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Preparation of Milkfish Bone Powder by a Novel Bone-Embrittlementing Technique and Used in Manufacturing High Calcium Egg Roll

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Abstract The milkfish bone powder (MBP) was produced by bone-embrittlementing technique (BET) in this study. The water activity (aw), thiobarbital acid (TBA) value, color difference and degree of crispy of the MBP through BET were compared. The results showed that with the increase of acetic acid concentration, the aw of MBP was significantly reduced and reached the lowest value 0.240, and the whiteness index was up to 80 or higher through the high temperature and high pressure treatment group, as well as the color was brighter and easily accepted. The TBA value of the MBP was as low as 2.09 mg malonadehyde/kg and the calcium content could be increased up to 26.76%. The highest overall acceptance was obtained when 3% of MBP was added to the egg roll. The BET could be used as an alternative method for treating aquatic waste and he MBP hasthe capacity for using in health or leisure foods.

Keywords: *milkfish, bone-embrittlementing technique (BET), milkfish bone powder (MBP), high calcium egg roll*

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1. Introduction

Milkfish (scientific name: *Chanoschanos*) has high-nutritional value and high-output, as a result, to be the important aquaculture industry, especially in Taiwan. The milkfish has been farming in Taiwan for more than three hundred years long and is also an important economic fish. The main producing area is Tainan and its productivity is first in Taiwan. The annual growth rate of milkfish production is increased due to the advances technology hence promoted local economic development.

The 80% sales is domestic for Taiwan's milkfish; however, with the increase of population and the development of resources as well as the suspension of cross-strait cooperation caused the supply and demand of the milkfish market is disordered. Therfore, it is need high-value and diversity products development to assist the structure adjustment and development plan of the milkfish industry [1].

The backbone accounts for 15% of the fish's body weight and is recognized a good source of many essential minerals, particularly calcium [2]. In general, the backbone is usually considered as aquatic waste and predominantly used for making feed, fertilizer or directly deposited; nevertheless, which is very wasteful for the utilization of fish bone calcium. If the fish bones can be appropriately used in foods, such as common food even functional food, it can be more widely used and greatly add it value. Thus, if the fish bones can be used to make into more related products, it will not only raise value-added, but also reduce environmental pollution and social cost [1].

Notwithstanding, the biggest drawbacks for fish bones to become food or one of food components are its firmness and taste is not good. It is necessary to develop a special technique to make the fish bones puffing and embrittlementing, so that can be added to a variety of foods, including high calcium food. If the developappropriate method can produce high-quality fish bone powder and suitable for adding to foods should be welcomed. Moreover, it may be able to replace included in part of oil, sugar or salt ingredients.

Egg roll is classified to "leisure food" [3] and is popular with the public including primary school students [4]. Interesting, to the best of the author's knowledge, there are only still a very few studies on this topic. Recently, related researches reported that adding rice (*Oryza sativa* L. *cv.* TNG 71) or *Lactobacillus* into egg roll [5,6]. Those researchers hope developed novel type egg roll products. The target of this research was to develop high-quality milkfish bone powder (MBP)by using the bone-embrittlementingtechnique (BET) to produce high-calcium fish bone powder and to add it to egg roll to develop a high-calcium leisure food.

2. Materials and Methods

2.1. Milkfish Bone and MBP Preparation

The milkfish bone was a kind gift obtained from Fortune Life Enterprise Co., Ltd. (Kaohsiung). Put the milkfish bone in a refrigerator (20°C) after receiving. It was thawing at 4°C overnight before the next day usage. After washing to remove the remaining fish meat, the backbone was grouped to raw fishbone (Group A), cooked fishbone (Group B), 0.5, 1.0 and 2.0% of acetic acid treated fishbone (Group C, D and E), pressure-cooking fishbone (121°C, 1.2 kgf/cm² for 30 min, Group F) and treated with the above different concentration of acetic acid and pressure-cooking fishbone simultaneously (Group G, H and I).

