

UDC: 663.914.5:616.379-008.64-05
original scientific paper



Acta Agriculturae Serbica, Vol. XII, 24 (2007) 77-83

Dietary Cocoa Cream Production

Tijana Topalovic

Faculty of Agronomy, Cacak, Serbia

S. Damljanovic

Eurolion d.o.o. profit centar Kremovi, G. Milanovac, Serbia

Gordana Jankovic

Eurolion d.o.o. profit centar Kremovi, G. Milanovac, Serbia

Z. Markovic

Faculty of Agronomy, Cacak, Serbia

Abstract: In accordance with the trend of world sweets production, sucrose is being substituted with other sweeteners. These products can be consumed by the people who are not allowed to use sucrose in their diet. In this work, cocoa creams with fructose, lactitol and xylitol are produced. The obtained products retain almost all physico-chemical and organoleptic properties of the cocoa cream with sucrose.

Key words: cream, fructose, sucrose, sweeteners

Introduction

Cocoa cream is a high quality food product supplying organism with many digestible nutrients and high caloric value.

Main raw materials for cocoa cream are: sweeteners, special fat with characteristics of brittle fat for cocoa spread, cocoa powder, milk powder and a hazelnut paste (Gavrilović 2003)

The trend of the world sweets production is production without sugar, i.e. with suitable "sugar substitute". Today, there are over 190 million people in the world suffering of diabetes, and it is estimated that this number will be increasing due to the growth of population, urbanization, way of life, etc (Carpenter 1984). Thus, it

is necessary to pay more attention to this group of people, which makes up a significant percentage of the world population. The goal of this work is to substitute sucrose in standard cocoa cream with fructose, xylitol, and lactitol.

Materials and methods

Dietary cocoa cream is produced using the following raw materials: sweeteners (fructose, xylitol, lactitol), cocoa powder, palm oil, hydrogenated vegetable oil, skim milk powder, whey powder, soybean flour, hazelnut paste and vanillin. Five experiments are performed with various sweeteners.

1. experiment – sucrose is substituted with 44% of fructose (palm fat is used)
2. experiment – sucrose is substituted with 44% of fructose
3. experiment – sucrose is substituted with a mixture consisting of 31% fructose and 13% of lactitol
4. experiment – sucrose is substituted with 44% of xylitol
5. experiment – sucrose is substituted with a mixture consisting of 22% of xylitol, 15% of fructose and 7% of lactitol

All mentioned raw materials are mixed in a low speed mixer after suitable preparation. The so-obtained doughy mass is passed over a 5- roll refiner to reach particle sizes of 20 μ m. Powdery mass is further improved in the conchers by adding the rest of the fat, the lecithin and aroma. The conching process of dietary cocoa cream is performed according to the standard cocoa cream production technology. Cocoa cream is produced in the flow line of the “Swisslion – TAKOVO” company. Technological process is presented in Fig. 1.

The obtained dietary cocoa creams are examined chemically and microbiologically. Chemical analyses include the content determinations of sucrose, lactose, total fats, proteins, ashes, moisture, and cocoa parts. The methods used for the determination of chemical contents are listed below:

- sucrose content determination – polarimetric method;
- lactose content determination – Luff – Schoorl method;
- total fats content determination – Soxlet method;
- raw proteins content determination – Kjeldahl method;
- ashes content determination – by combusting a sample and weighing the residue;
- water content determination – by drying under normal pressure;
- cocoa parts content determination of – by determining total quantity of alkaloids by means of spectrophotometer and expressing it as a percentage of theobromine, and then, calculating the fatless cocoa parts.

