for around 70% of global olive production, generating a production value of approximately EUR 7000 million annually;



In 2023, there were 104 olive oil mills in Trás-os-Montes and Alto Douro (23% of the mills in Portugal) (National Institute of Statistics);



The by-product in question, which is still little exploited, generates disposal costs. The most common options are burning it or burying it in the ground along with other waste and, in less frequent cases, it is used as a supplement for animal feed.

OLIVE OIL BY PRODUCT



Olive: 90%
Leaves: 10%



Pomace 30%



Olive Mill Wastewater 50%



Olive Oil 20%

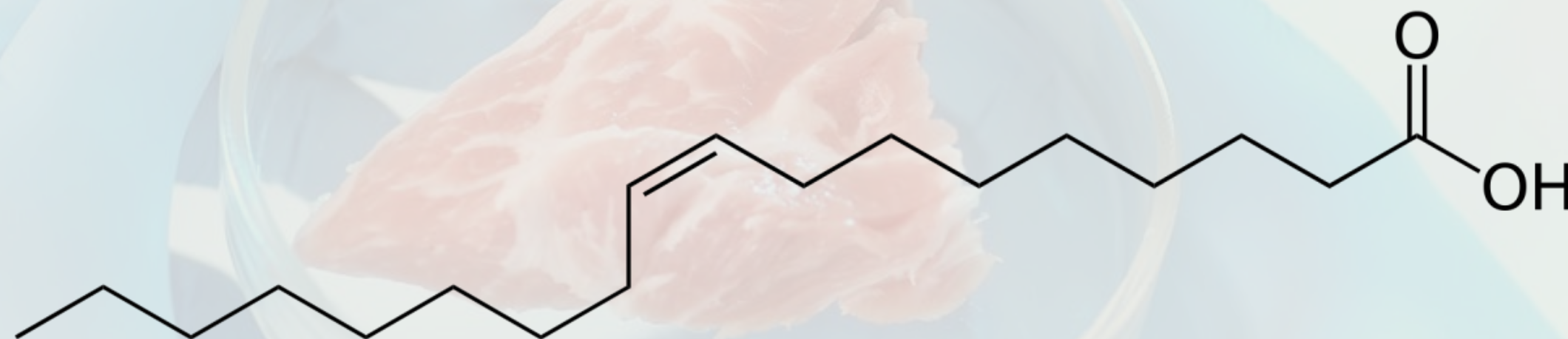
Composition (%)	Olive cakes		
	COC	TPOC	EOC
Dry matter	98.0	97.8	97.9
Organic matter	97.0	91.2	93.5
Neutral detergent fiber	67.7	57.4	65.1
Acid detergente fiber	52.3	51.2	52.4
Acid detergent lignin	26.2	23.3	25.6
Crude protein	5.4	6.8	7.3
Crude fat	14.5	10.0	1.5



BUT, WHAT ABOUT THE QUALITY OF THE MEAT?



The presence of fatty acids in the composition of olive cake reveals a high concentration of oleic acid, which positively affects the quality of animal products when incorporated into their diets;



The Bísara breed

- The Bísara pig breed has been attracting increasing interest in traditional breeding systems in the last three decades. Despite having a slower growth rate and excess weight in its adult phase, this breed is traditionally recognized for its high prolificacy, generating typical products associated with tradition and superior quality.
- Additionally, they are sustainable, which makes them eligible for the Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) regimes.



OBJECTIVES

The project intends to evaluate the inclusion of olive cake (OC) in the Bísaro pig diet. The timing of inclusion, quantity and its effects on meat and meat product quality are the parameters to be evaluated. With this, there is a possibility to boost the sustainability and circular economy by using a regional by-product in the feed of an autochthonous breed, lowering the production costs and increasing the dissemination of the Bísaro brand.



EXPECTED BENEFITS

- 23 Recovery of the olive oil by-product
- 02 The incorporation of olive cake into an animal's diet can influence the quality of the meat.
- 03 Valuing the idea of circular economy, in the context of proximity between the bísaro breed and olive cake.



