

Eigenschaften der Stärken und Qualität der gefrorenen Sossen

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Während der Arbeit wurden die Eigenschaften der abtauten Sossen geprüft, wobei ausländische so wie auch in experimentellen Mengen erzeugte einheimische Sorten der veredelten Stärken genutzt wurden.

Es wurde festgestellt, dass sich die Sorten der veredelten Stärken nicht gleich zur Erzeugung der Sossen, die eingefroren werden, eignen. Einige veredelte Stärken besitzen vorzügliche Eigenschaften.

Es ist nicht unbedingt notwendig zur Erzeugung der auf's Erfrieren widerstandsfähigen Sossen die bestimmten Sorten der veredelten Stärken zu benutzen. Die als Emulsion erzeugten Sossen, bei denen Weizenmehl und Natriumkaseinat genutzt wurden, werden beim Abtauen nicht schichtenförmig.

Properties of starches and quality of frozen sauces

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The authors have examined the characteristics of thawed sauces produced by the use of both foreign starches and experimentally produced quantities of domestic kinds of starches modified with the addition of polyphosphates.

It has been established that the examined kinds of modified starches are not equally suitable for the manufacture of sauces to be frozen. Some modified starches have excellent properties.

For the manufacture of sauces resistant to freezing, it is not necessary to use particular kinds of modified starches. Sauces produced as emulsion by the use of wheat flour and sodium caseinate do not dissociate on occasion of thawing.

Les caractères des amidons et la qualité des sauces congelées

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Au cours du travail on a vérifié les caractères des sauces congelées produites en utilisant les amidons étrangers et aussi les sortes d'amidons du pays, produits dans des quantités expérimentales.

On a établi que les sortes d'amidons améliorés recherchés / examinés/, ne sont pas également propices à la production des sauces qui se congèlent. Certains des amidons améliorés possèdent des qualités excellentes.

Il n'est pas indispensable, pour la production des sauces résistantes à la congélation, d'utiliser les sortes déterminées des amidons améliorés. Les sauces produites comme émulsion en employant la farine de blé et le sodium caséux, ne se décomposent pas au cours du dégel.

Свойства крахмалов и качество замерзших соусов

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В работе проверены свойства оттаявших соусов, изготовленных как использованием заграничных, так и в экспериментальных (опытных) количествах изготовленных сортов отечественного производства облагороженных крахмалов.

Установлено, что сорта исследованных облагороженных крахмалов не одинаково годны к производству замерзающих соусов. Некоторые из облагороженных соусов обладают различными свойствами.

Не необходимо, для производства устойчивых к замерзанию соусов, использовать определенные сорта облагороженных крахмалов. Соусы, изготовленные в виде эмульсии использованием пшеничной муки и натрий казеината, не расслаиваются во время таяния.

PROPERTIES OF STARCHES AND QUALITY OF FROZEN SAUCES

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The increasing significance of modified starches in food industry was indicated by McGrawn /1974/ and Diehl /1975/.

Dependent on the modification form, they endure the activity of heat, cold and different pH values of the environment, without more expressive retrogradation characteristic for native /unmodified/ starch. They are suitable for the production of both ready-to-eat meals in cans containing up to 10 l / Reichert and Höll, 1973; Völker, 1974a and 1974b/ and frozen ready-to-eat meals / Völker, 1974a and 1974b/.

EXPERIMENTAL

Kinds of starches.- Penetroze o5011/PeA/, Penetroze o5051 /PeB/, spec. Stärke o6308 / SŠA/ and Spec. Stärke o6306 / SŠB/ were products of "Maizena" A.G. from West German Federal Republic, whereas SK1, SK2, SK3 and SK4 starches were produced in experimental quantities by a domestic factory.

The way of sauce production

Sauces were prepared on the principle of an emulsion produced by warm procedure /Pfaff, 1974/. The quantities of oil, water, sodium caseinate, salt and vinegar were always the same, being as follows: oil - 50 g, water - 500 ml, water-soluble sodium caseinate - 15 g, common salt - 8 g and vinegar - 8 ml. Kinds and quantities of starches were changed dependant on the series.

Sauce with flour: Flour was fried in 20 g of oil, to which water was added gradually, by continuous stirring. Sodium caseinate and the remaining quantity of oil were put in the mixer to which the content of the first holder was then poured out, the ingredients of the sauce being thus mixed together.

Flour - emulsion was produced in the same way but without previous frying of wheat flour. The sauces were cooked, frozen and then stored at - 15°C for 24 hours, namely six months. After thawing and heating of frozen sauces, their properties were evaluated by three experts, by using five evaluations: excellent /+++/, good /++/, satisfactory /+/, acceptable /+/-/ and unacceptable /-/-/.

The experiment was carried out in three series, each series being repeated three times. The viscosity of individual sauces in the third series, prepared by using 25 g starch - SŠA, SK1, roasted flour, unroasted flour and native starch, is determined before freezing and after freezing of the sauce which was stored for 24 hours in frozen state.

Rotary viscosimeter "ROTOVISKO RV1"-HAAKE, was used after premixing for 15 sec. The temperature of the sauce was 25°C, and the viscosity was calculated according to the formula $\eta_{\text{app}} = \frac{T}{D}$

RESULTS AND DISCUSSION

The properties of sauces from the first series, thawed after 24-hour, namely 6-month storage at -15°C are presented in Table 1. Regardless of the storage duration, differences in the properties were not established.

Table 1.

No.	Kind of starch	g	Description of sauce properties	Evaluation
1	2	3	4	5
1.	PeA	10	Without granules and	++
	SŠB	15	moderately / usually/ thick.	

