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ВЛИЯНИЕ ПРОЦЕССА ЗАМОРАЖИВАНИЯ НА ОРГАНОЛЕПТИЧЕСКИЕ ПОКАЗАТЕЛИ КУЛИНАРНЫХ ИЗДЕЛИЙ ИЗ СЛОЕНОГО ТЕСТА

INFLUENCE OF FREEZING PROCESS ON ORGANOLEPTIC PARAMETERS OF PUFF PASTRY PRODUCTS

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Аннотация. В данной статье представлено описание результатов исследования влияния процесса замораживания на органолептические показатели кулинарных изделий из слоеного теста. Исследование проводилось в два этапа. Качественные показатели экспериментальных изделий оценивались органолептическим методом. В ходе исследования было выявлено влияние условий дефростации на внешний вид, цвет, вкус, аромат и консистенцию готовых изделий. А также выбраны оптимальные условия дефростации изделий для сохранения лучших органолептических показателей в процессе производства.

Ключевые слова: тесто, слоёное тесто, заморозка, дефростация.

Abstract. The article describes the results of a study of the effect of the freezing process on the organoleptic characteristics of culinary products from puff pastry. The study was conducted in two stages. Qualitative indicators of experimental products were evaluated by the organoleptic method. The study revealed the influence of defrosting conditions on the appearance, color, taste, aroma and texture of finished products. And also the optimal conditions for defrosting products were selected to maintain the best organoleptic characteristics in the production process.

Key words: dough, puffed, frost, microwave heating, defrosting.

Introduction. Recently, in the food industry and catering, frozen semi-finished products or frozen raw materials are widely used. You must select the correct mode of defrosting raw materials or semi-finished products to obtain products with the best organoleptic characteristics. The purpose of this study is to identify the influence of the freezing process on the organoleptic characteristics of finished products from puff pastry [1]. The objectives of the study are: 1) determination of the quality indicators of finished products by the organoleptic method; 2) determination of the organoleptic characteristics of the test pieces by the organoleptic method [2, 3]. For work, two types of puff pastry were taken: yeast and yeast-free. The layers were halved. The study took place in two stages.

First step. At the first stage, one part of the yeast and yeast-free dough was thawed using microwave heating for 40 seconds at high power, and the second part was thawed at room temperature 25 ° C.

The results of the study. The dough, thawed using microwave heating, was more solid in consistency than when defrosting at room temperature. It was revealed that yeast dough thawed faster than yeast-free; the dough thawed by microwave heating has less stickiness than the dough thawed at room temperature; yeast dough is less sticky than yeast. Table 1 presents the merchandising characteristics of experimental products.

Conclusion. Based on the presented in table. 1 data merchandising characteristics, we can conclude that the yeast dough, thawed at room temperature, gives the finished product more airiness and softness than thawed using microwave heating. However, with the yeast-free situation, the opposite is observed in the case of puffs. Puffs from yeast-free dough thawed at room temperature were less lush. products from dough thawed at room temperature have a milder flavor. Despite all the advantages of using microwave heating [4], the traditional method of defrosting has a better effect on finished products.

Second phase. At the second stage of the work, semi-finished products were made from puff yeast and yeast-free dough [5], thawed at room temperature 25 ° C and under microwave heating for 30 seconds. Then the semi-finished products were frozen in two ways: shock freezing [6, 7] at a temperature of -36 ° C and gradual at a temperature of -18 ° C [8].