TREATMENTS

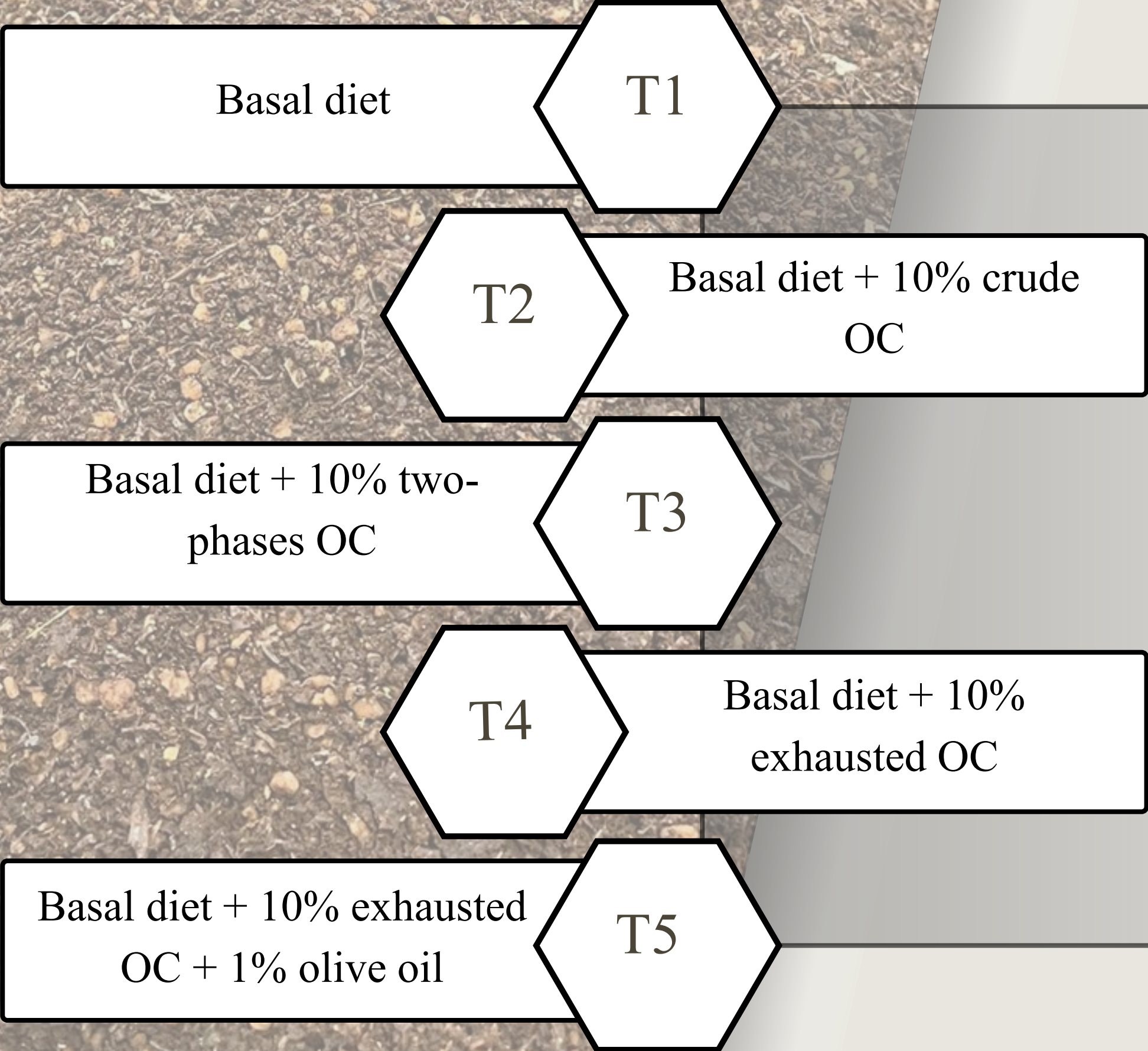


Table 2: Chemical composition of diets.

Chemical composition (g/kg, as feed basis)	Diets				
	T1	T2	T3	T4	T5
Dry matter	97.98	98.28	98.14	98.16	98.26
Organic matter	94.04	94.24	93.57	94.18	94.11
Neutral detergent fiber	17.80	23.25	23.26	23.87	23.13
Acid detergent fiber	6.29	10.66	10.38	10.37	10.13
Acid detergent lignin	0.92	3.15	2.86	3.07	2.95
Crude protein	15.44	13.93	13.54	14.28	13.99
Crude Fat	4.63	5.19	4.82	3.99	4.88

EXPERIMENTAL TRIAL



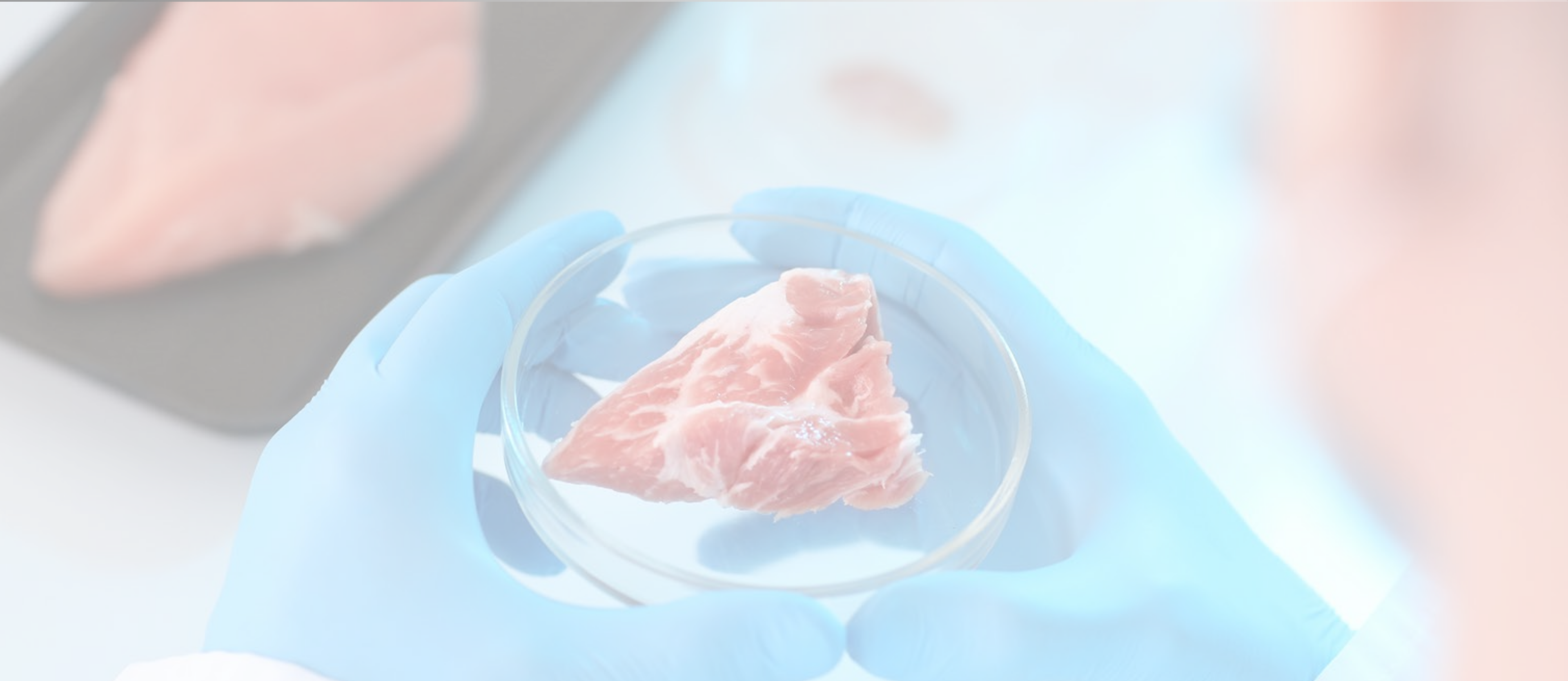
40 Bísaros pigs housed in pairs;
8 repetitions/ treatments

