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Development of Curd Mousse with Fruit-and-berry Builders

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Abstract

The technology of preparing curd mousse has been developed. The prepared curd mousse has smooth, creamed texture, the taste and essence are purely sour and milky with a pronounced flavor of added fruit-and-berry builders, as well as with the added builder taste. The whole mass color is smooth and has the color of the added builder.

The trading researches related to indicators of the quality of the prepared curd mousses with kiwi and cherry were made according to organoleptic, physical and chemical and micro-biological indicators.

The analysis of organoleptic indicators of samples of curd mousses with kiwi showed that sample 8 had a smooth, soft texture, sufficiently solid, without tangible elements of kiwi. It entirely complied with the requirements of regulatory documents (5 points). It had pure pleasant slightly sour taste (5 points). The favor of kiwi slightly smelled (5 points). The general impression about the mousse was 20 points. Mousse sample 7 with the 30% kiwi builder had close quality indicators and it was also estimated as excellent.

As curd mousses used various concentrations of fruit-and-berry builders, the degree of their impact on the active acidity of various test samples was studied. The pH indicator has an impact on the colloid state of proteins of the dairy product, the growth of useful and harmful micro-flora, and activity of ferments.

Keywords: curd mousse, acidity, herbal supplements, fruit-and-berry raw materials, indicators.

INTRODUCTION

The use of herbal supplements in producing dairy products has an impact on the content of vitamins, carbohydrates, mineral substances and food fiber in them [1, 2]. Besides, they add a pronounced flavor of added herbal supplements, as well as attractive external view. In addition to improving organoleptic characteristics of the product, herbal supplements act as prebiotics. Consequently, the product can be recommended for people in case of unfavorable ecological and hygienic factors and as staple foods [3, 4, 5].

However, adulteration by structure and type of the fruit-and-berry raw materials and ready-made dairy products based on them is possible [6, 7]. For reasons of cost efficiency, inferior fruit-and-berry raw materials are adulterated and sold as the ones of high quality [8, 9].

This work shows results of the researches related to stipulating recipes and technology of producing the dairy product - curd mousse with fruit-and-berry raw supplements – kiwi and cherry – analyzed before.

These are the researches tasks:

- To develop recipes and technologies of the dairy product by using fruit-and-berry raw materials,

- To estimate the quality of the developed product according to its organoleptic, physical and chemical indicators of quality and safety indicators.

According to GOST 51917-2002, a mousse (the product made of milk or containing milk) is creamed food preserving its structure.

The researchers developed various recipes and technologies of preparing mousses: curd mousses with fruit builders made of banana, orange, dried apricot, and lemon [10], cream mousse with fine oatmeal [11], hypoallergic mousse based on whey [13], cranberry mousse based on whey with the icinglass replaced by Citri-Fi food fiber, and sugar by fructose (Plekhanova et al., 2014), mousse based on whey with fruit powders (Dymar, 2016). There are objects of intellectual property based on the composition to prepare curd mousse (Patent No. 2325067) and methods of its production (Patent No. 2325066), etc.

METHODS

This experiment used lowfat curd, skimmilk powder, water for milk, icinglass, sugar, fruit-and berry builder (kiwi and cherry) as initial components for developing curd mousse with fruit-and berry builders. When developing the recipes, an optimal concentration of ingredients providing high organoleptic and physical and chemical indicators of the ready product quality was selected.

Model samples were made by using different amounts of kiwi/cherry, %: 0; 5; 10; 15; 20; 25; 30; 35; 40; 45. The control sample was the sample without kiwi/cherry prepared according to TR 9224-084-02068315-01.

The curd used to prepare model samples had the following characteristics that entirely complied with GOST R 52096-03 “Curd. Technical Requirements”:

- Organoleptic – external view and texture: soft, floury with tiny elements of milk protein and small amount of whey; color: white, entirely smooth, flavor: pure, sour-milk, without strange flavors,
- Physical and chemical – acidity – 190^0T, dry substances – 38%.

Organoleptic indicators of mousses samples were estimated according to the 20-points scale taking into account their taste, flavor, color, texture and external view. The maximum point for every indicator was 5. When estimating the product from 18.5 to 20 points, the quality category was

defined as "excellent'. When giving 16.5- 18.4 points, it was "good", 16-14 points – "satisfactory". If the number of points was below 13.5, the sample was removed from the sensory analysis.

DISCUSSION AND RESULTS

Tables 1 and 2 show the data of the sensory analysis of curd mousses with kiwi and cherry.

The analysis of organoleptic indicators of kiwi curd mousse samples showed that sample 8 had smooth, tender texture, moderately solid, without tangible elements of kiwi; it entirely complied with the requirements of regulatory documents (5 points) and had desaturated smooth color (5 points), pleasant slightly sour taste (5 points), and the kiwi flavor was slight (5 points). The total impression about the mousse is 20 points. The sample of mousse 7 with 30% kiwi had close quality indicators and was also estimated as "excellent".

