

Improving the nutritional characteristics of beef burgers by using olive oil oleogels

R. Lopes, M. Costa, F. Paiva-Martins

REQUIMTE-LAQV, Department of Chemistry and Biochemistry, Faculty of Sciences, University of Porto, Porto, Portugal.

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UNIVERSIDADE DO PORTO

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INTRODUCTION

Due to low price, convenience, and high sensory quality, beef burgers are widely consumed worldwide. However, because of their excessive content in saturated fatty acids, they have been related to an increased incidence of cardiovascular diseases. In order to produce healthier burgers, it is necessary to reduce their fat content and/or modify their fatty acid profile. However, reducing and replacing saturated fats with unsaturated ones decreases the oxidative stability and may decrease the sensory quality (taste, aroma and juiciness) of the product. Thus, the challenge of the meat industry is to find a viable alternative to decrease the fat level and provide a healthier lipid profile in their products without damaging their oxidative stability and their technological and sensory quality.

In this study we evaluate the effect of bovine back fat replacement by oleogels containing pork skin and olive oil on the oxidative stability, physicochemical, technological, nutritional and sensory parameters of burgers.

EXPERIMENTAL



Figure 1. Burgers before and after processing at 180 °C.

RESULTS AND DISCUSSION

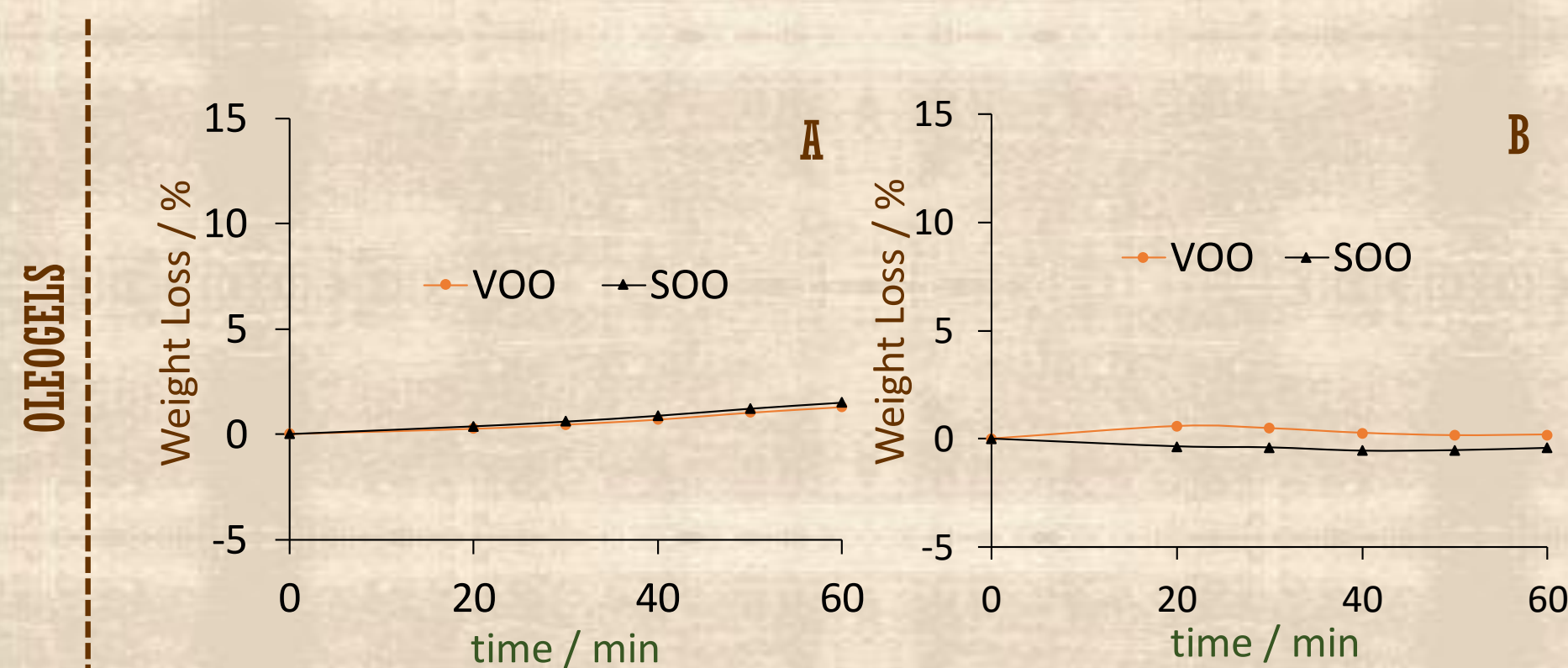


Figure 2. Oleogel weight loss during 1 hour at room temperature after storage at 4 °C for 7 days (A) and -20 °C for 90 days (B).