2.2. Egg Roll Preparation

Added MBP 3, 6 or 9% (the percentage by weight of the cake flour) to 100% cake flour (King Dog Food Co., Ltd., Taichung), and the 1% salt (Taiyen Biotech Co., Ltd., Tainan), 80% sugar (Taiwan Sugar Corp., Tainan), 80% shortening (Shangyu Enterprise Co., Ltd., Pingtung) and 220% liquid eggs (Neipu Local Fresh Food Supermarket, Neipu, Pingtung) were added in. After mixing all the above ingredients with a mixer (Mixer JD-61, Jenmao Food Machinery Co., Ltd., Kaohsiung), heated and grilled with an egg roll machine (CHD-815, King Dog Food Co., Ltd., Taichung) at 180°C for 10 sec.

2.3. Proximate Composition and Calcium Assay

Ash, calcium, fat and moisture content of fishbone were respectively determined according to the Chinese National Standards [7] 5033-N6114, 5034-N6115, 5036-N6117 and 12869-N6231, which were based on the methods of Association of Official Analytical Chemists [8].

2.4. Fracturability and Shearing Testing

For detecting the fracturability, the texture profile analysis (TPA) was executed as demonstrated by Færgemand et al. (1995) [9] and was performed employing an Instron universal testing (Model: 5564,Instron, Canton, Mass, U.S.A). In brief, sample was compressed down to its original height with a 120 mm/min of speed by an adaptor and a cylinder (9.5 mm diameter). An examination was completed by repeated the adaptor two-stage compressed action. A Warner-Bratzler tool kit was installed before detecting the shear force.

2.5. Color Evaluation

Sample color was detected by a color and color difference meter (CDM-08, Laiko Co., Ltd., Japan). A white standard control board (reference values of X = 80.30, Y = 81.65 and Z = 91.39) was employed as a consultation. Sample (2 g) was placed in a circular box (diameter 3 cm × height 1.5 cm) for analyzing. Sample (2 g) was placed in quartz container (height 15 mm × diameter 30 mm) for detecting and noting hunterL^*, a^* and b^*, i.e. lightness (L^*), green/red color component (a^*) and yellow/blue (b^*) [10]. The white index (W.I.) was calculated as $100-[(100-L^*)^2+a^{*2}+b^{*2}]^{1/2}$.

2.6. Morphological Properties Analysis

The scanning electron micrographic observation was employed to determine the rheological property of fish bone powder. Briefly, after 48 h freeze dried the lyophilized powder sample was mounted on circular aluminum stubs with double sticky tape, coated with gold, and then examined by a scanning electron microscope (SEM, Model: S-3000N, Histachi, Japan) and photographed at an accelerating potential of 15 Kv.

2.7. Water Activity (*aw*) Analysis

The *aw* of sample (5±0.5 g) was directly measured by a water detector (CX-2, Aqualab, Decagon Devices, Inc., USA).

2.8. ThiobarbituricAcid (TBA) Value Determination

TBA value was detected according to the description by Birkeland et al. (2003) [11]. Briefly, put the sample (2 g) into a tube (14 mm inside diameter × 160 mm length) and 20% trichloroacetic acid(5 mL) and deionized water (4 mL) was added, vortexed and filtered well by a filter paper (No. 4, Whatman)and poured into a conical flask after energetically trembling and mixing. Then, mixed a 3 mL of filtrate with 0.02 M TBA (3 mL) and bathed at 100°C for 35 min. After bathing, the sample was cooled by flowing trapped water for 10 min. The absorbance (*A*) at 532 nm was detected by a spectrophotometer (U-2001, Hitachi, Japan). The TBA value was calculated using the formula: TBA (mg malondialdehyde/kg sample) = $A_{532\ nm} \times 7.8$.

2.9. Aerobic Plate Count (APC) Calculation

The CNS 10890-N6186 method [7] was employ to determine the APC. In brief, a 25 g of egg roll sample was weighed in a homo-bottle and 225 mL of sterilized phosphoric acid buffer was poured in. After homogenizing (5000 rpm for 15 sec, and next 8000 rpm for 2 min), the suspension was diluted to 10^{-1}, 10^{-2}, 10^{-3} and 10^{-4}. Finally, absorbed the dilution (1 mL) and implanted into each individual sterilized petri-dish and cultured in an incubator (38°C for 48 h) and then counted the clones.

2.10. Sensory Evaluation of Egg Roll

The egg roll added with different concentrations of MBP was subjected to rate and judge with sensory evaluation examination by fifteen expert panelists who have received professional sensory exercises. The consequences were expressed via employing the nine-point hedonic scale method, i.e., the higher (or lower) the point matches the better or stronger (or weaker) characteristic (appearance, mouthfeel, flavor, crispness and overall acceptance).