If the share of kiwi is increased to 40% (sample 9) and 45% (sample 10), the growth of the flavor and pleasant slightly sour taste intensity is observed. The texture has tangible elements of the builder. This is the reason why the total point of sample 9 was 19.6, and that of sample 10 – 18.3.

The obtained data say about the reasonability to supplement the recipe of the curd mousse with 35-40% of kiwi. The further increase in the supplement causes strengthening of the sour taste, decreasing of the point estimate of the sample, and is considered as unreasonable.

The analysis of organoleptic indicators of cherry curd mousse showed that sample 7 where 30% of cherry was added had the best organoleptic indictors of quality (Table 2). In total, sample 7 got 20 points and was characterized by pleasant tender taste and characteristic flavor, the color was tenderly cherry, entirely smooth. The sample had smooth, tender texture, moderately solid, without tangible elements of cherry. Sample 8 (35% of cherry) was characterized by slightly pleasant flavor of cherry (4.8 points), unpronounced smooth color (4.8 points), and its taste was pure, with sour (4.8 points). The total estimate of this sample is 19.2 points.

Table 1. Characteristics of Organoleptic Indicators of Curd Mousse Samples Depending on the Added Kiwi Mass

Sample number	Share of kiwi,%	Quality indicator, estimation in points				
		Taste	Flavor	Color	Texture and external view	Total point
1	0 (control)	5.0± 0.01	5.0± 0.00	4.9± 0.24	4.9± 0.10	19.8± 0.02
2	5	4.4± 0.15	4.5± 0.20	4.1± 0.21	4.4± 0.22	17.4± 0.65
3	10	4.3± 0.19	4.3± 0.19	3.6± 0.16	4.3± 0.18	16.5± 0.43
4	15	4.3± 0.22	4.4± 0.21	3.8± 0.18	4.5± 0.22	17.0± 0.62
5	20	4.5± 0.21	4.0± 0.8	4.0± 0.21	4.5± 0.23	17.0± 0.70
6	25	4.5± 0.20	4.0± 0.20	4.5± 0.20	4.8± 0.20	17.8± 0.68
7	30	4.5± 0.21	4.5± 0.16	4.5± 0.22	4.6± 0.22	18.1± 0.84
8	35	5.0± 0.00	5.0± 0.00	5.0± 0.00	5.0± 0.00	20.0± 0.00
9	40	4.8± 0.23	5.0± 0.00	4.8± 0.21	5.0± 0.02	19.6± 0.40
10	45	4.5± 0.22	4.5± 0.15	4.7± 0.20	4.6± 0.23	18.3± 0.72

Table 2. Characteristics of Organoleptic Indicators of Curd Mousse Samples Depending on the Added Cherry Mass

Sample No.	Share of cherries,%	Quality indicator, estimation expressed in points				
		Taste	Favor	Color	Texture	Total point
1	0 (control)	5.0± 0.00	5.0± 0.00	4.5± 0.2	4.4± 0.19	19.9± 0.10
2	5	4.3± 0.18	4.3± 0.22	4.0± 0.2	4.4± 0.20	16.7± 0.57
3	10	4.0± 0.19	4.0± 0.15	3.5± 0.2	4.3± 0.17	15.8± 0.60
4	15	4.3± 0.21	4.0± 0.20	3.5± 0.2	4.5± 0.23	16.3± 0.52
5	20	4.5± 0.20	4.0± 0.18	4.0± 0.2	4.5± 0.21	17.0± 0.65
6	25	4.5± 0.26	4.0± 0.20	4.5± 0.2	4.8± 0.22	17.8± 0.89
7	30	5.0± 0.00	5.0± 0.00	5.0± 0.0	5.0± 0.00	20.0± 0.00
8	35	4.8± 0.22	4.8± 0.11	4.8± 0.2	4.8± 0.12	19.2± 0.12
9	40	4.5± 0.20	4.5± 0.22	4.0± 0.2	4.6± 0.22	17.6± 0.89
10	45	4.4± 0.22	4.5± 0.23	4.0± 0.2	4.3± 0.20	17.2± 0.77

Thus, the sample of mousse with 30% of cherry had the highest quality indicators and was estimated as "excellent".

When increasing the amount of cherry up to 40-45%, it is possible to observe an increase in flavor, color, strengthening of the taste soreness, the texture is too smudging with tangible elements of the builder. The total points of samples 9 and 10 were 17.6 and 17.2. The obtained data say about the reasonability to add 30% of cherry supplement in the mousse recipe. It is not reasonable to further increase the amount of the supplement.

