FACTORS AFFECTING THE QUALITY OF SOYBEAN/BLACK SESAME CONDENSED MILK

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GENERAL INFORMATION

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KEYWORD

Condense;

Soybean;

Black sesame;

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ABSTRACT

The materials used in the processing of soybean-black sesame condensed milk contribute to the creation of products with high nutritional value as well as a variety of products. In this study, we investigated the blend ratio of soybeans: black sesame was 8/2; 7/3; 6/4; 5/5; 4/6; milk to sugar was 8/2; 7/3; 6/4; 5/5; 4/6; and milk is assimilation level 500bar, 1000bar, 1500bar. After examining the blend ratio of ingredients used in the blending, as follows: The soybean: black sesame ratio is 7:3, a product with a protein content of 14.04%, a fat content of 24.67%, and a total sugar content of 20.75%; the blend ratio of condensed milk:sugar is 5/5, resulting in a product with 63 ^{o}Bx; and the product supplemented with 0.09% xanthan gum and 500 bar assimilation achieves high sensory value.

1. INTRODUCTION

Soy milk is extracted from soybeans. Soy milk contains the same amount of protein and fat as cow's milk, and it does not contain sugar, lactose, or cholesterol. Therefore, it is considered a healthy drink and is a popular alternative to milk for milk-intolerant populations (W. Shurtleff, A. Aoyagi et al., 2007).

Soy products provide a dairy replacement for developing communities while enriching the protein to yield a high-value protein concentration with tremendous economic potential in the food industry (Friedman et al., 2001; Mazza et al., 1998). Soy products can play an important and positive role in improving our health when they are incorporated into our diet.

Soy products should benefit cardiovascular and overall health because of their high content of polyunsaturated fats, fiber, vitamins and minerals, and low levels of saturated fat (F.M Sacks et al., 2006).

In 1999, based on results from 50 independent studies, the US Food and Drug Administration (FDA) announced: "A diet low in saturated fat and cholesterol that consists of 25 grams of soy protein a day will reduce the risk of cardiovascular disease." A University of Kentucky study, after an analysis of over 38 independent studies, the New England Journal of Medicine concluded: Consuming an average of 47 grams of per soy protein will reduce 9.3% total cholesterol, 12.9% low-density cholesterol (LDL-cholesterol), and 10.5% triglycerides. We know that a 1% reduction in total

cholesterol reduces a 2-4% risk of cardiovascular disease (Le Thi Thuy et al., 2010; O. Akouma et al., 2006).

Defatted soy flour and grains, soy protein concentrate, soy protein isolate, and soy and soy oil are just a few of the relatively advanced processing techniques that have helped soy products develop in the West for decades. Today, soy foods have become a part of Asian culture. From the soy, it is processed into foods such as soy milk, tofu, soy sauce, miso, natto, etc. (Bainy E. M. et al., 2008; Alibhaia Z. et al., 2006; B. M. Miller et al., 2012).

Lignans are a group of plant phenolic compounds that are synthetic derivatives of phenylpropanoids. (Ayres, Loike et al., 1990; Cunha et al., 2012; Durazzo et al., 2013; Ilkington et al., 2018). Several studies suggest that the diet of lignans can prevent many diseases, such as breast cancer, colon cancer, cardiovascular disease, menopausal symptoms, and osteoporosis (Durazzo et al., 2013; Landete et al., 2012).

Lignans are found in most oily seeds and nuts, as well as fiber-rich plants, including grains such as wheat, barley, oats, and sesame seeds. Sesame is a major source of lignans that have been shown to have different biological activities (Bedigian et al., 2010). Sesame (Sesamum notifyum L.) is one of the most important oilseed crops in the world because of its high lipid content (Shyu, Hwang et al., 2002). It is not only a raw material for cooking oil; it is also widely used in food processing and as a raw material for confectionery products (Namiki et al., 1995).

Sesame seeds are a nutritious, healthy food in eastern countries and have the effect of promoting the health of sesame (Shyu, Hwang et al., 2002).

2. METHODOLOGY

2.1. Materials

To ensure the quality and clear origin of soy and black seame from the VIETSAN company in Vietnam, choose the best type that has been removed from small sizes, insects, impurities, and harvested soybeans for 3 - 4 months.

2.2. Methods

Soybean seeds are cleaned, impurities removed, soaked for 8 hours, and peeled. Product manufacturing process diagram and homogenization equipment are in figure 1, 2.