Table 1. Nutritional composition of lard and oleogels.

	Fatty Acid Profile						
	Humidity	Protein	Fat	C16:0	C18:0	C18:1	C18:2
Lard	7.2	0,5	92	23	13	39	15
VOO	60	18	12				
SOO	60	18	11	11	2.5	76	7.5
ESOO	60	18	11				

Table 2. Colour parameters of lard and oleogels.

	Color parameters			
	L*	a*	b*	Whiteness
Lard	83 ^a	4.0 ^a	19 ^a	75 ^a
VOO	77 ^b	0.1 ^b	28 ^b	64 ^b
SOO	78 ^b	1.8 ^c	19 ^a	71 ^c
ESOO	78 ^b	1.7 ^c	19 ^a	70 ^c

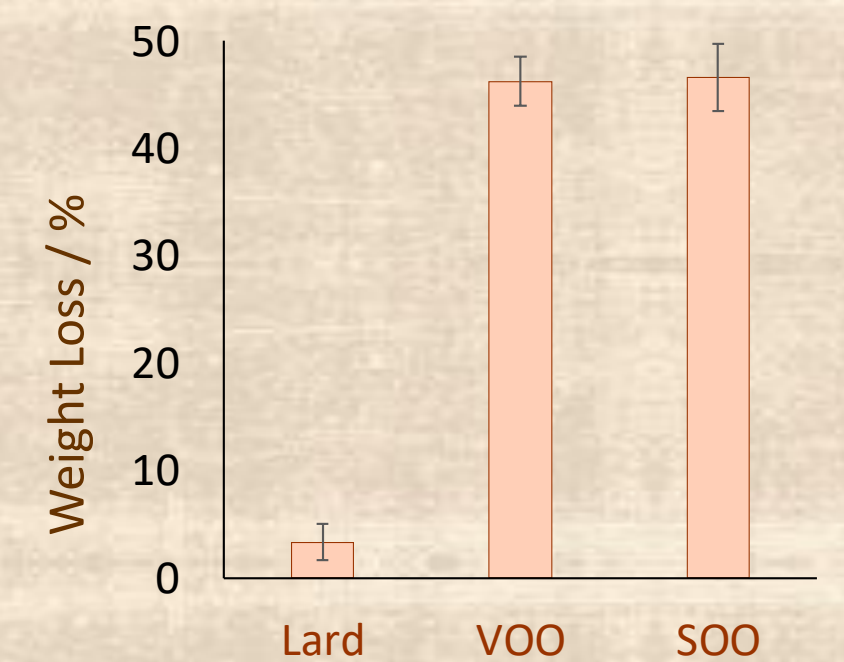


Figure 3. Weight loss after processing at 180 °C.

Table 3. Nutritional composition of burgers (%).

	Fat				
	Water	Proteins	Total Fat	SFA	UFA
HC	69	19	12	46	52
HVOO	72	22	3.6	40	60
HSOO	72	22	3.5	37	63
EHSOO	72	22	3.5	37	63

