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Quality Characteristics of Dried Salted Black Tiger Shrimp (*Penaeus monodon*) Affected by Different Pre-treatment and Drying Variables

Nguyen Phuoc Minh[1,*], Tran Thi Yen Nhi[2], Phan To Hoai Hiep[3], Duong Thi Nhan[4], Sari Tuan Anh[5]

[1]*Faculty of Chemical Engineering and Food Technology, Nguyen Tat Thanh University, Ho Chi Minh, Vietnam*
[2]*NTT Hi-Tech Institute, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam*
[3]*Mekong University, Vinh Long Province, Vietnam*
[4]*An Giang University, An Giang Province, Vietnam*
[5]*Can Tho University, Can Tho City, Vietnam*

Abstract.
Black tiger shrimp (*Penaeus monodon*) were considering important in export. It is an excellent source of dietary protein. Ojective of the present study focused on the effect salt (2.0, 3.0, 4.0, 5.0%) and sorbitol (1.0, 1.5, 2.0, 2.5%) concentration; boiling time (1.0; 1.5, 2.0, 2.5 minutes); drying temperature (55, 65, 75, 85^{o}C), size of shrimp (13-15, 16-20, 21-25, 26-30 pcs/lb) to the physico-chemical, microbial and sensory characteristics (water activity, a_w; elasticity, lb/in^2; astaxanthin, µg/g; *coliform*, cfu/g; sensory score) of dried salted shrimp. They were also periodically sampled to examine the peroxide value (mEqO2/ kg) and thiobarbituric acid (mg maloaldehyde/ kg) as rancidity during 12 month storage. Results revealed that 4.0% salt, 2.0% sorbitol, boiling in 1.5 minutes, drying 75^{o}C for the shrimp size 21-25 pcs/lb were adequated for dried salted shrimp. They could be preserved for 12 months with the racidity value in permitted level.
Keywords: *Black tiger shrimp, sorbitol, dried salted shrimp, rancidity, peroxide value, thiobarbituric acid*

I. INTRODUCTION

The black tiger shrimp (*Penaeus monodon*) has high economic value, and is one of the important cultured species in the Mekong delta, Vietnam (Nguyen Thi Ngoc Anh et al., 2018). Shrimp is one of the most delicious seafoods and is part of almost every nation's traditional meal. With its relatively lower lipid content (~ 1%), the DV (%) of 100 g shrimp for an adult human is 75%, 70% and 35% for eicosapentanoic acid + docosahexanoic acid, essential amino acids (methionine, tryptophan and lysine) and protein respectively. The lower atherogenic (0.36) and thrombogenic (0.29) indices of shrimp show its cardio-protective nature. Shrimps have low fat, less cholesterol and high PUFA content (J. Syama Dayal et al., 2013).

Sorbitol, less commonly known as glucitol, is a sugar alcohol with a sweet taste which the human body metabolizes slowly. It can be obtained by reduction of glucose, changing the aldehyde group to a hydroxyl group. Most sorbitol is made from corn syrup, but it is also found in apples, pears, peaches, and prunes. It is converted to fructose by sorbitol-6-phosphate 2- dehydrogenase. Sorbitol is an isomer of mannitol, another sugar alcohol; the two differ only in the orientation of the hydroxyl group on carbon 2. While similar, the two sugar alcohols have very different sources in nature, melting points, and uses (Awuchi Chinaza Godswill, 2017). In the dehydration of fish different agents such as salt, sugars, glycerol, and sorbitol have been used (Sanchez Pascua et al., 1994, 2001; Musjaffar & Sankat, 2006; Corzo & Bracho, 2007; Oladele & Ddedeji, 2008; Larrazabal-Fuentes et al., 2009; Czerner & Yeannes, 2010; Uribe et al., 2011). Lyoprotectants including saccharides, amino acids and sugar alcohols are used to stabilise the proteins during the freeze drying process (Arakawa et al. 2001; Shaviklo et al. 2011, 2012). Lipid oxidation induces formation of an array of products directly or indirectly decreasing the sensory quality of fish and fish products (Jacobsen, 1999). It produces unstable intermediary compounds such as free radicals and hydroperoxide precursors of volatile compounds responsible for the development of off-flavors (Hsieh and Kinsella, 1989). The presence of highly unsaturated fatty acids in the dried product makes it difficult to maintain the lipid quality of fatty fish product during storage.