Table 1

Commodity characteristics of experimental products
















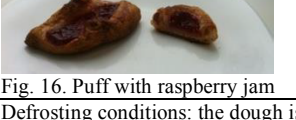
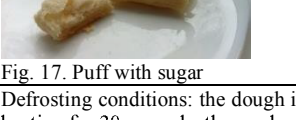
	Appearance: looks like a bow, sprinkled with sugar. Color: golden, uneven, white sugar on the surface. Odor: the smell of baked dough. Taste: sweetish taste of evenly baked dough. Consistency: crisp, soft inside.
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Fig. 1. Bows	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.	
	Appearance: the product looks like a bow, sprinkled with sugar. Color: golden, uniform, white sugar on the surface. Odor: pronounced aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: more airy, softer, firmer inside, crisp.
Defrosting conditions: the dough is thawed at room temperature 25 ° C; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.	
	Appearance: opened puffs with raspberry jam. Color: jam dark red; the dough is unevenly golden. Smell: aroma of raspberry jam and baked pastry. Taste: the sweet taste of raspberry jam, the taste of baked dough. Consistency: thickened jam; the dough is soft inside, the outside is crisp.
Defrosting conditions: the dough is thawed in the microwave for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 20 minutes.	
	Appearance: puffs with raspberry jam. Color: jam dark red; golden dough interspersed with darker shades of golden. Smell: aroma of raspberry jam and baked pastry. Taste: the sweet taste of raspberry jam, the taste of baked dough. Consistency: thickened jam; the dough is soft inside, more airy, crisp.
Defrosting conditions: the dough is thawed at room temperature 25 ° C; the product is baked in an oven at a temperature of 200 ° C for 20 minutes.	
	Appearance: air puff, looks like a loaf of bread (a rectangle with one "swollen" surface). The product is sprinkled with sugar on top. Color: light golden. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: airy, crisp on top, soft inside.
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.	
	Appearance: air puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: light golden. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: less airy, crisp, soft inside.
Defrosting conditions: the dough is thawed at room temperature 25 ° C; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.	
	Appearance: a small strudel with raspberry jam, sprinkled with sugar. Color: golden with burgundy jam. Smell: raspberry jam and baked dough. Taste: sweet, raspberry, taste of baked dough. Consistency: crisp, marmalade jam.
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.	
	Appearance: opened small strudel with raspberry jam, sprinkled with sugar. Color: pale golden with burgundy jam. Smell: raspberry jam and baked dough. Taste: sweet, raspberry, taste of baked dough. Consistency: less crisp, marmalade jam.
Defrosting conditions: the dough is thawed at room temperature 25 ° C; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.	

The results of the study. Semi-finished products were stored for two days [9]. Semi-finished products were also thawed in two ways: part at room temperature 25 ° C, part using microwave heating for 30 seconds at high power. During the defrosting of semi-finished products using microwave heating, it was noticed that semi-finished products from yeast dough, which was thawed at room temperature, noticeably darkened after microwave heating, became more liquid and sticky. Semi-finished products from yeast-free dough also had stickiness and a more fluid consistency. The following table 2 presents the merchandising characteristics of experimental products made from semi-finished products, gradually frozen at a temperature of -18 ° C.

Table 2

Commodity characteristics of experimental products

	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden uneven with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crisp, not airy inside.</p>
<p>Defrosting conditions: the dough is thawed in the microwave for 30 seconds; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.</p>	
	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crisp, not airy inside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.</p>	
	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: not crisp, slightly airy inside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.</p>	
	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crisp, slightly airy inside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.</p>	
	<p>Appearance: puffs with raspberry jam. Color: jam dark red; golden dough. Odor: aroma of baked dough. Taste: taste of baked dough. Consistency: thickened jam; the dough is soft inside, not airy, rather dry.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 20 minutes.</p>	
	<p>Appearance: puffs with raspberry jam. Color: jam dark red; golden dough. Odor: aroma of baked dough. Taste: taste of baked pastry, raspberry jam. Consistency: thickened jam; the dough is soft inside, not airy, a little dry, crispy on the outside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 20 minutes.</p>	
	<p>Appearance: puffs with raspberry jam. Color: jam dark red; golden dough. Smell: aroma of baked dough, raspberries. Taste: taste of baked pastry, raspberry jam. Consistency: thickened jam; the dough is soft inside, slightly airy, crisp on the outside.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 20 minutes.</p>	
	<p>Appearance: puffs with raspberry. Color: jam dark red; the dough is golden brown. Smell: aroma of baked dough, weak aroma of raspberries. Taste: taste of baked pastry, raspberry jam. Consistency: thickened jam; the dough is soft inside, airy, a little dry, crisp on the outside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 20 minutes.</p>	
	<p>Appearance: a cylindrical puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: pale golden. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: not airy, crisp, soft, dry inside.</p>
<p>Defrosting conditions: the dough is thawed in the microwave for 30 seconds; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.</p>	