Incorporation of 10% of different olive cakes in the diets (UTAD).



Effects on chemical composition and fatty acid profile in Biceps femoris muscle (IPB).

RESULTS



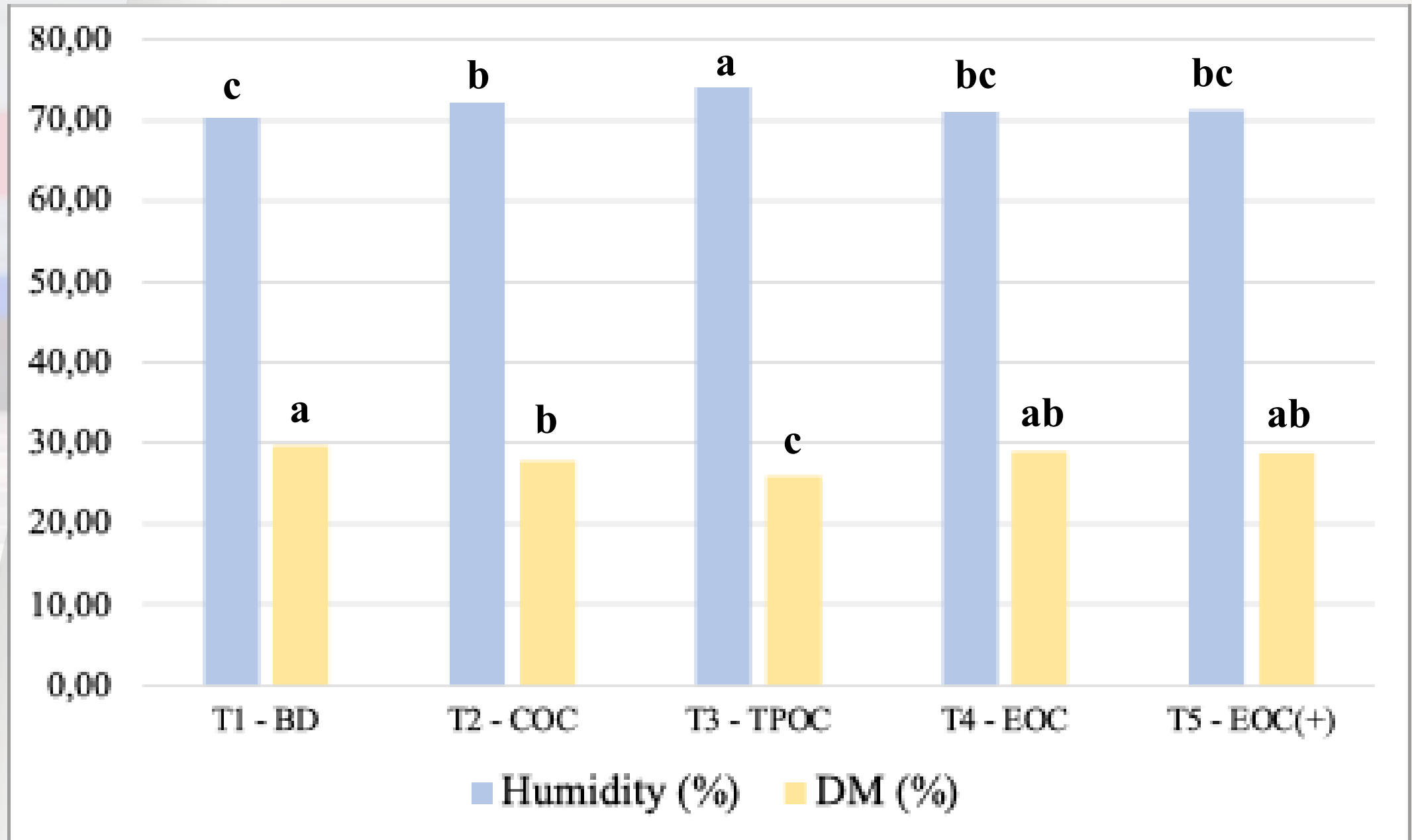
CHEMICAL COMPOSITION

Table 3: Chemical composition of Biceps Femoris muscle. Effect of diets with olive cake.

