CADMIUM CONTENTS IN CUBAN MEAT PRODUCTS

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SUMMARY

Cadmium occurs naturally in all parts of the environment. Consequently, all food whether it be of plant or animal origin, is exposed to and contains cadmium. The concentration of cadmium in meat, other than offal, is uniformly low (<0.05 µg/g). Animal offal, especially liver and kidney generally contains an average cadmium concentrations in excess of 0,05 µg/g and some more that this value. The aim of this paper is to report the concentrations of cadmium in Cuba meat products and to discuss their significance to human . Cd was determined by AAS method. The ranges of medium of concentrations (µg/g) of cadmium in the assayed samples were 0,001-0,244. Visceras showed significantly ($p<0,05$) higher values than other. It does not seem to exist a health risk through consuming meat products by Cuban population.

INTRODUCTION

Cadmium occurs naturally in all parts of the environment. Consequently, all food, whether it be of plant or animal origin, is exposed to and contains cadmium (Sherlock, 1984; Chowdhury and Chandra, 1987).

The concentration of cadmium in meat, other than offal, is uniformly low, average concentrations being <0,05 mg/kg. Animal offal, especially liver and kidney, generally contains an average cadmium concentration in excess of 0,05 mg/kg (Peterson and Alloway, 1979; Page et al., 1983; WHO, 1989).

This article informs the concentrations of cadmium normally present in Cuban meat products and discusses about their significance to human.

MATERIALS AND METHODS

The assayed samples were constituted by 9 types of sausages (hot dogs, hot dogs with vegetables, Viena sausages, Viena sausages with vegetables, Cocktail sausages, pork sausages «chorizos», blood sausages «morcillas», Havana cold-cut «jamonada» and mortadella), 4 types of cured meat (smoked pork loin and pork leg, ham leg and ham shoulder-blade), 6 types of visceras from pork and beef (liver, heart and kidney) and other 7 types of meat products (pork heart in tomatoes, beef tongue in sauce, stewed

beef, cudgelled «aporreado» beef, chicken cream and chicken pickled).

Each sample was analyzed by duplicate by means of wet mineralization with nitric and sulphuric acids and hydrogen peroxide. Cadmium was determined by atomic absorption spectrophotometry at 228 nm (AOAC, 1984).

Cadmium contents in each group were compared by using "t" student test, a variance analysis of simple classification and a Duncan multiples range test.

RESULTS AND DISCUSSION

The medium contents ($\bar{x}$), standard deviation (S) and ranges of cadmium in sausages food are shown in table 1. Significant differences ($p<0,05$) were found between pork sausages «chorizos» and blood sausages «morcillas» and the remain analyzed samples. This behaviour is due to the different raw materials to those used in the other foods and probably supply some quantities of cadmium to pork and blood sausages higher than in others. The cadmium contents of about 25% of pork and blood sausages were higher than maximum residue limit recommended by Council of Mutual and Economical Assistance (COMECOM)(1982).

Table 2 shows the medium contents ($\bar{x}$), standard deviation (S)

and ranges of cadmium in assayed cured meat products. No significant differences were found between these samples.

The medium contents ($\bar{x}$), standard deviation (S) and ranges of cadmium in visceras are shown in table 3. Significant differences ($p<0,05$) were foumd between liver and kidney and heart samples. It is not suprising, since the kidneys, and to a lesser extent liver of animals, including man accumulate the highest quantity of cadmium absorbed by the body. The cadmium levels of about 13,3% of assayed visceras were higher than maximum residue limit of this element recommended by COMECOM (1982).

Table 4 shows cadmium levels in other meat products. Significant differences ($p<0,05$) were found between luncheon meat «spam» and the remain assayed samples. This behaviour is because of the different raw materials to those used in the other foods.

Although, these behaviours in pork and blood sausages, visceras and spam, it does not seem to exist a health risk through consuming meat products by Cuban population, but it is necessary to carry out a systematic higienic-sanitary control in these products in order to avoid the consumption of cadmium-contaminated meat foods.

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Table 1 - CADMIUM CONTENTS IN CUBAN SAUSAGES
(in mg/kg)

Sausages	N	$\bar{x}$	S	Ranges
Hot dogs	12	0,012	0,006	<0,002-0,024
Hot dogs with vegetables	79	0,016	0,012	<0,002-0,051
Viena sausages	88	0,009	0,013	<0,002-0,056
Viena sausages with vegetables	14	0,014	0,015	0,005-0,059
Cocktail sausages	9	0,008	0,003	0,003-0,012
Pork sausages «chorizos»	24	0,058	0,031	0,012-0,152
Blood sausages «morcillas»	17	0,044	0,037	0,012-0,159
Havana coldcut «Jamonada»	14	0,011	0,010	<0,002-0,038
Mortadella	13	0,007	0,004	<0,002-0,014

Maximum Residue Limit (COMECOM, 1982) - 0,100 mg/kg Cd

Table 2 - CADMIUM LEVELS IN CUBAN CURED MEAT PRODUCTS (in mg/kg)

Cured meat	N	$\bar{x}$	S	Ranges
Pork loin, smoked	14	0,007	0,006	0,002-0,019
Pork leg, smoked	13	0,007	0,004	<0,002-0,007
Ham, leg	16	0,005	0,004	<0,002-0,015
Ham, shoulder-blade	8	0,003	0,002	<0,002-0,007

Maximum Residue Limit (COMECOM, 1982) - 0,100 mg/kg

Tabla 3 - CADMIUM CONTENTS IN CUBAN VISCERAS (in mg/kg)

Visceras	N	$\bar{x}$	S	Ranges
Pork liver	25	0,104	0,117	0,002-0,408
Pork heart	25	0,102	0,184	0,002-0,803
Pork kidney	25	0,244	0,185	0,038-0,757
Beef liver	25	0,198	0,152	0,002-0,484
Beef heart	25	0,060	0,065	0,002-0,308
Beef kidney	25	0,172	0,195	0,004-0,774

Maximum Residue Limit (COMECOM, 1982) - 0,500 mg/kg

Tabla 4 - CADMIUM LEVELS IN OTHER CUBAN MEAT PRODUCTS
(in mg/kg)

Meat Product	N	$\bar{x}$	S	Ranges
Pork heart in tomatoes*	6	0,013	0,010	<0,002-0,003
Beef tongue in sauce*	8	0,008	0,002	0,006-0,012
Lucheon meat «spam»	91	0,024	0,019	0,007-0,095
Pork leg in sauce	7	0,008	0,002	0,004-0,010
Stewed beef	28	0,001	0,0008	<0,002-0,003
Cudgelled beef «aporreado»	25	0,005	0,006	<0,002-0,020
Chicken cream	15	0,006	0,004	0,002-0,012
Chicken, pickled	17	0,009	0,003	0,004-0,016

Maximum Residue Limit (MRL) (COMECOM, 1982) - 0,100 mg/kg

* MRL - 0,500 mg/kg