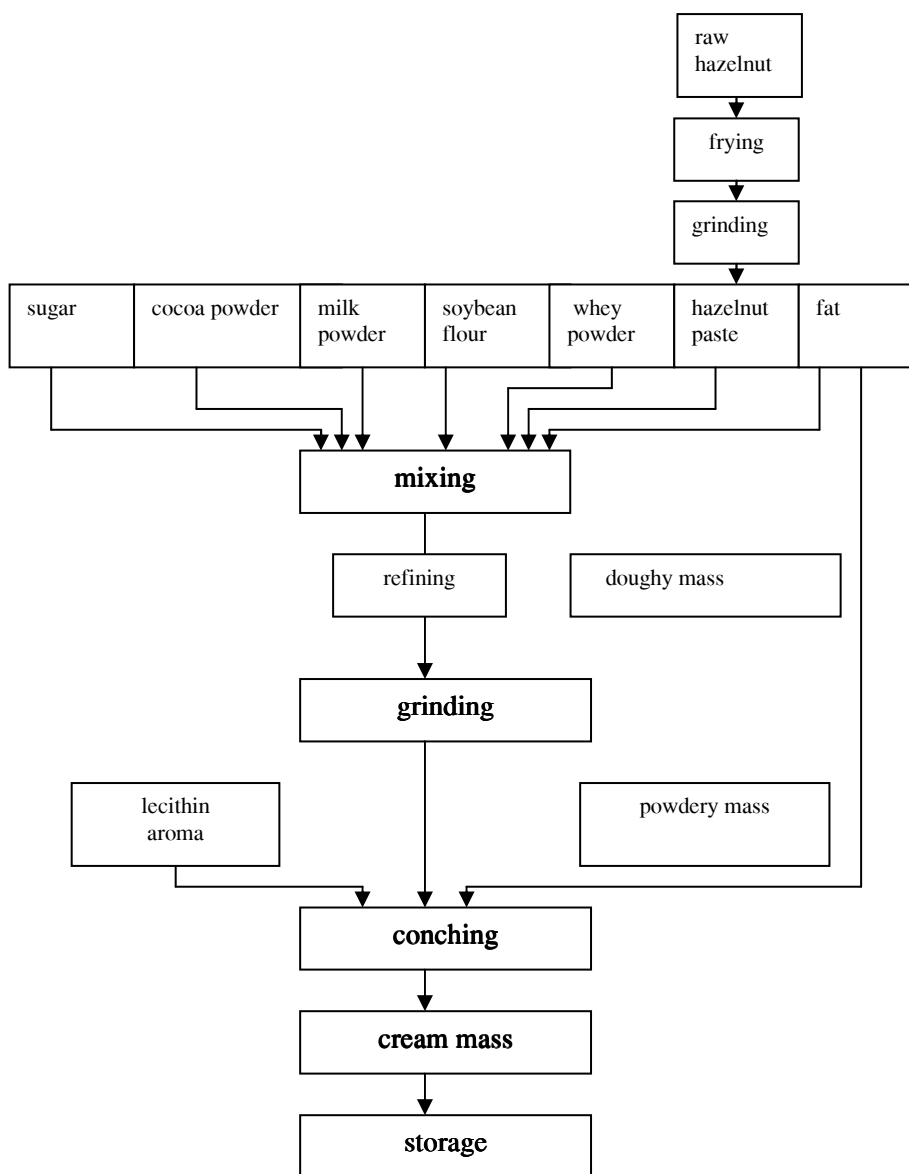
All mentioned chemical analyses are performed in accordance with the documented methods that were published in “The Official Gazette of the SFRY” number 41/87.

Microbiological analyses include:

- isolation and identification of *Salmonella*
- isolation and identification of *Proteus species*
- isolation and identification of *Escherichia coli*

- isolation and identification of sulfite-reducing *Clostridia*
- isolation and identification of positive *Staphylococcus*
- determination of the microorganisms count
- determination of the aerobic sporogenic bacteria count
- determination of the moulds and yeasts counts

All mentioned microbiological analyses are performed in accordance with the documented methods that were published in "The Official Gazette of the SFRY" number 25/80.



Results and discussion

Satisfactory results are achieved when sucrose is substituted with 44% sweetener in the modified standard procedure of the company "Eurolion d.o.o. profitni centar Kremovi" (Euroline Ltd. Profit Centre: Creams). The modifications include substitution of milk powder with whey powder in all experiments. It is only in the first experiment that the standard mixture of fats used in the company is substituted with palm oil. All obtained products are examined using chemical and microbiological methods. The results of these analyses are given in the tables. The results of chemical examinations of obtained cocoa creams are presented in Tab. 1., whereas the results of biochemical examinations are given in Tab. 2. The results of examinations of standard cocoa creams with sucrose are also presented in these tables.

Tab. 1. Contents of water, fats, proteins, sucrose, cocoa parts and ashes in examined products

Examined parameters	Cocoa cream with sucrose (%)	Exp. 1 (%)	Exp. 2 (%)	Exp. 3 (%)	Exp. 4 (%)	Exp. 5 (%)
Water	0,486	0,26	0,29	0,31	0,33	0,30
Fats	32,73	37,23	32,40	32,89	33,82	33,42
Proteins	6,65	5,58	5,62	5,47	5,78	5,59
Sucrose	50,76	2,72	2,74	3,12	2,83	3,25
Cocoa parts	2,9949	3,141	3,283	3,054	3,213	3,194
Ashes	1,28	1,147	1,157	1,1969	1,1829	1,1419

Tab. 1 shows that the content of fats in experiment 1 is significantly different from those in other experiments. This is a result of the use of palm oil in this experiment. A reduced content of proteins by 1% in experiments 1-5 is a result of the use of whey powder instead of milk powder, as whey powder contains fewer proteins. Although dietary cocoa cream production does not include sucrose, Tab. 1. shows that finished products contain 3% of sucrose. This is a result of the impossibility to clean off sucrose from the five-roll refiner.

