COMPARATIVE STUDY IN TERMS OF SENSORY USING POLYPHENOLS ENRICHED EXTRACTS FROM GRAPE POMACE, BEETROOT AND RED ONION IN MINCED MEAT

BISBOACA S.E., BARA V.

University of Agriculture and Veterinary medicine Cluj-Napoca – Faculty of Veterinary medicine – Department of Pharmacology and Toxicology arleena@gmail.com
University of Oradea – Faculty of Environmental Protection University of Oradea

Abstract

Antioxidants play an important role in food, preventing their oxidation, thereby extending the validity of commercial products by delaying the appearance of foreign taste and color change. The natural and synthetic antioxidants added together have a greater effect than the sum of their mathematical form as a synergetic system. Plant tissues contain a great variety of hydroxylate flavonoids and other phenolic compounds from traces to grams/kg. This study is referred at these phenols, how to valuate them and study their antioxidant activity. A part of the phenolic compounds have a good antioxidant activity, some inhibits LDL in vitro. Recapture the phenols from grape pomac, red onion and beetroote is considered an advantage and may have a large utilization in meat processing.

Key words: natural antioxidants, grapes, red onion, beetroot, meat products,

INTRODUCTION

The latest trend all around the world is to use natural plant extracts in disfavor of synthetic chemicals. Antioxidants play an important role in food, preventing their oxidation, thereby extending the validity of commercial products by delaying the appearance of foreign taste and color change. The natural and synthetic antioxidants added together have a greater effect than the sum of their mathematical form as a **synergetic system**.

Introducing natural antioxidants in meat products, increases the nutritional value by bringing a health benefit to the consumers, reducing the dose of synthetic antioxidants that are currently used.

Food can be considered as environment factor in which man contracts close throughout its existence. The oldest and most important relationship is determined by the fact that food provide to body nutrients that are necessary for life processes, to ensure essential energy for their synthesis and repair antiaging process, to form active substances (hormones, enzymes) that promote normal development of metabolic processes.

Proper nutrition requires the performance of other essential conditions, namely: consumer products be free of harmful agents or they may be found in safe concentrations for the body after being ingested. There are some situations when foods containing these harmful agents becoming

the factors undermining the health and even disease. Some are biological agents (bacteria, viruses, parasites), and some chemicals are toxic, mutagenic or carcinogenic.

Toxic substances in food have always concerned foods specialists but in recent decades agriculture chemical processing, environmental pollution, industrialization scale ever greater use of many food products have created an added dimension to this problem, with direct implications on the state of consumer's health. The presence of toxic substances takes the form of increasingly diverse and increasingly complex.

Antioxidants are substances which prolong the shelf life of food (life) by protecting them against oxidation damages(rancid taste, color change).

When choosing an antioxidant we should keep in mind the following: consistency with the food, the type of food processing , solubility and dispersabily of the antioxidant, product color change, acidity or alkalinity of the food, application of the antioxidant, concentration, the food processing temperature, presence of prooxidant factor**.**

For meat processing industry, antioxidants can be used especially in high fat content products like sausages, salami, ham, bacon and others. Most common chemical antioxidants that are used in meat processing technology are BHT and BHA, chelating agents like EDTA, citric acid, phospholipids, polyphosphates, ascorbic acid, etc. Many of them have well known negative side effects for human health, and are still used in food industry due to low costs.

Using natural antioxidants from a variety of fruits and vegetables extract can be healthier and the provides the same antioxidant protective effect in meat products.

The paper proposes a comparative experimental study on the synthesis and evaluation of comparative composition of phenolic compounds and their antioxidant capacity in samples of grape marc, beetroot and red onion.

MATERIALS AND METHODS

The raw material comes from different geographical areas of Romania from different varieties of plants:

1. grape pomace(skin, seeds)
2. beetroot
3. red onion.

The **polyphenolic extracts** were prepared by ethanolic extraction up to 65 °C. The ethanol was evaporated with a Buchi R 153 Rotavapory and the resulted extract was used for the experiment.