2.11. Statistical Analysis

Experimental data were resolved by Statistical Package for the Social Sciences (SPSS) analysis of variance (ANOVA). All the experiments were executed in triplicate at least and each data was expressed with mean±standard deviation (SD).

3. Results and Discussion

3.1. The Component and Characteristic of MBP

Ash is the residue of the sample after passing through the high temperature dry ashing at least 400°C. The residue concludes some inorganic substances especially calcium. After ashing, the amount of the organic substancessuch as protein and lipid might be reduced. The component and characteristic of fish bone after treating with different BETs is shown in Table 1. With the heating time increasing, the conversion and loss of some components in the backbone lead to a reduction in the ash amount after the ashing. The ash amount of milkfish backbone which cooked in boiling water (group B) was significant lower ($p < 0.05$) than other groups. This phenomenon may due to the some selected component released or lowered during the treatment and caused the reduction of ash.

For groups F, G, H and I which after high temperature and high pressure treat; however, theirs ash amount was significantly higher ($p < 0.05$) than other groups (A, B, C, D and E). It is assumed that high temperature and high pressure treatment caused the dissolution and removal of some organic substances including protein, fat, etc. As the result, the calcium content proportion was increasing in ash. In summary, it can achieve the intended purpose of increasing calcium content by BET.

Among these groups, the groups G, H and I were combined high temperature and high pressure as well acetic acid. The addition of acetic acid can slightly raise the amount of ash and significantly raise calcium content ($p < 0.05$) reach to the level of 26.76%. After BET treating, the fish bone tissue was destroyed (especially after high temperature and high pressure treatment) and water loss and caused the more pores [12]. Moreover, causing the fish bone fat in groups F, G, H, and I were significantly lower than groups A to E and therefore increasing the relatively calcium amount. The softening of fish bone has an important relationship with the loss of organic matter [13]. Due to the use of acetic acid, the dissolution of fish bone tissue causing the loss of some organic substances such as fat and protein.

The moisture of raw fish bones and boiled groups (A and B) were as high as from 10.9 to 11.26%, while after treatment with acetic acid (groups C, D and E) the moisture was reduced to 9.6%. The moisture of fish bone after high temperature and high pressure (F) and added with acetic acid treatment (groups G, H and I) were significantly reduced ($p < 0.05$) especially the moisture in group I (high temperature and high pressure added with 2.0% acetic acid) was reduced to only 4.2%.

For understanding the influence of different BETs on the color of fish bone powder to avoid the negative effect by color distortion the white index was employed. The results indicated that the white index of groups F to I were significant ($p < 0.05$) higher than groups A to E though the acetic acid addition was slightly reduced the white index all of the value were higher than the previous report [14].

The shear force of addition of acetic acid without high temperature and high pressure (groups C, D and E) were significantly ($p < 0.05$) decreased with the increase of acetic acid concentration; however, treated with high temperature and high pressure (groups F, G, H and I) the shear force were significantly ($p < 0.05$) lower more. This means that in terms of shear force, the high temperature and high pressure effect was stronger than that of acetic acid though the acidic solution has the removing the fishy order effect [15].

3.2. SEM Observation

The fish bone powder after acetic acid treatment seems with yellowish color and increased with the amount of acetic acid the color became slightly brownish yellow as well the color of the groups treated with high temperature and high pressure were brighter and more meticulous. No crack or slit on the surface of the raw fish bone (Figure 1A), which was smooth and sleek, but began to wrinkle after boiling and heating (Figure 1B). It is suggested that the fish bone tissue was starting to change owing to the heating. After acetic acid treatment, some fine pores began to appear on the surface of the fish bone (Figure 1C), and their number and area were increased more and larger (Figure 1D) with and when folding is more the hole was close to honeycombing (Figure 1E). After the high temperature and high pressure treatment, the fish bone has obvious cracks on the surface (Figure 1F), suggestingthis treatment will refinforce the softening speed of the fish bone [16]. Accompanied by the concentration of acetic acid the increase of the phenomenon of fragmentation was appeared (Figure 1G-I), showing the effect of BET and this evidence confirms the results of the aforementioned shear force analysis (Table 1).