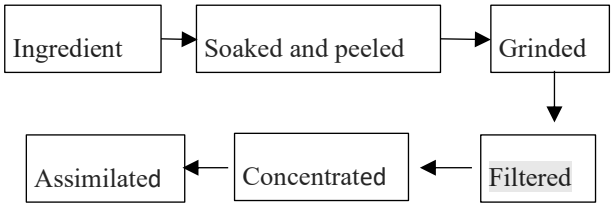

Figure 1. Product manufacturing process diagram

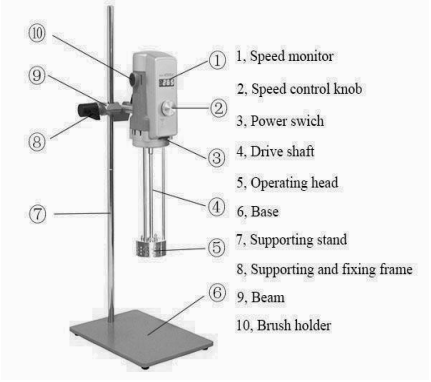

Figure 2. Homogenization equipment

The experiment was arrangerd in the blend ratio of soybeans: black sesame was 8/2; 7/3; 6/4; 5/5; 4/6, survey the blend ratio of milk: sugar is 8/2; 7/3; 6/4; 5/5; 4/6. The experiments based on Brix and sugar content, protein content, fat content to give reasonable parameters for processing milk concentrate from soybean. Determination of total protein content is the kjeldahl method. Method for Determination of fat content is a soxhlet extraction.

3. FINDINGS AND DISCUSSION

3.1. Effect of soybean/black sesame ratio to condensed milk quality

From Figure 3, when increasing the proportion of black sesame, the total protein increases gradually. The protein content obtained gradually decreased from the ratio of 8:2. The cause of the above change was because the protein content of soybeans was greater than the protein content of black sesame. So, when adding a soybean/black sesame ratio of 8/2, the total protein content is higher than the ratio of 7/3, 6/4, 5/5, and 4/6. The result was an increase in the proportion of sesame seeds, a decrease in the protein content (Fellows P. J. et al., 2000). On the other hand, When adding more black sesame, the color of the product will improve, and the fat content will also be higher.

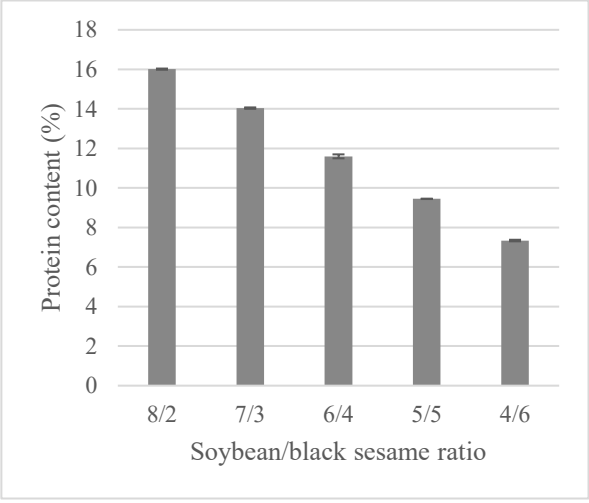

Figure 3. Effect of the soybean/black sesame blend ratio on protein content

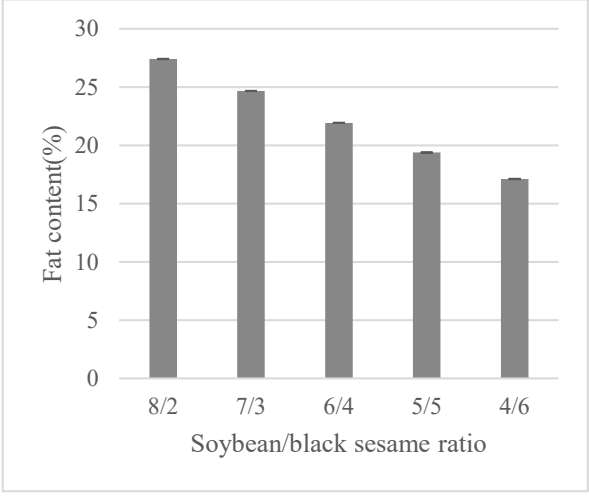

Figure 4. Effect of soybean/black sesame blend ratio on fat content

When increasing the proportion of black sesame, the amount of total fat increases gradually. From Figure 4, If the amount of black sesame added according to the soybean:black sesame ratio is 4/6, 5/5, the characteristic taste of soybeans will be affected. At normal temperature, the product will be easily defatted, spoil, and affect the sensory quality (Vu Binh Duong et al., 2015; Fellows et al., 2000). At a ratio of 8/2, the product color is not much improved, and the obtained nutritional value is not high.

