

Impact of type of polypropylen film on quality of packing rye bread with seeds

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Abstract

The packaging's and packaging materials that the food stuff comes in contact with, besides the protection function from the environment and the promoting and marketing ones, have to respond to an essential request specifically to the chemical stability of the packed product. The rye bread with seeds packaging in punctured and unpunctured polypropylene film contributes as well to the prolonging of the fresh maintenance of bread as a result of the slowing down of modifiers action that determines the staling of the bread but in the case of the bread packed in normal punctured foil there can be mentioned the disadvantage of alteration of the following sensorial properties: “the staling taste”, the drafting and lack of flavor. All these changes that take place during the storage are called staling and they have a considerable economic importance for the bread industry for it generally has a the most important influence on limiting the shelf life of bread products. The study contains the results of some bread packaging systems specifically the bread packaging in normal atmosphere in two ways: in unpunctured polypropylene foil and in micro punctured polypropylene foil. Almost 80% of the bread is mostly packed in polyolefin packaging's, an essential thing for: hygiene, bread protection towards deterioration and external environment actions maintenance of its preservation, providing information regarding the nutritional qualities, ingredients or other label information for the consumer.

Keywords: micro punctured foil, UV- ultra violet radiation, shelf life

1. Introduction

The packaging is the last stage in bread fabrication process. The conventional type of packaging applied in the normal bread industry uses the atmospheric air and the packaging/wrapping materials generally approved by law [1].

Packaging should be viewed as an integral part of production and conservation foodstuff. Thus, successful use of methods of conservation will be influencing polypropylene packaging film to quality and extension of validity. Packaging food is a process at least as important as any the whole range of other changes to the subject matter is first to become a finished product because without food package may be "moved" from one place to another, can not reach the market.[5].

The study contains the results of some bread packaging systems specifically the bread packaging in normal atmosphere in two ways: in unpunctured polypropylene foil and in micro punctured polypropylene foil [2].

The polypropylene chemical and mechanic features properties are very good fact that makes it a better packaging material than polyethylene. These features include: (Water, fat, acid, UV radiation, light etc.) resistance, good processing (on the packaging line), transparency, ant moisture, high printability [3]; traction resistance; specific low weight; non toxicity; smell proof [4].

2. Materials and methods

All breads for baking test was prepared from the following ingredients: wheat flour and rye from local producers, baker yeast from S.C. Rompak S.A., water, Sodium chloride, by mixing with a spiral mixer for 4 minutes at 140 rpm and for 3 minutes at 280 rpm. The dough temperature was 26° C. The dough was allowed to rise for 40 minutes at 34° C. and, after degassing and molding by hand, for 65 minutes at 34° C. The bread was subsequently baked for 30 minutes at 230° C.

After baking, the samples were cooled 3 hours in controlled atmosphere (UV lamps). After that all breads were wrapping as it follows: in regular polypropylene (PP) foil, 30 µm thick; in micro punctured (20 punctures/inch²) polypropylene PP oil, 30 µm thick. The samples were analyzed after 3 hours and after 5 days storage. For wrapping bread it was used Bag – PP regular foil (30 µm) and Bag – micro punctured PP foil (30 µm) 20punctures/inch², provided from national distributors. The analytical samples quality was determined according to the international standard methods, shown in table 1.

Table 1. Quality indicators and standard method for bread evaluation

Quality indicators	Determination method
Mass, kg	STAS 90-98
Volume, cm ³ /100g	STAS 90-98
H/D Rapport	S.R.91.2007 pct5
Porosity, %	S.R.91.2007 pct6
Elasticity, %	S.R.91.2007 pct7
Humidity, %	S.R.91.2007 pct.10
Acidity, acidity grades/100 g	STAS 90-88

The experiments are made in the research laboratory of “Ştefan cel Mare” University of Suceava, Faculty of Food Engineering and Bioresources Institute from Bucharest, Romania.