There were several researches mentioned to the processing of dried salted shrimps. Shrimp drying characterizes undergoing microwave treatment was elaborated (Asie Farhang et al., 2011). Optimization of the freeze drying process of *Penaeus monodon* to determine the technological mode was noted (Nguyen Tan Dzung, 2012). Effects of Hot Smoking and Sun Drying Processes on Nutritional composition of giant tiger shrimp (*Penaeus monodon*, Fabricius, 1798) was evaluated (Shehu Latunji Akintola, 2013). A study aimed to understand the influence of freeze-dried shrimp (*Penaeus monodon*) meat (SM) at different levels (2.5, 5, and 10%; w/w) in pasta processing (N. S. Ramya et al., 2015). Drying characteristics and physical and nutritional properties of shrimp meat as affected by different traditional drying techniques was mentioned (P. T. Akonor et al., 2016).

Ojective of the present study focused on the effect of salt (2, 4, 6, 8%) and sorbitol (1.0, 1.5, 2.0, 2.5%) concentration; boiling time (1.0; 1.5, 2.0, 2.5 minutes); drying temperature (55, 65, 75, 85^{o}C), size of shrimp (13-15, 16-20, 21-25, 26-30 pcs/lb) to the physico-chemical, microbial and sensory characteristics (water activity, a_w; elasticity, lb/in^2; astaxanthin, µg/g; *coliform*, cfu/g; sensory score) of dried salted shrimp. They were also periodically sampled to examine the peroxide value (mEqO2/ kg) and thiobarbituric acid (mg maloaldehyde/ kg) during 12 month storage.

II. MATERIALS AND METHOD

2.1 Sample

Black tiger shrimps were collected from Bac Lieu province, Vietnam. They must be reared following VietGAP without antibiotic residue to ensure food safety. After collecting, they must be kept in ice chest below 4^{o}C and quickly transferred to laboratory for experiments. They were washed and sanitized under washing tank having 20 ppm chlorine with a support of air bubble blowing to remove foreign matters. Besides black tiger shrimps we also used other material during the research such as chlorine, salt, sorbitol. Lab utensils and equipments included digital weight balance, Rotronic, stomacher, incubator, colony counter, steaming and dry oven.

Figure 1. Dried salted shrimp

2.2 Researching method

2.2.1 Effect of salt concentration to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with salt at different ratio (2.0%, 3.0%, 4.0%, 5.0%)) in 20 minutes to create a pleasant taste of dried product. After being treated with salt, shrimps were boiled at 100^{o}C for 2 minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score.

2.2.2 Effect of sorbitol concentration to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4% salt in 20 minutes and different ratio of sorbitol (1.0%, 1.5%, 2.0%, 2.5%) to create a pleasant taste of dried product. After being treated with salt, and sorbitol shrimps were boiled at 100^{o}C for 2 minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score.

2.2.3 Effect of boiling time to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4.0% salt and 2.0% sorbitol in 20 minutes. After being treated with salt and sorbitol, shrimps were boiled at 100^{o}C for different duration (1.0; 1.5, 2.0, 2.5) minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score.

2.2.4 Effect of drying temperature to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4.0% salt, 2.0% sorbitol in 20 minutes; boiling in 1.5 minutes. After that they were dried at different temperature (55, 65, 75, 85^{o}C) to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score.