3.3. The *aw*and TBA Value of MBP

The *aw* was significantly reduced ($p < 0.05$) after BET treating compared to the raw fish bone (Table 2). For example, the *aw* of the groups C, D and E which treated with acetic acid was about 0.420-0.460. For groups G, H and I which treated with high temperature and high pressure as well as acetic acid the *aw* can be as low as 0.240. It is surmised that the fish bone after BET treating is degraded due to the loss of water, which is conducive to preservation and prevention of spoilage. As the storage days increase, the *aw* of each group of fish bone powder will increase slightly. The BET can also reduce the TBA value especially for groups G, H and I significantly ($p < 0.05$) as low as 2.09 mg malonadehyde/kg. The reason might be because the fat loss to decrease the lipid oxidation and to prolong the shelf life.

3.4. Influence of MBP on Egg Roll

As can be seen in Table 3, the calcium content of the egg roll was increased with the MBP addition ratio, and was significantly different ($p < 0.05$) among all groups. According to the "Regulations on Nutrition Claim for Prepackaged Food Products" of Taiwan Food and Drug Administration, if the calcium is not less than 360 mg for per 100 g of solid (semi-solid) food will be announced "high calcium" food [17]. Therefore, the high calcium food standard (360 mg/100g) could be achieved when add 3% of MBP in egg roll.

