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IMPROVED LIPID OXIDATION OF RAINBOW TROUT FILLETS THROUGHOUT THE INCORPORATION OF RED BEET AND BETAINE ON THE DIETS

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INTRODUCTION

Rainbow trout is fatty fish specie with high commercial value and well appreciated by European consumers. As fatty fish specie, their quality is very prone to deterioration and lipid oxidation is one of the major causes of spoilage [1]. Different strategies have been proposed to prevent oxidative deterioration. Some of them are focused in processing process such as packaging and/or the use of antioxidants incorporated on food products. However, special attention during these years has been taking to the use of antioxidant ingredients on diet. Red beet is a traditional vegetable and recently is becoming to being known as a health-promoting food product [2]. Red beet is rich in valuable active compounds such as carotenoids, polyphenols, flavonoids, betalains and betaines. Betaines and betalaines have been widely studied for their nutritional and health benefits since present a high radical scavenging antioxidant activity [3]. Due to the beneficial effects found on red beet and betaine, in the present study was investigated the effect of these two ingredients on fresh rainbow trout fillet on fatty acid (FA) profiles, lipid peroxidation and sensory analysis.

MATERIAL AND METHODS

During 12 weeks rainbow trout were fed in a monitorised and controlled conditions using recirculation system at a temperature of 16±0.7ºC and 6±0.34mg/l of oxygen. Fish were randomly allocated in 20 tanks with 25 fish per tank. Rainbow trout were fed 5 isoproteic and isolipidic diets (45% CP and 18% CF). Diets contained two red beet (0-28%) and two betaine levels (0-1.63%). When fish reached their commercial weight, samples were taken to study FA profile of fish fillets and different oxidative parameters: peroxide value (PV), diens, triens, TBA. A sensory analysis was carried out to determine the effect of these oxidative parameters and correlate with objective measurements. Data were analyzed using SAS software by one and two-way ANOVA followed by a t-Student test and considering significant differences between values with a p-value<0.05).

RED BEET DIETS

0: 0% RedBeet **0%** Betaine
A: 14% RedBeet **0,9%** Betaine
B: 14% RedBeet **1,6%** Betaine
C: 28% RedBeet **0,9%** Betaine
D: 28% RedBeet **1,6%** Betaine

RESULTS AND DISCUSSION

Results showed that the inclusion of red beet and betaine had not a significant effect on saturated fatty acid (SFA). Monounsaturated fatty acids (MUFA) and specially C16:1 and C18:1 n-9 were significantly modified when red beet and betaine was incorporated into trout diets. Polyunsaturated fatty acids (PUFA) and specifically docosahexanoic acid (DHA; C22:6 n-3) in rainbow trout increased at higher red beet and betaine incorporation, and diets containing 28% red beet (diets C and D) had significantly higher concentration in muscle compared to fish fed diets A and B (Table 1).

TBA values were significantly different regarding the concentration of red beet and betaine. The highest value was observed in fillets from fish fed with diet A (20.54 µg malonaldehide g-1) and the lowest in fillets from fish fed diet C (5.85 µg malonaldehide g-1) (Figure 1). However, PV and conjugated dienes and trienes hydroperoxides for fish fillets were not significantly affected by the concentration of red beet and betaine.

Results from QDM showed that the inclusion of red beet and betaine had no significant effect in any of the parameters studied.

Table 1: Fatty acid composition of fish fillets fed different experimental diets

	DIETS[1]					SEM	Sign.
	CONTROL	A	B	C	D		
Σ SFA	21.50	21.77	21.33	20.72	21.10	0.34	N.S.
C14:0	1.75^{b}	1.69^{ab}	1.72^{ab}	1.64^{a}	1.64^{a}	2.14	**
Σ MUFA	34.44^{a}	34.30^{a}	35.72^{b}	34.43^{a}	33.66^{a}	0.43	**
C16:1	2.66^{b}	2.64^{b}	2.59^{ab}	2.40^{a}	2.39^{a}	0.08	*
Σ n-9	30.46^{a}	30.41^{a}	31.90^{b}	30.73^{a}	29.99^{a}	0.38	**
Σ PUFA	44.07^{ab}	43.92^{ab}	42.95^{a}	44.85^{b}	45.25^{b}	0.59	*
DHA	9.40^{bc}	8.84^{ab}	8.32^{a}	9.55^{bc}	9.60^{c}	0.32	*

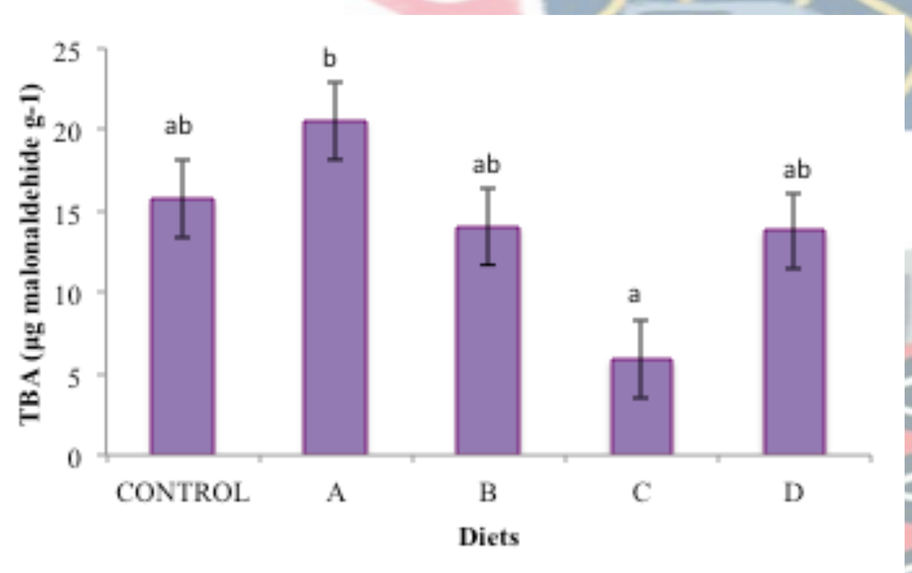

Figure 1: TBA of fish fillets fed different experimental diets

CONCLUSION

Red beet and betaine improves fish fillet perishability. Increased fat concentration on the muscle with an increase on PUFA, mainly DHA. The results suggest that increasing concentration of red beet and betaine slightly modify PUFA and maintain the level of oxidation lower than control samples.

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