2.2.4 Effect of size of shrimp to physico-chemica, microbial and sensory characteristics of dried shrimp

Different sizes of shrimp (13-15, 16-20, 21-25, 26-30 pcs/lb) were examined. Black tiger shrimp were treated with 4.0% salt, 2.0% sorbitol in 20 minutes; boiling in 1.5 minutes, drying at 75^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score.

2.2.5 Stability of dried shrimp during storage

The dried salted shrimps were periodically sampled (0, 3, 6, 9 and 12 months) to examine peroxide value (mEqO2/ kg) and thiobarbituric acid (mg maloaldehyde/ kg) developed during storage.

2.3 Physico-chemical evaluation

Water activity (a_w) was measured by Rotronic instrument. Elasticity (lb/in^2) was measured by penetrometer. Astaxanthin (µg/g) was measured spectrophotometrically using spectrophometer (Aline Kazumi Nakata da Solva et al., 2018). *Coliform* (cfu/g) was measured by 3M-Petrifilm. Peroxide value (mEqO2/ kg) was determined using the CDR FoodLab® instrument. Thiobarbituric acid (mg maloaldehyde/ kg) was measured by 1,1,3,3-tetraethoxypropane (Torres-Arreola et al., 2007). Sensory score was assessed by a group of panelist using the 9-point hedonic scale.

2.4 Statistical analysis

The experiments were run in triplicate with three different lots of samples. Data were subjected to analysis of variance (ANOVA) and mean comparison was carried out using Duncan's multiple range test (DMRT). Statistical analysis was performed by the Statgraphics Centurion XVI.

III. RESULT & DISCUSSION

3.1 Effect of salt concentration to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Black tiger shrimp were treated with salt at different ratio (2.0%, 3.0%, 4.0%, 5.0%) in 20 minutes to create a pleasant taste of dried product. After being treated with salt, shrimps were boiled at 100^{o}C for 2 minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score. Results were noted in table 1. The optimal salt concentration was recorded at 4.0%.

3.2 Effect of sorbitol concentration to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4% salt in 20 minutes and different ratio of sorbitol (1.0%, 1.5%, 2.0%, 2.5%) to create a pleasant taste of dried product. After being treated with salt, and sorbitol shrimps were boiled at 100^{o}C for 2 minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score. Results were noted in table 2. The optimal sorbitol concentration was recorded at 2.0%.

Table 1. Effect of salt concentration to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Salting concentration	Water activity (a_w)	Elasticity (lb/in^2)	Astaxanthin (µg/g)	*Coliform* (cfu/g)	Sensory score
0%	0.44±0.01^a	13.78±0.02^c	35.74±0.01^c	4.9x10^2±0.00^a	5.19±0.03^c
2.0%	0.40±0.00^{ab}	13.94±0.03^{bc}	37.44±0.03^{bc}	3.1x10^1±0.01^b	5.62±0.03^{bc}
3.0%	0.37±0.03^b	13.98±0.00^b	38.13±0.00^b	2.0x10^1±0.02^{bc}	6.11±0.01^b
4.0%	**0.33±0.02^{bc}**	**14.02±0.01^{ab}**	**38.57±0.02^{ab}**	**1.7x10^1±0.00^{bc}**	**6.84±0.02^a**
5.0%	0.30±0.01^c	14.09±0.00^a	38.82±0.01^a	1.0x10^1±0.01^c	6.73±0.00^{ab}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Table 2. Effect of sorbitol concentration to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Sorbitol concentration	Water activity (a_w)	Elasticity (lb/in^2)	Astaxanthin (µg/g)	*Coliform* (cfu/g)	Sensory score
0%	0.40±0.01^a	15.79±0.03^a	30.05±0.03^c	5.9x10^1±0.02^a	6.41±0.00^c
1.0%	0.36±0.02^{ab}	13.87±0.02^c	38.28±0.00^b	4.1x10^1±0.01^{ab}	6.52±0.03^{bc}
1.5%	0.34±0.00^b	13.95±0.00^{bc}	38.55±0.01^{ab}	2.3x10^1±0.03^b	6.79±0.01^{ab}
2.0%	**0.33±0.02^{bc}**	**14.02±0.01^{bc}**	**38.57±0.02^{ab}**	**1.7x10^1±0.00^{bc}**	**6.84±0.02^a**
2.5%	0.32±0.01^c	14.07±0.03^b	38.60±0.01^a	1.5x10^1±0.01^c	6.70±0.01^b

