Contribution level and temporal sequence of sensory traits of pork, assessed by temporal dominance of sensations

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Abstract – In this study, "Contribution" and "temporal sequence" of pork sensory traits were investigated by "temporal dominance of sensations" (TDS). Seven types of different pork loin were cooked by oven and evaluated them with the TDS technique. As a result, dominance rate of "Tender and/or Soft", "Tough and/or Hard", "Juicy", "Dry", "Fat melting", "Smooth", "Sour", "Umami" and "Beast odors" were higher than significant level, at least one type of pork. Therefore, these traits were suggested to contribute to sensory characteristics of pork. In addition, the sensory traits of pork roughly proceeded as follows, 0 to 10 sec, "Tender and/or Soft", "Tough and/or Hard"; 10 to 20 sec, "Juicy", "Dry", "Fat melting", "Smooth"; and 20 to 50 sec, "Sour", "Umami", "Beast odors". The temporal sequence and contribution of sensory traits of pork were revealed by TDS.

Key Words – meat quality, sensory analysis, Temporal dominance of sensations (TDS)

I. INTRODUCTION

The sensory traits of meat consist of various factors such as texture, taste and aroma, and affect eating quality. These traits of meat have been evaluated by sensory profiling in many studies. However, general descriptive sensory test cannot evaluate the "temporality" and "contribution level" of traits because sensory traits were immediately and individually evaluated after sensory stimulation. Temporal dominance of sensations (TDS) which was developed by Pineau *et al.* (2009) [1] can provide a temporal sequence and dominance rate of traits perception. Thus, TDS is expected as a useful technique to evaluate complex sensory characteristics of meat but there is no study about the traits of the meat by TDS. In this study, different kinds of the pork were evaluated by TDS and clarify the temporal sequence and contribution of sensory traits of pork.

II. MATERIALS AND METHODS

Longissimus muscles of the seven types of pork (A-G) were used for sample. These were taken from pigs which were the different breeds and feeding diet, and indicated a significant difference of traits of texture, taste and odors by descriptive sensory analysis. Samples were vacuum packed and stored at -40 °C and thawed at 4 °C 1 day before the sensory test. Samples were formed into 5×2.5×0.5 cm. Out of 5 cm, 1 cm was adipose tissue and 4 cm was muscle tissue. These samples were dipped in the 5% NaCl solution and cooked in the steam convection oven set at 230 °C for 4 minutes.

The 14 (4 males and 10 females) trained sensory panelists were used, and trained for TDS. The following 10 sensory traits were presented in each TDS session: "Tender and/or Soft", "Tough and/or Hard", "Juicy", "Dry (absence of moisture)", "Fat melting", "Smooth", "Sour", "Umami", "Blood odors", "Beast odors". The TDS computerized system designated by MagicSense (Taste Technology LLC., Higashikurume, Japan) showed the entire list of traits on a computer screen to panelist. Each panelist was then asked to touch on the start button as soon as the sample was into his/her mouth, then to consider which of the traits was perceived as dominant. Thereafter, each time the panelist felt the perception has changed, he/she selected the new dominant trait, until the end of experiment. Along the testing of one product, the panelist was free to select a trait several times. When panelist swallow all samples, trigger of swallow was selected. The experiment duration was 60 s, and data was collected every 0.2 seconds. The order of presentation of the samples was designated by Latin square. Experiment was performed 3 repetitions per pork type and panelist.

Collected data was analyzed by following process described by Pineau *et al.* (2009) [1]: 1) For each time point and each trait, "Dominance rate", which is the rate of runs for assessed as dominant, was calculated. 2) "Chance level (P_0)", which is the dominance rate that a trait can obtain by chance, was calculated. P_0 is equal to 1/p, p is the number of traits. 3) ''Significant level (P_s)", which is represents the smallest value of the proportion being significantly (p=0.05) higher than the chance level, was calculated by following formula: $P_s=P_0+1.645[P_0 (1-P_0) / n]1/2$, n is the number of runs.

III. RESULTS AND DISCUSSION

Dominance rates of "Tender and/or Soft", "Tough and/or Hard", "Juicy", "Dry", "Fat melting", "Smooth", "Sour", "Umami" and "Beast odors" were higher than significant level, in at least one type of pork (Figure 1). Therefore, these traits were suggested to contribute to sensory traits of pork. The sensory traits of pork roughly proceed as follows: 0 to 10 sec, "Tender and/or Soft", "Tough and/or Hard"; 10 to 20 sec, "Juicy", "Dry", "Fat melting", "Smooth"; and 20 to 50 sec, "Sour", "Umami", "Beast odors" (Figure 1).

"Tender and/or Soft" or "Tough and/or Hard", "Dry" and "Umami" had the highest dominance rate in all type of pork, at least once in experimental duration. Thus, these traits are significant contributor of sensory traits of pork. "Juicy", "Fat melting", "Smooth", "Sour" and "Beast odors" were only appeared in a few types of pork. These traits may be due to the differences between pork quality.

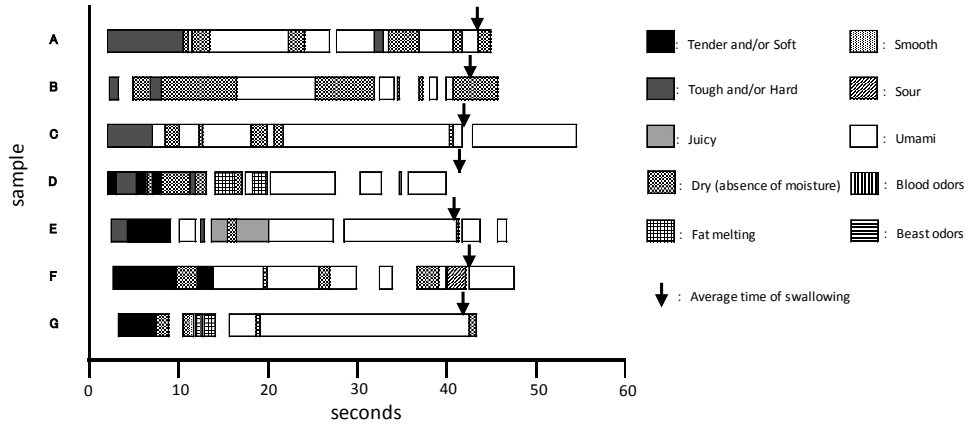

Figure 1. Time course changes in the traits which have the significant dominance rate.

If the dominance rate of several traits was higher than significant level, the traits which have the highest dominance rate was shown in each time point. The blank indicated that all traits were under the significant level.

IV. CONCLUSION

Time course of perception of sensory traits of pork was described clearly by TDS. In addition, it was suggested that "Tender and/or Soft" or "Tough and/or Hard", "Dry" and "Umami" contribute significantly to sensory traits of pork.

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