

STEFAN CEL MARE UNIVERSITY OF SUCEAVA

**Journal
Food and Environment Safety
of the
Suceava University**

FOOD ENGINEERING

*Volume XI, Issue 4
15 December 2012*

*Available online
<http://www.fia.usv.ro/fiajournal>*

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The purpose of *Food and Environment Safety* journal is to provide a means of rapid publication for significant contributions to the improvement and diversification of specific activities in the field of food engineering, food and environment safety, biotechnologies, chemical engineering, biosensors, agriculture and applied sciences as well. Moreover, the journal assures promotion of research results in the field of food production and, from the nutritional and toxicological point of view, it underlines the importance of applying the best analyzing and control methods for consumer's protection, food technologies, industrial biotechnologies and environment protection as well to increase life quality.

Food Engineering Faculty journal has been published since 2000 like *Analele Universitatii Ștefan cel Mare Suceava, Secțiunea Colegiul Tehnic* (ISSN 1583-2295). Between 2002 and 2004 the journal was published biannually like *Analele Universitatii Ștefan cel Mare Suceava, Secțiunea Inginerie Alimentară* (ISSN 1583-2295), then from 2005 till 2009, it was issued biannually like *ANNALS of Suceava University - Food Engineering* (ISSN 1842-4597), indexed in Index Copernicus data base and acknowledged by the National University Research Council (CNCSIS), Romania. In 2010, the Food Engineering Faculty journal changed its name in *Food and Environment Safety* (ISSN 2068 - 6609).

The cover of the journal was made by **Niculai Moroșan**.

Available online: <http://www.fia.usv.ro/fiajournal>
Address for submission, e-mail fiajournal@fia.usv.ro

CIP description of National Library

The scientific journal *Food and Environment Safety* (ISSN 2068 – 6609) is published by **University Publishing House of Suceava**, Romania.

Mail address of the University Publishing House of Suceava: Ștefan cel Mare University, Suceava, Universitatii str. No. 13, 720229, Suceava, Romania

www.usv.ro, <http://www.usv.ro/index.php/ro/1/Editura%20USV/238/3/15>

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INVESTIGATION ON RADIOACTIVE CONTAMINATION OF BONE RAW MATERIAL AS ONE OF THE ALTERNATIVE SOURCES OF ORGANIC CALCIUM

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Received 5 December 2012, accepted 14 December 2012

Abstract: *There were examined contents of radionuclides in bone raw material, afforded investigation results of contents of strontium– 90 and caesium– 137 in chicken and pig meat. It was determined that radionuclides contents changes with the age of bird.*

Key words: *bone, albumen, radionuclides, strontium– 90, caesium– 137, calcium, phosphorus, mineral agents.*

1. Introduction

Among the most important problems that have to be solved by processing industry today, there is a maximum usage of slaughterhouse domestic animals and poultry products for food aims. Special place in slaughterhouse products belongs to bones. During the processing of meat carcasses, bones are from 20% to 30% of the mass of carcasses. Fresh, dietary bones consist of up to 50% of water, up to 15% of fat, up to 13% of albumen and up to 22% of mineral agents.

In food industry bones raw material is only used as a source of albumen and fat. Lately the role of fibrous and bone tissues in the process of digestion of meat products in human organism has been studied.

In human organism mineral bones components has not only supportive, but also take part in exchange trophic processes. Bone tissue provides with stability of calcium and phosphorus contents in blood and tissues of other mammals, by support of pH balance of organism. Calcium and phosphorus play very important role in mechanism of contraction of muscles and cellular

membranes. Calcium ions take part in transmission of neural impulses and clotting.

In this connection with that reorganization always takes place in bones. Bones in too labial way take part in vital processes in human organism [1 - 5].

For the replenishment of calcium the person has to consume together with food and drinking water every day from 1000 to 1500 mgr of calcium in assimilative form [2, 5]. Lack of calcium in organism leads to development of osteoporosis metabolism disorder, nervous disorders and other diseases.

At the same time a huge territory of Ukraine is polluted with radionuclides that in an alimentary way get to human organism. Ecological influence of different radioactive isotopes on living tissue also greatly differs. For example, radioactive materials with half-value period of less than 8 days is not considered to be dangerous; since they keep a high level of radiation in the infected biotone just for a small period of and can be easily decreased in human organism. Materials with long half-value period such as, for example, uranium-238 (4,5 billion of years) are also

almost safe because of slight radiation during the certain period of time. However, big danger is presented by radioactive strontium-90 and cesium-137, that accordingly have half-value period of 28 and 33 years. As a result of similarity of chemical qualities accordingly of calcium and potassium, they easily get into human organism, stay there and can be accumulated in such amount that can cause harm for the organism. Radioactive strontium and cesium can cause chemical mutation – irreversible changes of structure of nucleic acids, albumen, lipids especially of cell membranes and appearing of active radicals. Immune system is one of the accessible parts in human organism for radiation influence. As a result of weakening of immune system functioning caused by ionized radiation, leucosis and other oncologic diseases can develop.

That is why in Ukraine after 1986 there is a precaution against bones as a source of getting into organism radionuclides in alimentary way.

It was also investigated that mammal organism assimilates calcium much better than strontium. That is why food that is rich in calcium is one of the best ways of decreasing strontium in human body [6].

2. Experimental

Bones are one of the most accessible and effective sources of mineral agents. Bird and pig breeding is considered to be the most perspective field of cattle breeding on the territory of Ukraine. That is why we conducted some research concerning cesium and strontium contents in chicken and pig bones.

Radionuclide structure of the investigated objects determined on scintillation spectrometers of gamma energy – types of radiation СЕГ-001 „АКП-С” and beta radiation СЕБ-01-70. Methods of investigation are standardized for strontium– 90 МИ12-0,5-99, MYK

2.6.1.717-98. True fault of radiation from $\pm 10\%$ to 50% if the inside expectancy is $P=0,95$.

3. Results and Discussion

Results of investigation of radionuclide contents are presented in the tables 1,2.

The results of investigation affirm that experimental samples of chicken and pig bones have radionuclide contents that are below the admissible limit, so poultry and pig bones, regardless of their age, can be for food by guaranteeing radioactive safety.

Table 1
Radionuclide contents in chicken and pig bones
(n=3; p≤0,05)

Indexes	Contents in the investigated element. Bk/kg		Permissible level. Bk/kg
	Chicken bones	Pig bones	
Cesium–137	15.4	18	50
Strontium–90	< 9.5	<10	200
Radium–226	< 9.5	<18	35 - 50
Potassium–40	< 47	<64	125- 180
Thorium–232	< 6	<10	20- 30

Table 2
Contents of cesium and strontium in chicken bones (n=3; p≤0.05)

Age of bird. days	Contents of ⁹⁰ Sr. Bk/kg	Contents of ¹³⁷ Cs. Bk/kg	Permissible levels . Bk/kg	
			¹³⁷ Cs	⁹⁰ Sr
90	< 9.5	18.0	200	50
120	< 9.3	18.6		
150	< 12.0	17.4		
180	< 12.5	15.4		
210	< 15.54	15.6		
300	< 16.0	15.8		

The next stage was to find out toxic elements in poultry and pig bones. The results of toxic elements contents in bones are presented in the table 3.

As it can be noticed in the table. in pig and chicken bones the level of zink. copper. plumb and mercury is minimal and according to maximum permissible level is (%):3.5..5.65. 12.8..15. 10..12. 5..10. Level