PE7.24 Effect of Adding Rhus verniciflua Stokes Oil on the Oxidative Stability of Salted Cooked Beef Patties with Different Internal Temperatures 242.00

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***Abstract*—The objective of this research was to investigate the effect of adding *Rhus verniciflua* Stokes oil on the oxidative stability of 1% NaCl-added beef patties cooked with different internal temperatures (44.1℃, 61.6℃, and 75.6℃). The UFA and n-3 PUFA contents were increased by RVS oil. The ORP was decreased by the higher internal temperature. The TRA was increased by RVS oil and the higher internal temperature. The TBARS content was decreased by RVS oil but increased by the higher internal temperature.**

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***Index Terms*—RVS oil, internal temperature, oxidative stability, beef patties.**

I. INTRODUCTION

THE oxidative stability is one of the major factors for quality and shelf-life of muscle foods.

Some plant oils are the important sources of natural antioxidants [2, 3, 15]. *Rhus verniciflua* Stokes (RVS) (a member of Anacardiacea family) has been used traditionally as herbal medicines in the eastern for a long while [5]. Historically, Korean people have eaten the RVS extract-boiled chicken meat for longevity. RVS extract contains flavonoid derivatives, such as fustin, quercetin, butein, and sulfuretin, protect against oxidative damage by scavenging reactive oxygen species [7].

Salt and cooking intensity promote the lipid oxidation in meat products [9, 14]. Liang et al. [10] have reported that RVS extract inhibited salt-induced lipid oxidation in cooked beef. However, there is little information on the effect of RVS oil in meat products.

Therefore, the objective of this research was to investigate the effect of adding RVS oil on the oxidative stability of salted cooked beef patties with different internal temperatures.

II. MATERIALS AND METHODS

A. Extraction of RVS oil

RVS oil was extracted from naturally dried RVS meal by *n*-hexane-dipping.

B. Sample preparation

M. Semitendinosus from 30-month-old Hanwoo (Korean cattle) steer was minced through 6 mm and 4 mm plates using a meat chopper, hand-mixed with sodium chloride and water at 1% (w/w) and 5% (w/w) based on total weight of meat, respectively, for 3 min, and separated into three groups. The refined grapeseed oil (CJ Co., Korea) and RVS oil were added to two groups at 2% (w/w) based on total weight of meat, respectively and the other (control) was non-added meat.

Samples were formed into 33 g patties using a ø60×15 mm petri dish, cooked in a household electric oven (HS-XC365APB, Samsung Electronics Co., Ltd., Korea) at 180° until internal temperatures of 44.1°, 61.6°, and 75.6° were reached, respectively. Following cooling at 4° overnight, patties were wrapped in a low density polyethylene wrap (O2 transmission rate=35,273 cc/m2·24 hr·atm; 0.01 mm thickness, 3M, Korea) and stored at 4° under dark for 8 days.

C. Experimental methods

Fatty acid composition was determined using a GC (6890N, Agilent Technologies, USA) equipped with a FID and a HP-Innowax fused silica capillary column (30 m×0.25 mm id ×0.25 μm film thickness) after extraction [4] and methylation [1] of lipid. Oxidation-reduction potential (ORP) was measured as described by Nam and Ahn [11] and expressed as mV. Total reducing ability (TRA) was determined as described by Lee et al. [8] and expressed as absorbance of 1 mM potassium ferricyanide minus absorbance of sample. Lipid oxidation was performed by the TBARS (2-thiobarbituric acid reactive substances) method of Sinnhuber and Yu [13] and expressed as mg malonadehyde (MA) per kg meat. Metmyoglobin (MetMb) content (%) was measured by the buffer extraction method of Krzywicki [6]. Data was analyzed by the General Linear Model procedure of SAS program [12].

III. RESULTS AND DISCUSSION

The effect of adding RVS oil on the fatty acid composition of salted cooked beef patties with different internal temperatures is presented in Fig. 1. The saturated fatty acids (SFA) content was significantly (P<0.05) decreased by the addition of RVS and grapeseed oils and the grapeseed oil-added was significantly (P<0.05) lower SFA content compared with the RVS oil-added. Moreover, it showed the tender to be decreased by the higher internal temperature. The unsaturated fatty acids (UFA) content was opposite to the result of SFA content. The polyunsaturated fatty acids (PUFA) content was significantly (P<0.05) increased by the addition of grapeseed oil but the addition of RVS oil and internal temperature did not affected PUFA content. The n-3 PUFA content was significantly (P<0.05) increased by the addition of RVS and grapeseed oils and the RVS oil-added was significantly (P<0.05) higher n-3 PUFA content compared with the grapeseed oil-added. But the internal temperature did not affect n-3 PUFA content.

The ORP (Fig. 2) was not significantly (P>0.05) different with the addition of RVS and grapeseed oils during storage. But increasing internal temperature significantly (P<0.05) decreased ORP during storage.