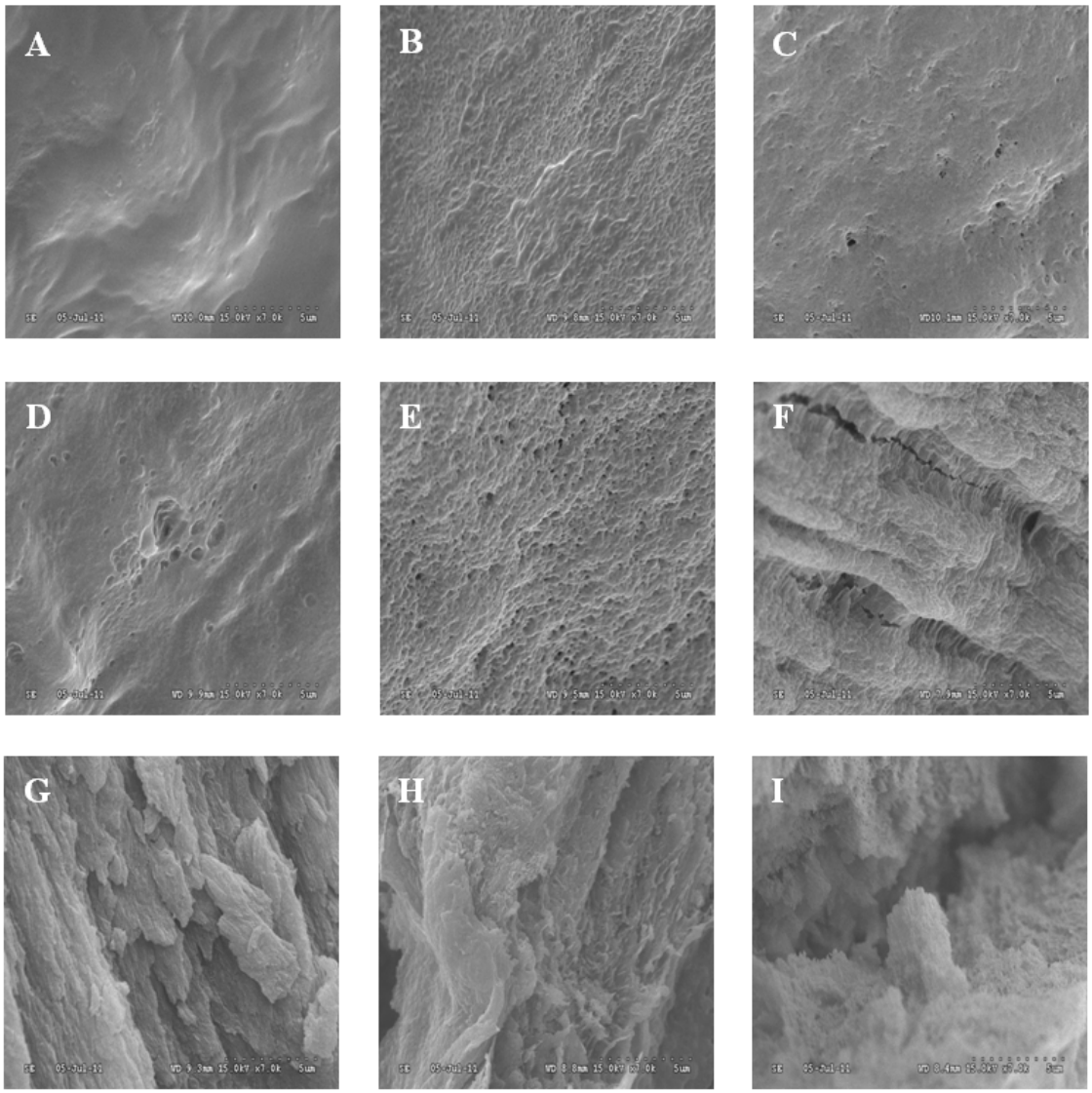

Figure 1. SEM imagine of MBP. Chart A to I were the same as Table 1

Table 1. Ash, calcium, fat and moisture content, white index and shear force of different BET

Group	Ash(%)	Calcium (%)	Crude fat (%)	Moisture (%)	White index	Shear force (N)
A	37.71 ± 0.11^{b}	15.08^{d}	20.95 ± 1.47^{a}	10.88 ± 0.46^{a}	44.88 ± 1.39^{e}	19.41 ± 0.22^{a}
B	30.10 ± 0.10^{b}	15.00^{d}	19.44 ± 0.03^{a}	9.73 ± 0.08^{a}	47.44 ± 0.19^{d}	1875 ± 0.51^{b}
C	38.96 ± 0.04^{b}	15.08^{d}	19.60 ± 0.95^{a}	9.73 ± 0.08^{b}	51.77 ± 0.93^{c}	15.15 ± 0.06^{c}
D	38.96 ± 0.02^{b}	15.07^{d}	18.89 ± 1.55^{a}	9.65 ± 0.04^{b}	51.16 ± 0.18^{c}	14.56 ± 0.04^{d}
E	38.75 ± 0.11^{b}	15.09^{d}	18.89 ± 2.14^{a}	9.66 ± 0.04^{b}	47.77 ± 1.38^{d}	11.76 ± 0.04^{e}
F	70.02 ± 0.05^{a}	24.31^{c}	6.74 ± 0.48^{b}	7.23 ± 0.31^{c}	82.33 ± 0.30^{a}	2.79 ± 0.09^{f}
G	72.42 ± 0.01^{a}	24.51^{c}	7.46 ± 2.14^{b}	5.92 ± 0.04^{d}	80.70 ± 0.42^{b}	0.51 ± 0.09^{g}
H	74.43 ± 0.01^{a}	25.00^{b}	6.27 ± 0.32^{b}	6.27 ± 1.54^{d}	81.16 ± 0.31^{b}	$0.09 \pm 0{,}05^{g}$
I	72.43 ± 0.01^{a}	26.76^{a}	5.32 ± 0.60^{b}	4.23 ± 0.31^{e}	81.18 ± 0.32^{b}	0.10 ± 0.05^{g}

The different superscript letters within the same column mean statistical significant difference ($p < 0.05$). Data are shown as means of measurements ± standard deviation (n = 3). A: Raw fishbone, B: Cooked in boiling water, C: 0.5% acetic acid, D: 1.0% acetic acid, E: 2.0% acetic acid, F: High pressure, G: High pressure with 0.5% acetic acid, H: High pressure with 1.0% acetic acid, I: High pressure with 2.0% acetic acid.

