

Секция 1

Инжиниринг и цифровые технологии пищевых производств и АПК

ASSESSMENT OF THE IMPORTANCE OF FACTORS INFLUENCING THE PROCESS OF KNEADING WHEAT FLOUR DOUGH BY A PRIORI RANKING METHOD

Chertkova Anna Dmitrievna, student, Institute of Technological, Russian State Agrarian University – Ministry of Agriculture named after K.A. Timiryazev, e-mail: anya20101@mail.ru

Scientific supervisor – Makarova Anna Andreevna, Ph.D. tech. Sciences, Assistant of the Department of Processes and Processing Equipment, Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev, e-mail: a.makarova@rgau-msha.ru

Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev, Russia, Moscow, e-mail: rector@rgau-msha.ru

Abstract: the efficiency of the kneading process of wheat flour dough in the bread production line mainly depends on the design features of the kneading organ of the kneading machine, the physico-chemical parameters of the semi-finished product, the features of the formulation, as well as on the rotation frequency of the kneading organ.

Keywords: ranking of factors, evaluation, dough kneading process, kneading machine, dough moisture.

Goal. Consideration of the most important factors affecting the process of kneading wheat flour dough, as well as evaluating the degree of significance of each of them by a priori ranking.

The modern bakery is a highly mechanized enterprise. Currently, the entire technological process is based on the interconnection of machines and devices, sequentially arranged, representing a production line.

Mechanization and automation of technological operations are present at every stage of production, from the acceptance of raw materials to the direct sale of goods.

Research methodology. A systematic approach is applied, represented by analytical and computational methods, as well as the method of a priori ranking, generalization.

Considering bakery production, one of the fundamental processes for obtaining a high-quality product is kneading dough. The operation is a uniform mixing of all dry and liquid components of the formulation to obtain an elastic and homogeneous semi-finished dough.

The batch depends on a number of factors that affect the physico-chemical and organoleptic parameters of the test. So, to assess their significance, independent experts from the field were ranked, each of whom was asked to determine the degree of influence of a particular factor on the process under study in the selected assessment system, where the highest score was assigned the lowest rank.

The following factors were highlighted:

1. Room temperature;
2. Indoor humidity;
3. The initial quality of the raw materials;
4. Dough kneading time;
5. Effective dough viscosity;
6. Specific work of the batch;
7. Test temperature;
8. Test humidity;
9. Temperature of the components;
10. The "power" of flour;
11. The rotation frequency of the kneading organ
12. The torque on the shaft of the kneading body of the kneading machine;
13. The volume of water for kneading;
14. The temperature of the kneading water;
15. The number of baking improvers.

As a result of the expert assessment, a rank matrix was constructed (Fig. 1), where a_{ij} is the rank, the j th expert i is the factor.

№ фактора	Эксперты					Сумма рангов S_i	Отклонения $S_i - L$	Квадрат отклонений $(S_i - L)^2$	Среднее значение сумм рангов a_i	Ранг
	1	2	3	4	5					
X1	13	11	10	11	10	55	15,00	225,00	11	10
X2	10	12	13	10	11	56	16,00	256,00	11,2	11
X3	15	14	15	13	15	72	32,00	1 024,00	14,4	15
X4	6	7	6	5	7	31	9,00	81,00	6,2	7
X5	8	8	7	7	8	38	2,00	4,00	7,6	8
X6	7	5	9	4	4	29	11,00	121,00	5,8	5
X7	2	3	1	2	3	11	29,00	841,00	2,2	2
X8	1	1	2	1	1	6	34,00	1 156,00	1,2	1
X9	11	15	12	12	12	62	22,00	484,00	12,4	13
X10	14	13	14	15	14	70	30,00	900,00	14	14
X11	4	2	3	3	2	14	26,00	676,00	2,8	3
X12	5	6	5	8	6	30	10,00	100,00	6	6
X13	3	4	4	6	5	22	18	324	4,4	4
X14	9	9	8	9	9	44	4	16	8,8	9
X15	12	10	11	14	13	60	20	400	12	12

Figure 1 – Rank matrix

Next, the concordance coefficient W was calculated to assess the degree of consistency of the opinions of the invited experts:

$$W = \frac{12S}{M^2(N^3 - N)},$$

where S is the sum of squared deviations, M is the number of experts, N is the number of factors. When determining the coordination coefficient, the following value $W=1.18$ was obtained. Since the number of experts is less than 7, i.e. $N < 7$, the

significance of the coordination coefficient W must be established using the Fisher criterion – $F_p = 4.31$ (Fig. 2).

