

# EFFECTS OF EMULSIFIED BLEND OIL ON THE PHYSICO-CHEMICAL AND SENSORY PROPERTIES OF YAK MEAT SAUSAGES

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## I. INTRODUCTION

Meat products with appropriate animal fats can improve the edible quality and increase consumer's acceptance [1], while reducing the fat content in meat products can affect the product acceptability [2]. Recently, consumers show more interests in low fat product and less interest in saturated fatty acid products. Therefore, developing novel meat products with low-fat content or low saturated fatty acids has become very popular. Asuming- Bediako *et al.* reported that using rapeseed oil emulsion to replace 12% of the total fat in making UK-style sausage could significantly reduce the saturated fat content while the product acceptability was not affected [3]. Utrilla *et al.* using emulsified olive oil to substitute for 15~55% of pork back-fat to make venison sausages found that thiobarbituric acid reactive substances (TBARS) and acid value(AV) of the products were within the acceptable range, but consumer acceptability lessened with the increase of emulsified olive oil [4]. Although a lot of studies have been reported in this area during the past years, how to cut down the saturated fatty acids in yak meat products have not been reported. The purpose of this study was to investigate the effects of using a mixed oil-soybean protein emulsion to partially replace pork back-fat in the production on the changes of physico-chemical properties of yak meat sausage.

## II. MATERIALS AND METHODS

Yak *longissimus* meat was obtained from local slaughter house. Emulsified oil was made from chopped oil, soybean protein isolate and ice water. Sausages were made with yak meat and 33.33% pig back fat in the control group or with emulsified oil to substitute for 15%(EBO15), 30%(EBO30), 45%(EBO45), 60%(EBO60) and 75%(EBO75) pork back-fat; TBARS, AV, volatile base nitrogen(TVB-N), scores of organoleptic evaluation and texture characteristics of the cooked sausages were determined. All data were expressed in the form of mean value plus standard deviation. One-way ANOVA and Duncan multiple comparison were performed with SPSS software Package (V19).

## III. RESULTS AND DISCUSSION

Changes of TBARS, AV and TVB-N in sausages were shown in Table 1. In the cooked sausages, the TBARS ranged from 1.75 to 2.19mg/kg and EBO75 showed the highest TBARS value ( $P<0.05$ ), and there was no difference between other treatments or the control ( $P>0.05$ ). AV ranged from 0.3~0.47 mg /g, and AV decreased with the increase of emulsified oil ( $P<0.05$ ). AV in all treatments was lower than that of the control, and this probably due to the active lipase in animal fat which promoted the hydrolysis of sausage fat. TVB-N fluctuated between 13.03 and 14.29mg/100g, and there was no significant difference among all treatments ( $P>0.05$ ). These results suggested that adding emulsified oil did not influence the protein degradation.

Table 1 Changes of lipid oxidation, lipolysis and freshness in different yak meat sausages

	Control	EBO15	EBO30	EBO45	EBO60	EBO75
TBARS(mg /kg)	1.86±0.15 <sup>b</sup>	1.89±0.18 <sup>b</sup>	1.82±0.1 <sup>b</sup>	1.83±0.11 <sup>b</sup>	1.75±0.06 <sup>b</sup>	2.19±0.17 <sup>a</sup>
AV(mg / g )	0.47±0.03 <sup>a</sup>	0.43±0.06 <sup>a</sup>	0.38±0.01 <sup>b</sup>	0.38±0.01 <sup>b</sup>	0.35±0.02 <sup>bc</sup>	0.3±0.02 <sup>c</sup>
TVB-N(mg/100 g)	13.51±1.38 <sup>a</sup>	13.03±0.34 <sup>a</sup>	13.11±0.15 <sup>a</sup>	14.34±0.77 <sup>a</sup>	13.74±0.61 <sup>a</sup>	14.29±0.95 <sup>a</sup>

Note: Data within the same row followed by different superscripts are significantly different ( $P<0.05$ ).

