



The Use of Pine Cone Extract in the Production of Albumen Curd

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ABSTRACT

Due to a lack of protein in the human diet, dairy products made from milk proteins have increased in production. The proposed new product was made from cheese whey and curds. The main ingredients were whey proteins and pine cone extract as a natural additive. The relevance of making albumen curd with vegetable extract is scientifically and experimentally justified. Based on this study, the optimal dose of pine cone extract was determined which results in imparting a distinctive taste and aroma characteristic of pine cone, improving the chemical composition, and extending the product's shelf life.

Introduction

Nowadays, secondary raw materials are highly relevant for the production of foods. Dietary protein deficiency can lead to various diseases in the elderly and young children, spurring a significant trend toward producing protein-rich foods to prevent them. Whey albumen proteins are considered complete because they can complement the list of protein-rich foods (Food Industry, 2022).

The production of the new type of food will expand the wide range of protein-dairy products, as well as enhance the chemical composition of the food and extend the shelf life (Galstyan, 2018; Dilanyan, 2000).

Pine cone extract is a rich source of biologically active

substances, which have a rich chemical composition and antioxidant properties. (sfera.fm)

Currently, the use of secondary raw materials such as whey allows for the expansion of product range and volume while reducing costs. The whey proteins can meet the needs of the elderly, athletes, and people engaged in various complex physical activities.

Materials and methods

Albumen curd is prepared using the technology typical for this protein product. Whey is an excellent source of nutrients and offers many health benefits. It contains

more than 200 beneficial substances essential for the full development of the human body. In addition, it has high nutritional value (Rodionov, et al., 2020).

The composition of whey is as follows: 6.3 % dry matter, 0.9% proteins, 0.3 % milk fat, 4.5 % lactose (Khrantsov, et al., 2018)

Whey contains 80 % minerals (*Ca, Fe, Mg, P, K, Na, Zn, Cu, Mn, Se*). It boosts immunity, helps with joint inflammation, regulates the body's metabolism, and positively affects gastrointestinal microflora (Yevdokimov, 2009).

A cone is a modified fruit found at the tops of branches, primarily in gymnosperms such as spruce, pine, cedar, and juniper. Tincture of cones can be used for inhalation and therapeutic procedures. The use of pine cones ensures improvement of blood circulation by strengthening blood vessels, significantly increases immunity, prevents heart attacks, accelerates metabolism, enriches the body with minerals, which contributes to the rapid strengthening of bones, regulates blood pressure, aids in blood recovery after internal bleeding, and provides a relaxing and tonic effect. Additionally, it promotes positive changes in the function of the organs of vision (sfera.fm).

Considering the Figure, the new food will have a great application value due to its full composition rich in vitamins, amino acids, proteins, and minerals. The main aim of the study was to obtain a new kind of albumen curd, rich in vitamins, amino acids, proteins, and minerals.

To achieve the goal, the following issues were raised:

To make albumen curd from cheese whey.

To investigate the effect of pine cone extract on the sensory indicators and the shelf life of the food produced.

To decide the optimum dosage of pine cone extract used for albumen curd production.

To study the sensory, physicochemical, and microbiological processes of albumen curd with pine cone extract.

Whey, pine cone extract, albumen curd, and albumen curd with pine cone extract samples were the object of the research. During the work, a study of the physicochemical, microbiological, and sensory indicators of the raw material, albumen curd with plant extract was performed.

The composition of pine cone extract:



Picture 1. Pine cone extract.

Nutritional value is 244.0 KCal / 1024.8 KJ, carbohydrates: 61.0 g, stored at 0-25°C with no more than 75% relative humidity. After opening, store in the refrigerator for up to 1 month. Shelf life is 36 months from the date of manufacture (Picture 1).

