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QUALITY CHANGE OF COMBINED EXTRUSION PRODUCTS DURING STORAGE

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Annotation

The results of quality changes research of new combined extrusion products, depending on receipt, packing and terms of storage are represented. The prolonged term of storage of these products is substantiated.

Problem formulation

Recently the extrusion method is widely used for making of various food products from starch and starch-containing raw material. Today with the help of thermoplastic extrusion the various assortment of this products is made with addition of wide spectrum of food additions and using of different types of packing. It is belonged to the combined extrusion products: products with the addition of fish, meat, vegetable raw material, the products, which are similar to burgers, sandwiches [1,2]. It is comparatively new products, its majority is still in the developmental stage and it has not been appearing at the food market of Ukraine.

To forming the assortment of these products a high emphasis is placed on in connection with that they are handy at using and in transporting, they are much in demand of users, they have the prolonged term of storage, during this period of time the useful properties are not weakened.

Orientation of food industry on creation of new extrusion products, which do not change the quality during the prolonged term of storage and they are characterized by the enhanced biological value is one of the most actual question of this day, directed on the improvement of the human health man.

To the study the problem of products` assortment expansion of extrusion technology, to the enhanced biological value and prolonged term of their storage the papers of Kovbasa V.M., Mironova N.G., Kobilinska O.V.,

Ukrainets A.I., Pivovarov P.P., Pritulska N.V., Rudavska G.B., Ostrikova A.N. and others [3,4,1].

A lot of methods are known today, which are able to cease the processes of the fats` oxidizations. This is the using of the special types of packing, storage temperature reduction, the using of the natural and artificial antioxidants. Some authors consider to be possible of using malt, oat, soy, lecithin, spiroulini, vitamin premix and quercitine as inhibitory of spoilage products of extrusion technology [3].

Hypothesis is set up by us about possibility of the using of the natural antioxidants of vegetable raw material (dill, parsley, garlic and chicory), which are brought into a receipt composition of the new combined extrusion products, with the purpose of ceasing of the oxidization processes.

The purpose of this work is fixing the guarantee storage term of the new combined extrusion products in the various storage conditions and in the different types of packing.

Results of researches.

The quality change of the developed products was investigated during 4 months. New combined extrusion products were investigated: sandwich «Ukrainsky» (small loaf of bread made by extrusion way with lard and garlic layer and with addition of dill or parsley), sandwich «Tourist» (the same small loaf of bread with chopped lard and garlic layer and with addition of garlic, dill or parsley), rolls «Health-giving» (with addition of succory with milk), rolls «Fairy-tale» (with addition of succory with milk and cacao). For sandwiched as a control is a small loaf of bread «With a garlic», for rolls – rolls under the name « Creamy».

Products, that created by us, have low mass part of moisture: 6–9%, that definitely limits the development of microbiological processes. The treatment in extruder at a high temperature and pressure provides elimination of all practically, even spore microform [1]. Therefore one of main reasons, that caused the loss of quality of these products and regulates the term of their storage there is the change of their fatty constituent, as a result of autoxidation . It is up to sandwiches and rolls because they contain the considerable quantity of fat (30-40%). The oxidation processes which take place in fatty faction of lipid lower the food value of the rolls and sandwiches and as the result of cutting down the terms of their storage.

It is made and the control types of products were placed for storage in the following terms:

- temperature + 4 $\pm 2^0$C, humidity 75-80%;
- temperature + 4 $\pm 2^0$C, humidity 70-75%;

- ❖ temperature + 18 ±2^{0}C, humidity 75-80%;
- ❖ temperature + 18 ±2^{0}C S, humidity 70-75%.

One part of the made rolls and the control rolls were packed in transparent cellophanes for different terms of storage, other – in the bioxalaligned polipropilene metallized packages (BOPP met. GM-200).

For sandwiches also different types of packing were used: film for the vacuum packing PE+OPA (thickness 65-90 mcm) and cellophane transparent packages (sandwich double packing); film for the vacuum packing PE+OPA and BOPP of metallized GM-200. Small loaves of bread as a control the packages cellophane transparent were used with BOPP metallized GM-200.