We took on study **fresh pork meat** from animals slaughtered in abattoir unit Tulca, Bihor county, Romania. The animals slaughtered were from the Landrace breed, slaughter weight of 120 kg. The meat has been checked and approved veterinary. Minced meat was obtained under the Meat Processing Technology Laboratory of Faculty of Environmental Protection University of Oradea, with meat grinder Dadaux Classic brand 82 machine-type and mixer Dadaux mark type of PMX-60. Heat treatment was performed using duplicate brand boiler Zasada.

Organoleptic characteristics of meat:

The appearance and color of meat is estimated to daylight. Meat color can vary from pale pink to dark red depending on the muscles type. The intensity and color hue is on myoglobin content, hemoglobin and chemical status of the muscle pigment.

Organoleptic characteristics of polyphenoli extracts:

Organoleptic characteristics has been achieved in terms of visual appearance and color. The smell was made according to principles of sensory analysis in wich was followed the foreign odors.

Organoleptic characteristics were performed on fresh extracts after 15 days and 30 days.

Determination of physical – chemical properties of the extracts

Total polyphenol content was determined by Folin-Ciocalteu method. Polyphenolic extracts from grape pomace were coded as follows: Aiud winery Logos: pr 1, pr 2, pr 3, winery Minis Pancota: pr 6, 7 and Urr winery Santimreu : pr 4, pr 5 .Sample noted with S was from beetroot extract and red onion sample with C.

There has been diluted 1: 10 in all samples, then were centrifuged at 6000rpm for 30 min. Supernatant was harvested from 100 ml to a new dilution 1: 10.

Folin Ciocalteu reagent was prepared with 24 hours in advance. For color reaction for each sample in hand it was 1700 ml distilled water, 200 ml diluted Folin Ciocalteu 1:10, 100 ml sample, which was added to 1000 ml over Na2CO3. After 2 h in the dark was reading the absorption at E: 765 nm. All tests were performed in duplicate.

Determination of microbiological characteristics of extracts: Methods for microbiological examination and maximum permissible values of determined parameters from the grape pomace extracts, beetroot and red onions are presented in the table below:

Table 1

Microbiological determinations of samples:

	Allowable value	Method
Total coliform bacteria	-	ISO 4831/2006
Escherichia coli g/ml	-	SR ISO 16649-1/2007
Salmonella /25g	-	SR EN ISO 6579/2003
Staphylococcus positive g/ml	-	SR EN ISO 6888-1/2005
Yeasts and molds g/ml	-	SR ISO 21527-1/2009

Microbiological characteristics were performed on on fresh extracts after 15 days and 30 days.

Fresh minced meat was treated with the polyphenolic extract from grape pomace, the beetroot and red onion. There have been 2% extract concentration. From each extract were taken 40 ml solution with a concentration of 50% soluble solids that were dissolved in 80 ml distilled water. The solution obtained was integrated into minced meat mass.

The samples were marked as:

A1 - control sample without plant extract, blank, A2 - sample of red beet extract, A3 - sample extract red onion, A4 - sample extract from red grapes, A5 - white grape extract sample.

The samples were analized in organoleptic properties , especially fresh meat color preservation. The above samples were carried out under boiling 15 g of each at 100 ° C for 15 minutes. All the initial samples were subjected to roasting sunflower oil at 240 º C for 10 minutes 15 g of each.

RESULTS AND DISCUSSION

Organoleptic characteristics of the extracts obtained:

Determining the layout was done visually, the garepe pomace extracts have reddish-brown, red-burgundy, depending on the type of grapes which was obtained, with viscous liquid appearance, opalescent, astringent aroma and flavor with tanninic smell.

Fig.1 Grape pomace samples diluted 1:10

Beetroot extract is liquid viscous, gelatinous, dark red-purple appearance, beetroot specific flavor, sweet astringent taste.

Red onion extract solution looks as a pink-red liquid, with aroma and flavor of onions and a strong smell of onions.

