

***Development of technology for the production  
of chopped semi-finished products-zraz in the  
collective farm named Michurina of the  
Vavozhsky district of the Udmurt Republic***

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***Goal: Develop a production technology for enriched chopped semi-finished product-zrazy, with the addition of pumpkin processing products, and evaluate its quality characteristics.***



# ***Tasks:***

- To study the general technology for the production of semi-finished meat products on the collective farm named after Michurin of the Vavozhsky district of the Udmurt Republic.***
- To assess the quality of raw materials used in the production of combined zraz.***
- To develop a recipe, a technology for the production of zraz using pumpkin products and evaluate their quality by organoleptic and physico-chemical indicators.***
- To substantiate economically the manufactured product.***

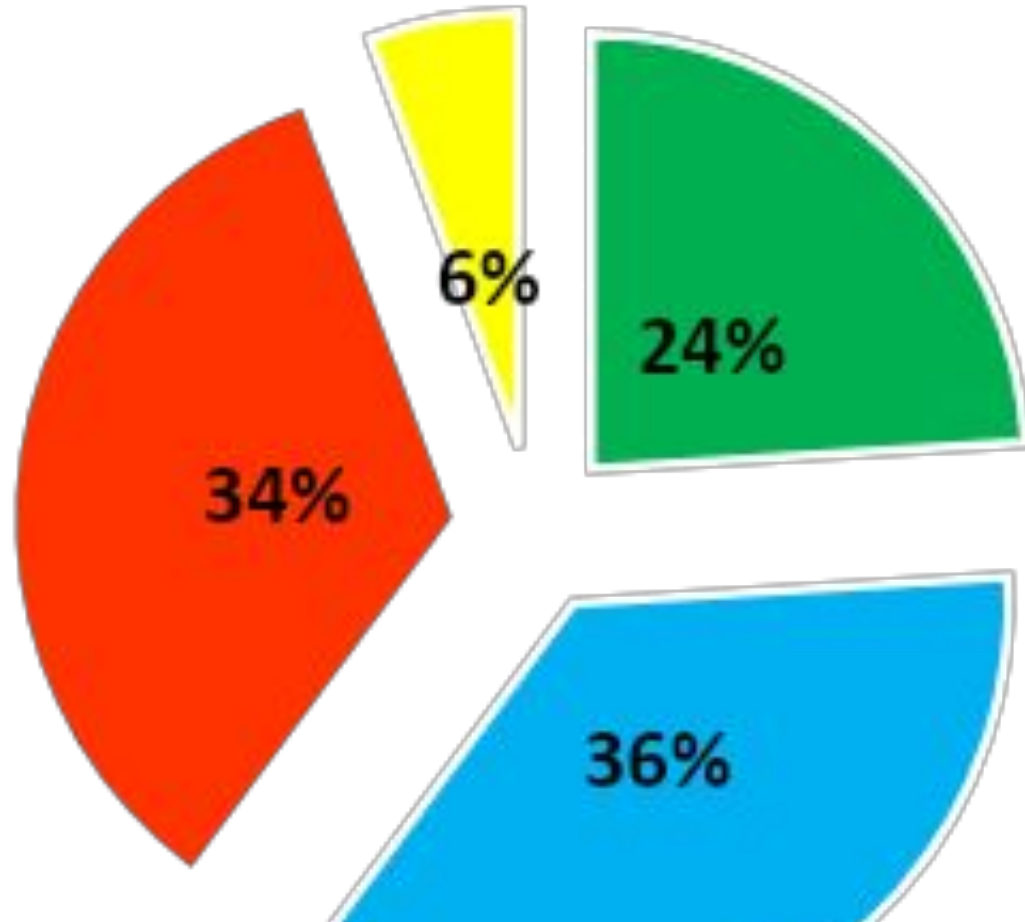
**Table 1 – Analysis of the size of production**