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Table 3. Effect of boiling time to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Boiling time (minutes)	Water activity (a_w)	Elasticity (lb/in^2)	Astaxanthin (µg/g)	*Coliform* (cfu/g)	Sensory score
1.0	0.33±0.01^a	13.74±0.03^c	40.12±0.00^a	2.4x10^1±0.03^a	6.94±0.03^{ab}
1.5	**0.33±0.00^a**	**13.91±0.00^{bc}**	**39.84±0.00^{ab}**	**2.1x10^1±0.01^{ab}**	**7.23±0.01^a**
2.0	0.33±0.02^a	14.02±0.01^b	38.57±0.02^b	1.8x10^1±0.00^{ab}	6.84±0.02^b
2.5	0.34±0.03^a	14.19±0.02^a	36.15±0.03^c	1.1x10^1±0.01^b	6.20±0.00^c

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Table 4. Effect of drying temperature to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Drying temperature (oC)	Water activity (a_w)	Elasticity (lb/in^2)	Astaxanthin (µg/g)	*Coliform* (cfu/g)	Sensory score
55	0.33±0.00^a	13.91±0.00^b	39.84±0.00^b	2.1x10^1±0.01^a	7.23±0.01^c
65	0.32±0.02^{ab}	14.03±0.03^{ab}	39.99±0.02^{ab}	1.6x10^1±0.00^{ab}	7.78±0.02^b
75	**0.32±0.01^{ab}**	**14.07±0.01^{ab}**	**40.14±0.01^a**	**1.3x10^1±0.00^{ab}**	**8.02±0.00^a**
85	0.31±0.03^b	14.10±0.02^a	40.16±0.03^a	0.6x10^1±0.02^b	7.89±0.03^{ab}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Table 5. Effect of shrimp size to physico-chemical, microbial and sensory characteristics of dried salted shrimp

Shrimp size (pcs/lb)	Water activity (a_w)	Elasticity (lb/in^2)	Astaxanthin (µg/g)	*Coliform* (cfu/g)	Sensory score
13-15	0.32±0.01^a	14.07±0.01^a	40.14±0.01^a	1.3x10^1±0.00^b	8.02±0.00^c
16-20	0.32±0.03^a	14.02±0.03^{ab}	39.36±0.02^b	1.4x10^1±0.02^{ab}	8.19±0.03^{bc}
21-25	**0.32±0.00^a**	**13.95±0.02^b**	**39.01±0.02^c**	**1.4x10^1±0.01^{ab}**	**8.45±0.02^a**
26-30	0.32±0.02^a	13.44±0.03^c	38.74±0.00^d	1.5x10^1±0.02^a	8.24±0.01^b

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

3.3 Effect of boiling time to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4.0% salt and 2.0% sorbitol in 20 minutes. After being treated with salt and sorbitol, shrimps were boiled at 100^{o}C for different duration (1.0; 1.5, 2.0, 2.5) minutes and dried at 55^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score. Results were noted in table 3. The optimal boiling temperature was recorded at 1.5 minutes.

3.4 Effect of drying temperature to physico-chemical, microbial and sensory characteristics of dried shrimp

Black tiger shrimp were treated with 4.0% salt, 2.0% sorbitol in 20 minutes; boiling in 1.5 minutes. After that they were dried at different temperature (55, 65, 75, 85^{o}C) to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score. Results were noted in table 4. The optimal drying temperature was recorded at 75^{o}C.