 <p>Fig. 18. Puff with sugar</p>	<p>Appearance: a cylindrical puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: pale, almost white. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: airy, crisp, soft, dry inside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.</p>	
 <p>Fig. 19. Puff with sugar</p>	<p>Appearance: a cylindrical puff, outwardly similar to a loaf of bread. The product is sprinkled with sugar on top. Color: pale, almost white. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: less airy, crisp, soft inside.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.</p>	
 <p>Fig. 20. Puff with sugar</p>	<p>Appearance: a cylindrical puff, outwardly similar to a loaf of bread. The product is sprinkled with sugar on top. Color: pale golden. Odor: aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: slightly airy, crisp, soft, dry inside.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.</p>	
 <p>Fig. 21. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: pale, closer to white. Smell: baked dough. Taste: baked dough. Consistency: crisp, marmalade jam, not airy.</p>
<p>Defrosting conditions: the dough is thawed in the microwave for 30 seconds; the semi-finished product is frozen in the freezer, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	
 <p>Fig. 22. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: Golden. Smell: baked dough. Taste: raspberry jam, baked dough. Consistency: crisp, marmalade jam, airy consistency.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	
 <p>Fig. 23. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: pale golden. Smell: baked pastry, raspberries. Taste: sweet taste of raspberry jam, baked dough. Consistency: a little crisp, marmalade jam, not airy consistency, dry.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	
 <p>Fig. 24. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: pale golden. Smell: baked pastry, raspberries. Taste: sweet taste of raspberry jam, baked dough. Consistency: slightly crisp, marmalade jam, airy consistency, dry.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen gradually, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	

Table 3 presents the merchandising characteristics of products made from semi-finished products frozen using shock freezing at a temperature of -36 ° C.

Table 3

Commodity characteristics of experimental products

















 <p>Fig. 25. Bows</p>	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crisp, not airy inside, slightly dry.</p>
<p>Defrosting conditions: the dough is thawed in the microwave for 30 seconds; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 ° C for 15 minutes.</p>	
	<p>Appearance: A bow-like product sprinkled with sugar. Color: golden uneven with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crisp, not airy inside, slightly dry.</p>

Fig. 26. Bows	
Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 °C for 15 minutes.	
	Appearance: A bow-like product sprinkled with sugar. Color: golden with white sugar on the surface. Aroma: pronounced aroma of baked dough. Taste: The sweet taste of evenly baked dough. Consistency: not crisp, airy inside, slightly dry.
Fig. 27. Bows	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in the oven at a temperature of 200 °C for 15 minutes.	
	Appearance: A bow-like product sprinkled with sugar. Color: golden uneven with white sugar on the surface. Fragrance: baked pastry. Taste: The sweet taste of evenly baked dough. Consistency: crispy, airy inside.
Fig. 28. Bows	
Defrosting conditions: the dough is thawed at room temperature; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in the oven at a temperature of 200 °C for 15 minutes.	
	Appearance: puffs with raspberry jam, uneven. Color: jam dark red; golden dough. Aroma: the aroma of baked dough and raspberries. Taste: The sweet taste of baked dough and raspberries. Consistency: thickened jam; the dough is soft inside, a little dry.
Fig. 29. Puff with raspberry jam	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 °C for 20 minutes.	
	Appearance: even puffs with raspberry jam. Color: jam dark red; the dough is golden brown. Aroma: the aroma of baked dough. Taste: taste of baked dough, raspberries. Consistency: thickened jam; the dough is soft inside, not airy, rather dry.
Fig. 30. Puff with raspberry jam	
Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 °C for 20 minutes.	
	Appearance: puffs with raspberry jam. Color: jam dark red; the dough is golden, sometimes dark golden, closer to brown. Aroma: aroma of baked dough, weak aroma of raspberry. Taste: the taste of baked dough and raspberries. Consistency: thickened jam; the dough is soft inside, slightly airy, rather dry.
Fig. 31. Puff with raspberry jam	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in an oven at a temperature of 200 °C for 20 minutes.	
	Appearance: puffs with raspberry jam. Color: jam dark red; the dough is golden brown. Aroma: the aroma of baked dough. Taste: The sweet taste of baked dough and raspberries. Consistency: thickened jam; the dough is soft inside, airy.
Fig. 32. Puff with raspberry jam	
Defrosting conditions: the dough is thawed at room temperature; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in an oven at a temperature of 200 °C for 20 minutes.	
	Appearance: a cylindrical puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: golden with pale golden patches. Aroma: weak aroma of baked dough. Taste: The sweet taste of baked dough. Consistency: not airy, crisp, soft, dry inside.
Fig. 33. Puff with sugar	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 °C for 10 minutes.	
	Appearance: a cylindrical puff, outwardly similar to a loaf of bread. The product is sprinkled with sugar on top. Color: pale golden. Aroma: the aroma of baked dough. Taste: The sweet taste of baked dough. Consistency: not airy, crisp on top, inside soft, dry.
Fig. 34. Puff with sugar	
Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in the oven at a temperature of 200 °C for 10 minutes.	
	Appearance: smooth cylindrical puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: light golden. Aroma: weak aroma of baked dough. Taste: The sweet taste of baked dough. Consistency: airy, crisp on top, soft inside.
Fig. 35. Puff with sugar	
Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in the oven at a temperature of 200 °C for 10 minutes.	

