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Research Article

Study on the efficiency of pineapple juice with a salt solution on the consumption characteristics of Thai native cattle meat

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Abstract

The research study the effect of pineapple juice in combination with a salt solution on the nutritional characteristics of native cattle meat. The experiment was conducted by marinated native cattle meat in pineapple juice with salt solution at ratios of 0:0 (T1), 100:0 (T2), 0:100 (T3), 25:75 (T4), 50:50 (T5) and 75:25 (T6). In completely randomized design (CRD)experiment and tested for consumer's acceptance, chemical, physical and biological properties. The results show that consumers accept the appearance, color, texture, taste and overall score. The results of the consumer acceptance for appearance, color, odour, texture, taste and overall score of native cattle meat marinated with pineapple juice together with 0:100 pineapple-salt solution (T3) was higher than other experimental groups significantly marinated This shows acceptance at the level of like to like very much (4.47 - 6.20). However, total bacteria, color of meat (L*, a*), chroma, gumminess, chewiness, shear force and cooking loss do not find statistical differences between experimental groups. Physical properties, has value of pH with decreases while native cattle meat marinated in pineapple juice with salt solution at 0:100 ratio (T3) showed hardness was higher and springiness was similar with other groups statistically significant ($p<0.05$).

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Introduction

Native cattle are ruminants that have been bred for a long time. But the original species and history in the past are not known for sure. Native cattle will vary from region to region of the country. Real native cattle will be in the central and northeastern regions. The northern and southern parts Some native cattle will have different shapes. Because there are other cattle bloodlines, especially Indian cattle, mixed with some, it has a large structure. In particular, some cows may weigh up to 480 kg. Native cattle are classified as "Indian cattle." Bos indicus is relatively small. short-haired It generally has a reddish-brown body. but may have many different colors, such as black, red, brown, white, yellow, etc. long, fragile face, narrow forehead, small rump, wattle, and not much skin under the abdomen, small ears, agile disposition, easily

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alarmed, loves flocks, remembers flocks well, is strong. Resistant to hot and humid environments, Diseases of parasites and insects are good. It has the ability to use roughage of low quality. but has a disadvantage, namely low growth. When it comes to eating meat, some people choose to avoid it by not accepting it. Eating foods that are difficult to chew or stick to the teeth, such as beef or pork with toughness (Kanchanaporn, 2018). The components in pineapple juice, there is an enzyme called bromelain, which has properties similar to the enzyme papain in papaya. It was found in large quantities at the core of the fruit. The bromelain enzyme has good protein digestion. It stimulates the digestive system and cleans the intestines. This substance also reduces inflammation. It prevents platelets from clumping together in blood vessels, reducing the risk of developing cardiovascular disease. Bromelain enzymes work to break down proteins, making the meat softer. This may be done by fermentation or injecting enzymes into the meat. Therefore, this study aims to study the efficacy of pineapple juice combined with salt solution for consumption and the quality of native beef in the future. Efficacy of improved dietary characteristics of indigenous beef marinated with pineapple juice and salt solution This experiment led to the creation of the story doing concept of a prototype of indigenous beef with information on nutritional value and physical quality. This included acceptance testing, assessing sensory quality and overall preference. as well as to communicate with consumers in marketing to maintain product standing and expand the market to increase future product sales.

Material and Methods

Animal and Treatments

Completely randomized design (CRD) experiments were planned, with test groups following The production formulas were different for 6 groups, each experimental group had 3 iterations as follows: The experiment was conducted by marinated native cattle meat in pineapple juice with salt solution at ratios of 0:0 (T1), 100:0 (T2), 0:100 (T3), 25:75 (T4), 50:50 (T5) and 75:25 (T6).

Table 1.

Show the Raw Material of the Salt Solution (According to the Formula of 20 kg of Water).

No.	Compound used	Amount used (g)
1	Sodium nitrite	300
2	Mix phosphate	300
3	Sodium chloride	270
4	White sugar	730
5	Monosodium glutamate	200
6	Sodium erythorbate	200

Source: Adapted from Raksasiri (2017)

Sample Collection and Analysis

2-3 year-old Thai native cattle are slaughtered, using only the loin marinated with Batavia pineapple and salt solution. (scientific experimental animal license number: U1-05112-848 2559, Thailand and certified of human research ethic Silpakorn University research, innovation and creativity administration office).