Since curd mousses use various concentrations of fruit-and-berry builders, the degree of their impact on active acidity of various samples of variants under research were studied. Active acidity is one of the quality indicators. It is defined by the concentration of hydrogen ions. The pH value has an impact on the colloid state of proteins of the dairy product, growth of useful and harmful microflora, activity of ferments, etc. (Borodina, 2002; Ostroumova, 2000).

Figure 1 shows dynamics of changing the active acidity of curd mousse with different mass of fruit-and-berry builders.

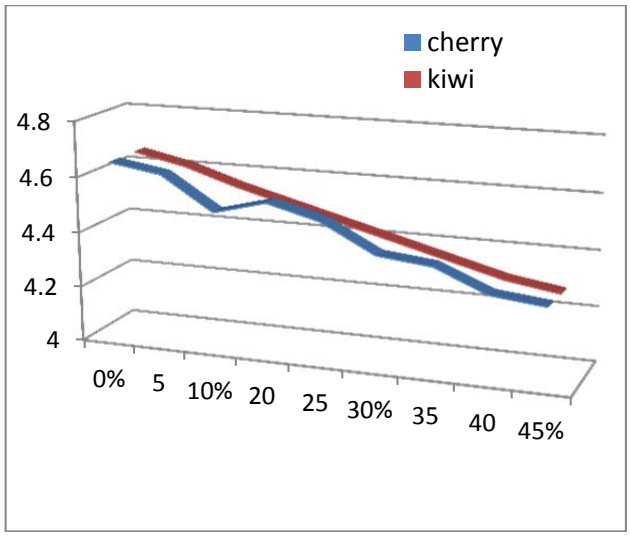

Fig.1. Dynamics of Changing the Active Acidity of Curd Mousse with Different Mass of Fruit-and-Berry Builders

The analysis of the obtained data shows that if the mass of fruit-and-berry builder is increased, the indicator of activity acidity slightly decreases as compared to the control sample (on the graph it is found as 0% builder), i.e. the product acidifies.

The results of the researches revealed that the active acidity for the determined optimal indicators of supplemented concentrations of fruit-and-berry builders that provided the highest organoleptic indicators of curd mousses (35-40% for kiwi, and 30% for cherry) was 4.3 and 4.4, respectively.

In order to select the correlation of components and develop scientifically grounded recipes of curd mousses with fruit-and-berry builders, the joint impact of the mass share of moisture, amount of added icinglass and sugar under the set values of the builder concentration were considered, and three-dimensional graphs – responses surfaces made according to the matrix - were used.

The graphs show that the moisture has a considerable impact on organoleptic indicators of curd mousse with kiwi builder. The best indicators of texture, flavor and taste are observed under the product moisture being 64-68%. The icinglass concentration has an impact on the product texture. The maximum point of concentration is observed under 2.3-3.0% of icinglass in the product. Sugar has an impact on flavor and taste. The analysis of graphs shows that maximum values of points of the flavor and taste indicator are observed if the range of concentration of sugar in the mousse is 26-30% and the concentration of icinglass equals to 2.2-2.4%.

Modelling the composition of curd mousse with the kiwi builder showed that the highest points of the organoleptic estimate were noted under the concentration of sugar – 25-30%, icinglass – 2.2-2.4%, product moisture – 64-68%, and kiwi builder – 38%. Under these concentrations of ingredients, the active acidity of the model product is pH 4.3.

Modelling the composition of cherry curd mousse showed that the best indicators of organoleptic estimate were noticed when the concentration of sugar in the recipe was 26-30%, icinglass – 3%, product moisture – 64-66%, and cherry builder (without kernels) – 30 %. Under such concentration of ingredients, the active acidity of the model product is pH 4.4.

Based on the conducted researches, the recipes and technology of curd mousses with kiwi and cherry builders were developed.

The composition for preparing curd mousses includes lowfat curd, skimmilk powder, sugar, icinglass stabilizer, fruit-and berry builders and water. Herewith, the correlation of curd and skimmilk powder is from 17.0:3.5 to 15.0:4.0. The composition includes icinglass as a stabilizer under the following correlation of components, mass, % (Table 3). The use of herbal builders allows to enrich the product with the vitamins and mineral substances that characterize the used builders.

Table 3. Correlation of Components of Curd Mousses Compositions

Raw materials	Mass, %	
Lowfat curd	15.0	17.0
Skimmilk powder	4	3,5
Icinglass	2	3
Sugar	25	30
Cherry	-	30
Kiwi	38	-
Water	16	16.5
In total:	100	100

The obtained curd mousse has a smooth, creamed texture. The taste and flavor are pure, sour-milk with the pronounced flavor of fruit-and berry builders, as well as added supplement. The color is entirely smooth stipulated by the added supplement.