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1	2	3	4	5
2.	SK1	10	Visible granules being felt in mouth.Thick.	-
	SK3	15		
3.	PeB	10	The same as No.1 but thicker	+
	SŠA	15		
4.	SK2	10	The same as No.1	++
	SK4	15		
5.	Control /Native starch/	25	Granulated	-

Sample No. 1 from the first series /Table 1/ was identical, regarding the used starches, to sample No. 6 from the second series / Table 2/, except that their quantities were changed. In the first series sample No. 1 contained 10 g of PeA and 15 g of SŠB, whereas in the second series sample No. 6 contained 15 g of PeA and 10 g of SŠB. The same was done with samples No. 7, 8 and 9 from the second series in relation to samples 2, 3 and 4 from the first series.

The properties of thawed sauces from the second series are presented in Table 2.

Table 2.

No.	Kind of starch	g	Description of sauce properties	Evaluation
1	2	3	4	5
6.	PeA	15	Without granules, moderately / usually / thick	++
	SŠB	10		
7.	SK1	15	Without granules. Thinner.	++
	SK3	10		
8.	PeB	15	Slightly granulated. Thicker.	+
	SŠA	10		
9.	SK2	15	Without granules, moderately thick.	++
	SK4	10		
10.	Control /Native starch/	25	Granulated.	-

In the third series sauces were prepared by using one kind of starch in the quantity of 25 g. In addition, the properties of sauces produced by the addition of fried flour /sample No. 19/, not fried flour / sample No. 20/, native fried starch /sample No. 21/ and native not fried starch / sample No. 22/, were also evaluated. The obtained results are presented in Table 3.

Table 3.

No.	Kind of starch	Description of sauce properties	Evaluation
1	2	3	4
11.	PeA	Thicker, granulated	+-
12.	SŠB	Thinner, without granules	+++
13.	PEB	Thick, without granules	4+
14.	SŠA	Slightly thinner, without granules	++
15.	SK1	Slightly thicker, granulated	+-
16.	SK3	Exceptionally thick, granulated	+-
17.	SK2	Thinner, without granules	+++
18.	SK4	Thicker, without granules	++
19.	Flour-sauce	Moderately thick, without granules pale-yellow	+++
20.	Flour-emulsion	Moderately thick, white	++
21.	Native starch-sauce	Thicker, granulated	-
22.	Native starch-emulsion	Thick, granulated	-

The values of apparent viscosity / η apparent / of the sauce, before and after freezing at sliding rate of $D = 49,0 \text{ sec}^{-1}$, are shown in Table 4.

Table 4.

The type of starch used	Viscosity of fresh sauces η appar./P/	Viscosity of defrozen sauces η appar./P/
SŠA	5,7	2,6
SK1	11,7	5,0
roasted flour	4,9	3,4
unroasted flour	2,0	3,2
native starch	13,1	4,4

The sauces prepared by using starches SŠA, SK1, roasted flour and native starch are more liquid /watery/ after freezing, while the sauce prepared by using unroasted flour is thicker after freezing than the same sauce before freezing.

The determined values of viscosity after freezing are in agreement with the sensoric description of the sauces given in Table 3.

On occasion of producing sauces for ready-to-eat meals to be sterilized, Reichert and Höll /1973/ recommend the use of two kinds of modified starches. Effected by heat, one kind should swell earlier and the other kind later - by the end of sterilization process. Such combination of starches for the above purpose is justifiable. The sauce remains thin during the whole heat processing period. The time of sterilization is shortened and the product is of better quality. According to our results, the use of starch combinations is not necessary in the cases when sauces to be frozen are produced. Sauces of very good properties, evaluated by the taste panel as the best ones / samples Nos 12 and 17, Table 3/, were produced by the use of modified starch SŠB or modified starch SK2 alone.

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It is known that during freezing of the gel of native starch, there takes place an appearance called retrogradation / Tressler et al., 1968/. In the starch granule, polysaccharides are connected by hydrogen bonds. When starch is heated in the presence of water to the gelatinization temperature, less firm bonds break and the granules separate one from another allowing water to come in. Linearly arranged molecules are very quickly, without any particular order, arranged into a net structure. At room temperature, irreversible gel is formed. During keeping, there appear strong tendencies to hydrogen binding between two linearly laid amylose molecules. The net becomes closer, water is separated and retrogradation appears / Schoch, 1968/. The intensity of retrogradation is measured by the gel ability to bind water after thawing. Besides the starch quality, the intensity is also dependent on the rate by which the critical freezing temperature is got over - the phase in which the largest percentage of water in a medium is frozen. The shorter is the period, less expressive is the retrogradation / Chan and Toledo, 1976/. The work of Jakobsen / 1971/ also emphasizes the importance of freezing rate.

In the conditions of our experiment, by using the temperatures of slower freezing methods - which are usually used in practice, the gels of some modified starch kinds / first of all Spec. Stärke 06306 and domestic product SK2/, in contrast to the native starch, do not undergo retrogradation during freezing. A good quality of sauce, which does not dissociate during freezing and thawing, can be produced not only by the use of modified starches or their combinations but also by the use of wheat flour. The sauce should be produced in the way described in the work: as an emulsion by the use of sodium caseinate. Sauce is of better quality if flour is previously fried / flour-sauce, Table 3, sample No. 19/. than if not heat processed / flour-emulsion, Table 3, sample No. 20/. The nature of changes which in given conditions are caused by short-term activity of heat on flour is not known to us. The activity of heat on the native starch / native starch-sauce, Table 3, sample No. 21/ in contrast to flour - is not efficient. After thawing, the sauce is granulated and unacceptable.

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