The TRA (Fig. 2) was significantly (P<0.05) increased by the addition of RVS oil during storage but significantly (P<0.05) decreased by the addition of grapeseed oil at 8 day of storage. Furthermore, it was significantly (P<0.05) increased by the higher internal temperature.

The TBARS and MetMb contents (Fig. 3) was significantly (P<0.05) decreased by the addition of RVS oil during storage. The higher internal temperature resulted in the higher (P<0.05) TBARS content during storage.

IV. CONCLUSION

The effect of adding RVS oil on the oxidative stability of salted cooked beef patties with different internal temperatures was investigated in this research. The addition of RVS oil improved the n-3 PUFA content and lipid and myoglobin oxidation stabilities. Moreover, the higher internal temperature decreased the lipid oxidation stability.

ACKNOWLEDGEMENT

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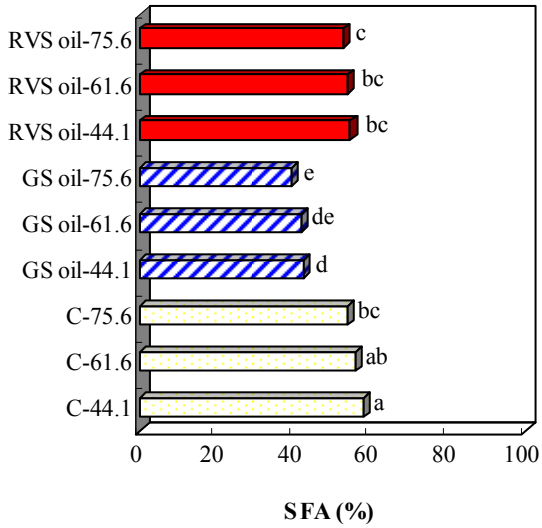
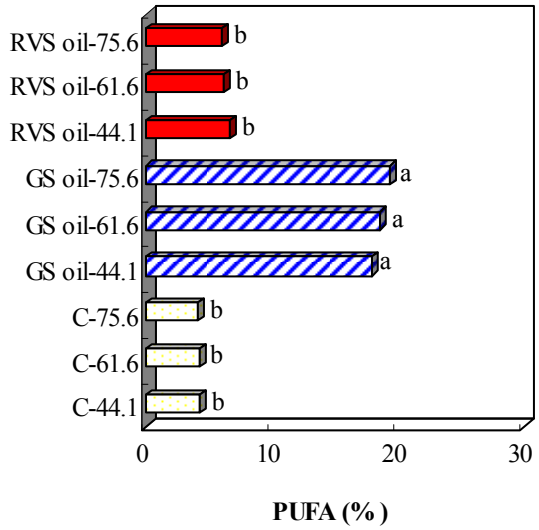
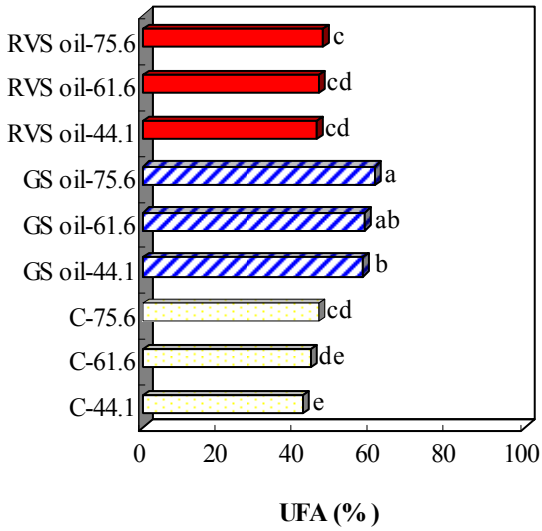






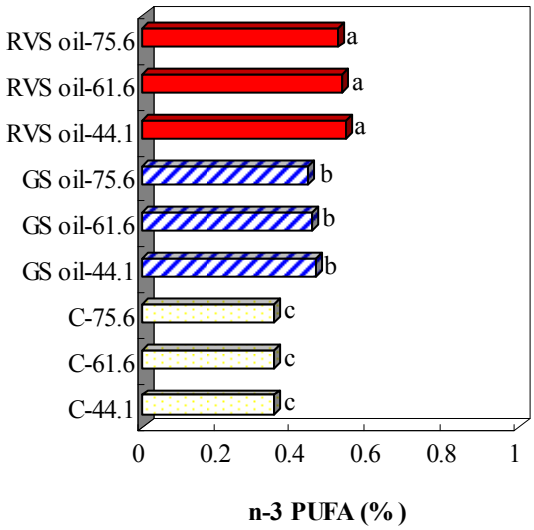


Fig. 1. The effect of adding RVS oil on the fatty acid composition of salted cooked beef patties with different internal temperatures.