3. Results and Discussion

First of all it were determinate the analytical quality of obtained samples (table 2). The bread volume, H/D ratio, porosity, elasticity and acidity didn't show important modification. They were linked to the water content (humidity) and presented a slow value reduction. The bread samples packed in punctured foil after 3 days presented a rough/hard cover and in the section there was noticed a modification of the core, exactly the roughing of ½ of it in the cover-core direction.

Table 2. The quality indicators of bread obtained in experiments

No.	Physic-chemical determinations	Obtained values		
		Initially	5 days storage	
			Bread in unpunctured PP foil	Bread in punctured PP foil
1	Mass, kg	0,418	0,424	0,392
2	Volume, cm ³ /100 g	392	399	451
3	Ratio H/D	0,65	0,66	0,56
4	Porosity, %	88	88	87
5	Elasticity, %	99	99	99
6	Humidity, %	46,3	45,7	44,0
7	Acidity, acidity grades / 100 g	1,0	1,0	1,0

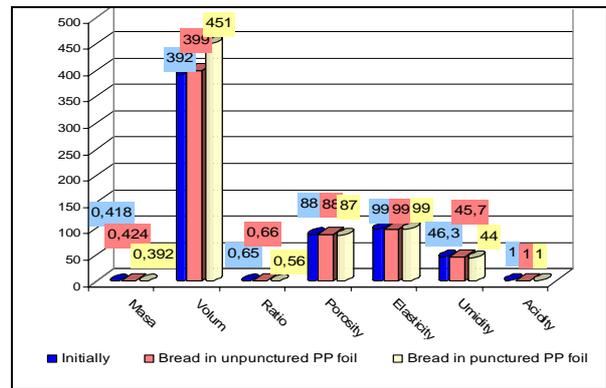


Figure 1. The quality indicators of bread used in experiments

In the fifth day mold stains started to appear on the inferior side of the bread (the “bread foot”) and the cover and ½ of the core were very rough. The low bread humidity determined the molds growth inhibition (table 3).

Table 3. The microbiological analysis of bread packed in punctured and unpunctured foil

Storage day	Yeasts and molds, cfu/g	
	Bread packed in unpunctured PP foil	Bread packed in punctured PP foil
1	< 10	< 10
2	< 10	< 10
3	< 10	< 10
4	Mold stains	< 10
5	Mold invasion	Mold stains

The bread samples packed in unpunctured foil didn't show significant modifications in 3 days. In the fourth day the samples presented yeasts and molds colonies on ¾ of the bread surface and on the fifth day strongly developed molds were observed on the entire surface of the bread. The molding process/mildew is favored by bread preservation in improper conditions respectively average air humidity greater than 80% and temperatures between 24 and 30° C.

The spores on the cover's surface germinate in the conditions in which the cover arrives at the minimum humidity necessary for this process, then the mold gradually penetrates through the spores the core of the bread spreading throughout it. Through mold development a series of processes are started: the bread loses in weight, its appearance is modified due to the characteristically colored mold colonies, and the taste is altered as a result of the action of some compounds produced by the mold that imprints in the bread the characteristic taste of it making it improper for consumption.

In the case of bread packaging in plastic bags the spreading of the spores found on the cover can be favored these ones being able to produce a massive molding also favored by the relative high air humidity in the waterproof package.

4. Conclusion

The conclusions that can be derived after the experiments led on the bread packed in micro punctured foil present on one hand the advantage that it increases the microbiological shelf life but on the other hand the disadvantage of alteration of sensorial properties: "the staling taste", the drafting and lack of flavor.

All the unwilling changes that take place during the storage are called staling. The staling has a considerable economic importance for the bread industry for it limits the shelf life of bread products.

The staling is a complicated process that involves changes for all the bread's components and actually there is a sensorial answer for all these changes called "the staling taste". While facts like the decrease of flavor and the dry taste sensation are measured through the testing of staled bread taste the common method used by the consumer is the "test of pressuring" in which the staling equals the resistance appeared at the hand pressure upon a slice of bread during its storage.

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