Chemical Composition	Treatments					SEM	<i>p</i> Value
	T1	T2	T3	T4	T5		
	BD	COC	TPOC	EOC	EOC (+)		
Wa	0.96	0.96	0.97	0.95	0.96	0.005	0.157
Humidity (%)	70.41 c	72.26 b	74.20 a	71.03 bc	71.25 bc	0.462	<.0001
DM (%)	29.59 a	27.75 b	25.80 c	28.97 ab	28.75 ab	0.462	<.0001
Ash (%)	1.54	1.66	1.65	1.66	1.59	0.060	0.537
Total fat (%)	5.73	2.84	3.00	3.95	3.73	0.794	0.112
Protein (%)	20.91 b	22.69 a	22.58 a	22.21 a	22.95 a	0.277	0.0002
Hydroxyproline	0.11	0.15	0.07	0.08	0.09	0.019	0.058
Collagen (%)	0.86	1.19	0.55	0.66	0.71	0.153	0.057
Heme pigments (mg/g)	1.99 ab	2.33 a	2.01 ab	1.75 b	1.96 b	0.123	0.041

Humidity and Dry Matter

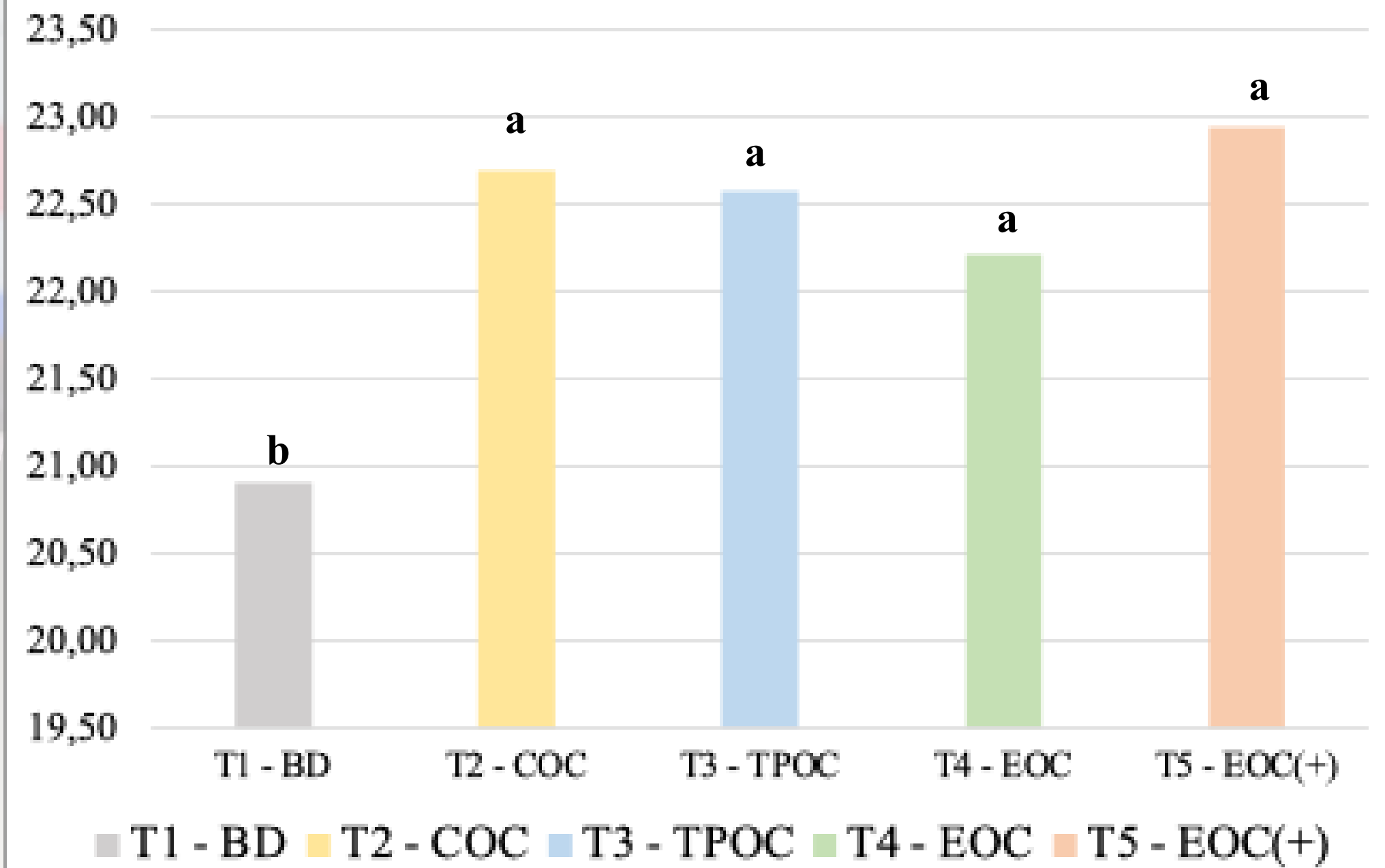
Proteína	24.74	(%)
Tecido conjunt...	2.57	(%)
Proteína s/ TC	18.64	(%)
Sal	4.52	
Cinzas	5.13	
NPN	...	



