THE INFLUENCE OF TENDERAZITION AGENT ON THE SENSORY AND NUTRITIONAL PROFILE OF PORK MEAT

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Abstract: *Tenderizing meat is a process by which changes its texture to be more easily consumed. Tenderization agent is very important in estimating meat quality, along with taste and juicy.*

The paper presents a study on the influence of bruising agents on the sensory and nutritional profile of pig meat. In this regard, it was used fresh pork boneless shoulder and tenderness agents: salt brine 7% solution, soy sauce, cider and apple juice. After analyzing sensory highest score earned him sample tender meat with soy sauce, and from the nutritional point of view were obtained similar values were not significantly influenced by the tender itself.

Key words: *tenderizing meat, sensory profile, nutritional profile, brine solution, cider, apple juice*

INTRODUCTION

The pork meat is one of the most consumed foods in the word because of its pleasant taste and nutritional quality. Consumer appreciates the meat sensory qualities depending on their own perception about tasty and tender when they observe and ingest the product [6].

The sensory properties are assessed using the senses during eating food and will influence the consumer decision [9]. Generally the consumer satisfaction, is in the first step linked to tenderness, juiciness and taste and often determined the intention to repurchase. From all mentioned sensory characteristic, tenderness is considered the most important factor which influences the consumer choice [14].

In this context we tested the influence of different tender agent as: salt brine, soy sauce, cider and apple juice on the sensory and nutritional profile of pork meat. In addition to the organoleptic properties, the nutritional quality is taken into account when the "pork quality" concept it is defined [10,2].

The nutrients of meat are a valuable for human healthy. The pork is also an important source of protein, fat, vitamin and mineral and last but not least is flavorful [8,11].

Soy sauce is very appreciated for its flavor and is used by people around the world, but especially in Southeast Asia [12,16]. Soy sauce is a source of nutrients, such as essential amino acids, zinc, calcium, iron, manganese, natural antioxidant and other trace elements [7,13].

The tenderization effect of soy sauce on the meat is due to the increasing of collagen solubility and to the proteolysis and is determined by soy sauce concentration in marinade [5].

The main sensory characteristics of apple juice are pleasant aroma, optimal balance between sweetness and acidity, the colour and the consistency [3]. Apple juice contents of

phenolic compounds, vitamins, minerals, dietary fiber and it has antioxidant capacity and it depends on the raw apple quality [15].

Apple cider is a sweet and sparkling soft drink with low content of juice and low alcohol concentration. One of the most important chemical components is phenolic procyanidins which induce astringency and bitterness to the ciders. The main components of the apple cider are carbohydrates but it contains low quantity of vitamin C and minerals as iron, potassium and sodium [4].

In this study we assessed the influence of using salt brine, apple juice, apple cider and soy sauce as tenderizing agent on the sensorial and nutritional profile of pork shoulder.

MATERIAL AND METHOD

Meat samples. 4 samples of 2kg fresh pork boneless shoulder were injected with salt brine 7% NaCl, apple juice, apple cider and soy sauce. The injected products were maintained for 48 hours in a refrigerator at 2-4^{0}C in order to tenderized them. After tenderizing, the samples were cooked in oven at 180^{0}C until in the technology centre of the product 76°C was reached. The samples were codified as follows:

Prototype 1 Reference – fresh pork shoulder;
Prototype 2 – pork shoulder injected 20% with brine of 7% salt concentration;
Prototype 3 – pork shoulder injected 20% with soy sauce;
Prototype 4 – pork shoulder injected 20% with apple cider;
Prototype 5 – pork shoulder injected 20% with apple juice.

Determination of sensorial profile

In order to assess the sensory profile we used the descriptive method [1]. The key attributes which were evaluated classified as descriptors were appearance, smell, taste, texture, and aftertaste (Table 1).

Table 1

Description of attributes used to assess the sensory profile of pork samples

Category	Attribute name	Description
Appearance	Appearance before cooking	Evaluate before cooking, based on the respondent personal opinion for the prototype
	Appearance before cooking	Evaluate after cooking, before eating, based on the respondent personal opinion for the crust aspect
	Section aspect	Evaluate before eating, based on the respondent personal opinion for the section aspect of the cooked product
Smell	Overall aroma	Evaluated before eating, based on the respondent personal opinion for the prototype aroma
	Specific aroma	The intensity of specific aroma (soya sauce, apple cider, apple juice) aroma, evaluated before eating
	Others (off aroma)	The respondent will mention if other smells are perceived
Taste	Overall flavor	Evaluated at the first bite, based on the respondent personal opinion about the product taste balance
	Meat flavor	Meat flavor intensity, evaluated while chewing the product
	Specific flavor	Specific flavor intensity (salt, soya sauce, apple cider, apple juice), evaluated while chewing the product
	Others (off flavor)	The respondent will mention if other flavors are perceived
	Hardness	The product texture at the first bite
Texture	Tenderness	The product texture while chewing
	Melting time	The time needed to chew the product
	Persistency	The flavor intensity perceived after solowing the product
Aftertaste	Aftertaste	The flavor intensity perceived after swallowing

The respondents were calibrated, before evaluation, in order to have an understanding of each attribute based on a scores from -5 to 5 (-5 – very much less than reference, 0 – reference (fresh pork shoulder), 5- very much more than reference). All the

samples were splitted in pieces of similar size (10cm) and were evaluated taking the fresh pork shoulder as reference. The panel team received water and a cracker between samples, for taste neutralization.