Table 2. Changes of *aw* and TBA value of fishbone powder with different BET during 90-day storage

Group	Storage day			
	0	30	60	90
aw				
A	0.900 ± 0.006a	0.920 ± 0.011a	0.930 ± 0.008a	0.930 ± 0.012a
B	0.540 ± 0.008b	0.550 ± 0.008b	0.620 ± 0.118b	0.560 ± 0.003b
C	0.430 ± 0.002c	0.440 ± 0.035c	0.460 ± 0.010c	0.460 ± 0.005c
D	0.440 ± 0.011c	0.440 ± 0.004c	0.430 ± 0.001c	0.440 ± 0.004cd
E	0.420 ± 0.007d	0.410 ± 0.012c	0.420 ± 0.005c	0.430 ± 0.002cd
F	0.410 ± 0.007d	0.410 ± 0.005c	0.430 ± 0.004c	0.400 ± 0.064cd
G	0.300 ± 0.003e	0.340 ± 0.031d	0.320 ± 0.010d	0.330 ± 0.005e
H	0.270 ± 0.011f	0.240 ± 0.043e	0.300 ± 0.005d	0.390 ± 0.071d
I	0.240 ± 0.014g	0.250 ± 0.015e	0.280 ± 0.005d	0.300 ± 0.020e
TBA				
A	5.300 ± 0.018a	6.180 ± 0.059a	6.200 ± 0.682a	6.660 ± 0.103a
B	4.440 ± 0.030b	6.130 ± 0.009a	6.310 ± 0.059a	6.280 ± 0.146b
C	3.320 ± 0.017c	5.290 ± 0.240b	5.940 ± 0.050a	5.920 ± 0.102c
D	3.180 ± 0.057c	4.980 ± 0.028c	5.960 ± 0.019a	5.800 ± 0.137c
E	2.940 ± 0.026e	3.990 ± 0.073d	3.290 ± 1.457bc	5.080 ± 0.074d
F	2.540 ± 0.011f	2.560 ± 0.032e	3.980 ± 0.030b	4.110 ± 0.960e
G	2.170 ± 0.044g	2.550 ± 0.006e	2.760 ± 0.624c	3.250 ± 0.184f
H	2.130 ± 0.017fg	2.540 ± 0.003e	2.780 ± 0.027c	2.950 ± 0.025g
I	2.090 ± 0.046g	2.240 ± 0.122f	2.360 ± 0.040c	2.360 ± 0.090h

The different superscript letters within the same column mean statistical significant difference ($p < 0.05$). A-I: The same as description in Table 1. Data are shown as means of measurements ± standard deviation (n = 3).

Table 3.Effect of added different ratios of MBP on *aw*, calcium content, fracturability and APC of egg roll

MBP (%)	*aw*	Calcium content(g/100 g)	Fracturability(N)	APC(CFU/mL)
Control (No addition)	0.512 ± 0.010^{a}	0.02 ± 0.00^{d}	0.67 ± 0.07^{c}	995 ± 710^{a}
3	0.511 ± 0.010^{a}	0.39 ± 0.01^{c}	0.73 ± 0.29^{c}	ND*
6	0.490 ± 0.020^{ab}	1.47 ± 0.04^{b}	1.22 ± 0.02^{b}	ND*
9	0.475 ± 0.010^{b}	1.92 ± 0.01^{a}	2.04 ± 0.13^{a}	ND*

The different superscript letters within the same column mean statistical significant difference ($p < 0.05$). *ND: None detectable. Data are shown as means of measurements ± standard deviation (n = 3).

The *aw* and fracturability of egg roll were also influenced by adding MBP and it was found that as the amount of MBP increase both the *aw* and fracturability were heighten. The *aw* of the control group (without addition of MBP) was the highest up to 0.512 but has no significant difference ($p > 0.05$) with the addition of 3%of MBP. However, the more the MBP added the lower the *aw*. When added 9% of MBP, the *aw* was the lowest and has significant ($p < 0.05$) differences compared with the other three groups. Similarly, the more of MBP added the higher the fracturability. The highest fracturability value (2 N) was found in 9% added group and significantly ($p < 0.05$) higher than other three groups. As for the acceptance of the high fracturability of the egg roll, it's still an issue of discussion and will be further studied by the successor.

Bacteria, molds and yeasts are the main cause of food spoilage. For egg roll, it is ready-to-eat food (snack) so its sanitary situation is needed to be paid more attention [18]. The APC can be used as an indicator of food spoilage. The APC of each group was still lower than the sanitation standards of 10^3 CFU/mL [19] even though the APC of control could reach 995 CFU/g. More interesting, no APC was detected in the addition of MBP groups. It could be speculated that the MBP have an antibacterial effect.