$p < .0001$

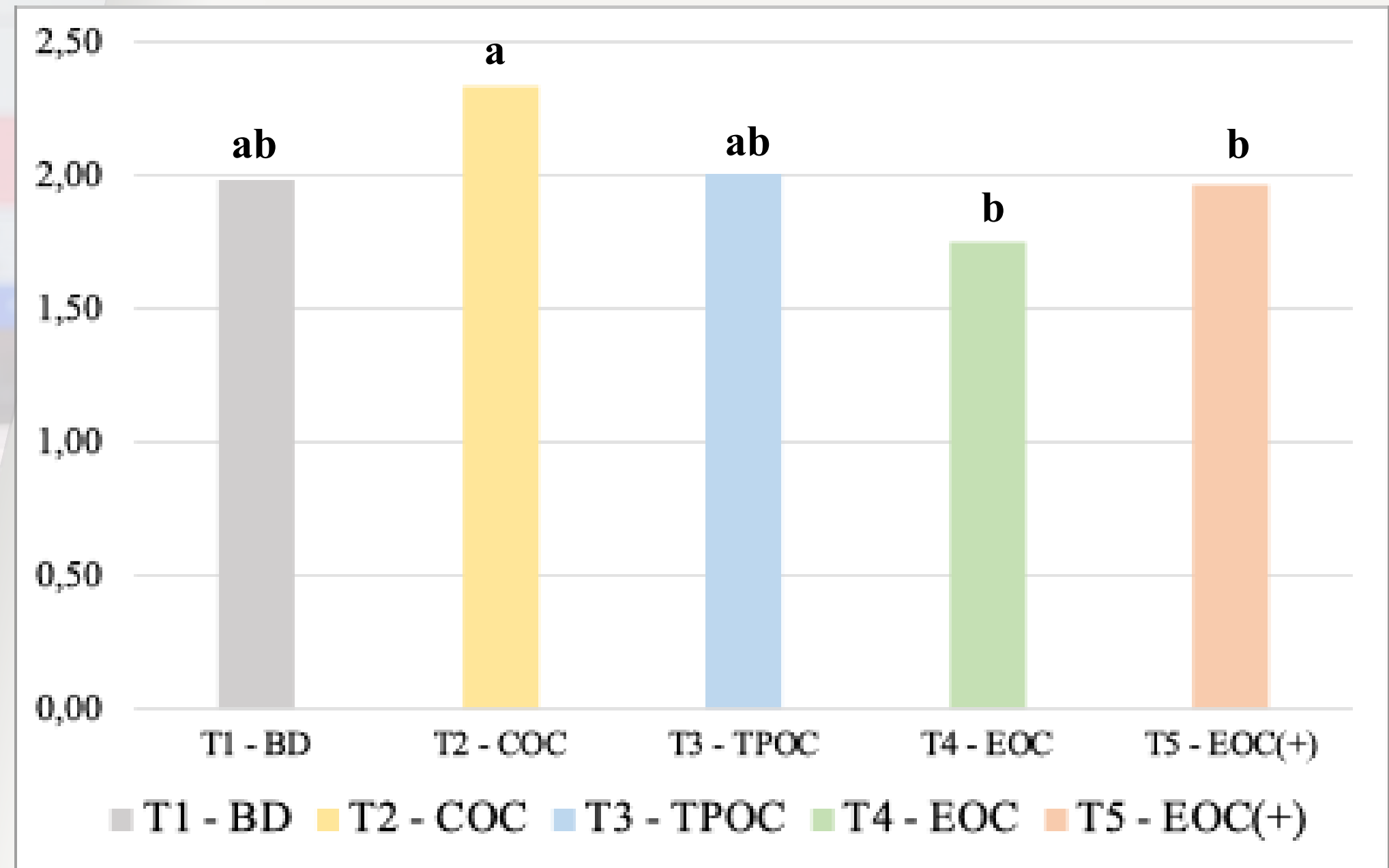
Protein

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$p = 0.0002$

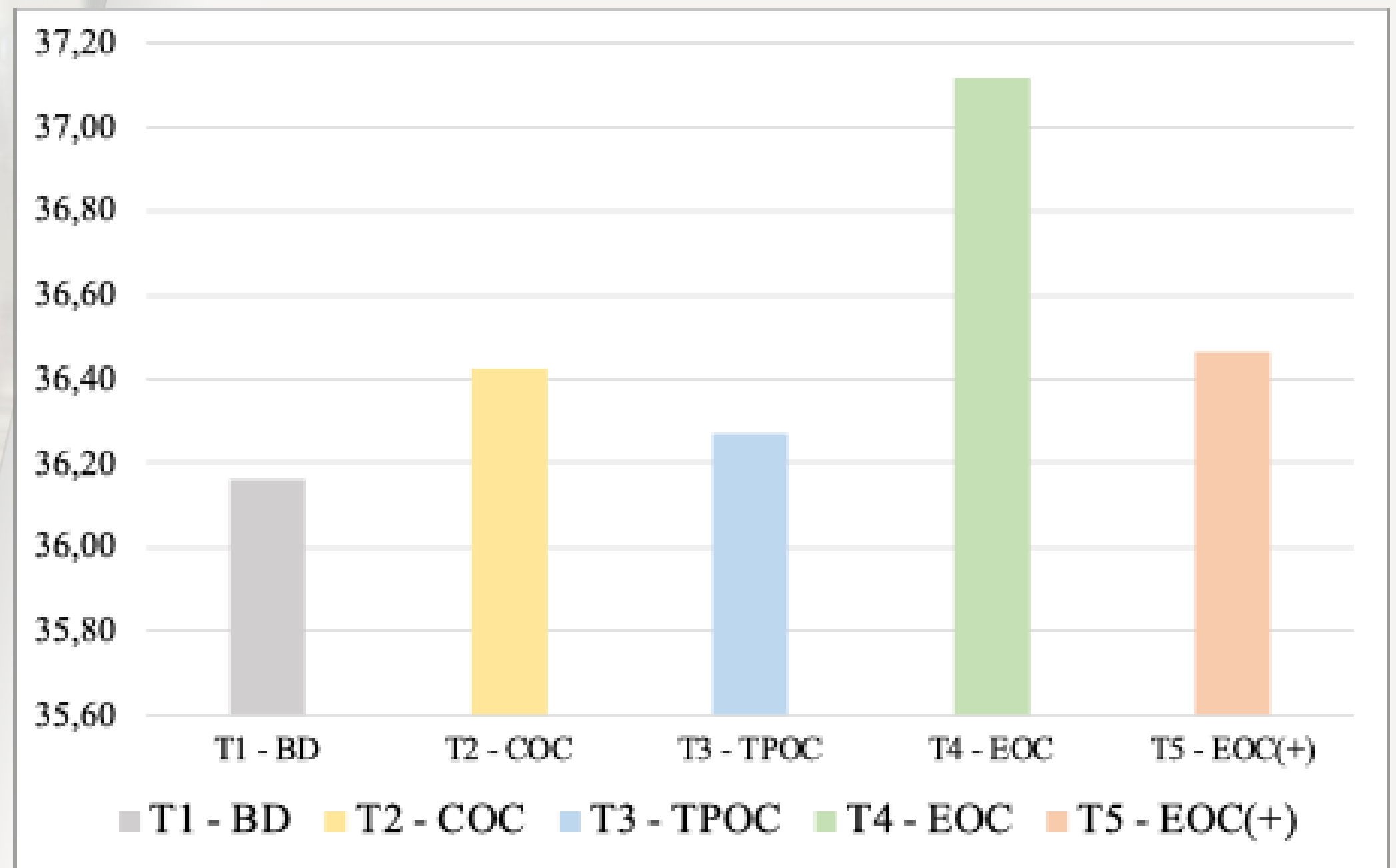
Heme pigments



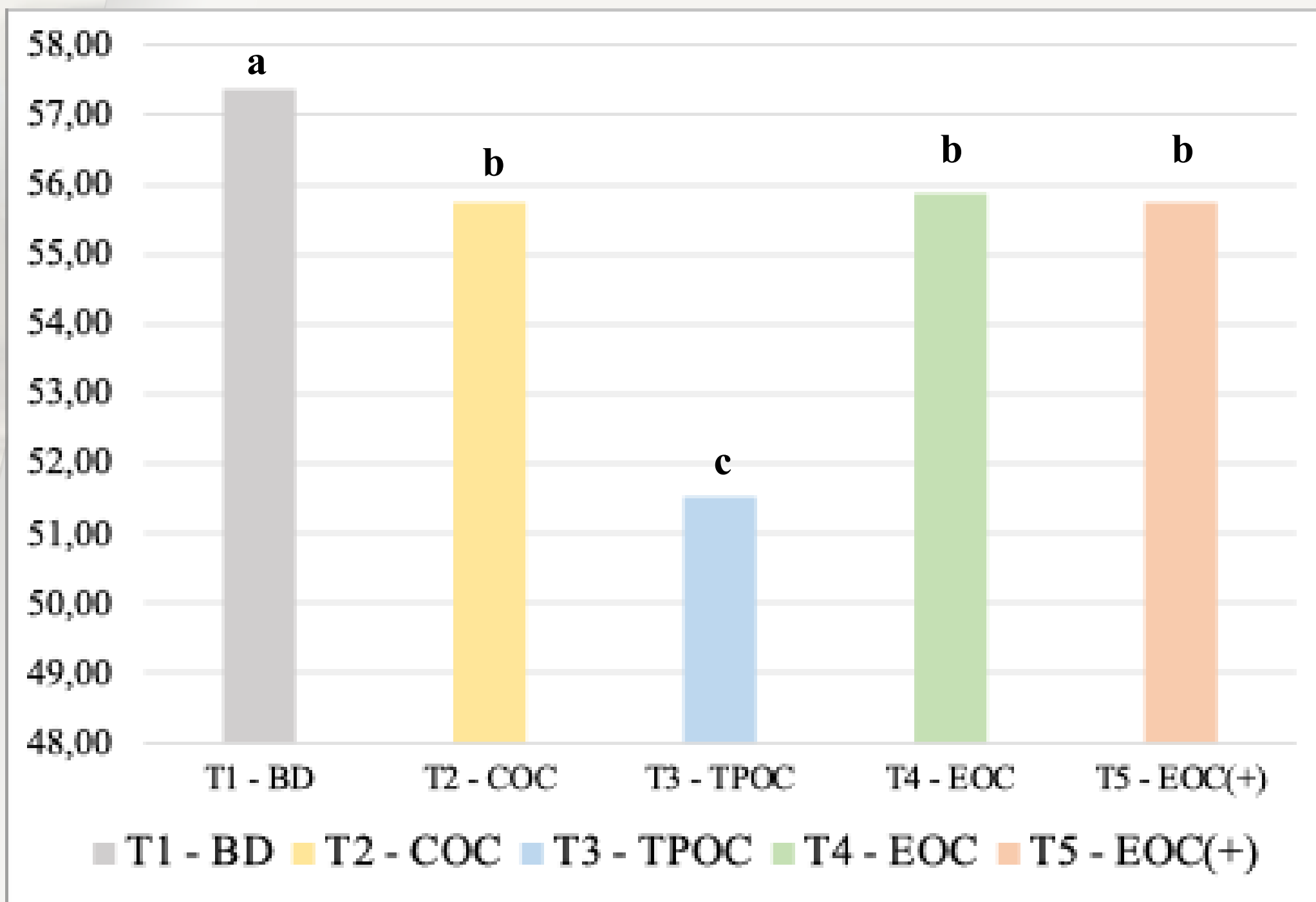
FATTY ACID PROFILE

Fatty Acids	Treatments					SEM	<i>p</i> Value
	T1	T2	T3	T4	T5		
	CD	COC	TPOC	EOC	EOC (+)		
C10:0	0.05	0.07	0.07	0.04	0.05	0.011	0.209
C14:0	1.09	1.16	1.13	1.10	1.14	0.034	0.595
C15:0	0.06 b	0.30 ab	0.53 a	0.19 b	0.08 b	0.108	0.046