The microbiological analyses show that the obtained cocoa creams satisfy the microbiological criteria. The increased total microorganisms count and sporogenic bacteria count are expected, bearing in mind the fact that all experiments are performed in semi-industrial conditions.

The obtained products retain almost all organoleptic properties (consistency, aroma, color and taste) of the cocoa cream with sucrose. The cream spreading is very good, and viscosity is very similar to that of the standard product. Exceptions are experiments where lactitol is used (experiments 3 and 5), where a sandy consistency

is observed, as a result of impossibility to achieve good granulation of lactitol in the 5-roll refiner.

Tab. 2. Results of microbiological examinations

Examined parameters	Cocoa cream with sucrose	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5
presence of <i>Salmonella</i> species	negative	negative	negative	negative	negative	negative
presence of <i>Proteus</i> species	negative	negative	negative	negative	negative	negative
presence of <i>Escherichia coli</i>	negative	negative	negative	negative	negative	negative
presence of sulfite reducing <i>Clostridium</i>	negative	negative	negative	negative	negative	negative
presence of <i>Staphylococcus</i>	negative	negative	negative	negative	negative	negative
microorganisms count	2 - 3000/g	7000/g	6500/g	7500/g	5000/g	7000/g
aerobic sporogenic bacteria count	30-50/g	850/g	850/g	650/g	750/g	850/g
moulds and yeasts counts	Not present	Not present	Not present	Not present	Not present	Not present

Conclusion

The modern confectionery industry has a great number of natural and artificial sweeteners available which, in accordance with suitable production technology, enable preparation of high quality cocoa products for special nutritional purposes.

During the experimental work where sucrose is substituted with other sweeteners in cocoa cream, it is concluded that the obtained product is in accordance with the Book of Regulations on Dietary Products, published in "The Official Gazette of Serbia and Montenegro" number 56/03.

Dietary cocoa cream is of interest because:

- it is a new product on domestic market

- physics and chemical characteristics are satisfactory, with an exception of experiments 3 and 5, where lactitol is used as a sweetener
- these products can be consumed by diabetics and people with special nutritive needs
- industry production is possible using existing equipment for cocoa cream with sucrose, thus avoiding additional investments in new equipment.

The only imperfection of this product in comparison to the existing sucrose-containing cocoa cream is the high cost of sweeteners, especially in the case of fructose. On the other hand, some higher costs of the products can be neglected, taking into account the fact that these products are meant for people who are not allowed to consume sucrose in their diets.

References

- Gavrilović Milena (2003): Tehnologija konditorskih proizvoda, Univerzitet u Novom Sadu, Tehnološki fakultet, Novi Sad (in Serbian).
- Pravilnik o uslovima u pogledu zdravstvene ispravnosti dijetetskih namirnica koje se mogu stavlјati u promet, objavlјen u „Sl. listu SCG“ br. 56/03 (in Serbian).
- Pravilnik o mikrobiološkoj ispravnosti namirnica u prometu, objavlјen u „Sl. listu SRJ“ br. 26/93 i 53/95 (in Serbian).
- Dokumentovane metode za mikrobiološke analize, objavlјene u „Sl. listu SFRJ“ br. 25/80(in Serbian).
- Dokumentovane metode za hemijske analize, objavlјene u „Sl. listu SFRJ“ br. 41/87 (in Serbian).
- Xyrofin Fructose-Technical properties Information brochures. GB-redhill, 1992
- Carpenter J. (1984) Alternative Sweetenes, Man. Conf. 64 5 63.
- Information from internet:
www.lowcarb.ca
www.caloriecontrol.org
www.schneekoppe.com

PROIZVODNJA DIJETETSKOG KAKAO KREMA

- originalni naučni rad -

Tijana Topalović

Agronomski fakultet, Čačak

S. Damljanović

Eurolion d.o.o. profit centar Kremovi, G. Milanovac

Gordana Janković

Eurolion d.o.o. profit centar Kremovi, G. Milanovac

Z. Marković

Agronomski fakultet, Čačak

Rezime

U skladu sa trendom svetske konitorske industrije da se u konditorskim proizvodima saharoza substituiše drugim zaslađivačima i time se omogući korišćenje ovih proizvoda i licima koja ne smeju da koriste saharozu u svojoj ishrani, proizvedeni su kakao kremovi sa: fruktozom, laktitolom i ksilitolom. Dobijeni proizvodi su zadržali skoro sve fizičko-hemijske i organoleptičke osobine kako krema sa saharozom.