<b><i>Indicator</i></b>	<b><i>Year</i></b>			<b><i>Reporting year to the base,%</i></b>
	<b>2015</b>	<b>2016</b>	<b>2017</b>	
<b><i>Meat semi-finished products produced, tons</i></b>	<b>85.3</b>	<b>77.6</b>	<b>47.9</b>	<b>56.15</b>
<b><i>The average annual value of fixed assets, thousand rubles</i></b>	<b>5371</b>	<b>5878</b>	<b>6422</b>	<b>119.6</b>
<b><i>The cost of working capital, thousand rubles</i></b>	<b>4345</b>	<b>4820</b>	<b>3809</b>	<b>87.7</b>
<b><i>The average annual number of employees, people</i></b>	<b>8</b>	<b>8</b>	<b>5</b>	<b>62.5</b>
<b><i>Production area of the enterprise, sq. m.</i></b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>



# Range of products

- Natural semi-finished products
- Chopped semi-finished products
- Semi-finished dough
- Frozen Dumplings



## Research design



**Study of the technology for the production of chopped semi-finished products**

**Selection and evaluation of the quality of raw materials**

**Calculation of the recipe and development of production technology for combined zraz**

**I experimental batch**

**Pumpkin pulp flour**

- ✓ 5%
- ✓ 10%
- ✓ 15%

**control sample**

- ✓ Beef - **34.7%**
- ✓ Pork - **47.8%**
- ✓ Semolina - **5.5%**

**II experimental batch**

**Pumpkin seed flour**

- ✓ 5%
- ✓ 10%
- ✓ 15%

**Evaluation of the quality of the finished product ЛЯМ**

**Economic evaluation of results**

**Table 2 - Raw material quality assessment**

<b><i>Ingredients</i></b>	<b><i>Normative documents</i></b>	<b><i>Factual data</i></b>
<b><i>Beef</i></b>	GOST R 54315-2011	<b><i>Match</i></b>
<b><i>Pork</i></b>	GOST 31476-2012	
<b><i>Pumpkin Seed Flour</i></b>	STO 98415974-00402016	
<b><i>Pumpkin Pulp Flour</i></b>	STO 64350476-015-2015	
<b><i>Onion</i></b>	GOST 1723-15	
<b><i>Semolina</i></b>	GOST 7022-97	
<b><i>Breadcrumbs</i></b>	GOST 28402-89	
<b><i>Egg powder</i></b>	GOST R 53155	
<b><i>Eggs</i></b>	GOST 31654-12	
<b><i>Food salt</i></b>	GOST R 51574-00	
<b><i>Ground black pepper</i></b>	GOST 29050-91	
<b><i>Drinking water</i></b>	GOST R 51232-98	
<b><i>Sunflower oil</i></b>	GOST 1129	



**Mineral composition:**  
K, Na, Ca, Mg, P, Fe, Zn, Cu,  
F, Co, Mn

**Vitamins:**  
A, B1, B2, C, E,  
PP, D

**Fatty acid**



**Alimentary fiber:**  
cellulose, pectin, gum,  
mucus, lignin

**A rich source of  
complete and easily  
digestible vegetable  
protein**



**Table 3 - Recipe chopped semi-finished product - zraz**

<b>Name of raw materials</b>	<b>Control sample</b>	<b>Pulp flour 5%</b>	<b>Seed flour 5%</b>	<b>Pulp flour 10%</b>	<b>Seed flour 10%</b>	<b>Pulp flour 15%</b>	<b>Seed flour 15%</b>
<b>Beef</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>24</b>	<b>24</b>	<b>22,8</b>	<b>22,8</b>
<b>Pork</b>	<b>34,5</b>	<b>35</b>	<b>35</b>	<b>33,1</b>	<b>33,1</b>	<b>32</b>	<b>32</b>
<b>Bow</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>
<b>Egg powder</b>	<b>0,5</b>	<b>0,7</b>	<b>0,7</b>	<b>0,7</b>	<b>0,7</b>	<b>0,7</b>	<b>0,7</b>
<b>Semolina</b>	<b>4</b>						
<b>Salt</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Pepper</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>
<b>Pumpkin flour</b>		<b>3,3</b>		<b>6,2</b>		<b>8,5</b>	
<b>Pumpkin Seed Flour</b>			<b>3,3</b>		<b>6,2</b>		<b>8,5</b>
<b>Breading</b>	<b>2,2</b>	<b>2,2</b>	<b>2,2</b>	<b>2,2</b>	<b>2,2</b>	<b>2,2</b>	<b>2,2</b>
<b>Boiled egg</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>
<b>Onion (fried)</b>	<b>2,7</b>	<b>2,7</b>	<b>2,7</b>	<b>2,7</b>	<b>2,7</b>	<b>2,7</b>	<b>2,7</b>
<b>Technological water</b>	<b>8,0</b>	<b>10</b>	<b>10</b>	<b>15,1</b>	<b>15,1</b>	<b>19,3</b>	<b>19,3</b>

