

RESEARCHES REGARDING THE QUALITY OF SOME ASSORTMENTS OF LACTO-FERMENTED VEGETABLES TRADED IN THE MUNICIPALITY OF IAȘI

CERCETĂRI PRIVIND CALITATEA UNOR SORTIMENTE DE LEGUME LACTOFERMENTATE, COMERCIALIZATE ÎN MUNICIPIUL IAȘI

BECEANU D., ANGHEL Roxana Mihaela

University of Agricultural Sciences and Veterinary Medicine Iași, Romania

Abstract. *Pickling is a semiconservation method by which they try to obtain the necessary concentration of lactic acid in a saline solution, through bacterial fermentation, starting from the glucides existing in products. In this paper we made a comparative study between lacto-fermented products from the commercial network and lacto-fermented products obtained in a different way (iodated/non-iodated salt) through the household pickling method. All in all, we had 14 samples of lacto-fermented products, 9 samples from supermarkets and 5 samples of sauerkraut with iodated and non-iodated salt. During the carrying out of the study, we also followed the highlighting of iodated salt's effects on the conservation process of vegetables by pickling. Through the chemical analyses and the physical determinations effectuated, we tried to show the differences existing between the products purchased from the commercial network and those obtained by household pickling.*

Key words: quality of vegetables, lacto – fermentation, processing

Rezumat. *Murarea este un procedeu de semiconservare prin care se urmărește obținerea, în soluție salină, prin fermentație bacteriană, a unei concentrații necesare de acid lactic, pornind de la glucidele existente în produse. În prezenta lucrare s-a realizat un studiu comparativ între produse lactofermentate din rețeaua comercială și produse lactofermentate obținute diferențiat (sare iodată/neiodată) prin procedeul de murare casnică. În total au fost 14 probe de produse lactofermentate, 9 probe din supermarketuri și 5 probe de varză murată cu sare iodată și neiodată. Pe parcursul efectuării studiului s-a urmărit deasemenea punerea în evidență a efectelor pe care le are sarea iodată asupra procedeeului de conservare a legumelor prin murare. Prin analizele chimice și determinările fizice efectuate am încercat să punem în evidență deosebirile care există între produsele cumpărate din rețeaua comercială și cele obținute prin procedeul de murare casnică.*

Cuvinte cheie: calitate legume, lactofermentare, prelucrare

INTRODUCTION

Lacto-fermentation is a conservation method known from times immemorial. In Romanian, the terms pickles and brine (the covering liquid) derive from the Latin words *muria*, *murationum* (pl) that referred to products fermented in sea water concentrated in salts by boiling. (Beceanu D., 2005, 2003,)

At present, there exists a culinary and food tradition related to these

products in all areas of the world, among which Korea might occupy the most important place. They consider that Romanian could obtain the necessary quantity of vitamin C during the cold season by consuming pickles, especially cabbage (keeping the terminology for 2000 years). (Beceanu D., 2009, 2008)

Though many people consider it to be a more or less spontaneous process, in fact it is a complex technology more evolved the greater the quantities of vegetables for the supply of a larger community.

MATERIAL AND METHOD

As a study material, we used 14 samples of lacto-fermented products: a sample of pickled autumn tomatoes, 3 samples of pickled cucumbers and 10 samples of sauerkraut. The samples under analysis are presented in table 1.

Nine out of ten samples (table 1) were packed in vacuumed bags and 5 were packed in PET containers. In the table, we mention the ingredients (water, salt, spices, preservatives etc). The manufacturing companies are both Romanian and foreign (9 variants) to which we add 5 variants pickled in household conditions, each of them different by the type of salt used (Salrom – iodated cooking salt, Xion and Niki – iodated sea salt, Albito and Elcirom – non-iodated cooking salt).

RESULTS AND DISCUSSIONS

From chemical analysis, physical and organoleptic assessment determinations were obtained the following results:

The content of titrating acidity (table 2) registered values between 0.6g lactic ac./100g of product (pickled cucumbers RN) and about 2.0 g lactic ac./100g of product (sauerkraut D P). The maximum extreme has the highest (positive) deviation from average (about 0.9g lactic ac./100g of product).