Parameters such as sensory panel method with Affective method (consumer method) were used to test the response of consumers in terms of adoption. There were about 50-100 people whom are not necessarily trained tasters were used as consumers (Bhutharit, 2010). Using the hip muscles of spent laying hens in the study the sample breast meat for examination with pH (45 mn. to 24 hrs.), the percentage of drip loss and cooking loss during storage. (Devine, 1999). Parameters used were in accordance to; Van Oeckel et al. (1999), for shear force and compression force; Saricoban et al. (2010) for, color of meat such as Lightness (L*), redness (a*), and yellowness (b*), chroma and hue angle; Novasiana: TH 200, for water activity (aw), and Kristensen and Purslow, (2001); for water-holding capacity (WHC). The sensory panel method (Affective method) gave a preference score on physical properties, including appearance, color, smell,

taste, texture and the overall acceptance of consumers with five preference scores ranged from 5 (very like = 4.21-5.00), 4 (like = 3.41-4.20), 3 (passive = 2.61-3.40), 2 (disliked = 1.81-2.60), and 1 (most disliked = 1.00-1.80), used among 212 tasters (regardless of gender and age).

Statistical Analysis

Data was analyzed statistically Following completely randomized design (CRD.Significant differences between treatments were determined using Duncan's news multiple range test (DMRT) by R program version 4.1.1.

Results

The results of the study on the efficacy of pineapple juice with a salt solution on the consumption characteristics of Thai native cattle meat. Sensory education It was found that consumers were satisfied with the appearance, color, smell, taste, texture, and overall acceptance of the local beef group marinated in pineapple juice with salt solution (Marinated with only salt solution) at a ratio of 0:100 (T3), both roasted and boiled more than the other experimental group, statistically significant ($p<0.05$). And The difference with the control group was found in Table 2. On the quality of the use of pineapple juice with salt solution on the dietary characteristics of native beef. It was found that total bacteria (cfu/g), reflectance (L*, lightness), red light reflectance (a*, redness), brightness (chroma), hue angle, cohesiveness (ratio), Gumminess (N), chewiness (N), shear force (kg/cm3), and the percentage of weight loss during storage on day 1 (Drip loss, %) did not differ statistically ($p<0.05$). The percentage weight loss during retention of days 2, 3, 4, and 5 (Drip loss, %) was lower in the third group than in the other groups. The pH value (pH) in the pineapple supplementation group showed a significantly lower pH than all other groups. The values were statistically significant ($p<0.05$), with values of 6.39, 5.01, 6.38, 5.67, 5.51, and 5.45 in groups 1, 2, 3, 4, 5, and 6, respectively. (Springiness, ratio) in the control group and the group that fermented pineapple juice with saline solution at 100:0 (T2), 25:75 (T4), 50:50 (T5), and 75:25 (T6). The raw materials after pressure were statistically significantly lower than those fermented pineapple juice with salt solution at 0:100 (T3) ($p<0.05$), Table 3.

Table 2.

Effect of Sensory Panel Method on Consumption Properties of Pineapple Juice with a Salt Solution on the Consumption Characteristics of Native Cattle Meat (Grilled and Boiled), Total Number of Testers 13 and 12 People Following (No Gender and Age Limit)

Assessed characteristics	Experimental group (N=12)						SEM	P-value
	T1 (Control)	T2 (100:0)	T3 (0:100)	T4 (25:75)	T5 (50:50)	T6 (75:25)		
Grilled								
Appearance	4.48^{ab}±0.22	2.92^{b}±0.07	5.56^{a}±0.11	3.10^{b}±0.37	3.12^{b}±0.08	3.05^{b}±0.11	0.39	0.005
Color	4.79^{ab}±0.29	3.02^{b}±0.11	5.46^{a}±0.20	3.10^{b}±0.22	3.07^{b}±0.20	3.12^{b}±0.24	0.51	0.005
Odour	4.43^{ab}±0.23	3.07^{b}±0.15	4.51^{a}±0.84	3.38^{b}±0.13	3.41^{b}±0.15	3.43^{b}±0.23	0.70	0.022
Texture	4.02^{b}±0.16	2.69^{b}±0.13	5.41^{a}±0.19	3.28^{b}±0.34	3.02^{b}±0.38	2.97^{b}±0.04	0.50	0.009
Taste	4.17^{b}±0.16	2.61^{b}±0.13	5.28^{a}±0.26	3.35^{b}±0.23	3.10^{b}±0.38	3.17^{b}±0.19	0.55	0.233
Overall score	3.87^{b}±0.86	3.05^{b}±0.16	5.58^{a}±0.23	3.46^{b}±0.27	3.25^{b}±0.43	3.28^{b}±0.08	0.83	0.349
Boiled								
Appearance	4.05^{b}±0.04	2.97^{b}±0.33	5.30^{a}±0.12	3.25^{b}±0.44	3.16^{b}±0.16	2.88^{b}±0.12	0.49	0.003