Trading researches related to indicators of quality of the ready curd mousses with kiwi and cherry according to organoleptic, physical and chemical, microbiological indicators were made. Table 4 shows characteristics of organoleptic indicators of the developed mousses.

Table 4. Characteristics of Organoleptic Indicators of Curd Mousses Quality

Indicator	Characteristics of curd mousses samples	
	With kiwi	With cherry
Taste and flavor	Pure, sour-milk, sour and sweet, with the flavor of kiwi. Without strange flavors.	Pure, sour-milk, pleasant sour and sweet. Without strange flavors
Texture	Smooth, creamed, slightly smudging. With tiny elements of kiwi.	Smooth, creamed, slightly smudging.
Color	The whole mass is smooth. Even light green.	The whole mass is smooth. Even light-cherry.

The analysis of the obtained data says about high quality of the developed products. The mousses taste and flavor pleasantly according to the added fruit-and-berry raw materials without strange flavors. The texture is smooth, well creamed and slightly smudging.

Table 5 shows characteristics of physical and chemical indicators of the curd mousses quality.

Table 5. Characteristics of Physical and Chemical Indicators of the Developed Curd Mousses Quality

Indicator	Samples characteristics	
	With kiwi builder	With cherry builder
Weight fraction of moisture, %	65±0.9	65± 1.0
Weight fraction of saccharobiose, %	27± 0.8	28± 0.9
Acidity, pH	4.3	4.4
Phosphatase	No	No

In order to define the terms of storage of the developed curd mousses with fruit-and-berry raw materials, organoleptic, physical and chemical and microbiological indicators of quality were researched every three days during 21 days of storage under the regulated temperature of 2-6°C.

The results say that the curd mousses have high organoleptic indicators of quality during the first 9 days of storage and are estimated as "excellent". After 12 days of storage it is possible to notice inconsiderable changes of the taste, flavor and texture of the product: the texture becomes more gummous, too smudging, the flavor is less pronounced, and the product is estimated as "good" (Table 6).

When the product is stored longer, it is possible to see considerable changes of organoleptic indicators of quality. On the 12th storage day, the product has vivid defects of flavor, taste, color, and texture. Thus, when storing curd mousse during 12 days, organoleptic indicators keep their initial characteristics.

Table 6. Organoleptic Indicators of Quality of Curd Mousses with Kiwi When Storing

Quality indicator	Term of storage, days					
	0	3	6	9	12	21
Taste (point, max – min 5.0 – 3.0)	5.00±0.0	4.8±0.0	4.7±0.0	4.5±0.0	4.0±0.0	2.0±0.0
Favor (point, max – min 5.0 – 3.0)	5.0±0.0	4.7±0.1	4.6±0.1	4.5±0.1	4.3±0.1	2.2±0.0
Texture and external view (point, max – min 5.0 – 1.0)	5.00±0.0	4.80±0.4	4.6±0.2	4.6±0.2	4.6±0.2	3.1±0.1
Color (point, max – min 5.0 – 2.5)	5.0±0.0	5.0±0.0	4.6±0.0	4.6±0.2	4.5±0.2	3.2±0.2
In total (point, max – min 20.0 – 11.5)	20.0±0.0	19.3±0.9	18.5±1.2	18.2±0.1	17.4±0.8	10.5±0.6

Table 7. Microbiological Indicators of the Developed Curd Mousses Safety When Storing

Indicator		Indicator value when storing, day							
		standard	3	6	9	12	15	18	21
Product mass (g) that does not allow	Coliforms	0.01	Not found						
	S. aureus	1.0	Not found						
	Pathogenic including salmonella	25.0	Not found						
Yeast fungi, CFU/G, not more than		50	Not found		2	10	12	38	53
Penicillium, CFU/G, not more than		50	Not found.		3	17	24	42	55

The analysis of the obtained data about the change of the active acidity of curd mousses says that the acidity of the product increases on the 12th day (pH indicators decrease) and overreaches the permissible indicator. During the first 9 days this indicator complies with the normalized indicator.

Table 7 shows the changes of microbiological indicators of the developed curd mousses safety when storing them. The analysis of the data from the table shows that according to microbiological indicators, curd mousses comply with regulatory documents when storing during 7 days.

The comprehensive research of organoleptic, physical and chemical, and microbiological indicators of quality and measuring them during the storage allow to define optimal terms of storage of the developed curd mousse with fruit-and-berry raw materials. The product maintains its initial features during 7 days.

According to the results of the research, the regulated indicators of quality for curd mousses with fruit builders made of cherry and kiwi were developed.

CONCLUSION

Thus, as a result of the work, the recipes of curd mousse with fruit-and-berry builders have been developed, and their organoleptic, physical and chemical, and microbiological indicators have been researched.

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