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Effects of Brine Concentration,Thickness and Microwave Finish Drying on the Textural Characteristics of Buffalo Jerky

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ABSTRACT

Jerky, a ready-to-eat snack, known for its high protein and low-fat content. Current methods used in jerky processing take 6-10 hours in a conventional oven, dehydrator or smokehouse. In this study, whole buffalo meat was sliced to 5mm and 6mm and cured in three different salt concentrations of 1.0%, 1.5% and 2.0% for 24 hours at 4°C. The effects of microwave finish drying (5, 10 and 15 seconds) were examined after samples were dried in a convection oven for three hours. Cured buffalo slices showed significant ($p<0.05$) lower initial moisture content compared to uncured slices. This is due to the effect of salt which increased the protein solubility thus reducing its moisture content. Buffalo jerky treated with 2.0% salt showed the lowest final moisture content and the highest weight loss. Analysis of the texture characteristics showed that lower salt content and higher microwave duration produced softer buffalo jerky. The colour analysis of dried buffalo jerky implied that altering salt concentration and drying treatment did not give negative impact to the colour. Thus, microwave finish drying is capable of producing a good buffalo jerky without jeopardizing its quality.

1. Introduction

High protein meat-based snack such as jerky has gained interest globally as consumers are more health conscious. Due to its low water activity, it is shelf stable. Meat jerky can be made from any lean meat. The most popular jerky is made of beef or pork. There are two ways to prepare meat jerky, one by slicing the meat into strips and another by grinding the meat before moulding it into strips. The product from the former method is also known as whole meat jerky and the latter is known as restructured jerky [11,8].

The influence of drying and curing on beef and pork jerky has been studied over the years. Though beef and buffalo seem to be similar, the composition of the meat differs vastly [15]. Currently, in Malaysia, most of the buffalo meats are imported from India. Since the price of buffalo meat is lower compared to beef, it is commonly used in food industry. Based on the research carried out by Kandeepan *et al*., [9], young male buffalo meat is more suitable for processing due to

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its higher moisture, water holding capacity and collagen solubility. However, recent studies on buffalo meat are still limited.

Generally, jerky is prepared by curing and drying over a period of time, which reduces the water activity to approximately 0.70-0.85. The drying process consumes between 6 to 10 hours at 60°C in dryer, smokehouse or oven. Therefore, the reduction of processing time would lead to substantial reduction in cost, thus increasing the production efficacy. To date, there are no studies that have been conducted to investigate the assistance of microwave to reduce the drying time of whole buffalo jerky. Therefore, in this study, an attempt was made to explore the fusion of oven and microwave to reduce the drying time in the preparation of buffalo jerky. The effect of different brine concentrations and jerky thickness were also investigated.

2. Materials and Methods

2.1 Sample Preparation

Frozen buffalo meats (*Bubalus bubalis*) were obtained from a local supermarket. The excess and visible fat were trimmed off from the meat. The frozen buffalo meat was sliced to 5mm and 6mm thick pieces, using a meat slicer (Duegi Affettatrici, Italy). The slices were then cut into 50mm x 20mm. The meat slices were frozen at -18°C until use. Samples were thawed at 4°C prior to curing.

2.2 Experimental Design

The mixture for curing consisted of water, salt, sugar and sodium nitrate was prepared. Buffalo meat slices were cured for 24 hours at 4°C. All experiments were carried out in triplicates. The cure formulations are shown in Table 1.

Table 1
Formulations for buffalo jerky curing

Cure agents	Thickness of sample					
	5mm			6mm		
Salt	1.0%	1.5%	2.0%	1.0%	1.5%	2.0%
Sugar	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Sodium nitrate	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Water	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%

2.3 Drying Treatment

Table 2
Process parameters used for convection oven and microwave finish drying

Treatment	Drying time (hours)	Drying time (seconds)
	Convection dryer (70°C)	Microwave (800W power)
1	3	5
2	3	10
3	3	15

Drying treatments were carried out in a laboratory-scale cabinet dryer (M-CD0106, Malchem, Malaysia) which was designed to dry and heat using convective energy. A setting of 70°C air temperature and level 5 fan speed was used to dry the samples for 3 hours. After 3 hours, the samples were removed and placed in the microwave (NN-ST342M, Panasonic, Malaysia). All

experiments were conducted in triplicates. Table 2 shows the process parameters used in microwave drying.