Table 2

Titrateable acidity and vitamin C content of commercial network products

Nr. crt.	Product	Titrateable acidity (g ac. lactic/100 g prod)	Vitamin C (mg/100 g prod)
1	Pickled cucumbers Roadele Naturii	0,59	1,23
2	Pickled autumn tomatoes Roadele Naturii	0,69	1,69
3	Sauerkraut Roadele Naturii	0,59	2,11
4	Pickled cucumbers Putina Soacrei	0,79	1,23
5	Sauerkraut Putina Soacrei	1,48	5,10
6	Sauerkraut Mama Nina	1,28	1,23
7	Pickled cucumbers Dorsvet Plus	0,88	10,03
8	Shredded cabbage Dorsvet Plus	1,28	9,32
9	Head cabbage Dorsvet Plus	1,97	5,45

Table 1

The products under analysis

Nr. crt.	Product	Net mass (g)	Producer Distributor	Ingredients	Package
1	Pickled cucumbers Roadele Naturii	504	OVM TOTAL 2003 S.R.L.	cucumbers, water, salt, dill	Vacuum
2	Pickled autumn tomatoes Roadele Naturii	1020	OVM TOTAL 2003 S.R.L.	autumn tomatoes, salt, dill	Vacuum
3	Sauerkraut Roadele Naturii	814	OVM TOTAL 2003 S.R.L.	cabbage, salt, dill	Vacuum
4	Pickled cucumbers Putina Soacrei	738	S.C. MAGIC RADU S.R.L. București	Cucumbers, water, salt, horseradish, dill	Vacuum
5	Sauerkraut Putina Soacrei	2082	S.C. MAGIC RADU S.R.L. București	cabbage, salt, dill	Vacuum
6	Sauerkraut Mama Nina	2000	FIX CO S.R.L.; București	Cabbage, water, salt, dill, spices: potassium sorbate	Vacuum
7	Pickled cucumbers Dorsvet Plus	500	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	Cucumbers (7-12 cm), brine (water, salt, spices, preservative E 202	Vacuum
8	Shredded cabbage Dorsvet Plus	1000 g	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	White cabbage shredded, mixed spices, brine water, salt, preservative E 211, 224	Vacuum
9	Head cabbage Dorsvet Plus	1000	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	White cabbage, salt, water, preservative E 211, E 224	Vacuum
10	Sauerkraut with salt Salrom	5000	Household pickling	Cabbage, salt, water	PET Container
11	Sauerkraut with Xion	5000	Household pickling	Cabbage, salt, water	PET Container
12	Sauerkraut with salt Niki	5000	Household pickling	Cabbage, salt, water	PET Container
13	Sauerkraut with salt Albito	5000	Household pickling	Cabbage, salt, water	PET Container
14	Sauerkraut with salt Elcirom	5000	Household pickling	Cabbage, salt, water	PET Container

The content of ascorbic acid (table 2) ranged between 1.2 and 10.0 mg/100 g of product, the average of variants being about 4.2 mg/100 g of product. We noticed 5 variants with very low values, 2 variants with a content close to average (PS sauerkraut and DP pickled head of cabbage), and two variants with a double content as compared to average (DP pickled cucumbers and DP shredded sauerkraut).

The sauerkraut pickled in household conditions (table 3) registered practically the same values of lactic acidity (values a third smaller than the average of manufactured products) though the 5 variants were different by the types of salt used.

For the variants pickled in household conditions, the average content of ascorbic acid (table 3) is three times higher due to the lack of additional conservation treatments using high temperatures. In this case too, we noticed maximum values of 18.4 mg/100 g of product for the sauerkraut pickled with Niki salt and minimum values of about 9.2 mg/100 g of product for the variant pickled with Elcirom salt. There is no obvious correlation between the content/lack of iodine additives and the ascorbic acid content.