Table 1. The difference in soybean/black sesame blend ratio to total sugar content

Soybean/black seame ratio	Total sugar content (%)
8/2	22.79a ±0.03
7/3	20.75b ±0.04
6/4	18.49c ±0.01
5/5	16.76d ±0.24
4/6	14.54e 0.05

Table 2. Differences in soybean/black sesame blend ratio to sensory mean

Soybean/black sesame ratio	Sensory point		
	Color	Structure	Taste
8/2	4.06^{a}	1.13^{e}	0.20^{e}
7/3	3.00^{b}	1.86^{d}	0.80^{d}
6/4	2.00^{c}	3.06^{c}	2.06^{c}
5/5	1.00^{d}	4.00^{b}	3.13^{b}
4/6	0.01^{e}	4.93^{a}	4.13^{a}

From Table 1 and Table 2, when increasing the proportion of black sesame, the total sugar increases gradually. The sugar content obtained from the ratio of 8/2, the cause of the above change because the sugar content of soybeans

is greater than the sugar content of black sesame. So, when adding a soybean/black sesame ratio of 8/2, the total protein content is higher than the ratio 7/3, 6/4, 5/5, 4/6. So in this experiment, we chose the 7/3 soybean/black sesame ratio as the most appropriate ratio because, when adding a lot of black sesame, the color of the product will improve and the nutritional content will be higher.

3.2. Influence of the sugar blending ratio on product quality

Table 3. Difference in sugar mixing ratio to sensory mean score

Milk/sugar mixing ratio	Sensory point		
	Color	Structure	Taste
8:2	4.86[a]	4.86[a]	1.00[e]
7:3	4.00[b]	4.33[a]	1.86[d]
6:4	2.93[c]	2.93[b]	2.93[c]
5:5	1.80[d]	1.93[c]	4.00[b]
4:6	0.93[e]	0.93[d]	4.86[a]

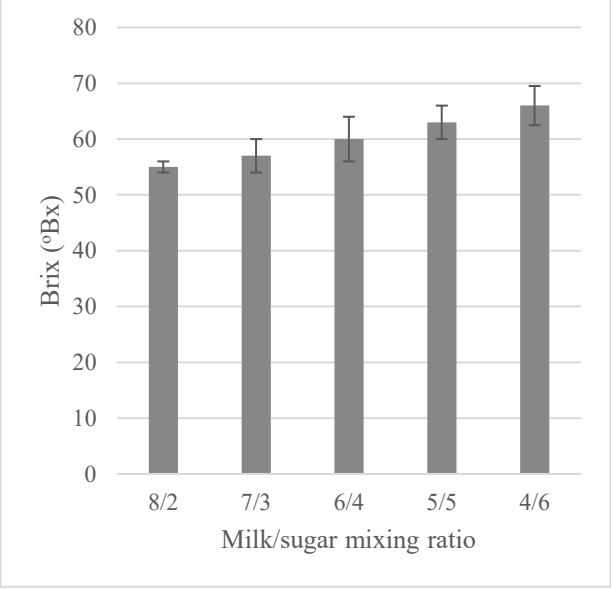

Figure 5. Effect of sugar blending ratio on product

From the results of Figure 5 and Table 3, we see that the Brix level increases with an increasing sugar ratio. The ratio 4/6 gives the highest Brix level, but the color of the product is greatly affected, similar to Brusentsev and Maslov's research; too much sugar during condensation will cause darkening (Brusentsev, Maslov et al., 1982). In addition, when adding too much sugar, there is foam because the sugar does not dissolve completely in the product (Thomas et al., 2001). On the contrary, if adding sugar in a small ratio of 8/2, 7/3, and 6/4, the sweetness will reduce the storage time, have a low viscosity, and not be consistent with the criteria for condensed milk products, Robinson asserts that using sugar to increase shelf life is not a substitute for raw milk, so use the appropriate amount (Robinson et al., 2002). Choose a ratio of 5/5 as the most suitable ratio of added sugar.