Color	4.05[b]±0.42	2.61[b]±0.04	5.55[a]±0.29	3.16[b]±0.33	2.80[b]±0.26	2.99[b]±0.14	0.61	0.001
Odour	4.55[b]±0.04	2.69[b]±0.17	5.13[a]±0.34	3.00[b]±0.41	3.00[b]±0.22	2.91[b]±0.16	0.55	0.001
Texture	3.52[b]±0.17	2.38[b]±0.17	5.55[a]±0.25	3.02[b]±0.17	2.99[b]±0.14	2.86[b]±0.20	0.45	0.002
Taste	4.08[b]±0.14	2.41[b]±0.30	5.47[a]±0.54	2.94[b]±0.20	2.94[b]±0.19	2.75[b]±0.22	0.65	0.002
Overall score	4.25[b]±0.22	2.77[b]±0.12	5.75[a]±0.38	3.38[b]±0.20	3.36[b]±0.17	3.02[b]±0.17	0.51	0.007

[ab]Mean in the same row with different superscript differ (P<0.05), T1= control, T2 = pineapple juice 100 percent, T3= salt solution 100 percent, T4 = Combine pineapple juice with salt solution in a ratio of 25:75 percent, T5 = Combine percent.

Table 3.

Effect of Physical, Chemical and Biological of Pineapple Juice Together with Salt Solution on Meat Quality of Native Cattle Meat

Assessed characteristics	Experimental group (N=12)						SEM	P-value
	T1 (Control)	T2 (100/0)	T3 (0/100)	T4 (25/75)	T5 (50/50)	T6 (75/25)		
pH	6.39^{a}±0.21	5.01^{b}±0.56	6.38^{a}±0.19	5.67^{ab}±0.22	5.51^{ab}±0.12	5.45^{ab}±0.07	0.56	0.001
Cooking loss (%)	26.21^{ab}±4.24	36.12^{a}±3.14	24.31^{b}±0.93	25.90^{b}±0.63	27.28^{ab}±2.85	28.42^{b}±3.95	6.45	0.001
Drip loss (%)								
day1	3.12±1.82	4.75±1.85	2.77±2.00	2.92±1.71	3.01±1.44	3.24±1.87	4.38	0.165
day2	0.32^{b}±0.28	1.11^{a}±0.50	0.30^{b}±0.09	0.63^{ab}±0.37	0.64^{ab}±0.21	1.54^{a}±1.63	1.26	0.002
day3	0.24^{b}±0.09	0.93^{a}±0.21	0.23^{b}±0.07	0.52^{ab}±0.16	0.58^{a}±0.12	0.90^{a}±0.42	0.43	0.008
day4	0.32^{b}±0.09	0.97^{a}±0.33	0.23^{b}±0.07	0.40^{b}±0.15	0.54^{ab}±0.17	0.63^{a}±0.35	0.47	0.003
day5	0.27^{b}±0.14	0.91^{a}±0.37	0.23^{b}±0.07	0.37^{b}±0.17	0.53^{ab}±0.18	0.62^{a}±0.35	0.52	0.002
L* (lightness)	48.48±0.65	49.81±2.03	47.86±0.83	48.91±0.81	49.97±2.80	49.83±0.54	3.13	0.261
a* (redness)	6.24±0.61	5.99±0.33	6.56±0.62	6.13±0.43	6.04±0.67	6.02±0.79	1.41	0.684
b* (yellowness)	7.80^{b}±0.87	9.28^{a}±0.39	7.80^{b}±0.47	8.05^{ab}±0.48	8.28^{ab}±0.48	8.67^{a}±0.56	1.33	0.001
Chroma	0.81±0.15	0.64±0.04	0.84±0.13	0.76±0.07	0.73±0.10	0.70±0.13	0.25	0.098
Hue angle	0.89±0.08	0.99±0.03	0.87±0.07	0.92±0.04	0.94±0.06	0.96±0.08	0.14	0.078
Total Bacteria (cfu/g)	8.67±0.44	8.38±0.28	8.41±0.15	8.51±0.13	8.47±0.33	8.51±0.14	0.60	0.631
Hardness (N)	29.80ab±0.33	28.68b±0.27	31.05a±0.76	31.12a±1.14	28.84b± 0.45	30.38a±1.31	1.74	0.001
Cohesiveness (ratio)	0.67±0.01	0.63±0.01	0.68±0.01	0.66±0.02	0.66±0.03	0.64±0.05	0.05	0.225
Springiness (mm)	0.74ab±0.02	0.70b±0.03	0.77a±0.01	0.75ab±0.02	0.73ab±0.03	0.71b±0.03	0.05	0.005
Gumminess (N)	19.91±0.75	19.18±0.75	20.26±0.63	18.87±1.38	18.45±1.94	17.83±2.14	3.11	0.104
Chewiness (N)	18.94±0.69	18.74±0.58	19.29±0.67	18.91±0.34	18.83±0.25	18.79±0.42	1.21	0.631
Shear force (kg/cm3)	6.67±0.94	6.23±1.10	7.00±1.25	6.37±0.36	5.85±1.18	6.22±0.81	2.31	0.554