Determination of nutritional profile

The energy value and nutritional profile of pork shoulder fresh, raw and of those tenderized with salt brine, apple juice, apple cider and soy sauce were calculated using the data from National Nutrient Database for Standard Reference of USA [17]. The results were analyzed by comparison.

RESULTS AND DISCUSSIONS

Assessment of sensory profile

The sensory profile of pork samples after cooking is presented in figure 1.

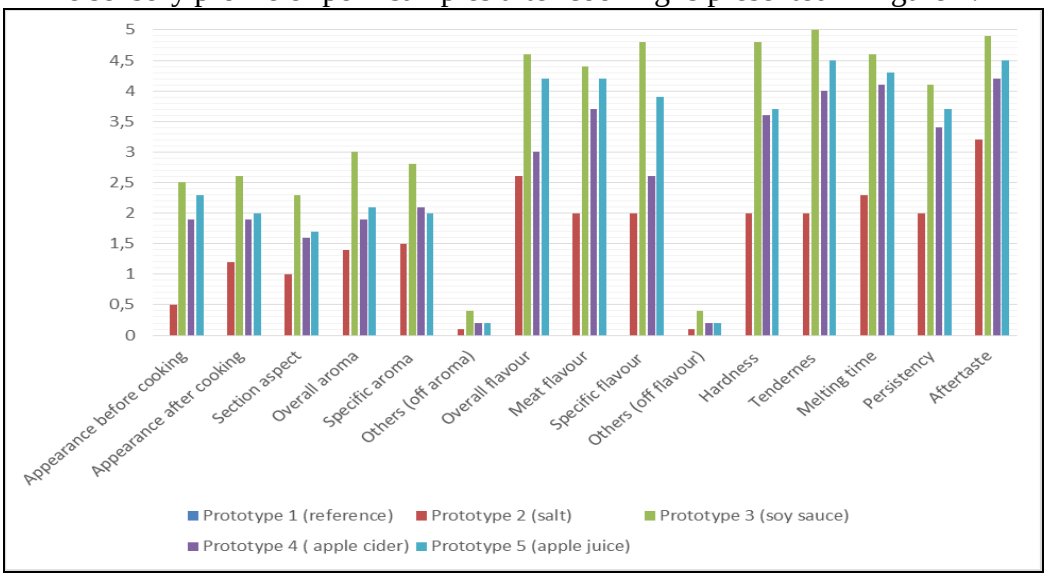

Figure 1. The sensory profile score of cooked pork shoulder samples

All types of solutions used for injection of pork shoulder had a positive impact over the product sensorial attributes, especially over the flavor and texture. Also, is to be mentioned the fact that no off flavor has been perceived, and the flavor and texture were highlighted by the all types of brines used, but the most effective one was the soy sauce brine, followed by the one with apple cider and apple cider. The less appreciated from point of view of sensorial attributes was prototype 2 (injected with salt solution 7% concentration). Prototypes 3, 4, and 5 are recommended to be industrialized having a positive impact over the consumer's acceptance level. The figure 2 emphasis the results obtained for the most effective brine used in the present study pork shoulder tenderized with soy sauce (prototype 3) due to the fact that the product texture reached the expectation level, and the flavor and aroma have been evaluated as the most balanced one.

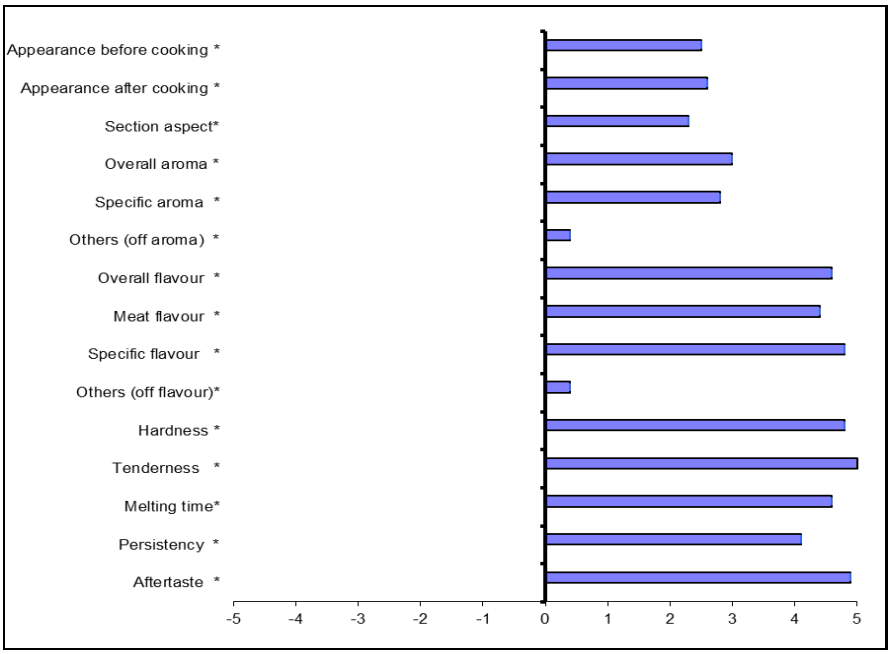

Figure 2. The sensory profile of prototype 3 (pork shoulder with soy sauce 20%)