C16:0	24.10	24.45	23.58	24.20	24.28	0.257	0.219
C16:1n-7	3.35	4.03	3.33	3.46	3.36	0.219	0.177
C17:0	0.17 b	0.16 b	0.20 a	0.18 ab	0.18 ab	0.007	0.043
C17:1n-7	0.22	0.20	0.23	0.21	0.22	0.013	0.534
C18:0	10.43	10.01	10.53	11.15	10.46	0.254	0.079
9t-C18:1	0.17	0.15	0.16	0.19	0.17	0.011	0.191
C18:1n-9	52.72 a	50.50 b	46.89 c	51.15 b	51.12 b	0.464	<.0001
C18:2n-6	5.41 b	6.37 b	9.46 a	5.77 b	6.43 b	0.382	<.0001
C20:1n-9	0.82	0.73	0.65	0.77	0.76	0.043	0.145
C18:3n-3	0.02	0.00	0.03	0.02	0.02	0.017	0.057
C20:2n-6	0.23	0.22	0.26	0.24	0.26	0.017	0.366
C20:4n-6	0.43 b	0.79 b	1.74 a	0.54 b	0.61 b	0.125	<.0001
SFA	36.16	36.42	36.27	37.12	36.46	0.270	0.161
MUFA	57.36 a	55.74 b	51.52 c	55.88 b	55.75 b	0.447	<.0001
PUFA	6.48 b	7.84 b	12.21 a	7.00 b	7.78 b	0.473	<.0001
PUFA/SFA	0.18 b	0.22 b	0.34 a	0.19 b	0.21 b	0.013	<.0001
n-6/n-3	22.01	20.26	22.90	19.20	20.64	1.274	0.310
IA index	0.45	0.46	0.44	0.46	0.45	0.006	0.347
IT index	1.09 ab	1.09 ab	1.06 b	1.13 a	1.10 ab	0.014	0.008
h/H	2.33	2.26	2.37	2.29	2.30	0.036	0.303