2.4 Moisture content

The moisture contents of the sample were measured using Precisa Moisture Content Analyser (Precisa Gravimetrics, Switzerland). The buffalo jerky slices were cut into 10 mm x 10 mm and placed into the device.

2.5 Weight loss measurement

Initial and final weights were measured and the weight loss was calculated by using this formulation:

Weight loss percentage = ((Initial weight – Final weight)/ Initial weight)) × 100%

2.6 Texture Profile Analysis (TPA)

Texture measurement of jerky samples was conducted using a computer-assisted TA-XT2i Texture Analyzer (Stable Micro System, UK), fitted with Warner-Bratzler blade. The method was to determine hardness, springiness and chewiness. A piece of buffalo meat jerky measuring 20 x 50 mm was placed on the platform, with the fibres of the meat parallel to the direction of the blade. A 30 kg load cell with 50% strain was used to compress the sample. The settings of the texture analyser were as follows; pre-test speed of 5.0mm/s; test speed 2.0mm/s, post-test 5.0mm/s.

2.7 Colour analysis

The colours of dried buffalo jerky were measured using a calorimeter (Minolta spectrophotometer CM 3500d, Japan). The colour reading includes lightness (L*), redness (a*) and yellowness (b*).

2.8 Statistical analysis

All data were analysed by using two-way analysis of variance (ANOVA), using Minitab 17. Differences were considered significant at $p < 0.05$.

3. Results and Discussion

3.1 Moisture Content

The moisture content for sliced buffalo jerky was tabulated in Table 3. Samples with the highest mean were showed by the lowest salt concentration and vice versa. Data significantly ($p<0.05$) showed that the higher the salt concentration, the lower the final moisture content. This is seen throughout all different microwave treatment and both jerky thickness. It can be due to the osmotic effect which was theorized by Offer *et al*., [17] which stated that myosin depolymerised in the presence of salt or with acid marinades. A weakening of muscle protein will lead to a poor water holding capacity due to the decrease of hydrogen bonding and hydration of ionic groups, thus increasing water molecules to be released from jerky [4]. When the temperature is raised

during the drying process, higher water molecules were lost. The moisture content of all samples decreases after curing steps due to moisture diffusion and decreased further due to evaporation when heat is applied [21]. The thickness and porosity of a material also affect the movement of water molecules [2]. Overall result showed that 6mm buffalo jerky has higher final moisture content compared to the 5mm dried buffalo jerky.

Table 3
Moisture content of 5mm and 6mm buffalo strips[1]

Strip size	Salt concentration (%)	O-MW treatment[2]			
		Control	1	2	3
5 mm	0	$78.97^{aA} \pm 1.53$	$35.77^{aB} \pm 0.78$	$32.83^{aC} \pm 0.63$	$31.85^{aC} \pm 0.77$
	1.0	$67.02^{bA} \pm 0.67$	$29.11^{bB} \pm 0.95$	$28.54^{bB} \pm 1.32$	$30.40^{abB} \pm 0.82$
	1.5	$66.44^{bA} \pm 1.04$	$27.63^{bcB} \pm 0.49$	$28.38^{bB} \pm 0.72$	$29.29^{bcB} \pm 0.82$
	2.0	$66.81^{bA} \pm 2.01$	$25.81^{cB} \pm 0.83$	$26.46^{bB} \pm 0.82$	$27.79^{cB} \pm 0.97$
6 mm	0	$76.20^{aA} \pm 2.85$	$36.21^{aB} \pm 1.14$	$33.54^{aC} \pm 0.67$	$32.58^{aC} \pm 1.23$
	1.0	$70.41^{bA} \pm 1.21$	$30.87^{bB} \pm 0.41$	$29.64^{bB} \pm 0.49$	$31.35^{aB} \pm 1.40$
	1.5	$69.76^{bA} \pm 0.95$	$28.02^{cB} \pm 1.38$	$29.56^{bB} \pm 0.13$	$27.91^{bB} \pm 0.53$
	2.0	$69.30^{bA} \pm 0.68$	$26.90^{cB} \pm 0.74$	$26.54^{cB} \pm 1.20$	$26.45^{bB} \pm 0.49$