3.5. TBA Value of Egg Roll during Storage

The TBA value of the egg roll was significantly reduced with the higher proportion of MBP added and was significantly lower ($p < 0.05$) than control during storage (Table 4). This may be due to malondialdehyde (MDA), a secondary product during lipid peroxidation, and some fatty oxides are further oxidized to organic alcohols and acids [20]. In addition, it may also be because TBA reactive substances interact or aggregate with selected food ingredients [21] caused to a decline in TBA value. The lowest TBA value were found in the higher MBP added groups (6 and 9% addition) though no significant difference ($p > 0.05$) between both groups. When part of egg roll ingredients was substituted by MBP thereby the *aw* was reduced (Table 2), hence, it appeared that MBP not only prolongs the shelf life but also inhibits food spoilage.

Table 4. Changes of added different ratios of MBP on the TBA value of egg roll during 90-day storage

Fishbone powder (%)	Storage day			
	0	30	60	90
Control (No addition)	1.80 ± 0.05^{a}	2.40 ± 0.18^{a}	2.81 ± 0.03^{a}	3.66 ± 0.03^{a}
3	1.66 ± 0.05^{b}	1.87 ± 0.02^{b}	2.35 ± 0.03^{b}	3.08 ± 0.08^{b}
6	1.70 ± 0.10^{b}	1.74 ± 0.05^{c}	2.30 ± 0.08^{bc}	2.63 ± 0.12^{c}
9	1.65 ± 0.05^{b}	1.70 ± 0.04^{c}	2.24 ± 0.05^{c}	2.63 ± 0.03^{c}

The different superscript letters within the same column mean statistical significant difference ($p < 0.05$). Data are shown as means of measurements ± standard deviation (n = 3).

Table 5. The sensory evaluation of egg roll added different ratios of MBP

MBP (%)	Appearance	Mouthfeel	Flavor	Crispness	Overall acceptance
Control (No addition)	6.85 ± 1.67^{a}	5.89 ± 1.72^{ab}	6.21 ± 0.93^{ab}	4.82 ± 1.47^{b}	6.11 ± 1.75^{b}
3	7.29 ± 1.48^{a}	6.11 ± 1.90^{a}	6.85 ± 1.48^{a}	6.97 ± 1.94^{a}	7.71 ± 1.45^{a}
6	6.11 ± 1.83^{a}	4.82 ± 1.12^{bc}	5.57 ± 1.00^{bc}	6.97 ± 1.77^{a}	5.68 ± 1.29^{b}
9	5.79 ± 2.22^{a}	4.40 ± 1.16^{c}	4.92 ± 1.32^{c}	6.43 ± 2.26^{a}	5.25 ± 1.29^{b}

The different superscript letters within the same column mean statistical significant difference ($p < 0.05$). Data are shown as means of measurements ± standard deviation (n = 15).

3.6. Sensory Evaluation of Egg Roll

Though the MBP was much brighter after BET treating (Table 1); however, no matter the amount ofthe MBP was added, no significant difference ($p > 0.05$) was found in the hedonic appearance score of the egg roll ($p > 0.05$) (Table 5). In terms of mouthfeel and flavor, the scores were higher in the 3% MBP group and the control group, and no significant difference ($p > 0.05$) was found between both groups. But the score lowerwith the increase of the MBP amount, indicating that the ratio of the MBP higher than 3% would impact the taste assessment of the egg roll. The crispness of the MBP groups was significantly higher ($p < 0.05$) than control, and which responds the results of aforementioned egg roll fracturability (Table 3). The added of 3% of MBP group has the height score and significantly higher ($p < 0.05$) than other three groups, and which there was no significant difference ($p > 0.05$) between later three groups.

4. Conclusion

In this study, the MBP was successfully produced by BET. In which, combined use of acetic acid could let the MBP much brighter and with smooth and sleek appearance. An antibacterial effect could be exhibited of MBP when added it to egg roll for the APC was none detectable. The addition of 3% MBP group has the height score of overall acceptance and could be the most actual and applicable for further development. In summary, the results showed that the BET developed in this study is an alternative solution for aquatic waste. The BET not only enhances the utilization of aquatic waste and simultaneously develops new food materials such as MBP. At the same time, the MBP exhibits its potential for exploiting new health food or leisure food such as egg roll.

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