Note: ^{a,b} Different letters in the same line are statistically significant (P <0.05). mn = minute, hr = hour, WHC= water holding capacity and pH = is a measurement after the end of the experiment

Discussion

From the experimental results, it was found that the local beef marinated in pineapple juice with salt solution decreased sensory characteristics. However, pineapple juice has the ability to help digest protein fibers. which has a natural enzyme, bromelain, which will increase the digestion of meat protein, making the meat tender (Palida, 2012). It has food preservation properties. Salt reduces the moisture content of food. change the properties of water in food. Microorganisms use water to make growth more difficult. and also increases the osmotic pressure, causing microorganisms to plasmolysis and stop growing (Pearson, 1976). It also helps with taste and smell. Improve product characteristics such as color, texture, water holding capacity, and meat adhesion. as well as preventing the growth of pathogenic bacteria (Maclean, 2017; Maclean, 1970). to reduce the harsh taste of salt, giving the product a mellow flavor. It has a more succulent texture and improves the color of the product (Ruiter, 1979). MSG enhances the original flavor of the product while inhibiting the production of fishy odors in the product. However, the study found that appearance, color, texture, taste, and overall acceptance. Consumers accepted the experimental group with only salt solution enrichment at the ratio of 0:100 at the very like (4.47–6.20). Meanwhile, the product's characteristics for the smell have consumer acceptance at a very like (4.47–5.33) (Ritthibun, 2011). The percentage of weight loss during cooking (Cooking loss, %) in the third experimental group was higher than in the other experimental groups. Statistically significant ($p<0.05$). The reflectivity of yellow light (b*, yellowness) in experimental groups 1 and 3 was higher than that of the other experimental groups. It is statistically significant ($p<0.05$), while the hardness (Hardness, N) in experimental groups 3, 4, and 6 was higher than in other experimental groups. Statistically significant ($p<0.05$). At the same time, the fermentation of retired laying hens with pineapple juice and salt solution at 25:75 and 50:50 ratios lowered the pH, while the degree of color and hardness were higher. The percentage of weight loss during cooking was significantly lower, as a result, the retired laying hens are softer and increase the water-holding efficiency of the meat as well (Raksasiri et al. 2020). However, pineapple juice it has the ability to taste and smell. Improve product characteristics such as color, texture, water holding capacity and meat adhesion. as well as preventing the growth of pathogenic bacteria (Raksasiri, 2017). And a salt solution that can digest collagen, fat, fibrosis and connective tissue. which results in protein degradation. Therefore, the water binding capacity of proteins is reduced (Laenoi et al. 2016)

Conclusion

The study of the use of pineapple juice with salt solution on meat quality and consumer acceptance of native cattle. It was found that in native cattle, pineapple juice with salt solution had an effect on softness and the water holding efficiency of the meat in a negative way. This is because the meat obtained from the fermentation process is very crumbly and rotten. This may be because the fermentation time is too long. The ratio of pineapple juice is not appropriate in the group that used pineapple juice with salt solution at the ratio of 0:100. There was a study on consumer acceptance of the product. It was found that consumers accepted both appearance, color, smell, touch, taste, and overall acceptance. It was shown that the consumer acceptance of the indigenous beef experimental group with the salt solution was used in the pineapple juice and fermentation salt solution experiment groups at the ratio of 0:100 (salt solution only) at the very like (4.51-5.58), indicating that the use of pineapple juice and salt solution can enhance the nutritional properties of native beef. However, the fermentation time and the ratio of pineapple juice to salt solution must be adjusted to be more appropriate and accurate.

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