# *Technological scheme of production*

Raw material preparation  
(cutting, deboning, trimming)

Shredding,  $d=2-3$  MM.

Preparation of a plant  
ingredient

Cooking minced meat in a mixer, 3-6 minutes.

forming semi-finished products

Freezing (at air  $t = -30^{\circ}\text{C}$  to  $-18^{\circ}\text{C}$ ,  
3-4 hours)

Packaging, marking

Storage ( $t = -10^{\circ}\text{C}$ , no more  
than 20 days)

**Table 4 - Tasting evaluation of samples of semi-finished meat products - zraz with the addition of pumpkin**

<b><i>Ingredients</i></b>	<b>Control sample</b>	<b>5% pulp flour</b>	<b>10% pulp flour</b>	<b>15% pulp flour</b>	<b>5% seed flour</b>	<b>10% seed flour</b>	<b>15% seed flour</b>
<b><i>Appearance</i></b>	<b>4.6</b>	<b>4.6</b>	<b>4.5</b>	<b>4.6</b>	<b>5</b>	<b>4.9</b>	<b>4.8</b>
<b><i>Consistency</i></b>	<b>5</b>	<b>4.2</b>	<b>4</b>	<b>4.8</b>	<b>5</b>	<b>5</b>	<b>5</b>
<b><i>Sectional view</i></b>	<b>5</b>	<b>5</b>	<b>4.8</b>	<b>4.6</b>	<b>5</b>	<b>4.9</b>	<b>4.6</b>
<b><i>Smell</i></b>	<b>4.8</b>	<b>4.6</b>	<b>4.8</b>	<b>4.7</b>	<b>4.8</b>	<b>4.7</b>	<b>4.7</b>
<b><i>Taste</i></b>	<b>4.6</b>	<b>4.4</b>	<b>5</b>	<b>3.9</b>	<b>4.9</b>	<b>4.5</b>	<b>4.0</b>
<b><i>Color</i></b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>4.6</b>	<b>5</b>	<b>5</b>	<b>4.7</b>
<b><i>Total</i></b>	<b>29.0</b>	<b>27.8</b>	<b>28.1</b>	<b>27.2</b>	<b>29.7</b>	<b>29</b>	<b>27.8</b>

**Table 5 - Assessment of organoleptic indicators**

<b>Name of indicator</b>	<b>Semi-finished product characterization</b>		
	<b>Sample №1, pumpkin pulp 5%</b>	<b>Sample №2, pumpkin pulp 10%</b>	<b>Sample №3, pumpkin pulp 15%</b>
<b>Appearance</b>	<i>Ground homogeneous mass; without torn and broken edges evenly covered with breadcrumbs</i>	<i>conformity</i>	<i>conformity</i>
<b>Section View</b>	<i>On the cut of the product, the filling consisting of crushed eggs.</i>	<i>On the cut of the product, a filling consisting of crushed eggs.</i>	<i>On the cut of the product is a filling consisting of crushed eggs. Small inclusions of a yellow shade are visible.</i>
<b>Color, smell, taste</b>	<i>Цвет начинки не изменился, фарш имеет слегка желтоватый оттенок. Непонятный вкус и запах тыквы.</i>	<i>The color of the filling has not changed; the minced meat has a slightly yellowish tint. The incomprehensible taste and smell of pumpkins.</i>	<i>The color in the section is saturated with a yellow tint. The distinct taste and smell of pumpkins.</i>