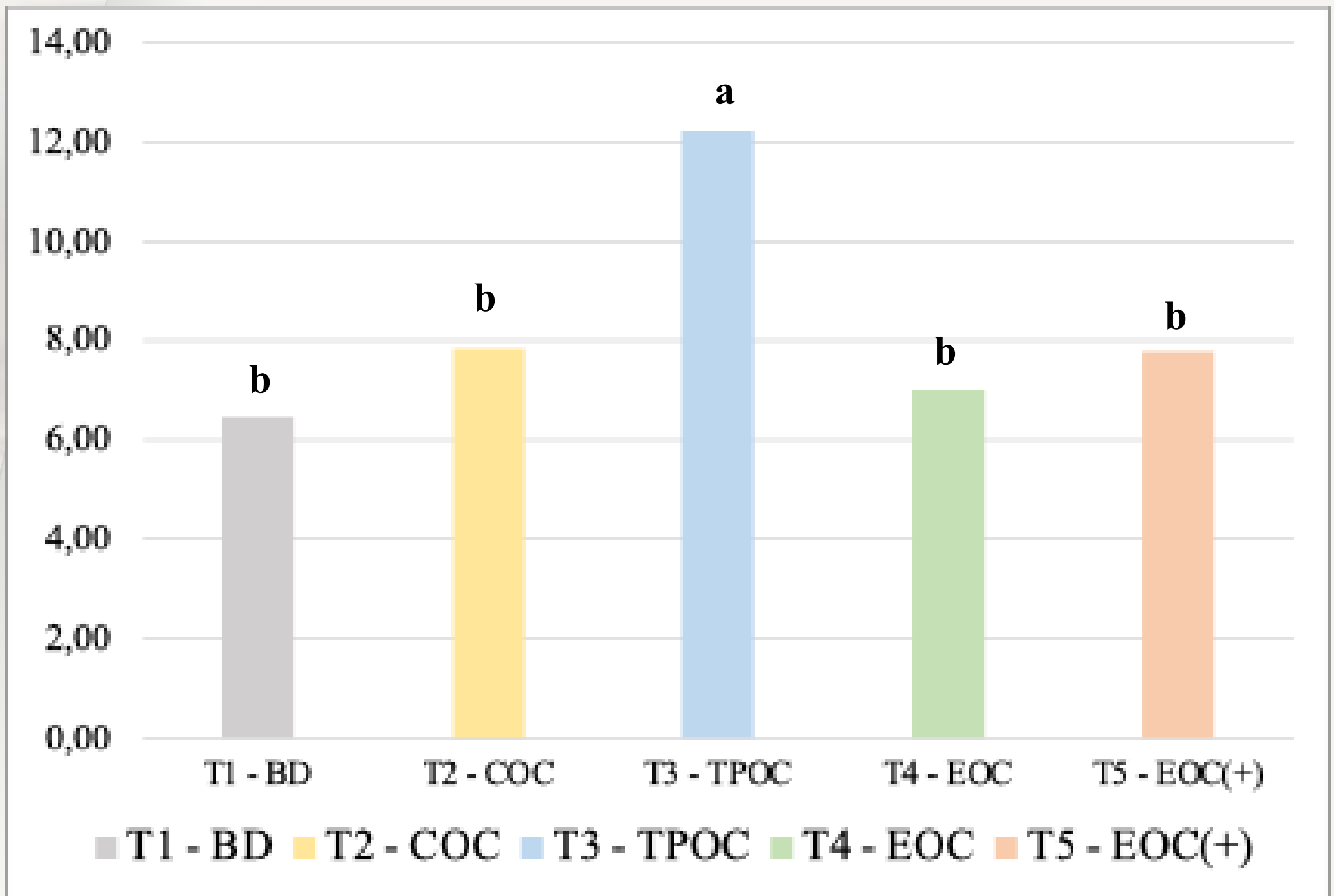
SFA



MUFA



PUFA



$p < .0001$

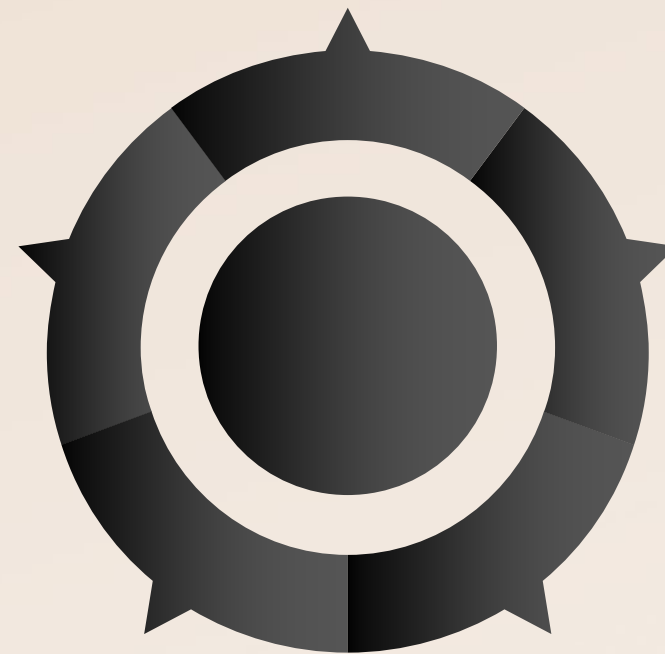
CONCLUSIONS

- Meat quality encompasses aspects related to both consumer acceptance and technological characteristics. Muscle fibre characteristics are one of the main factors influencing meat quality, as they affect the meat's colour, water retention capacity, pH and tenderness;
- Our analysis revealed a notably higher protein content in the groups that received olive cake incorporation, a trend that has also been noted by other researchers;
- The introduction of olive oil by-products into pigs' diet can play an essential role in the nutritional quality of the meat due to its high content of monounsaturated fatty acids, notably oleic acid. In our study, we did not observe this interference. This may be due to the fact that we basically diluted the diet by incorporating olive cake, resulting in a decrease in this content;
- Given the characteristics of the different olive cakes and the results obtained, TPOC has the most significant potential to be incorporated into the animals' diets.

FUNDING

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THANK YOU FOR YOUR
ATTENTION!



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