3.5 Effect of size of shrimp to physico-chemica, microbial and sensory characteristics of dried shrimp

Different sizes of shrimp (13-15, 16-20, 21-25, 26-30 pcs/lb) were examined. Black tiger shrimps were treated with 4.0% salt, 2.0% sorbitol in 20 minutes; boiling in 1.5 minutes, drying at 75^{o}C to 12% moisture content. Dry-salted shrimps were chosen randomly to analyse water activity (a_w), elasticity (lb/in^2), astaxantin (µg/g), *coliform* (cfu/g) and sensory score. Results were noted in table 5. The optimal shrimp size was recorded at 21-25 pcs/lb.

3.6 Stability of dried shrimp during storage

The dried salted shrimps were periodically sampled (0, 3, 6, 9 and 12 months) to examine peroxide value (mEqO2/ kg) and thiobarbituric acid (mg maloaldehyde/ kg) developed during storage. Results were noted in table 6.

Table 6. Peroxide value (mEqO2/ kg) and thiobarbituric acid (mg maloaldehyde/ kg) changes of dried salted shrimp during storage

Storage (months)	Peroxide value (mEqO2/ kg)	thiobarbituric acid (mg maloaldehyde/ kg)
0	0^{c}	0^{c}
3	0.06 ± 0.02^{b}	1.03 ± 0.02^{b}
6	0.11 ± 0.03^{ab}	1.08 ± 0.00^{ab}
9	0.15 ± 0.01^{ab}	1.13 ± 0.03^{ab}
12	0.17 ± 0.01^{a}	1.19 ± 0.02^{a}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Black tiger shrimps are characterized by a high degree of unsaturation in the form of multiple double bonds in the fatty acids and are generally susceptible to molecular oxygen. Production of off-flavor compounds constitutes the primary quality deterioration observed during lipid oxidation, although the process of lipid oxidation can also lower nutritional quality and modify texture and color. Sugar alcohols could delay the formation of peroxides. Peroxides are intermediate metabolites during lipid oxidation in foods, so their formation increases up to a maximum value to later start decreasing encouraging the production of aldehydes and ketones as final oxidation products. Therefore the use of sugar alcohols significantly delayed the formation of peroxides. Regarding to thiobarbituric acid (mg maloaldehyde/ kg), there was significant differences ($p<0.05$) among the three treatments executed. It was suggested that a marked lipid oxidation in the muscle occurred due to the high interaction with oxygen.

Texture is an important quality factor in seafood which depends on species, age, size, fat, protein content, handling and storage conditions (Kagawa et al., 2002). Table 2 shows changes in texture of dried salted fishes during preservation. The control showed the highest loss of elasticity, while dried salted fishes treated with sugar alcohols had more elasticity probably due to the effect of sugar alcohols on lipids present in the muscle, thus delaying possible protein-lipid interactions, as has been documented by Torres-Arreola et al. (2007) that lipid oxidation in fish muscle can cause changes in texture due to the effect of protein-lipid interactions during dried salted storage. This protein-lipid interaction effect, together with a modification in the protein-water interactions and endogenous proteolytic activity of the muscle are the main factors that affect the integrity of the muscle fibers.

Atka mackerel (Am) and Japanese common squid (Sq) meats were cured in 0.5–1.5 M sorbitol solutions (pH 7.0) and dried at 30°C (relative humidity, 60%), and the effect of sorbitol on the moisture transportation and textural change during the curing and drying processes was investigated. With an increase in sorbitol permeated through samples, the moisture contents decreased by 52% (Am) and 42% (Sq) by curing in 1.5 M sorbitol solution. When the cured meats were dried, slow moisture vaporization occurred at the initial drying period, and the critical moisture content significantly decreased with an increase in the sorbitol content of the cured meats. Further, the hardening of the dried products was effectively suppressed by sorbitol curing. These effects of sorbitol would contribute to the reduction of drying time and particularly the elimination of the excess hardening of dried fish products (Zensuke Iseya et al., 2008).