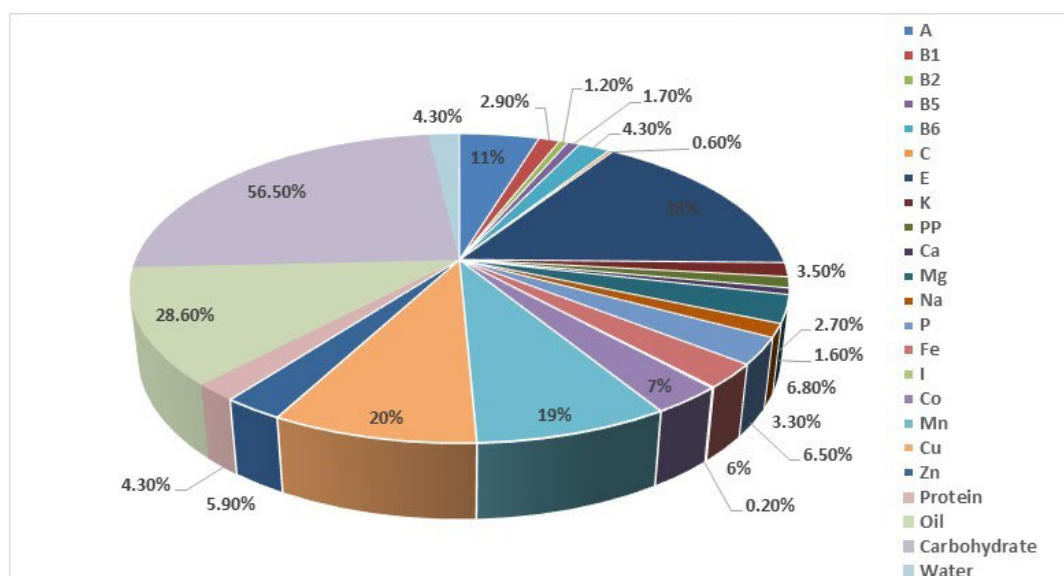


Figure. The Chemical composition of the pine cone extract (health-diet.ru)

Cone juice, also known as the elixir of health, is obtained from young, green pine cones using a special traditional technology. The use of pine cone extract is effective for boosting immunity, strengthening the body's defense mechanisms, and treating various conditions such as rheumatism, metabolic disorders, colds, bronchial asthma, bronchitis, and coughs of various origins, among other diseases (sfera.fm).

Results and discussions

Control and test samples of albumen curd were prepared in the production of "Daughter Marianna" LLC, and the experiments were carried out in the laboratory of the abovementioned production.

The following study was conducted:

Study of physicochemical indicators of whey

Study of pine cone extract according to normative documents

The use of pine cone extract in the production of albumen curd

Investigation of physicochemical, sensory, and microbiological indicators of the new product

Contribution and summary of scientific results

Classically accepted scientific research methods were used during the study (Aydinyan and Chatinyan, 2009). Whey, pine cone extract, and the finished product were investigated.

Sensory indicators of pine cone extract- color - brownish-green, taste typical of a pine cone, without extraneous taste and smell, consistency - certain thickness, without sediment. (Tsaturyan, et al., 2014). Sensory indicators of whey - color - slightly yellowish, taste - natural lactic acid, without extraneous taste and smell, consistency - certain thickness, with an expressed somewhat sediment.

Physicochemical indicators of whey used for the preparation of test and control samples are fat content of 0.6 %, titratable acidity: of 15 °T, density: of 1025kg/m³, lactose: of 4.5 %, and protein amount: of 0.9 % (Picture 2).

The following processes were carried out to obtain albumin curd from the investigated whey:

- *Heat Treatment*: Heat the pasteurized whey to 90-95 °C.
- *Acid Addition*: Add lactic acid (0.001 %) to the whey.
- *Protein Precipitation*: Allow the proteins to precipitate.

- *Self-Pressing*: Let the mixture self-press.

- *Pressing*: Press the mixture for 1.0-1.5 hours.

- *Pine Cone Extract Addition*: Add the pine cone extract.



Picture 2. Milk whey.



Picture 3. The new product.