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

However, it is also noted that the output power has a crucial effect on drying rate. In this research, the output is maintained at one level. Therefore, there are no significant differences ($p>0.05$) between the final moisture content between samples exposed to different microwave time, except for uncured buffalo slices. The salt compound found in the cured mixture interact with free water found in the buffalo slices thus reduces the concentration of water available for evaporation [19]. Studies have also shown that too high microwave power has also been associated with physical damage to products such as charring and uneven temperature [7,18]. These physical damages are the result of the continuous increase in sample temperature. It is also discovered that microwave output power will affect the characteristics of the surrounding air rapidly increasing the temperature of the water vapour in the air reducing the drying rate [6]. Hence, it is difficult to control the quality and drying rate of buffalo jerky when higher power output is applied.

3.2 Weight Loss

Weight loss (%) data were shown in Table 4. The overall trend showed an increasing weight loss as salt concentration increases. The highest weight loss for 5mm buffalo jerky is recorded by samples treated with 2.0% salt concentration and exposed to 15 seconds microwave. There are significant differences between the percentages of weight loss of buffalo jerky as salt concentration increases. This can be seen in all three different oven-microwave treatments, although varying microwave time did not significantly affect the weight loss. A similar trend is recorded for 6mm buffalo jerky. Nevertheless, for 6mm buffalo jerky strip, treated with 1.5% salt concentration showed a contrast result. Weight loss for the samples showed significant differences when treated with different microwave time. For both 5mm and 6mm, there was no significant interaction between salt concentration and oven-microwave time, though salt concentration showed a significant effect ($p<0.05$).

Table 4
Weight loss (%) of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2]		
		1	2	3
5 mm	0	$51.00^{cA} \pm 1.61$	$51.73^{cA} \pm 0.55$	$53.27^{cA} \pm 2.23$
	1.0	$56.45^{bA} \pm 1.43$	$53.25^{bcA} \pm 2.78$	$54.48^{cA} \pm 0.74$
	1.5	$58.78^{bA} \pm 0.86$	$58.25^{abA} \pm 0.95$	$61.26^{bA} \pm 1.62$
	2.0	$63.35^{aA} \pm 1.47$	$62.66^{aA} \pm 2.51$	$66.95^{aA} \pm 3.06$
6 mm	0	$51.41^{cA} \pm 1.26$	$52.81^{cA} \pm 1.50$	$52.66^{cA} \pm 1.64$
	1.0	$52.76^{bcA} \pm 3.21$	$52.75^{bA} \pm 0.80$	$52.69^{cA} \pm 1.07$
	1.5	$58.36^{abA} \pm 1.13$	$53.47^{bAB} \pm 2.64$	$56.81^{bB} \pm 1.66$
	2.0	$62.91^{aA} \pm 2.83$	$64.63^{aA} \pm 3.26$	$65.64^{aA} \pm 1.45$

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

The results indicated that microwave did reduce moisture content, which contributed to most of the weight loss. Water loss from buffalo jerky is mainly due to sudden volumetric heating, generating high pressure in the strips. Exposure to microwave generates large vapour pressure gradients between the internal and the surface of the buffalo jerky, which propel the movement of inner moisture to the surface [14]. This is consistent with the results obtained by Maskan [13], which suggested that microwave energy should be applied in the falling rate period for finish drying.