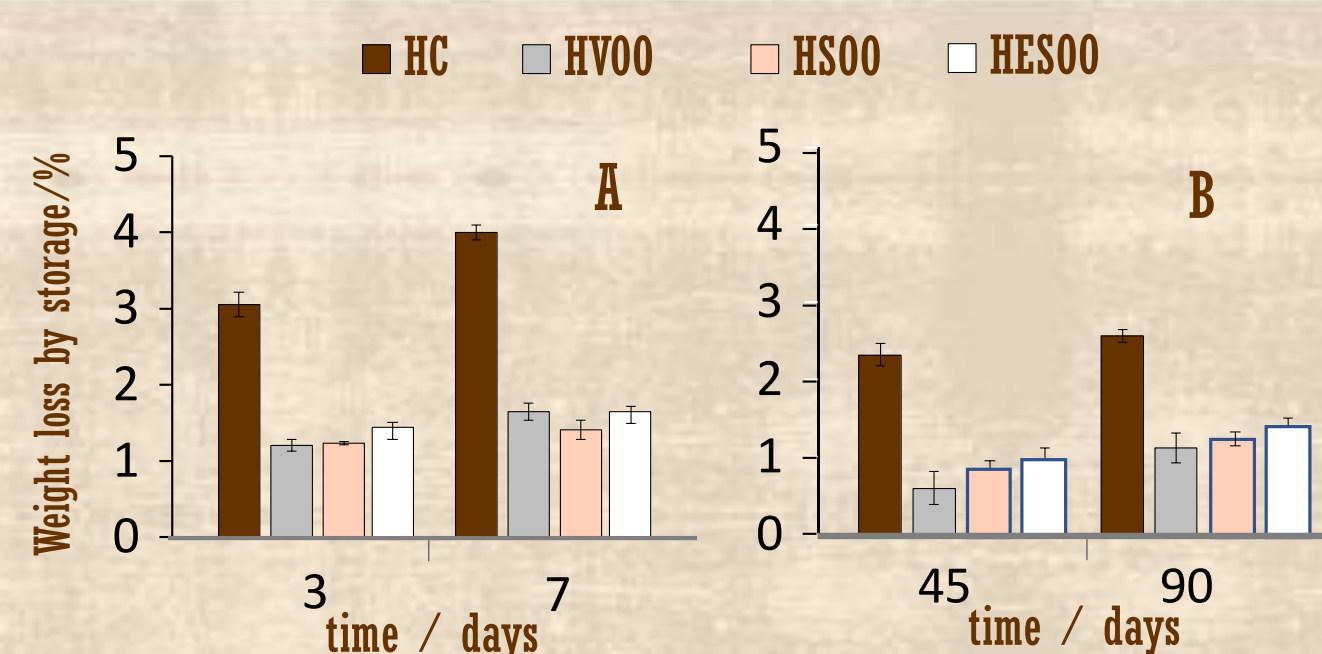


Figure 4. Weight loss after 1 h at room temperature by burgers stored at 4 °C for 7 days (A) and -20 °C for 45 and 90 days (B).

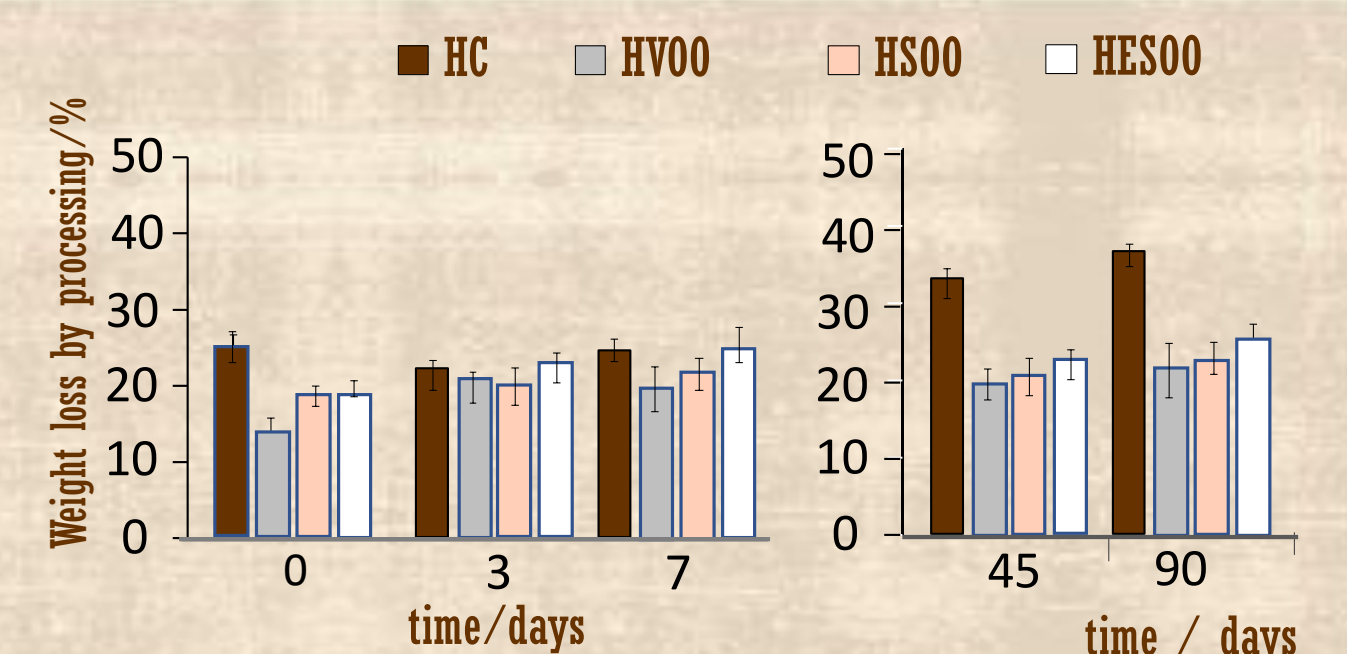


Figure 5. Weight loss after processing at 180 °C by burgers stored at 4 °C for 7 days (A) and -20 °C for 45 and 90 days (B).

