NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT]
ISSN: 2394-3696
VOLUME 7, ISSUE 4, Apr.-2020

THE STUDY OF THERMAL STABILITY OF MIXTURES OF COTTONSEED OIL AND LAMB FAT USED FOR DEEP FAT

SALOMOV B. KH.,
SADIKOV I. SH.,
KAMALOVA F. R.,
AVIZOV S. R.
Bukhara Engineering and Technology Institute
Uzbekistan Bukhara

ABSTRACT

In this article, the author studied the processes of thermal exposure to a mixture of cottonseed oil and lamb fat, for deep-frying. The values of fat consumption, the duration of frying pies and the quality of finished products have been found experimentally, which helps to improve the quality of flour products and increase the range of deep-fat fats. A mixture of cottonseed oil with mutton fat can be recommended as more heat-resistant.

KEYWORDS: deep-frying, oil, fat, frying, heat resistance, quantity, inactivation, production, test, experiment.

INTRODUCTION

In the manufacture of deep-fried culinary products in the field of public catering, fats are used that are heat-treated. When these organic compounds (fats) are heated, they lose their nutritional value. Vegetable oils during their processing, as well as when used in the process of cooking food under high temperature heating, undergo significant physico-chemical changes as a result of hydrolysis, thermal destruction, polymerization and oxidation. It was established that, depending on the temperature and duration of heating, the native composition of fats undergoes various depth changes - from inactivation of the natural biologically active substances contained in them to the formation of toxic compounds. Moreover, the composition of the fat itself with the same production mode can be a decisive factor in the oxidation process. The use of animal fat as a component of a mixture of fats during deep fat frying helps to increase the thermal stability of deep fat [1,4].

A mixture of cottonseed oil and lamb fat is often used in the diet of the Central Asian population. There is no data explaining the empirically established use of such a mixture of fats. Also, the quality of the mixture, its change during the roasting process, has not been investigated. There is only some data on the effect of a mixture of cottonseed oil and animal fat on the human body, so the introduction of this mixture of cottonseed oil and sheep's fat in an I: I ratio lowers blood lipid levels, provides a better ratio of albumin-globulin and lipoprotein fractions, unlike from the action of only mutton fat. However, the use of fats in the mixture helps to increase their thermal stability during deep frying.

The purpose of the study was to study the technological and physico-chemical parameters of a mixture of vegetable oils and animal fats intended for deep-frying.

The object of the study was a mixture of cottonseed oil and lamb fat. Refined cottonseed oil was used as a reference sample.

Fat mixtures of cottonseed oil with lamb fat were prepared in a ratio of 1: 1 and 1: 2, respectively. The fat was heated for 6 hours, then stored for 18 hours at a temperature of 20-300C. The used fat was filtered by settling. Fresh fat was added daily 1 time to the initial volume of the test mixture. The total duration of heating the fat was 30 hours. Samples of the studied samples were taken every 10 hours for frying and stored in dark glass at a temperature of + 4 ± 10C in a closed form. In all samples, the following values were determined: acid number — by the method of conduct metric titration; peroxide value - by the iodometric method; refractive index - by refract metric method; the total content of carbon compounds by the modified method of Golovkin and Perkel; total content of oxidation and copolymerization products by the Farrion method [2,3,5].

Simultaneously with the experimental verification of the heat resistance of the selected samples of fats and their mixtures under production conditions, the norms of fat consumption, the duration of frying pies, and the quality of finished products were determined. Fat consumption per product was determined by the difference between the amount of fat before and after frying products, taking into account their quantity. The quality of the finished products was investigated by the tasting method.

The results of the study are shown in the table.

Physico-chemical quality indicators of the studied fats

Type of fat product	Acid number, mg KOH	Peroxide value, %	Refractive index at 20^0C	Carbonyl number, mol	The content of oxidation products,%
Frying time 5 minutes, fat consumption 6.50 g					
Cottonseed oil (source)	0,19	0,18	1,4717	3,4	0,17
The same after frying for, h					
10	0,63	0,15	1,4730	20,1	0,63
20	0,90	0,09	1,4732	22,3	0,98
30	1,14	0,06	1,4738	32,5	1,40
Frying time 4 minutes, fat consumption 6.57 g					
A mixture of oil with fat 1: 2 (original)	0,64	0,14	1,4685	3,0	0,15
The same after frying for, h					
10	1,30	0,26	1,4690	24,3	0,59
20	1,49	0,18	1,4697	25,1	0,94
30	2,06	0,29	1,4700	31,6	1,10
Cooking time 4.5 minutes, fat consumption 6.50 g					
A mixture of oil with fat 1: 1 (original)	0,78	0,26	1,4695	3,10	0,16
The same after frying for, h					
10	0,93	0,32	1,4724	12,7	0,62
20	1,59	0,17	1,4731	16,8	0,81
30	1,96	0,16	1,4732	21,4	0,92
Lamb fat (source)	0,93	0,04	1,4674	2,91	0,13