Table 1. Additive Pine Cone Extract Doses*

A sample	The amount of pine cone extract%	The amount of albumen curd in gram
Control	0	100
Test 1	9	100
Test 2	10	100
Test 3	11	100

*Composed by the authors.

To the finished albumen curd, add the solution of the cone in the appropriate proportions, as presented in the table 1.

The additive pine cone extract dosage chart shows the amounts expressed in %. It can be seen in the table that in the control sample, the albumen curd was 100 grams, and in the test samples, pine cone extract was added at 9%, 10%, and 11% and measured per 100 grams. The results of the physicochemical and sensory indicators of the samples with the indicated dosages are presented in Table 2.

As a control option, albumen curd was prepared in the manner mentioned above. The test samples were prepared by adding different amounts of cone extract. The moisture content of the control and test products was determined using an ELVIS-2 hygrometer. The test samples were prepared at "Daughter Marianna" LLC (Picture 3).

Table 2. The effect of pine cone extract on albumen curd's physicochemical and sensory indicators*

The indicators	Test options			
	Test 1	Test 2	Test 3	Control
The amount of increase of the pine cone extract, %	9.0	10.0	11.0	-
Titrate acidity, °T	59	58	56	60
Mass fraction of oil, %	7	7	7	7
Mass fraction of water, %	69.79	69.80	69.92	73.2
The amount of carbohydrates, %	7.49	8.10	8.71	2
Appearance	With a very faint extract hue throughout	With a subtly pronounced distinctive extract hue throughout	With a pronounced extract hue throughout	With a fine whitish-yellow hue throughout
Taste and smell	Lactic acid without extraneous taste and smell, very faint taste and smell of cone extract	Lactic acid without extraneous taste and smell, slightly pronounced cone extract taste and smell	Lactic acid without extraneous taste and smell, pronounced taste and smell of bright cone extract	Lactic acid without extraneous taste and smell, characteristic of albumen curd
Color	With an unexpressed hue	Expressed with a subtle hue	Expressed with hue	With a whitish-yellow hue

Table 3. Microbiological parameters of the new food with pine cone extract*

Name of the indicators	The permissible level of mg/kg, not more	Additions	According to the results	Compatibility
Microbiological indicators				
MAFAM	1x10 ⁶ GAM/cm ³ /g/, not more	-	1x10 ⁴	Compatible
Pathogen, a/t salmonellas	25 g/cm ³ in food	not allowed	-	Compatible
Staphylococcus S.aureus	0.1g/cm ³ in food	not allowed	-	Compatible
Yeast	50 GAM/cm ³ (g) not more	-	10	Compatible
Mold	50 GAM/cm ³ (g) not more	-	5	Compatible

*Composed by the authors.

As a result of the research presented in the table above, different dosages of pine cone extract were used as a natural supplement and the optimal dosage was determined based on physicochemical and sensory indicators. The control and test samples were aged at a temperature of 2-6 °C, as a result

of which the control sample had a shelf life of 72 hours and the test sample had a shelf life of 100 hours. According to the results of the research, high sensory and appropriate physicochemical indicators were recorded, as well as an extension of the shelf life was observed in sample 2.

From the table of microbiological indicators of the new product with pine cone extract, it is evident that with the use of extract, the product meets the specified requirements.

Conclusion

Considering the results of the scientific research, and theoretical and experimental works, the following conclusions and recommendations were made. The composition of whey is enriched with easily digestible carbohydrates, vitamins, and minerals. Enriching new food with carbohydrates, vitamins, and minerals was theoretically justified and experimentally confirmed. As a result of the research, the use of 10% pine cone extract was selected as the optimal dosage, as relatively high sensory indicators and extended shelf life were reported at this dosage. As a result of the research, it was found that the use of extract contributes to the production of food with new unique taste properties, and high nutritional and biological value. As a result, it acquires a rich chemical composition, a unique taste, and smell, and a homogeneous fine coloring.

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Declarations of interest

The authors declare no conflict of interest concerning the research, authorship, and/or publication of this article.

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