All respondents evaluated the prototype 3 (pork shoulder tenderized with soy sauce 20%) with high scores for texture and flavor. Also, the appearance both before cooking and after cooking was appreciated, based on the panel personal opinion. Hardness, tenderness, melting time, specific flavor, and meat flavor reached the expectation level.

Assessment of nutritional profile

The calculated energy values of injected pork shoulder samples is situated in range of 111-119 kcal/100g and 469-499 kJ/100g, respectively (Figure 3). The highest energy value was determined in case of reference-fresh pork shoulder (123kcal/100g and 514kJ/100g) and could be attributed to the fact that the meat was not substituted with brine.

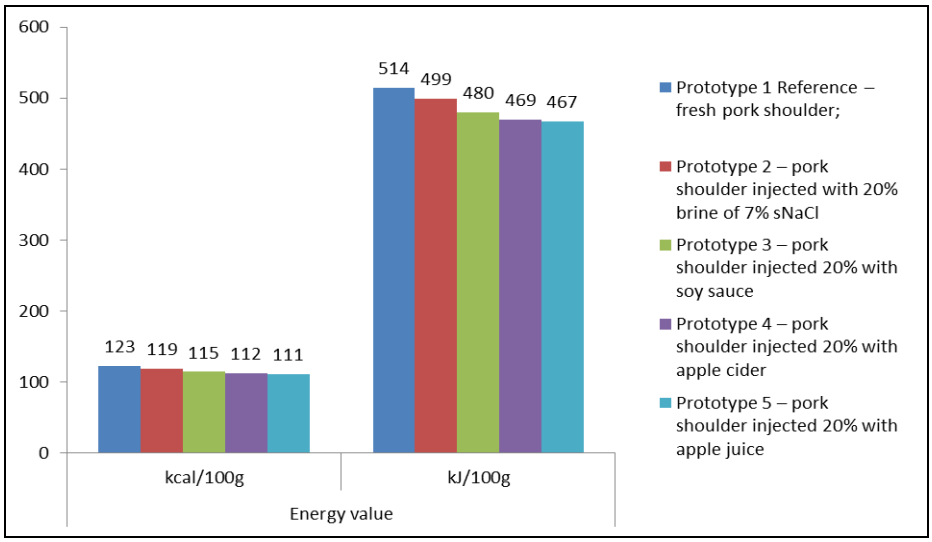

Figure 3. The energy values of the pork shoulder samples

The calculated nutritional values of pork shoulder tenderized (Table 2) revealed a similarity of total lipids and saturated fatty acids values in case of samples injected with

soy sauce, cider and apple juice and smaller than those determined for reference and samples tenderized with salt brine.

Table 2

Nutritional values of pork shoulder samples

Samples	Nutritional values, g/100g						
	Total lipids	Total saturated fatty acids	Carbohy drate	Sugar	Fiber	Protein	Salt
Prototype 1 Reference – fresh pork shoulder	3,4	1,1	0,0	0,0	0,0	22,5	0,1
Prototype 2 – pork shoulder with 20% brine of 7% salt concentration	3,3	1,0	0,0	0,0	0,0	21,9	3,0
Prototype 3 – pork shoulder injected 20% with soy sauce	2,9	0,9	0,8	0,0	0,0	20,8	2,2
Prototype 4 – pork shoulder injected 20% with apple cider	2,9	0,9	1,9	1,9	0,0	19,2	0,1
Prototype 5 – pork shoulder injected 20% with apple juice	2,9	0,9	1,7	1,4	0,0	19,2	0,1

The higher content in protein was calculated for reference and is due to the protein content of the fresh pork shoulder which had not substituted with brine. The higher salt content was determined in pork shoulder injected with salt brine followed by one in which it was used soy sauce. The carbohydrate and sugar were registered only in samples tenderized with soy sauce, cider and apple juice and can be attributed to the content in this nutrients of the brines. It has to be mentioned that the fiber is absent from all studied samples.

CONCLUSIONS

All brine used in order to tenderize the pork shoulder enhanced the sensory attributes of the meat and were preferred over the reference, so they could be used as natural tenderness agents in this process. The samples injected with soy sauce received the highest acceptance score.

The calculated energy value was similar in case of all samples and was not significantly influenced by the using of the brines. Using of salt brine and soy sauce led to the increase of salt content in samples tenderized with these tenderness agents.

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