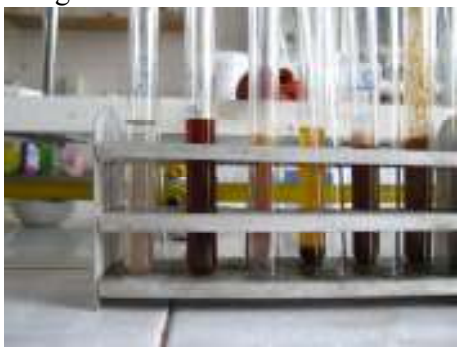

Fig. 2 Red onion and beetroot extrats diluted 1:10

Determination of physical – chemical properties of the extracts

Total polyphenol content was determined by Folin-Ciocalteu method Readings were made at 765 nm spectrophotometer UVmini - Shimadzu 1240:

Table 2

Total polyphenols

Sample	Abs1	Abs2	Media	mg GAE/ml	X 100 dilution factor mg GAE/ml
Pr1	0.760	0.820	0.790	0.7379	7.379
Pr2	0.777	0.789	0.783	0.7309	7.309
Pr3	0.297	0.323	0.310	0.2579	2.579
Pr4	0.731	0.764	0.747	0.6954	6.954
Pr5	0.963	0.875	0.919	0.8669	8.669
Pr6	0.950	0.852	0.880	0.8489	8.489
Pr7	0.819	0.811	0.815	0.7629	7.629
S	0.109	0.024	0.066	0.0144	0.144
C	0.053	0.054	0.053	0.0009	0.009

Microbiological Properties:

For all the samples was carried out microbiological examination. Results of microbiological tests performed are presented in the following table:

Table 3

Mirobiolagical rezults on fresh extracts

	Allowable value	Pr1	Pr2	Pr3	Pr4	Pr5	Pr6	Pr7	S	C
Total coliform bacteria	-	0	0	0	0	0	0	0	0	0
Escherichia coli g/ml	-	0	0	0	0	0	0	0	0	0
Salmonella /25g	-	0	0	0	0	0	0	0	0	0
Staphylococcus positive g/ml	-	0	0	0	0	0	0	0	0	0
Yeasts and molds g/ml	-	0	0	0	0	0	0	0	0	0

Table 4

Mirobiolagical rezults on 15days extracts

	Allowable value	Pr1	Pr2	Pr3	Pr4	Pr5	Pr6	Pr7	S	C
Total coliform bacteria	-	0	0	0	0	0	0	0	0	0
Escherichia coli g/ml	-	0	0	0	0	0	0	0	0	0
Salmonella /25g	-	0	0	0	0	0	0	0	0	0
Staphylococcus positive g/ml	-	0	0	0	0	0	0	0	0	0
Yeasts and molds g/ml	-	0	0	0	0	0	0	0	0	0

Table 3

Mirobiolagical rezults on 30 days extracts

	Allowable value	Pr1	Pr2	Pr3	Pr4	Pr5	Pr6	Pr7	S	C
Total coliform bacteria	-	0	0	0	0	0	0	0	0	0
Escherichia coli g/ml	-	0	0	0	0	0	0	0	0	0
Salmonella /25g	-	0	0	0	0	0	0	0	0	0
Staphylococcus positive g/ml	-	0	0	0	0	0	0	0	0	0
Yeasts and molds g/ml	-	0	0	0	0	0	0	0	0	0

The minced meat samples treated with polyphenolic solution 2%, were identified on following organoleptic changes such as heat treatment. Sample A1 fresh minced meat without plant extract, has pale pink aspect, smell and flavor of fresh pork meat. The termic treatment on sample A1 suffer discoloration as in specific thermal treatments, such as gray color meat with gray-non commercial aspect, specific smell and taste.

The sample A2, fresh beetroot extract treated minced meat has strong red color, odor and flavor of fresh pork, they are not influenced by the addition of plant extract. In both heat treatment, boiling and roasting specifically red meat remains fresh red-pink look, smell and taste is not influenced by the addition of plant extract.

