

# WEIGHT CHANGES OF LOCAL THAI BEEF UNDERGOING VARIOUS SOUS-VIDE COOKING TEMPERATURES

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**Abstract** – The effects of sous-vide conditions on cook yield and sous-vide loss of sirloin from local Thai beef were observed. Sirloins were packed in vacuum pouch and sous-vide cooked using cooking temperatures of 60, 70 or 80°C and cooking times of 0, 6, 12, 18, 24, 30 or 36 h before weight changes determination. It was found that using higher temperature presented higher percentage of sous-vide loss and lower cook yield than that of lower temperature. Cooking at longer time resulted in increasing sous-vide loss while cook yield decreased. Cooking at 60°C tended to have the lowest sous-vide loss and highest cook yield with significantly ( $P<0.05$ ) different compared to other higher temperatures.

**Key Words** – Cook yield, Local Thai beef, Shear force, Sous-vide, Sous-vide loss

## I. INTRODUCTION

Local Thai beef has a unique taste and flavor. The chemical composition of local Thai beef mainly consists of 76.15% water, 20.67% protein and 0.58% fat. Moreover, it is rich in nutrients such as vitamin E of 374.2 µg/100g, calcium of 2.8 µg/100g, selenium of 1.55 µg/100 g and iron of 1.3 µg/100 g [1]. Local Thai beef is generally tough then it is better to cook for a long time, especially for stewing [2]. This may be related to the physical properties of beef. Attempts to decrease toughness of local Thai beef are an alternative to create high nutrients raw material to further beef menu. Cooking under controlled conditions of temperature and time inside heat-stable vacuum called sous-vide is desired to improve qualities of meats [2, 3]. Sous-vide technique is proved to decrease shear force and hardness of beef *semitendinosus* muscles [3] and presented higher retention of B<sub>12</sub> compared to traditionally boiled meat [4]. However, cooking under low temperature for a long time induces water and nutrient loss from materials. Thus, the objective of this research was to study effect of different time and temperature cooking on changes in cook yield and sous-vide loss of sirloin from local Thai beef.

## II. MATERIAL AND METHODS

**Beef preparation:** Sirloin beef muscles from local Thai beef (*Bos indicus*) were purchased from Huatakhue market, Bangkok province, Thailand. Samples were retained blood before trimming fat and connective tissue. Samples were sliced into 7×7×7 cm. Then samples were sealed in plastic bag and stored at 4°C until sous-vide cooking.

**Sous-vide process:** Samples were vacuum packed into LLDPE bag with size of 15×23 cm and then sous-vide cooked using water bath at temperatures of 60, 70 or 80°C for 0, 6, 12, 18, 24, 30 or 36 h [3, 5, 6]. After that samples were cooled at 4°C for 30 min prior to properties determination.

**Cook yield and sous-vide loss:** Percentage cook yield and sous-vide loss were calculated using equation (1) and (2), respectively. Sample was measured in 3 replicates in each condition.

$$\% \text{Cook yield} = \frac{\text{weight of sample after sous-vide cooking}}{\text{weight of sample before sous-vide cooking}} \times 100 \quad (1)$$

$$\% \text{Sous-vide loss} = 100 - \% \text{Cooking yield} \quad (2)$$

### III. RESULTS AND DISCUSSION

**Cook yield and sous-vide loss:** Cooking at high temperature and long time resulted in decreasing cook yield and increasing sous-vide loss (Fig. 1a, Fig. 1b). Heat induces loss of moisture content and nutrients from materials. Results were found that Cooking at longer time resulted in increasing sous-vide loss while cook yield decreased. It was also found that cooking at 80°C presented the lowest cook yield and displayed the highest sous-vide loss. This is because of protein was changed in structure and then muscle fiber was denatured and to shrink and released water from muscle [3, 7].

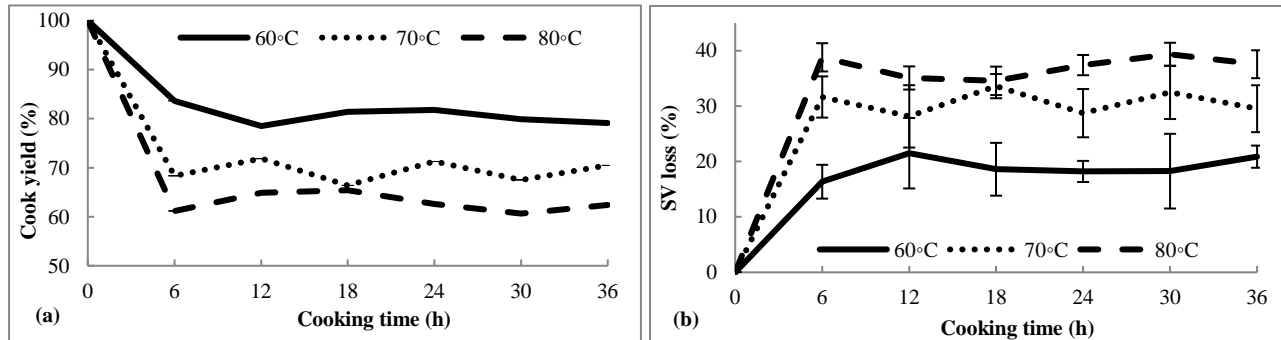


Figure 1. Percentage of cooking yield (a) and sous-vide loss (SV) (b) of sirloin beef after sous-vide cooking at 60°C, 70°C and 80°C for 0-36 h.

### IV. CONCLUSION

Temperature and time in sous-vide process affected weight change of sirloin beef. It had a large effect on percentage of cook yield and sous-vide loss of sirloin beef. Using temperature of 60°C presented higher cook yield and lower sous-vide loss to beef.

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