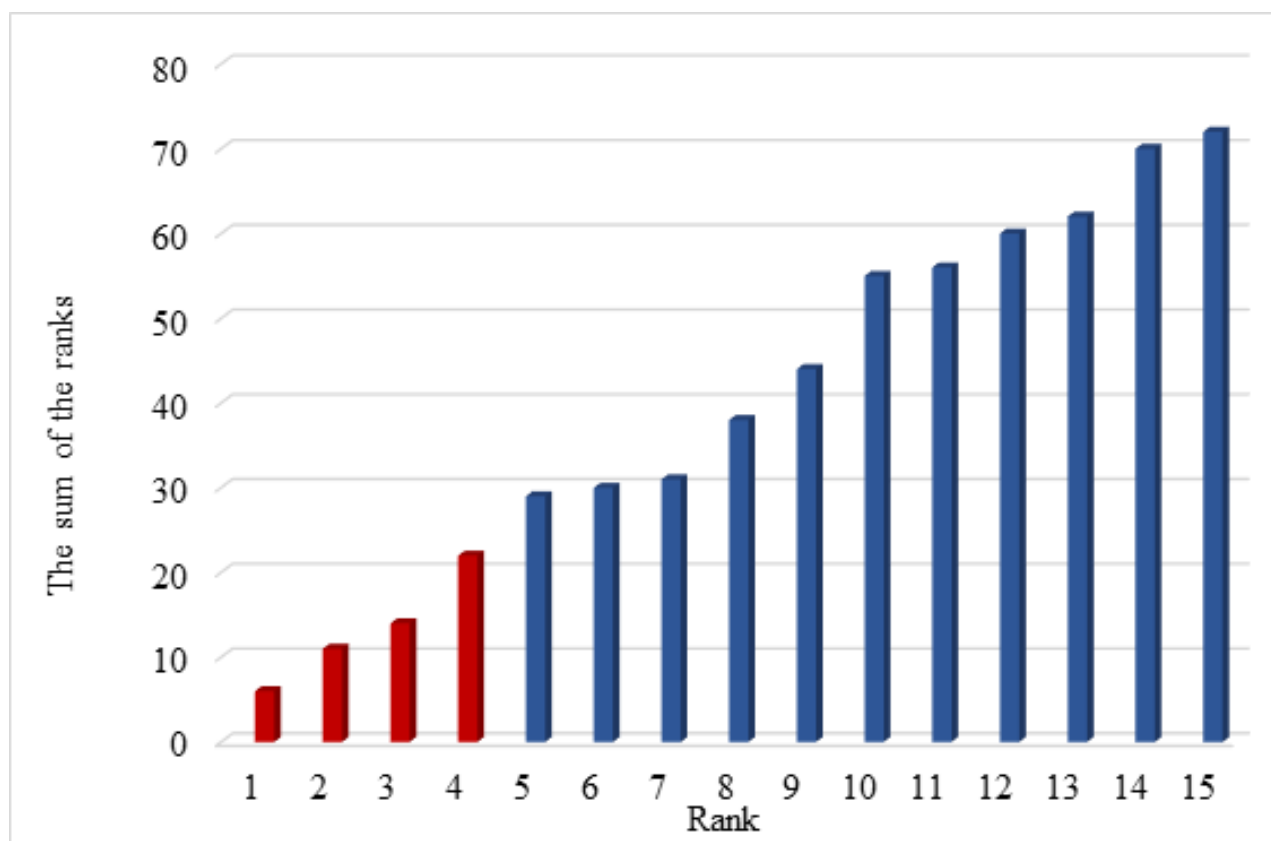


Figure 2 – Results Rank Chart

During the analysis, experts ranked a number of factors proposed by them that affect the process of kneading wheat dough, and identified the most significant ones. The degree of consistency of the results of their assumptions was also assessed.

Conclusions. Thus, it was found that the most significant factors in the process of kneading the dough are: the humidity of the dough, the temperature of the dough, the rotation frequency of the kneading organ, the volume of water for kneading. The factors that were proposed to the experts for ranking and evaluating the significance undoubtedly affect the process of kneading the dough. In the course of the work, the most significant of them were identified. Thus, when upgrading the kneading machine by replacing the kneading body, it will be possible to increase the efficiency of the process with further economic benefits. The issue of optimizing dough kneading today is raised superficially and requires a deeper studies.

Bibliographic

1. Zimnyakov, V.M. The state of production of bread and bakery products in Russia / V. M. Zimnyakov // Innovative technique and technology. - 2022. – vol. 9. – No. 4. – pp. 87-92.

2. Chertkova, A.D. Increasing resistance to microbiological spoilage of wheat bread using lactic acid starter culture based on *Lactobacillus brevis* - 78 / A.D.Chertkova // Collection: A multipolar world in the focus of a new reality. Materials of the XIII-th Eurasian Youth Forum - Ural State University of Economics, Yekaterinburg, 2023 – p. 330-035

3. Processes and devices of food technology / S. A. Bredikhin, A. S. Bredikhin, V. G. Zhukov [et al.] ; Edited by: Bredikhin S. A. — 2nd ed., revised. — St. Petersburg: Lan, 2023. — 544 p.