3.3 Texture Profile Analysis

The texture profile analysis was carried out to determine the textural characteristics of buffalo jerky. Main parameters that are concentrated in this test were hardness, chewiness and springiness. Table 5 showed the changes in hardness level when buffalo jerky is cured in different salt concentrations and dried in a different duration of microwave treatments. Overall, uncured strips showed lower hardness level compared to the cured strips. The data showed that the effect of salt significantly affects ($p<0.05$) the texture. Increasing the concentration of salt may increase the hardness of the buffalo jerky. There are possibilities of hardening reactions and interaction of protein due to the moisture loss during heating. Higher concentration of salt also promotes the loss of water, therefore increases hardening and protein binding which results in harder jerky. This is supported by studies done by Church *et al*., [3], stated that the application of microwave did not produce a softer beef jerky.

Chewiness refers to the work needed to be done during mastication. The chewiness for all samples of dried buffalo jerky is found to be high, all recorded above 1000g. There were no significant differences ($p>0.05$) between the two thickness (5mm and 6mm). The results indicated that the sample thickness insignificantly affects the chewiness of buffalo jerky. There was also no significant effect ($p>0.05$) of increasing salt concentration on the chewiness of buffalo jerky for most of the designs except for 6mm buffalo jerky, exposed to 10 seconds microwave. The chewiness is due to the cross-linkage and protein binding during the drying process. Since buffalo meat is considered as tough meat due to its high collagen content, the addition of tenderizers or humectant may assist in achieving tenderer buffalo jerky [1, 11, 16].

Table 5
Hardness of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	3003.16^{bA} ± 139	2889.75^{bA} ± 16	3305.50^{aA} ± 830
	1.0	3967.90^{abA} ± 342	3046.54^{bA} ± 86	3244.50^{aA} ± 527
	1.5	4756.50^{abA} ± 232	5059.90^{aA} ± 328	4204.10^{aA} ± 377
	2.0	5996.90^{bA} ± 1034	5415.80^{aA} ± 400	5504.70^{aA} ± 877
6 mm	0	3001.60^{cA} ± 301	2880.71^{cA} ± 131	3407.70^{cA} ± 154
	1.0	3412.00^{cA} ± 190	4131.60^{bA} ± 226	3728.80^{cA} ± 210
	1.5	4981.92^{bA} ± 57	5201.24^{aA} ± 48	5267.40^{bA} ± 210
	2.0	6100.40^{aA} ± 279	5975.60^{aA} ± 311	6262.29^{aA} ± 71

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

Table 6
Chewiness of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	1085.20^{aA} ± 272.30	1282.10^{aA} ± 247.10	1320.07^{aA} ± 93.61
	1.0	1314.50^{aA} ± 230.90	1595.80^{aA} ± 298.00	1597.19^{aA} ± 79.07
	1.5	1447.22^{aA} ± 78.17	1557.40^{aA} ± 143.60	1621.10^{aA} ± 203.70
	2.0	1688.25^{aA} ± 79.20	1829.70^{aA} ± 193.20	1693.10^{aA} ± 149.10
6 mm	0	1176.50^{aA} ± 267.90	1203.10^{bA} ± 147.70	1369.56^{aA} ± 86.88
	1.0	1490.78^{aA} ± 70.53	1600.04^{abA} ± 45.34	1431.50^{aA} ± 314.70
	1.5	1504.20^{aA} ± 417.70	1601.08^{abA} ± 35.22	1876.85^{aA} ± 140.95
	2.0	1870.43^{aA} ± 6.88	1878.80^{aA} ± 161.90	2160.80^{aA} ± 196.60