Sensory evaluation (Table 2) showed that there was no significant difference in hardness, chewiness, odor and color among the different treatments ( $P>0.05$ ). However, the juiciness score of EBO45 and EBO60 was significantly lower than that of EBO15, and no significant difference were found among the treatments. It

was reported that the decreased juiciness score was caused by the fat [5]. The acceptability of sausages in each treatment was between "slightly acceptable" and "acceptable", and there were no significant difference among the treatments ( $P > 0.05$ ). No obvious changes in taste, texture and flavor were found. This implies that it is possible to make low saturated fat sausages without detrimental effects to the product edible quality.

Table 2 Sensory scores of different type of yak meat sausages

	Hardness	Chewiness	Juiciness	Smell	Color	Acceptance
Control	6.41±0.40	6.56±0.40	6.27±0.13 <sup>ab</sup>	6.46±0.23	7.49±0.28	6.87±0.45
EBO15	6.52±0.45	6.49±0.59	6.56±0.49 <sup>a</sup>	6.78±0.23	7.57±0.13	6.95±0.61
EBO30	6.67±0.37	6.49±0.62	6.56±0.40 <sup>ab</sup>	6.6±0.34	6.93±0.15	6.74±0.14
EBO45	6.29±0.10	6.36±0.20	6.09±0.04 <sup>b</sup>	6.44±0.17	7.14±0.73	6.93±0.18
EBO60	6.31±0.29	6.41±0.18	6.08±0.17 <sup>b</sup>	6.38±0.46	7.0±0.29	6.48±0.16
EBO75	6.43±0.13	6.38±0.37	6.14±0.15 <sup>ab</sup>	6.84±0.14	7.04±0.37	6.59±0.06

Note: Data within the same column followed by different superscripts are significantly different ( $P < 0.05$ ).

Data of TPA were shown in Table 3. With the addition of emulsified oil, the hardness, cohesiveness and chewiness of the sausage decreased significantly ( $P < 0.05$ ), but the springiness was not statistically affected. Both gumminess and cohesiveness in the control samples was significantly higher than that in EBO15, EBO45, EBO60 or EBO75 ( $P < 0.05$ ). These inferred that adding emulsified oil to replace the pork back-fat could influence the texture properties of the yak meat sausage and might obtain relatively soft sausages.

Table 3 Texture properties of different type of yak meat sausages

	Hardness (N)	Springiness(cm)	Gumminess	Cohesiveness (N/cm <sup>2</sup> )	Chewiness (N)
Control	22.99±1.18 <sup>ab</sup>	0.92±0.02	0.69±0.05 <sup>a</sup>	15.81±0.41 <sup>a</sup>	14.61±0.22 <sup>a</sup>
EBO15	23.63±0.52 <sup>a</sup>	0.95±0.01	0.56±0.04 <sup>c</sup>	13.69±0.45 <sup>b</sup>	12.61±0.93 <sup>b</sup>
EBO30	19.4±1.81 <sup>c</sup>	0.95±0.01	0.64±0.02 <sup>ab</sup>	12.79±1.1 <sup>b</sup>	11.83±1.31 <sup>b</sup>
EBO45	20.75±0.25 <sup>bc</sup>	0.95±0.02	0.62±0.02 <sup>b</sup>	12.89±0.36 <sup>b</sup>	12.18±0.14 <sup>b</sup>
EBO60	20.23±0.68 <sup>c</sup>	0.95±0.02	0.63±0.01 <sup>b</sup>	12.66±0.52 <sup>b</sup>	12.00±0.38 <sup>b</sup>
EBO75	19.93±1.84 <sup>c</sup>	0.92±0.02	0.62±0.02 <sup>b</sup>	12.70±1.02 <sup>b</sup>	12.56±1.25 <sup>b</sup>

Note: Data within the same column followed by different superscripts are significantly different ( $P < 0.05$ ).

#### IV. CONCLUSION

Adding emulsified oil into the sausage to replace the pork back-fat did not influence TBARS and TVB-N, and decreased the AV. The edible quality and the acceptability of the sausages were not affected ( $P > 0.05$ ). The results suggested that adding emulsified oil may be a potential method to develop health meat products.

#### ACKNOWLEDGEMENTS

This research was financially supported by National "Twelfth Five-year" Science & Technology support program (Project No: 2015BAD29B02) and Sichuan Provincial Major Science and Technology Program (Project No: 2016NZ0005).

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