4. Method for producing bakery products using phospholipid concentrate of safflower oil / S. Altayuly, G. O. Magomedov, E. I. Ponomareva [et al.] // Biosciences Biotechnology Research Asia. – 2015. – Vol. 12, No. 3. – P. 2313-2318. – DOI 10.13005/bbra/1906.

5. Патент № 2425708 С1 Российская Федерация, МПК В01Д 1/22. Конический ротационно-пленочный аппарат : № 2010103078/05 : заявл. 29.01.2010 : опубл. 10.08.2011 / С. Алтайулы, С. Т. Антипов, С. В. Шахов ; заявитель Государственное образовательное учреждение высшего профессионального образования Воронежская государственная технологическая академия (ГОУ ВПО ВГТА)

6. Новиков, Н. Н. Формирование пивоваренных свойств зерна ячменя в зависимости от уровня азотного питания при выращивании на дерново-подзолистой среднесуглинистой почве / Н. Н. Новиков, А. Г. Мякинков, Р. В. Сычев // Доклады ТСХА, Москва, 01 января – 31 2010 года. Том Выпуск 283, Часть I. – Москва: Российский государственный аграрный университет - МСХА им. К.А. Тимирязева, 2011. – С. 452-456.

7. Патент № 2545298 С1 Российская Федерация, МПК В01F 7/26. Центробежный смеситель с направляющим диффузором : № 2013146116/05 : заявл. 15.10.2013 : опубл. 27.03.2015 / Д. М. Бородулин, С. А. Ратников, Д. В. Сухоруков ; заявитель Федеральное государственное бюджетное образовательное учреждение высшего профессионального образования Кемеровский технологический институт пищевой промышленности.

8. Совершенствование процесса затираания при производстве пива / В. А. Помозова, А. Н. Потапов, У. С. Потитина, М. В. Просин // Вестник КрасГАУ. – 2012. – № 12(75). – С. 191-196

ОЦЕНКА ЗНАЧИМОСТИ ФАКТОРОВ, ВЛИЯЮЩИХ НА ПРОЦЕСС ЗАМЕШИВАНИЯ ТЕСТА ИЗ ПШЕНИЧНОЙ МУКИ МЕТОДОМ АПРИОРНОГО РАНЖИНИРОВАНИЯ

Черткова Анна Дмитриевна, студентка Технологического института Российского государственного аграрного университета – МСХА им. К.А. Тимирязева, e-mail: Anya20101@mail.ru

Научный руководитель – Макарова Анна Андреевна, канд. техн. наук, ассистент кафедры процессов и аппаратов перерабатывающих производств, Российского государственного аграрного университета – МСХА им. К.А. Тимирязева, e-mail: a.makarova@rgau-msha.ru

ФГБОУ ВО «Российский государственный аграрный университет – МСХА имени К.А. Тимирязева», Россия, Москва, e-mail: rector@rgau-msha.ru

***Аннотация:** эффективность процесса замеса теста из пшеничной муки на линии производства хлеба в основном зависит от конструктивных особенностей месильного органа месильной машины, физико-химических показателей полуфабриката, особенностей рецептуры, а также от частоты вращения разминающего органа.*

***Ключевые слова:** ранжирование факторов, оценка, процесс замеса теста, месильная машина, влажность теста.*

УДК 637.52

PREPARATION OF THE CHICKEN SOUFFLE

Sataeva Zhuldyz Isakovna, PhD, Associate Professor of the Department of "Technology of Food and Processing Production" of the Saken Seifullin Kazakh Agrotechnical Research University, e-mail: julduz.kaynar@mail.ru
Zhamantay Meruert Aytugankyzy, student of the Department of "Technology of Food and Processing Production" of the Saken Seifullin Kazakh Agrotechnical Research University, e-mail: zhamantay2002@mail.ru

Saken Seifullin Kazakh Agrotechnical Research University,
Kazakhstan, Astana, e-mail: office@kazatu.edu.kz

Abstract: The article contains the technology for preparing chicken soufflé with the addition of dill, walnuts, coconut milk, and determining the organoleptic and nutritional properties of the new meat product.

Key words: chicken soufflé, nutritional value, energy value, dietary product.

The invention relates to the food industry, and just to the production of chicken soufflé. And it has the potential to be used in gluten-free, that is, in dietary products. The method involves preparing minced chicken with the addition of chicken egg yolks and coconut milk. As well as the quantitative ratio of the components of chicken soufflé.

It ensures the creation of a product containing essential nutrients that help maintain health, reducing the calorie content of the product through the use of polysaccharides, enhancing the antioxidant effect, as well as an extension content of dietary fiber and expanding the range of functional and gluten-free products [1].

In the interview "In Kazakhstan, 84% of children consume fast food and almost 20% of minors are overweight", it is said about the occurrence of overweight or obesity [2]. The main ones include: a shift in the diet, increasing the consumption of high-