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

Table 7
Springiness of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	0.81^{aA} ± 0.01	0.84^{aA} ± 0.02	0.83^{aA} ± 0.06
	1.0	0.77^{abA} ± 0.02	0.77^{abA} ±0.03	0.74^{aA} ± 0.01
	1.5	0.71^{bcA} ± 0.01	0.77^{abA} ± 0.05	0.73^{aA} ± 0.02
	2.0	0.67^{cA} ± 0.02	0.69^{bA} ± 0.02	0.69^{aA} ± 0.05
6 mm	0	0.81^{aA} ± 0.01	0.82^{aA} ± 0.04	0.80^{aA} ± 0.04
	1.0	0.76^{abA} ± 0.01	0.79^{abA} ± 0.01	0.77^{aA} ± 0.04
	1.5	0.78^{aA} ± 0.03	0.74^{abA} ± 0.01	0.75^{abA} ± 0.02
	2.0	0.69^{bAB} ± 0.02	0.70^{bA} ± 0.01	0.64^{bB} ± 0.01

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

There was also no significant difference ($p>0.05$) between the springiness of buffalo jerky throughout the different oven-microwave treatment. The p-value across 1.0% salt concentration for 5mm strips is 0.45, which suggests that the contrasting microwave treatment time did not affect the springiness of buffalo jerky. Similarly, the p-value for 6mm strips is 0.39, which indicates the same. Varying salt concentration showed no consistent effect on the springiness of the dried buffalo jerky. Based on Zochowska-Kujawska [22], dry-cured deer muscles with lower salt content showed lower hardness, cohesiveness, springiness and chewiness.

3.4 Colour

The lightness (L*) of dried buffalo jerky are presented in Table 8. The 5mm uncured samples showed lower lightness value, which ranged from 27.36 to 27.75. Overall, uncured buffalo jerky scored significantly ($p<0.05$) lighter colour compared to cured buffalo jerky. This is because of the presence of curing agents such as salt and sodium nitrate. Usage of salt alone is insufficient to stabilize the colour of buffalo jerky [21], therefore sodium nitrate was added. The redness of the dried buffalo jerky increased significantly ($p<0.05$) for 5 mm thickness in the presence of sodium nitrate (Table 9). This is supported by study on goat meat (chevon) jerky where the redness increased as the sodium nitrite included during processing [12]. However, other study substituted tomato powder to enhance the colour of the dried jerky since sodium nitrate is not favourable in the food industry [10].

Table 8
Lightness (L*) of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	$27.59^{aA} \pm 0.25$	$27.75^{aA} \pm 0.14$	$27.36^{aA} \pm 0.06$
	1.0	$30.01^{bB} \pm 0.70$	$31.29^{bAB} \pm 0.74$	$33.41^{bA} \pm 0.61$
	1.5	$32.78^{cA} \pm 0.91$	$32.07^{bA} \pm 0.65$	$34.83^{bA} \pm 0.54$
	2.0	$32.84^{cB} \pm 0.86$	$37.08^{cA} \pm 0.21$	$37.17^{cA} \pm 0.54$
6 mm	0	$36.04^{aA} \pm 4.13$	$36.89^{aA} \pm 1.41$	$36.02^{aA} \pm 1.27$
	1.0	$33.15^{bB} \pm 0.87$	$36.92^{bA} \pm 0.05$	$38.70^{bA} \pm 1.44$
	1.5	$37.82^{aA} \pm 2.02$	$34.86^{cA} \pm 0.01$	$37.52^{bA} \pm 1.47$
	2.0	$33.54^{bB} \pm 0.64$	$37.21^{bA} \pm 0.96$	$37.95^{bA} \pm 1.17$

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

The average range of yellowness for 5mm buffalo jerky was from 0.39 to 1.14 and for 6mm was 0.32 to 1.18 (Table 10). The result showed that the change in salt concentration did not have any significant effect on the yellowness of dried buffalo jerky for 5 mm thickness. However, for 6mm buffalo jerky, the changes in salt concentration did have a significant effect ($p>0.05$) on the yellowness of the samples. Samples cured in 1.0% showed the highest yellowness in colour for all three treatments. However, O-MW treatment of 10 seconds gave significant change for both thicknesses. Buffalo jerky cured in 1.0% salt concentration and dried in 10 seconds microwave showed the highest yellowness for 5mm and 6mm samples. This correlates with the research by Thiagarajan [20], which found that the changes in colour are based on pH alteration and changes in salt content do not significantly affect colour.