3.3. Effect of mixing ratio xanthan gum

Table 4. The difference in the mixing ratio of xanthan gum additives to the sensory average

The ratio of xanthan gum	Structure
0.06%	1.13[e] ±0.01
0.07%	1.80[d] ±0.02
0.08%	2.93[c] ±0.01
0.09%	4.06[b] ±0.03
0.1%	4.80[a] ±0.02

From Table 4, we see that the higher the mixing ratio of xanthan gum, the higher the viscosity. But if you choose a mixing ratio of 0.1%, the milk will be too thick, causing difficulties in the preservation and use

processes and affecting the sensory quality. Choosing the mixing ratio of 0.06%, 0.07%, and 0.08% degrees of Brix is low. So choosing the optimal rate of mixing xanthan gum of 0.09% is the appropriate rate.

3.4. Effect of the assimilation level on the product

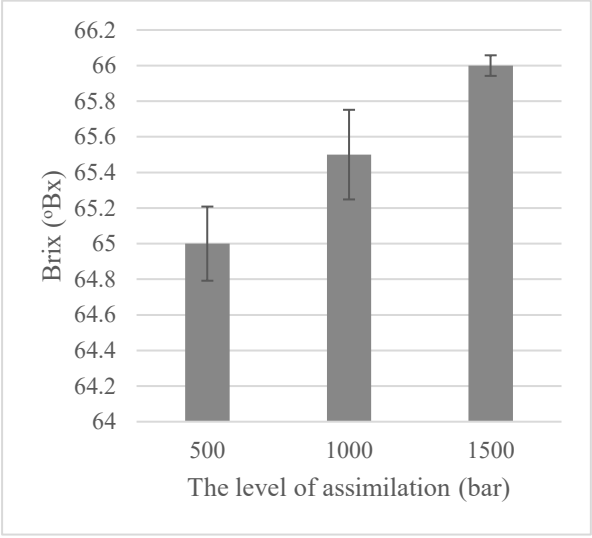

Figure 6. Effect of assimilation on the product

From the result of Figure 6, we see that the Brix level of the product increases gradually with the homogenization level from 500 bar, 1000 bar, to 1500 bar, but if homogenized at high pressure, it will cause the milk to burn and foam. An anabolic level of 500 bar is an appropriate level of anabolism that reduces the size of the fat globules, helps them distribute them evenly in milk fat, makes milk homogeneous, increases the quality of milk, and increases milk storage time because when assimilating milk for longer than 6 months, the milk will not be dehydrated.

4. CONCLUSION

The ratio of soybean blending with black sesame is 7/3, the ratio of sugar mixed with 5/5, and the product has high sensory value. The results of the topic are the process of processing soy condensed milk; black sesame contributes to the diversification of condensed milk lines, meeting the current market demand for dairy products. To increase the sensory value of the product, it is necessary to explore adding the ingredients of the blended seeds to the formula of condensed milk.

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NGHIÊN CỨU TỈ LỆ NGUYÊN LIỆU ẢNH HƯỞNG ĐẾN SẢN PHẨM SỮA ĐẶC MÈ ĐEN

Hồ Thị Ngọc Nhung[1*], Nguyễn Thị Thùy Duyên[1], Lại Thị Hiền[1], Huỳnh Thị Thúy Loan[1], Lại Nguyễn Uy Thy[1], Đinh Thị Cẩm Liên[1]

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THÔNG TIN CHUNG

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TỪ KHOÁ

Đậu nành;
Mè đen;
Sữa đặc;
Mè đen;
Sữa.

TÓM TẮT

Nhằm đa dạng hóa các sản phẩm sữa đặc có nguồn gốc thực vật thì sản phẩm sữa đặc mè đen với nguyên liệu chính từ đậu nành và mè đen góp phần tạo ra những sản phẩm có giá trị dinh dưỡng cao cũng như sự đa dạng về chủng loại sản phẩm. Trong nghiên cứu này, chúng tôi khảHo sát tỷ lệ phối trộn của đậu nành: mè đen là 8:2; 7:3, 6:4, 5:5, 4:6; sữa mè đen với đường là 8:2, 7:3, 6:4, 5:5, 4:6; đồng hóa sữa ở các mức độ 500 bar, 1000 bar, 1500 bar. Sau khi kiểm tra tỷ lệ phối trộn của các nguyên liệu dùng trong phối trộn như sau: Tỷ lệ đậu nành : mè đen là 7:3, sản phẩm có hàm lượng protein 14,04%, hàm lượng chất béo 24,67% và tổng lượng đường là 20,75. %; tỷ lệ pha trộn giữa sữa đặc mè đen: đường là 5:5, thu được sản phẩm có 63^{o}Bx; và sản phẩm có bổ sung 0,09% xanthan gum và đồng hóa ở 500 bar thì sản phẩm đạt giá trị cảm quan cao.