 <p>Fig. 36. Puff with sugar</p>	<p>Appearance: a cylindrical puff, looks like a loaf of bread. The product is sprinkled with sugar on top. Color: pale golden. Aroma: the aroma of baked dough. Taste: sweet, baked pastry flavor. Consistency: airy, crisp on top, inside soft, dry.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in the oven at a temperature of 200 ° C for 10 minutes.</p>	
 <p>Fig. 37. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: Golden. Aroma: baked dough, weak raspberry aroma. Taste: sweet taste of raspberry jam, baked dough. Consistency: crisp, marmalade jam, slightly airy consistency.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	
 <p>Fig. 38. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: Golden. Fragrance: baked pastry. Taste: sweet taste of raspberry jam, baked dough. Consistency: crisp, marmalade jam, airy consistency, dry.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; the semi-finished product is frozen using shock freezing, thawed using microwave heating for 30 seconds; the product is baked in an oven at a temperature of 200 ° C for 15 minutes</p>	
 <p>Fig. 39. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: pale golden. Aroma: baked dough, weak raspberry aroma. Taste: sweet taste of raspberry jam, baked dough. Consistency: crisp, marmalade jam, airy consistency.</p>
<p>Defrosting conditions: the dough is thawed using microwave heating for 30 seconds; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	
 <p>Fig. 40. Strudel with raspberry jam</p>	<p>Appearance: a small strudel with raspberry jam. Color: pale golden. Fragrance: baked pastry, raspberries. Taste: sweet taste of raspberry jam, baked dough. Consistency: crisp, marmalade jam, airy consistency.</p>
<p>Defrosting conditions: the dough is thawed at room temperature; semi-finished product is frozen by shock freezing, thawed at room temperature; the product is baked in an oven at a temperature of 200 ° C for 15 minutes.</p>	

Findings. In semi-finished products frozen by means of gradual freezing, it was noticed that products from semi-finished products thawed by microwave heating lost their airiness and became dry. Also, stuffed products lost their pronounced raspberry flavor, or the fragrance was subtle. The color of some products was rather pale.

For semi-finished products frozen by shock freezing, it was noted that yeast semi-finished products thawed by microwave heating also slightly darkened. For semi-finished products, the dough of which was thawed in the microwave, a slight loss of flavor is characteristic. Semi-finished products from microwave were drier and slightly airy. Semi-finished products, the dough of which was thawed at room temperature, often had a paler color, but they had a more pronounced aroma, the consistency was more airy, it was not as dry as from a microwave.

General conclusions. In the course of the work, an organoleptic analysis of the quality indicators of products from puff pastry, as well as dough pieces was carried out; The influence of the freezing process on finished products is revealed. Dough thawed at room temperature is more preferable for products, since products from this dough subsequently have organoleptic characteristics higher than products from the same dough, thawed by microwave heating. The same dependence is observed for semi-finished products from puff pastry. In semi-finished products frozen at a shock temperature, more often the indicators are higher than in products frozen gradually. This is due to the features of shock freezing.

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