Table 3

Titrateable acidity and vitamin C content of household pickling

Nr. crt.	Product	Titrateable acidity (g ac. lactic/100 g prod)	Vitamin C (mg/100 g prod)
1	Sauerkraut with salt Salrom	0,69	14,9
2	Sauerkraut with Xion	0,69	16,5
3	Sauerkraut with salt Niki	0,69	18,4
4	Sauerkraut with salt Albito	0,69	16,5
5	Sauerkraut with salt Elcirom	0,69	9,15

The average percentage content in NaCl (table 4) was 2.33%. We noticed 2 variants with half the average content (DP sauerkraut), 6 variants close to average and one single variant with double values as compared to average (RN sauerkraut).

The pickled products based on cabbage had an average content of soluble dry substance (about 4.7 °Bx) superior to those based on cucumbers (4.2°Bx), and autumn tomatoes (4°Bx).

The total dry substance registered a value of 5.8 %, and we noticed 6 values inferior or close to average and only 3 values superior to it (DP pickled head of cabbage, PS sauerkraut and RN sauerkraut).

The values corresponding to the SUS content do not proportionally and wholly correspond to SUT values.

Table 4

Salt, soluble dry substance and total dry substance content in commercial network products

Nr. crt.	Product	NaCl %	SUS Bx	SUT %
1	Pickled cucumbers Roadele Naturii	2,52	4	5,11
2	Pickled autumn tomatoes Rodel Naturii	2,61	3	5,94
3	Sauerkraut Roadele Naturii	4,11	4,6	8,28
4	Pickled cucumbers Putina Soacrei	2,59	5,2	5,15
5	Sauerkraut Putina Soacrei	2,04	3	6,96
6	Sauerkraut Mama Nina	2,34	4,8	5,95
7	Pickled cucumbers Dorsvet Plus	2,50	5	4,40
8	Shredded cabbage Dorsvet Plus	1,20	5	4,25
9	Head cabbage Dorsvet Plus	1,14	5,8	6,05

For the sauerkraut pickled in household conditions (table 5), the average of the 5 variants is about 2.5 g NaCl %, noticing that there are 3 values closer to average as well as two variants having a content of ± 1 g NaCl % (sauerkraut pickled with Salrom salt and the one pickled with Elcirom salt). We may notice a predominance of superior percentage values for the variants pickled with iodated salt.

The total dry substance of the household variants registered an average of 5.6 %, with more important positive deviations for the sample pickled with Xion salt and negative for the sample pickled with Elcirom salt.

Table 5

Salt, soluble dry substance and total dry substance content in products of household pickling

Nr. crt.	Product	NaCl %	SUS ⁰ Bx	SUT %
1	Sauerkraut with salt Salrom	3,02	4,2	5,44
2	Sauerkraut with Xion	2,74	4,6	6
3	Sauerkraut with salt Niki	2,39	4,6	5,70
4	Sauerkraut with salt Albito	2,15	4,6	5,84
5	Sauerkraut with salt Elcirom	2,09	4	5,25

As for the sensorial analysis, there were no deficiencies in terms of content. As deficiencies related to the colour of products, we notice a certain non-uniformity of it for the PS sauerkraut, MN sauerkraut, DP pickled cucumbers. As for consistence, there are deficiencies for the PS pickled cucumbers (that are partially soft). Taste registered deficiencies in the case of RN pickled autumn tomatoes and PS pickled cucumbers (an intense salty taste), as well as the DP sauerkraut (very sour taste).

CONCLUSIONS

1. We notice an obvious difference between the products conserved by lacto-fermentation and pasteurization existing in the commercial network and the household products (thermally untreated) for all parameters, especially in terms of content of ascorbic acid.

2. The variants produced in household conditions registered differences following the use of some different types of salt (non-iodated, additivated cooking salt or iodated sea salt).

3. Though the products obtained in household conditions stand out (in our case) by superior features, we must appreciate the steady quality of the existing sterilized products and their stability within the validity term.

4. In the commercial network, products subjected to the sensorial qualitative control did not have major differences, except some colour non-uniformities and excessively intense tastes (salty or sour).

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