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EFFECTS OF USING SURIMILI LIKE MATERIALS FROM THAI NATIVE BEEF TRIMMING AS SUBSTITURE FOR LEAN BEEF ON PHYSICAL PROPERTIES OF VIENNA SAUSAGE.

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I. INTRODUCTION

Surimi is a myofibrillar protein derived from fish flesh that has been stabilized for use as a raw material in a variety of food products such as imitation crab meat, kamaboko, and other seafood items [1,2]. It is hypothesized that surimi-like materials from the muscle of other animal species would exhibit similar properties to those of fish surimi [3]. However, using red meat from domestic animals as a starting material presents challenges that differ from those encountered when making fish surimi [3]. Thai native cattle offer an advantage due to their lean beef, which is low in fat content but high in connective tissue [4,5]. In addition, traditional Kho-Isaan Thai native cattle are known to possess more lightness, hardness, moisture, and ash levels than their counterparts [4]. The utilization of beef trimming, which is derived from the meat carcass, is a common practice in Northeast Thailand where it is used to prepare local dishes such as "Thai hot soup with beef," "sun-dried beef," "Beef Mum," and "Isan beef sausage" [6]. However, there has been limited research conducted on the use of beef trimming for the extraction of myofibrillar protein in meat products, which is desirable for "Vienna sausage." Therefore, the objective of this study was to investigate the effect of using surimi-like materials from Thai native beef trimming as a substitute for lean meat on the quality and sensory properties of Vienna sausage.

II. MATERIALS AND METHODS

In this study, Thai native beef trimming containing 35% fat content was obtained from local retailers in Khon Kaen Province, Thailand [7,8]. Surimi-like materials were prepared by mincing the beef trimming twice using a grinder (Saviloi,32, SAV-TRC32C, Italy), followed by washing with cold distilled water (1:3 ratio) and centrifugation at 3000xg (4°C, 20 min) to collect the sediment. The collected sediment was then washed with cold water (7:1 ratio) to obtain the slurry sample. The protein was solubilized, and the pH was adjusted to 11, followed by centrifugation at 3000xg (4°C, 20 min) to collect the concentrated protein. The protein was then precipitated by adjusting the pH to the iso-electric point (2N HCL, point to 2.5), followed by centrifugation to release the water and the addition of a cryoprotectant to protect against protein dehydration. The surimi-like materials (SLM) samples were stored in vacuum plastic bags at 4°C until use [2,3]. For the preparation of the Vienna sausage [6], a formulation was obtained using 50% lean meat (beef:breast chicken, 1:1 ratio), 25% fat (pre-emulsified rice brand oil:pork back fat, 1:1 ratio), and 5% inulin, which served as the basic control treatment. Comparative samples were prepared by varying the amount of SLM used as a lean meat replacer at 10, 20, and 30% (w/w). The samples were analyzed for emulsion stability and texture profile analysis [9], cooking loss and color profile [10], and chemical composition [11]. The data was presented as mean ± standard deviations. The experiment was run in triplicated, and statistical analysis was performed using IBM SPSS Statistic 22.0 software. One-way ANOVA was used to test the significance between each sample.

III. RESULTS AND DISCUSSION

In the present study, replacement of lean meat with SLM resulted in a significant increase in emulsion stability ($p \leq 0.05$). Cooking loss did not differ significantly among the comparative treatments and control samples ($p > 0.05$), but an increasing trend was observed in samples with 20% and 30% SLM as lean meat replacers. Almost all color traits were comparable ($p > 0.05$). Hardness, gumminess, and chewiness of 20% and 30% SLM samples were significantly higher than the control and 10% SLM samples ($p \leq 0.05$). Cohesiveness and springiness were not significantly different among the samples ($p > 0.05$). Protein and ash content significantly decreased in 20% and 30% SLM samples ($p \leq 0.05$), whereas fat content and caloric value decreased in 30% SLM samples. Moisture content was significantly highest in 30% SLM samples ($p \leq 0.05$). Sensory test showed no significant difference in odor, flavor, texture, and overall liking between the control sample and the comparative treatments ($p > 0.05$), although 30% SLM sample had the highest score for color and overall liking ($p \leq 0.05$).

Table1 physical properties of Vienna sausage

Parameters	Control	10% SLM	20%SLM	30%SLM
Emulsion stability(TFR)	6.22 ± 0.08^{c}	10.53 ± 1.10^{b}	11.18 ± 0.17^{b}	14.69 ± 0.33^{a}
Cooking loss	5.73 ± 0.80^{bc}	5.34 ± 0.24^{c}	6.59 ± 0.62^{b}	10.63 ± 0.55^{a}
Color				
L*	56.75±2.01	57.45±1.04	56.92±1.44	58.27±0.84
a*	7.07±1.29	5.97±0.73	6.56±0.87	5.85±0.42
b*	18.75±0.61	18.60±0.53	19.20±0.36	19.07±0.29
Texture profile analysis				
Hardness	17.74 ± 1.19^{a}	16.71 ± 1.38^{ab}	15.04 ± 0.70^{c}	15.65 ± 0.68^{bc}
Gumminess	13.81 ± 0.82^{a}	12.89 ± 1.04^{ab}	11.80 ± 0.44^{c}	12.25 ± 0.44^{bc}
Chewiness	13.09 ± 0.85^{a}	12.25 ± 1.06^{ab}	11.12 ± 0.60^{c}	11.60 ± 0.49^{bc}
Composition analysis				
Moisture	65.77 ± 0.15^{b}	65.81 ± 0.24^{b}	65.97 ± 0.28^{b}	68.15 ± 0.26^{a}
Ash	2.37 ± 0.03^{b}	2.49 ± 0.04^{a}	2.34 ± 0.04^{b}	2.23 ± 0.04^{c}
Crude protein	14.82 ± 0.12^{a}	14.55 ± 0.14^{a}	14.05 ± 0.03^{b}	13.47 ± 0.21^{c}
Fat	11.88 ± 0.12^{a}	11.39 ± 0.09^{a}	11.38 ± 0.41^{a}	10.50 ± 0.24^{b}
Caloric value	201.09 ± 0.17^{a}	199.05 ± 1.44^{ab}	196.39 ± 0.81^{b}	185.30 ± 2.95^{c}

Different superscripts(a, b)indicate significant differences between means.($p \leq 0.05$)

IV. CONCLUSION

The utilization of surimi-like materials from Thai native beef trimming as a substitute for lean meat had varying effects on the physicochemical properties of Vienna sausage. There were changes observed in terms of cooking loss, emulsion stability, hardness, gumminess, and chewiness. The crude protein and caloric value tended to decrease as the level of surimi-like material replacer increased. Replacing 30%SLM had the highest color and overall liking ($p \leq 0.05$).

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