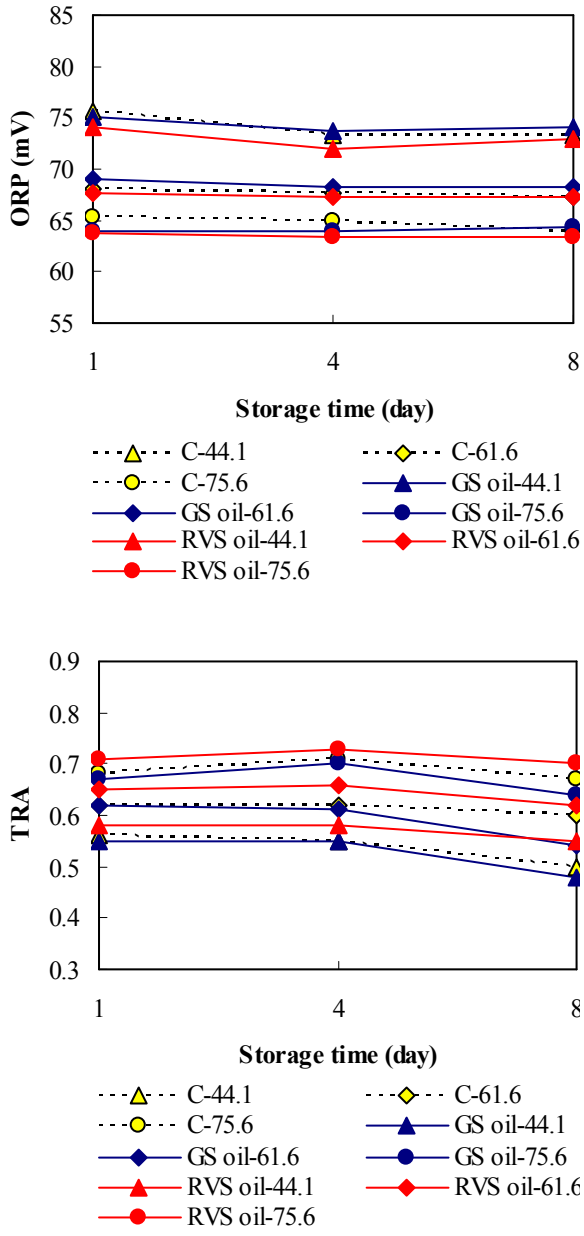
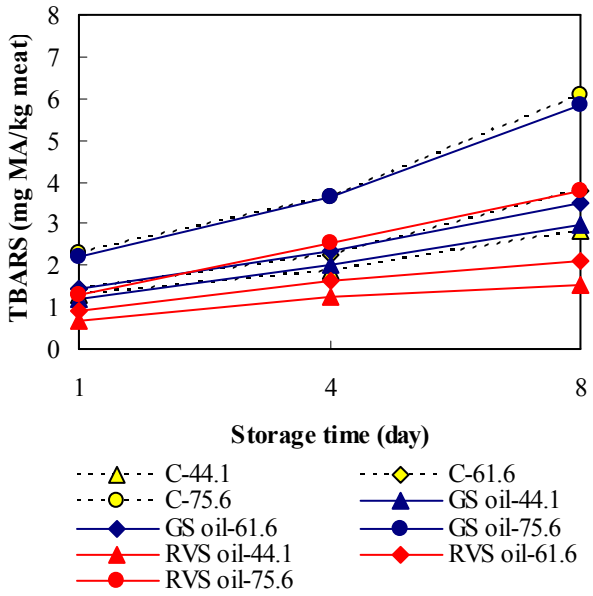


Fig. 2. The effect of adding RVS oil on the ORP and TRA of salted cooked beef patties with different internal temperatures during storage at 4℃.



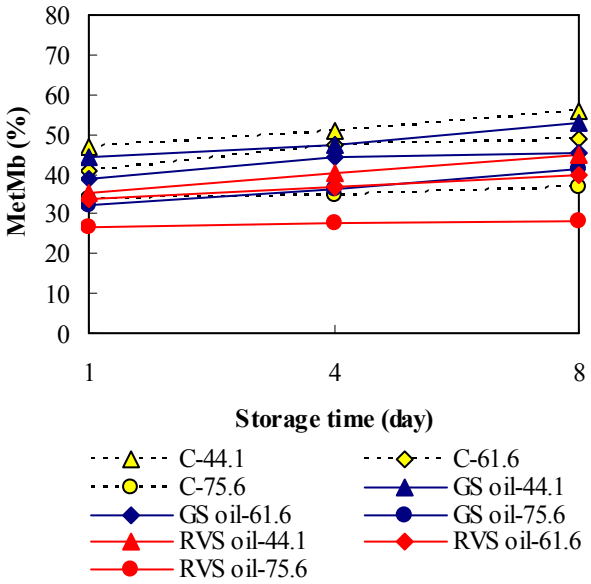


Fig. 3. The effect of adding RVS oil on the TBARS and MetMb contents of salted cooked beef patties with different internal temperatures during storage at 4℃.