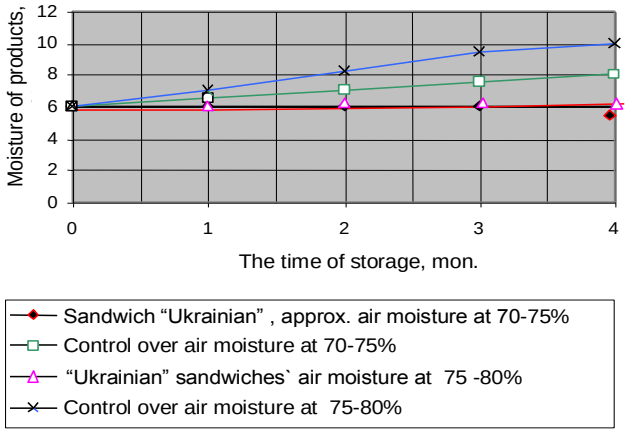
Table 1.**Tasting quality appreciation of extrusion products after 4 months of storage under t 18± 2° C is taken φ 75-80%**

№	Indexes of quality	Weight coefficient	Name of product							
			Rolls «Creamy (control)		Rolls «Health-giving»		Small loaf of bread «With a garlic» (control)		Sandwich «Ukrainian»	
			in cellophane packing	in BOPP met.	in cellophane packing	in BOPP met.	in cellophane packing	in BOPP met.	in cellophane packing	in BOPP met.
1	Original appearance	1	4,1	4,3	4,4	4,9	4,3	4,8	4,6	4,9
2	Consistence	1,5	4,4 6,6	4,7 7,05	4,4 6,6	4,9 7,35	4,1 6,15	4,8 7,2	4,6 6,9	4,9 7,35
3	Color	1	4,2	4,2	4,5	4,5	4,2	4,2	4,4	4,4
4	Smell	1,5	3,9 5,85	4,2 6,3	4,4 6,6	4,7 9,4	4,0 6,0	4,1 6,15	4,6 6,9	4,9 7,35
5	Taste	2	3,7 7,4	3,9 7,8	4,4 8,8	4,9 9,8	3,9 7,8	4,1 8,2	4,7 9,4	4,9 9,8
6	General amount of balls taking into account the weight coefficient		28,15	29,65	30,9	35,95	28,45	30,55	32,2	33,8
7	General middle balls estimation		5,63	5,93	6,18	7,19	5,69	6,11	6,44	6,76

After organoleptic indexes of the quality change of extrusion products after 2 months of storage is not revealed. It is also made and the control products have characterized for them the taste, color, aroma and consistency. Quality researches were fulfilled every 30 days, to display of the first hints of product spoilage. After 4 months of storage at the temperature of 18±2º C and average humidity of air 75-80% the control products remained without the substantial changes.

Bringing the natural antioxidants to the receipt was made for prolonging the term of their storage. Very high organoleptic quality indexes differed from the products under control that were packed in BOPP metallized GM- 200. The same ones that were packed in cellophane packages had the insignificant changes. The rolls and sandwiches have poorly expressed aroma of the used additions. The most noticeable changes happened in the control, namely: filling of rolls «Creamy», which were packed by BOPP metallized GM-200, have small stale taste, small loaves of bread «With a garlic» were less crisp. Products, which were saved in cellophane packages at the same temperature conditions had the considerable changes: rolls differed by the loosened aroma and bitterish taste, and small loaves of bread lost crisp and had stale taste (figure. 1).

Figure1. Moisture air influence upon the "Ukrainian" sandwich`s moisture, which is packed in cellophane packages under 18 ± 2 º C



As stated above the products, which contain not enough moisture – 6 - 9% [5], and therefore they are characterized by increased hygroscopic.

However in sandwiches «Ukrainian» (they are packed in vacuum film and in a cellophane package) at the temperature of storage 18 ± 2 ^{0}C the humidity is permanent during all period of storage time not depending on humidity of air. Vacuum film stopped the processes of concentrated moisture. And in the control (small loaves of bread "With a garlic") there were the considerable changes. At φ 75 – 80 % humidity of product rise up grew in 1,6 times, and exceeded possible norms over a standard [5].

A basic process which reduce a quality of food fats at storage is self-catalyzed reaction of oxidation stale, that is process of fats`autooxidation during which various undesirable tastes and smells appear – oily, lardy, oxidated, staly, fishy, metallic and so on.

Fats oxidation is possible only in presence of oxygen, oxygen absence (storage of fat-containing product in a vacuum, atmosphere of rare gases and others like that) fully exclude the oxidation processes. The high temperature accelerates the processes of oxidation. Speed of formation and dissociation hydrates is sharply increased. Ultraviolet rays increase the oxidation processes of polyunsaturated fat acids. Oxidation speed by molecular oxygen depends, also, upon the composition of fat acids. Glycerides of saturated fat acids oxidize considerably slow [6]. New extrusion products contain a vegetable refine oil (rolls) and lard (sandwich "Ukrainian"). In sandwiches, which were packed in vacuum film cellophane packages during all term of storage, at temperature 18 ± 2 ^{0} C, the fat acid number remained permanent (due to antioxidants – garlic, dill and parsley, vacuum film and containing of the saturated fat acids). The changes of acid number of fat were observed in rolls at the same terms of storage.

