

P-03-11

Enrichment of Majorcan Black Pig patties with rose hip and its effect as natural antioxidant (#176)

Evelyn A. Rivera, Carlos Terriente, Raúl Martín, Isabel Díaz, Marta Gil, María A. Oliver

Institute of Agrifood Research and Technology (IRTA), Product Quality Programme, Girona, Spain

Introduction

TREASURE EU project aims to develop sustainable pork chains based on European local pig breeds. The Porc Negre Mallorquí (Majorcan Black Pig, MBP), is an endangered native breed from Mallorca Island. Innovative products can be seen as a strategy to maintain the market of MBP. The application of antioxidants from plants has been proved to be effective in reducing oxidation in meat products [1, 2].

The aim of this study was to assess the effect of the addition of natural antioxidants from rose hip paste (*Rosa canina* L) on color stability, fatty acids (FA) and vitamins content of MBP patties. The rose hip (RH) can be found in the Mediterranean area and it is a fruit rich in essential FA, vitamins (C, E), β -carotene, coenzyme -Q and polyphenols, which may improve the product shelf-life and provide health benefits [3]. The Dietary reference value for α -tocopherol is 13 and 11 mg/day [4], and vitamin C is 90 and from 80 mg/day for men and women, respectively [5].

Methods

Five types of experimental patties were prepared differing in the contents of ascorbic acid and RH paste. They were elaborated with meat and fat from two MBP animals (23% fat, minced meat). Then, 0.3 g sulphite, 14.5 g NaCl and 100 mL of pasteurized egg per kg of meat were added. RH and acid ascorbic were mixed according to each treatment: T₁ - 0.25 g ascorbic acid; T₂ - 15 g RH; T₃ - 30 g of RH; T₄ - 15 g RH, 0.25 g ascorbic acid; T₅ - 30 g RH, 0.25 g ascorbic acid.

Fat content was measured by Near Infrared Transmittance and instrumental colour (CIELAB space) using a spectrophotometer MINOLTA. FA composition was determined by GC; vitamin C (ascorbic acid) by HPLC-DAD; and tocopherol, coenzyme Q and β -carotene by HPLC -DAD -MS.

Statistical analysis: the results were subjected to analysis of variance (ANOVA) and Tukey's test for means comparisons with the SAS software, considering 5% of significance level.

Results

Instrumental colour: the variables L*, a*, b* showed significant differences between times (Table 1), but there were no differences between treatments. The differences of FA profiles between treatments although significant are very small and not relevant. The most abundant were oleic, palmitic and stearic; α -linolenic acid showed the lowest percentage, which is a characteristic from MBP meat in relation to conventional pigs and that could influence positively the shelf life of the patties (Table 2).

Coenzyme-Q and α -Tocopherol showed significant differences between treatments and control (T1). Vitamin C was higher in T₄, T₅ and T₁ patties, which contained ascorbic acid and RH compared with T₂ and T₃ which contained RH (Table 3).

Conclusion

RH paste may be used as a partial substitute for ascorbic acid in MBP patties, since even when added in small amounts, the patties were enriched with natural antioxidants.

TREASURE project was funded by EU H2020 RIA program (grant agreement No 634476).

LITERATURE

1. Salminen, H., et al. 2006. Eur. Food Res. and Technol. Vol. **223**: 461-468.
2. Ganhão, R., et al. 2010. J. Agric. and Food Chem. **58**: 8854-8861.
3. Bañón, S., et al. 2007. Meat Sci. **77**: 626-63
4. EFSA Panel on Dietetic Products, N. and Allergies. 2015. EFSA Journal. **13**: 4149.
5. EFSA Panel on Dietetic Products, N.a.A.N. 2013. EFSA Journal, 2013. **11**: 3418.

This abstract reflects only the authors' view and the EU Agency is not responsible for any use that may be made of the information it contains.

Notes

Tables

Table 1. Colour instrumental parameters (L*, a*, b*) of MBP patties with RH paste

	Time (0 days)	Time (6 days)	Time P	RMSE
L*	50.48	47.86	*	3.162
a*	12.01	7.35	***	1.327
b*	15.53	14.29	**	0.995

Values are LSMEAN (n=5, patty: 100g): L* (lightness), a* (redness), b* (yellowness). RMSE: root mean square error. Values are significantly different; * = P < 0.05; ** = P < 0.01; *** = P < 0.001

Table 2. Percentage of fatty acid profile of MBP patties (g/100g).

Fatty acids	C	T1	T2	T3	T4	T5	p	RMSE
C16:0 (palmitic)	24.06 ^a	24.03 ^a	23.61 ^b	24.13 ^a	23.65 ^a	23.69 ^a	*	0.189
C18:0 (stearic)	11.33	11.38	11.07	11.13	11.09	11.11	NS	0.177
C18:1 n9 (oleic)	47.79 ^a	47.30 ^b	47.97 ^a	47.22 ^b	47.62 ^a	47.62 ^a	**	0.200
C18:2 n6 (linoleic)	5.57 ^d	6.12 ^c	6.16 ^{bc}	6.12 ^c	6.32 ^a	6.23 ^{ab}	***	0.039
C18:3 n3 (α-linolenic)	0.32 ^c	0.35 ^b	0.36 ^a	0.36 ^a	0.37 ^a	0.37 ^a	***	0.003
ω6/ω3	18.31 ^a	18.32 ^a	17.87 ^b	17.95 ^{ab}	18.27 ^{ab}	18.08 ^{ab}	**	0.143
PUFA/SFA	0.17 ^c	0.19 ^b	0.20 ^{ab}	0.19 ^b	0.20 ^a	0.20 ^a	***	0.003

Values are LSMEAN (n=3). C: (Control: meat and fat MBP); T1: 0.03 g ascorbic acid; T2: 1.5 g RH; T3: 3 g RH; T4: 0.03 g ascorbic acid + 1.5 g RH; T5: 0.03 g ascorbic acid + 3.02 g RH. RMSE: root mean square error. Different letters (a, b, c, d) at the same row mean significant differences; NS= not significant; * = P < 0.05; ** = P < 0.01; *** = P < 0.001.

Table 3. Natural antioxidants from rose hip paste in MBP patties (mg/kg)

Antioxidants ¹	T1	T2	T3	T4	T5	p	RMSE
β-carotene	0	0.11	0.06	0.06	0.09	NS	0.044
Coenzyme Q	0 ^b	1.75 ^a	1.91 ^a	1.61 ^a	1.32 ^a	**	0.407
α-Tocopherol	0 ^b	1.39 ^a	1.36 ^a	1.53 ^a	1.69 ^a	***	0.159
Vitamin C	99.42 ^b	3.35 ^c	5.25 ^c	134.24 ^a	123.88 ^{ab}	***	11.200

¹Expressed as (mg/kg). Values are LSMEAN (n=3). Rose hip: (β-carotene: 51.08 mg/kg, coenzyme Q: 6.68 mg/kg, α-tocopherol: 38.49 mg/kg, Vitamin C: 2935.16 mg/kg). Treatments: T1 : (0.3 g ascorbic acid); T2: (15 g rose hip); T3: (30 g rose hip); T4 : (0.3 g ascorbic acid + 15 g rose hip); T5: (0.3 g ascorbic acid + 30 g rose hip). RMSE: Root mean square error. Different letters (a, b, c) at the same row means significant differences between treatments; NS= not significant; * = P < 0.05; ** = P < 0.01; *** = P < 0.001

Tables 1,2,3

Notes