Burgers

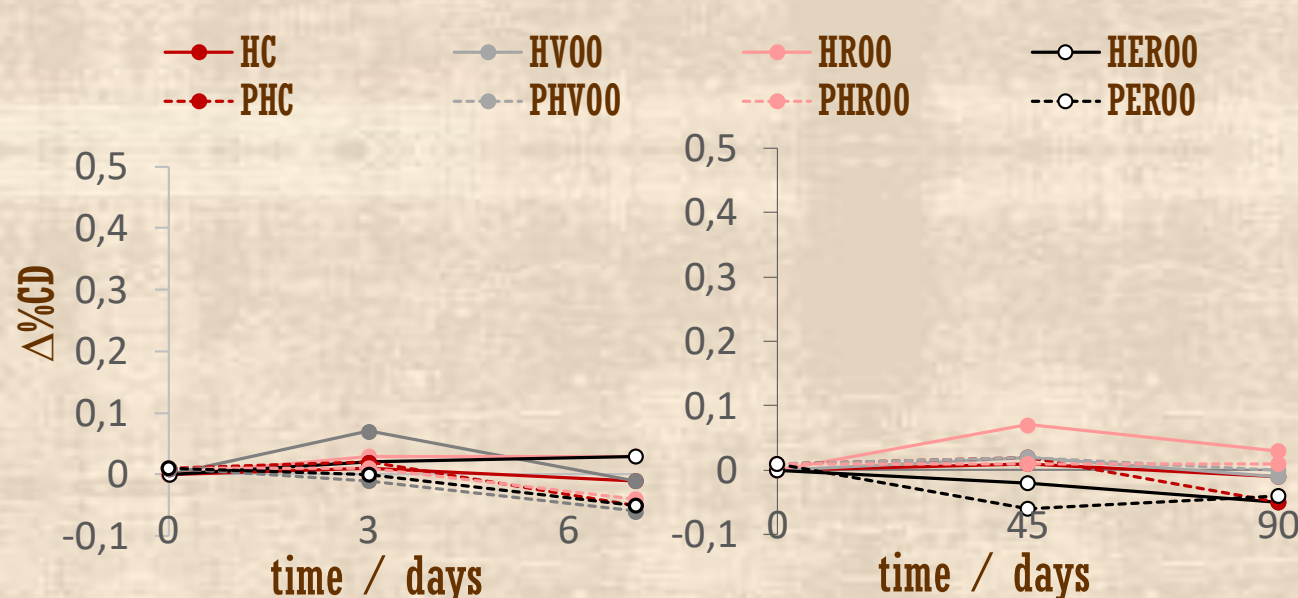


Figure 6. Change in the conjugated dienes of burgers before (HC, HVOO, HROO, HEROO) and after processing at 180 °C (PHC, PHVOO, PHROO, PHEROO) after 7 days at 4 °C (A) and 90 days at -20 °C under vacuum (B).

- The oleogels produced with pork skin showed a high protein content (Table 1).
- Oleogels colours were not very different from lard colour, specially in the case of oleogels prepared with striped olive oil (Table 2).
- Oleogels showed high physical stability during storage at 4° and -20 °C (Figure 1). In contrast, a substantial weight loss (Figure 2) was observed after processing at 180 °C, probably caused by evaporation of water.
- The replacement of 10 % burger fat by oleogels increased the content in protein by 15% and decreased the percentage of fat by 80%. The fatty acid profile found in burgers containing types of OO also showed beneficial characteristics for consumers because of their higher percentage in unsaturated fatty (UFA) acids when compared to control (HC) (Table 3).
- After storage at 4 °C for 7 days (Figure 4) and at -20 °C for 90 days (figure 4B), control burgers showed higher weight loss than burgers HVOO, HSOO and HESOO.

- After processing at 180 °C, weight loss was similar for all burgers stored at 4 °C for 7 days (Figure 5A) but lower for burgers containing all types of OO stored at -20 °C (Figure 5B).
- All burgers were oxidative stable during storage at 4 °C for 7 days (Figure 6A) (change in the conjugated dienes content was lower than 0.1%).
- When stored at -20 °C for 90 days under vacuum, all burgers were shown not to be oxidized (change in conjugated diene content lower than 0.1%). Nevertheless, the level of oxidation was lower for HVOO and EROO burgers, probably due to their higher antioxidant content.
- Regarding sensorial analysis (data not shown), the new products exhibited high acceptance, specially when processed at 180 °C (Figure 1), with high rates in terms of tenderness, juiciness, color, flavor and odor, similar to control. Concerning raw burgers, the most important difference observed was the fat perception (Figure 1) by consumers since the oleogel was perceived as fatty tissue, lowering the appearance rating.