Table 9
Redness (a*) of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	$3.98^{bA} \pm 0.33$	$3.20^{bAB} \pm 0.11$	$2.81^{cB} \pm 0.10$
	1.0	$7.70^{aAB} \pm 0.92$	$10.43^{aA} \pm 0.79$	$6.33^{bB} \pm 0.14$
	1.5	$8.82^{aA} \pm 0.18$	$8.97^{aA} \pm 0.28$	$8.27^{aA} \pm 0.81$
	2.0	$9.79^{aA} \pm 0.66$	$9.64^{bA} \pm 0.54$	$9.51^{aA} \pm 0.21$
6 mm	0	$8.29^{aA} \pm 0.04$	$7.89^{aA} \pm 1.08$	$7.40^{bA} \pm 0.01$
	1.0	$8.84^{aA} \pm 1.02$	$8.10^{aA} \pm 0.81$	$9.60^{aA} \pm 0.04$
	1.5	$7.14^{aA} \pm 0.13$	$8.75^{aA} \pm 0.99$	$8.70^{abA} \pm 0.69$
	2.0	$9.14^{aA} \pm 0.10$	$8.60^{aA} \pm 0.23$	$8.70^{abA} \pm 0.28$

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

Table 10
Yellowness (b*) of dried 5mm and 6mm buffalo jerky[1]

Strip size	Salt concentration (%)	O-MW treatment[2] 1	2	3
5 mm	0	$0.82^{aA} \pm 0.20$	$0.81^{abA} \pm 0.10$	$0.68^{aA} \pm 0.08$
	1.0	$0.52^{aB} \pm 0.06$	$1.14^{aA} \pm 0.16$	$0.59^{aB} \pm 0.04$
	1.5	$0.49^{aB} \pm 0.05$	$0.39^{bB} \pm 0.03$	$0.82^{aA} \pm 0.06$
	2.0	$0.39^{aA} \pm 0.10$	$0.41^{bA} \pm 0.12$	$0.79^{aA} \pm 0.11$
6 mm	0	$0.46^{bA} \pm 0.15$	$0.32^{bA} \pm 0.13$	$0.42^{bcA} \pm 0.16$
	1.0	$0.83^{aA} \pm 0.05$	$1.18^{aA} \pm 0.16$	$1.06^{aA} \pm 0.04$
	1.5	$0.62^{abA} \pm 0.05$	$0.59^{bA} \pm 0.11$	$0.71^{abA} \pm 0.04$
	2.0	$0.46^{bAB} \pm 0.04$	$0.55^{bA} \pm 0.06$	$0.32^{cB} \pm 0.04$

[1]Means ± SD with different superscripts row-wise (capital letter) and column-wise (small letter) are significantly different ($p<0.05$) within the same strip size
[2]O-MW treatment 1 = 3 hours oven + 5 seconds microwave; O-MW treatment 2 = 3 hours oven + 10 seconds microwave; O-MW treatment 3 = 3 hours oven + 15 seconds microwave

4. Conclusion

Different microwave treatments and curing of buffalo strips in different concentrations of salt had significantly affected the moisture content of the dried buffalo jerky. Increasing the microwave duration and the salt concentration is found to increase the rate of moisture loss. The increase of salt concentration also affects the textural characteristics, as the hardness of buffalo jerky is found to be higher when cured in higher salt concentration. However, the changes of microwave treatment duration did not significantly affect the textural parameters of buffalo jerky. There were also no significant effects of microwave duration on the colour of dried buffalo jerky but the red colour was affected by the concentration of the brine. It can be concluded that the use of microwave reduced the drying time needed for the preparation of buffalo jerky without negatively impacting the texture and colour of the buffalo jerky. Traditional convective drying assisted by microwave demonstrated superior efficiency in dehydrating buffalo jerky sample, compared to traditional oven processing. This translates to substantial energy saving.

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