Astaxanthin is a highly unsaturated molecule and thus, can easily be degraded by thermal or oxidative processes and lose its bioactive properties during the manufacture and storage of foods. Generally, carotenoids are found in nature as all-trans molecules in which all the double bonds are in the trans confguration (Rodriguez & Rodriguez-Amaya, 2007). It is also well known that high temperature and light conditions may promote the isomerization to the cis forms. The cis isomers of the provitamin A carotenoids have less activity than their corresponding all-trans carotenoids (Stahl & Sies, 2003; Rodriguez & Rodriguez-Amaya, 2007).

A study investigated the effects of replacing sucrose with sugar alcohols (sorbitol, glycerol and xylitol) on the quality properties of semi-dried jerky**.** Xylitol slightly decreased the pH when compared to the other sugar alcohols ($p>0.05$). The water activity of the semi-dried jerky was significantly reduced by treatment with glycerol and xylitol ($p<0.05$). The moisture content of semi-dried jerky containing various sugar alcohols was significantly higher than that of the control ($p<0.05$), while replacing sucrose with glycerol yielded the highest moisture content. The shear force of semi-dried jerky containing sugar alcohols was not significantly different for the sorbitol and glycerol treatments, but that replacing sucrose with 5.0% xylitol demonstrated the lowest shear force ($p<0.05$). The TBARS values of semi-dried jerkies with sugar alcohols were lower than the control ($p<0.05$). The sugar content of the semi-dried jerkies containing sorbitol and glycerol were lower than the control and xylitol treatment ($p<0.05$). In comparison with the control, the 5.0% xylitol treatment was found to be significantly different in the sensory evaluation ($p<0.05$). In conclusion, semi-dried jerky made by replacement with sugar alcohols improved the quality characteristics, while xylitol has applicability in manufacturing meat products (Sung-Jin Jang et al., 2015).

A research investigated the effects of various parameters, that is, concentration of salt solution (2%, 3%, 4%[w/v]), boiling time (3, 5, 7 min), drying air temperature (80, 100, 120 degrees C), and size of shrimp, on the kinetics of drying and various quality attributes of shrimp, namely, shrinkage, rehydration ability, texture, colors, and microstructure, during drying in a jet-spouted bed dryer. In addition, the effects of these processing parameters on the sensory attributes of dried shrimp were also investigated. Small shrimp (350 to 360 shrimp/kg) and large shrimp (150 to 160 shrimp/kg) were boiled and then dried until their moisture content was around 25% (d.b.). It was found that the degree of color changes, toughness, and shrinkage of shrimp increased while the rehydration ability decreased with an increase in the concentration of salt solution and boiling time. Size of shrimp and drying temperature significantly affected all quality attributes of dried shrimp. The conditions that gave the highest hedonic scores of sensory evaluation for small dried shrimp are the concentration of salt solution of 2% (w/v), boiling time of 7 min, and drying air temperature of 120 degrees C. On the other hand, the conditions that gave the highest hedonic scores of sensory evaluation for large dried shrimp are the concentration of salt solution of 4% (w/v), boiling time of 7 min, and drying air temperature of 100 degrees C. The quality attributes of dried shrimp measured by instruments correlated well with the sensory attributes, especially the color of dried shrimp (Chalida Niamnuy et al., 2007).

IV. CONCLUSION

Black tiger shrimp is one of the major candidate species for export oriented aquaculture which dominates the seafood market. Carotenoid content in seafood has now become one of the important criteria in determining the quality of edible product. At the present time the world market demand for shrimp is increasing day by day. Drying is a widely used technology for the production in fishery sector. We have successfully investigated to study the effect of salt and sorbitol concentration; boiling time; drying temperature, size of shrimp to the physico-chemical, microbial and sensory characteristics of dried salted shrimp. Stability of dried salted shrimps also evaluated during 12 month storage.

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