Table 5

<b><i>Name of indicator</i></b>	<b><i>Semi-finished product characterization</i></b>		
	<b><i>Sample №4 pumpkin seed flour 5%</i></b>	<b><i>Sample №5 pumpkin seed flour 10%</i></b>	<b><i>Sample №6 pumpkin seed flour 15%</i></b>
<b><i>Appearance</i></b>	<i>Ground homogeneous mass; without torn and broken edges evenly covered with breadcrumbs</i>	<i>conformity</i>	<i>conformity</i>
<b><i>Section View</i></b>	<i>On the cut of the product is a filling consisting of crushed eggs. Slightly visible green blotches.</i>	<i>On the cut of the product is a filling consisting of crushed eggs. Visible green blotches.</i>	<i>On the cut of the product is a filling consisting of crushed eggs. Green blotches clearly visible.</i>
<b><i>Color, smell, taste</i></b>	<i>The color of the filling has not changed; the minced meat has a light greenish tint. The incomprehensible taste and smell of pumpkins.</i>	<i>The color of the filling has not changed; the minced meat has a greenish tint. Light smack of pumpkin seeds.</i>	<i>The color of the filling has not changed; the minced meat has a slightly greenish tint. Strong smell and taste of pumpkin seeds.</i>

**Table 6 - Physico-chemical indicators**

<i>Name indicator</i>	<b>GOST 32951-2014 requirements</b>	<b>Control sample</b>	<i>Pumpkin pulp samples</i>			<i>Pumpkin Seed Patterns</i>		
			<i>5%</i>	<i>10%</i>	<i>15%</i>	<i>5%</i>	<i>10%</i>	<i>15%</i>
<i>M. d. Sodium chloride,%, no more:</i>	<b>1.8</b>	<b>1.5 ±0.1</b>	<b>0.82 ±0.09</b>	<b>0.75 ±0.1</b>	<b>0.70 ±0.08</b>	<b>0.93 ±0.2</b>	<b>0.88 ±0.1</b>	<b>0.82 ±0.1</b>
<i>Product yield, %</i>		<b>94±2.0</b>	<b>98±1.9</b>	<b>98±2.0</b>	<b>94±2.1</b>	<b>94±2.0</b>	<b>96±2.1</b>	<b>92±1.9</b>

**Таблица 7 - Economic efficiency of production of chopped semi-finished product**

<b><i>Indicators</i></b>	<b><i>Unit of measurement</i></b>	<b><i>Samples</i></b>			
		<b><i>Control</i></b>	<b><i>5% pumpkin processed products</i></b>	<b><i>10% pumpkin processed products</i></b>	<b><i>15% pumpkin processed products</i></b>
<b><i>Total cost</i></b>	Руб./ц	<b>17092.97</b>	<b>18810.10</b>	<b>19815.56</b>	<b>20604.09</b>
<b><i>Including 1kg</i></b>	Руб.	<b>170.92</b>	<b>188.10</b>	<b>198.15</b>	<b>206.04</b>
<b><i>Selling price</i></b>	Руб./кг	<b>200</b>	<b>210</b>	<b>220</b>	<b>230</b>
<b><i>Gross profit</i></b>	Руб./кг	<b>29.08</b>	<b>21.9</b>	<b>21.85</b>	<b>23.96</b>
<b><i>Net profit</i></b>	Руб./кг	<b>25.29</b>	<b>19.05</b>	<b>19.01</b>	<b>20.8</b>
<b><i>Profitability</i></b>	%	<b>14.7</b>	<b>10.1</b>	<b>9.6</b>	<b>10.1</b>
<b><i>Annual production</i></b>	т	<b>10.4</b>	<b>10.4</b>	<b>10.4</b>	<b>10.4</b>
<b><i>Annual net profit</i></b>	Тыс. руб.	<b>268.02</b>	<b>198.12</b>	<b>197.70</b>	<b>216.32</b>

A decorative border of pumpkins and pumpkin slices surrounds the central text. The border consists of a top row of pumpkins, a bottom row of pumpkins, and vertical columns on the left and right sides, each containing alternating images of whole pumpkins and pumpkin slices.

## Suggestions

***1) To expand the range of manufactured semi-finished products for functional and technological purposes in the Udmurt Republic, we recommend producing chopped semi-finished products - zrazy containing 10% flour from pumpkin pulp and 5.0% flour from pumpkin seeds.***





***Thank you for attention!***