x The amount of added oil left in all options 40%

The studied samples of natural lamb fat according to organoleptic and physico-chemical indicators corresponded to the requirements of GOST 25292-2017 for premium mutton fat.

Comparing the samples of lamb fat that are delivered to catering establishments with the samples of cottonseed oil in terms of oxidation performance, it can be assumed that when they are combined in lamb fat, the oxidation rate of unsaturated fatty acids will decrease during deep frying of culinary products.

In the study of samples of frequent cottonseed oil after deep-frying pies for 30 hours, it was found that the acid number increased from 0.19 to 1.14 mg KOH, the refractive index increased from 1.4717 to 1.4738, carbonyl compounds increased from 3.4 up to 32.5 mol, the total content of oxidation products insoluble in petroleum ether reached 1.40%.

In a mixture of cottonseed oil with lamb fat (1: 2), after frying the pies for 30 hours, an increase in the acid number was observed from 0.64 to 2.06 mg KOH, the refractive index from 1.4685 to 1.4700, and the peroxide value was -0 , 14 to 0.29%, carbonyl compounds -3.0 to 31.6 mol, the total content of insoluble oxidation products in petroleum ether from 0.15 to 1.10%.

In a mixture of cottonseed oil with lamb fat (1: 1), after frying the same products for 30 hours, the acid number increased from 0.78 to 1.96 mg of KOH, the refractive index increased from 1.4695 to 1.4732, the carbon compounds increased from 3.10 to 21.4 mol. The total content of oxidation products reached 0.92%.

It has been experimentally proved that the use of lamb fat, as a component of a mixture of fats and oils used for deep-frying, improves the thermal stability of the mixture. Moreover, the best option for a mixture of cottonseed oil and lamb fat as a deep fat when frying flour products is a 1: 1 ratio.

The accumulation of oxidation products in fat up to 1.00% in fat is the limit of the good quality of fat. Therefore, in the conditions of the Central Asian region, the maximum time for frying pies in cottonseed oil can be considered 20 hours, in a mixture of cottonseed oils with lamb fat (in a ratio of 1: 1 and 1: 2) - 30 hours. In addition, when frying pies in a mixture of vegetable oil with animal fat, compared with frying in pure vegetable oil, the duration of the process is reduced by 0.5-1 minute. The fat consumption per product does not change and ranges from 6.5-6.7 g both when frying in natural cottonseed oil and when frying in a mixture.

CONCLUSIONS

When using mixtures, in addition to greater thermal stability compared to pure cottonseed oil, the palatability of the finished product is also significantly improved by reducing the specific smack of oil and lamb fat always accompanying their use.

Thus, to improve the quality of flour products and increase the range of deep-frying fats, it is possible to recommend a mixture of cottonseed oil with lamb fat as more heat-resistant. The most acceptable is their 1: 1 ratio, which is recommended to be used no more than 30 hours.

REFERENCES

1) B.Kh.Salomov. The study of oil subjected to heat treatment. Materials of international scientific and practical. Conferences. “Problems of Intensification of the Integration of Science and Production” 2006 Bukhara. 275 ..- C
2) Golovkin N.A., Perkel R.L. Analysis of carbonyl compounds in oxidized fish oils. Proceedings of the ARRIAH. Vol. 27 m. 1965
3) Gamayurova V.S., L.E. Rzhechitskaya “Food chemistry: / textbook for university students /, - M:“ KDU ”,“ Dobrosvet ”, 2018. (Electronic resource) -Access mode: https: // bookonlime. 1-4 / noole / 1525 |
4) L. Aleshina, A. Mglinets, N. Uspenskaya, G. Lovacheva, N. Luchkina, A. Tregubova., Laboratory work on the production technology of catering products. Year of publication: 1987
5) Stepanova I.V. Sanitation and food hygiene. Tutorial. Release Year: 2010