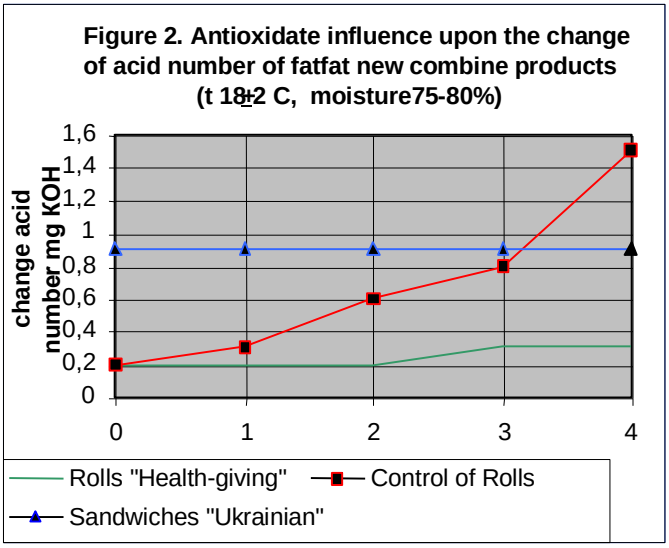


Figure 2. Antioxidate influence upon the change of acid number of fatfat new combine products (t 18±2 C, moisture75-80%)

The indexes of rolls "Health - giving" some rose, but within the limits of norm (0,3 mg KOH). In the rolls` control the amount of the investigated compounds was increased in 5,2 times it is equalized with experimental products (figure. 2).

The fat containing products, in which oxidative spoilage happened , contain peroxides RO_2 and hydro peroxides ROOH, which are the primary products of oxidation. Their presence is possible to find out long before the appearance of unpleasant smell and taste. As already said experimental products and control were packed in different types of packing – cellophane, and bi-ocsalnooriented polipropilene metallized packages (BOPP met. GM-200). For four months of storage at the temperature 18 ± 2 ^{0} C in rolls «Health - giving», which were packed in BOPP the fat superoxide number did not change. Those rolls, which were packed in cellophane transparent packages had the insignificant changes of superoxide number – within

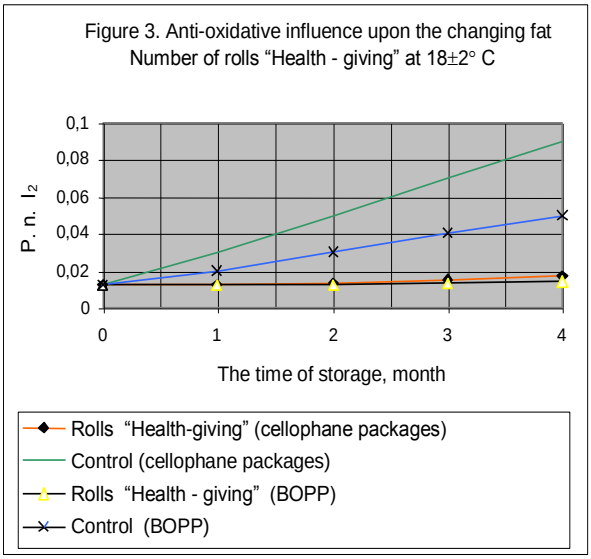


Figure 3. Anti-oxidative influence upon the changing fat Number of rolls "Health - giving" at 18±2° C

the limits of norm (0,0125). In the control, which was packed in the cellophane packing, the number of fat superoxide rose, in 7,2 times, is equal with experimental rolls and made 0,09 I_2, which is considered not possible for these products [7] (figure 3).

Abscopal activity of chicory hindered to accumulation of products of oxidation in the fatty basis of rolls «Health - giving».

Sandwiches «Ukrainian» (with addition of dill, parsley and garlic), at different terms of storage, in different types of packing had the unchanging indexes of fat oxidant number – 0,02% I_2 [8].

In according to fulfilling researches the following conclusions were done: those products, which were under a control and were packed in the cellophane packing, at the temperature of $18+2^0$C and humidity 75-80%, the guarantee term of storage (4 months) was not survived, basic indexes – humidity, oxidation and the fat acid number exceeded possible standards; experimental products due to natural antioxidants were unchanging organoleptic and physical and chemical characteristics during four months not depending upon packing and temperature of storage. Experiments after the changes of their quality during the subsequent storage are going on.

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