The sample A3, fresh onion extract minced meat has specific aspect of fresh pork meat with onion flavor and smell. The heat treatment has changed the color appearance, preparation in yellowish-gray appearance, has taste and smell of onions.

The sample A4, red grape pomace extract minced meat, fresh sample has intense red color, odor and flavor of pork, which are not influenced by the addition of plant extract. The heat treatment maintains its red color sample, taste and smell are specific to heat treatment meat.

The sample A5, white grape pomace extract minced meat, fresh preparation is pink-yellow, odor and flavor of fresh pork meat. In both heat treatment by boiling and roasting, to maintain the appearance of pink-yellow flesh, taste and smell of meat being subjected is specific to termic treatments.

According to the obtained results from conducted laboratory tests, the extracts rich in polyphenols are not at any toxicological risk to be used as food additive.

According to the results are grape pomace extracts have a significantly higher content of total polyphenols than beetroot extract and

red onion extract. This is because in one kg of grape pomace come pericarp, seeds and bunch from about 8-10 kg of grape.

In fresh extracts the amount of total polyphenols is higher and decreases over time. This is revealed by the difference between samples 1, 2 and 3, the third test being 2 years old.

The highest quantity of total polyphenols was determined in the extract of white variety from the vineyard Feteasca Szentimre Bihor county. This value is influenced primarily by the traditional method of wine making technologie used in wine cellar from Szentimre compared to modern technology used in Minis and Logos. In base of the traditional wine making techonologie results an extract richer in polyphenols.

As a result of polyphenols extraction with alcohol at moderate heat treatment, no surviving microorganisms and specific pathogens microflora in fresh plant extracts. The extracts does not show any microbiologically risk in terms of biosecurity for humans.

After using the extracts it was show that organoleptic parameters of possessed minced meat are kept at appropriate levels, compared to untreated control sample that shows clear differences, negative differences. We recommend further research on other types of polyphenol and use of all extracts in more complex meat products and impact assessment in terms of commercial validity of those preparations.

REFERENCES

1. Apostu S., Mihaela A.Rotar, 2004, Lucrari practice de Microbiologie alimentara, Ed. Risoprint, Cluj-Napoca
2. Bara L., 2004, Microbiologie, Ed. Universitatii din Oradea, Oradea
3. Bara L., 2008, Ecotoxicologia produselor agroalimentare, Ed.Universitatii din Oradea, Oradea
4. Bara V., C-tin Pop, 1994, Metode de lucru pentru determinari microbiologice si fizico-chimice in laboratoarele circumscriptiilor sanitar veterinare pentru controlul alimentelor si a celor de asistenta, Imprimeria de Vest, Oradea
5. Bara V., Georgeta Ionescu, Camelia Bara, O.Henegariu, L.Bara, Ghe. Ciobanu, G.V.Paul, A. Mudura, I. Sarac, I. Mintas, 2001, Tehnologii de prelucrare si microbiologie a produselor agroalimentare, Ed. Universitatii Oradea
6. Camelia Bara, 2008, Microbiologia si calitatea alimentelor de origine animala, Ed. Universitatii Oradea, Oradea
7. Heinz G., Hautzinger P. , – Meat Processing technology – for small to medium scale producers – Food and Agriculture Organization of the United nations regional office for Asia and the Pacific, Rap Publications
8. M.A. Dubnick, S.T. Omaye, 2001 - Evidence for grape, wine and tea polyphenols as modulators of atherosclerosis and heart disease in humans- J. Nutra. Func. Med. Foods, 3, 67-93.
9. Mariana Albulescu, A. Chiriac, E. Timariu, 2008 – Compusi polifenolici naturali din clasa antocianinelor – Ed. Eurobit, Timisoara
10. Mariana Albulescu, D. Puscau, 2008 – Compusii polifenolici naturali din clasa izoflavonoidelor – ed. Eurobit, Timisoara
11. Salagean C.D., D. Tibulca, 2009, Tehnologia Produselor din Carne, ed. Risoprint, Cluj-Napoca.