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INVESTIGATION OF EFFECT OF GRILLAND SOAK IN CITRIC ACID AND THEN GRILLON THE CHANGES OF FE, PB AND CD IN SHEEP'S LIVER

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ABSTRACT

Liver like other red meat, rich in vitamins B, such as vitamin B_1, B_2, B_6 and B_{12} is. But heavy metals are the most important food chemical contaminants and its presence in food of animal origin may put people at risk of complications from the continuous (perhaps for life) is increased hence the experiment with three replications in a completely randomized design to evaluate the effects of grillingand soak (7, 5, 2 min), citric acid and then grilling on some heavy metals such as Fe, Cd and Pb in Liver of the sheep.Experimental results demonstrate that the grilling and soak in citric acid, then grilling lamb Liver,in places where the likelihood of exposure to Cd and Fe cattle is not recommendedbecause it increases the concentration of these metals in the Liver but, on the grilling sheep Liver may reduce the amount of Pb than the rest of the treated,the possibility of poisoning livestock in places where there is an element of this way of cooking is recommended.

Key words: Sheep Liver, heavy metals, grilling, soaks in citric acid

INTRODUCTION

Because the liver, the body's metabolism in humans and animals is a rich source for vitamins (especially vitamin A) and minerals are.Liver like other red meat, rich in vitamins B, such as vitamin B_1, B_2, B_6 and B_{12} is.The inner body member of livestock, with elements such as Zn, Fe and folic acid are also and moderate use it to those who suffer from anemia due to Fe deficiency, is recommended.100 grams of liver, containing about 6 mg of Fe,while every 100 grams of beef, just 2 mg Fe it.Liver, the protein is abundant and good quality (Salamat Poster).More than 90% of iron is bound to proteins, the most important of these proteins, hemoglobin, transferrin and ferritin, respectively.Among the enzymes that contain iron or can be activated by the catalase, peroxidase, phenylalanine hydroxylase and many more carboxylic acid cycle enzymes, including enzymes have been reported.Long-term consumption of iron can lead to nutritional problems, reducing the growth and phosphorus deficiency. Excess iron in human blood can cause deposits that clog the blood vessels (Qasemi *et al*., 2012).Although some of the elements necessary for life and metabolic processes are needed, but if too much is absorbed, can be toxic (Spear *et al*., 1986).Today in countries and industrialized societies in the world of health and environmental pollutants, heavy metals formamong them, arsenic, lead, cadmium, mercury and nickel for human and animal health are important.Heavy metals are those metals that are the specific gravity is more than 5 grams per cubic centimeter.In this group of 69 metallic in nature and are not sufficient in the case of some of the toxicological data.Heavy metals are the most important food chemical contaminants and its presence in food of animal origin may put people at risk of complications from the continuous (perhaps for life) is increased (Rokni, 2007; Watson, 2001).The main objection is that heavy metals are not metabolized in the body, in fact they are not excreted from the body after entering the body and accumulate in tissues.This causes a variety of diseases and disorders in the body. These metals also grow and spread of viral, bacterial and fungal increase.On the other hand, salts and minerals that the body needs to be replaced.For example, in tissues such as blood vessels, muscles, bones, or the deposition Zn deficiency in the diet, it will replace Cd in the body (Watson, 2001; Vos *et al*., 1988).Overall, the most common form of poisoning by lead and cadmium poisoning around the world are lead through air, food

and water body (Qasemi *et al*., 2012).Cd in liver, kidney, pancreas, bone and accumulates and it seems that the presence of different species vary in the muscles.This element of complications such as kidney failure, lung cancer, brain diseases, anemia, skeletal deformity, congenital malformation and leads to reproductive disorders.Cd mainly on the amount of Cu, Fe and Zn to the chemical similarity and competition in the annex to affect enzyme active sites and has also been reported that cadmium can be phosphorus, calcium and bone metabolism are affected (Jorhem *et al*., 1991; Qasemi *et al*., 2012).Given the importance of the presence of heavy metals in the food,the aim of this study was to evaluate the effect of grilling and soak in Citric Acid and then grilling on some heavy metals such as iron, cadmium and lead in the liver of the sheep.

MATERIALS AND METHODS

Fresh sheep liver and equal to 2 x 2 cm, cut into piecesthen, at a temperature of 260 ° C was used to measure heavy metals (cadmium, lead, and iron) in the treatment of liver and also in atomic absorption meter was placed.

Method of treatment, immersed in citric acid

Raw liver pieces ready for 2, 5 and 7 minutes to put citric acid and after removing the sample from the lime juice for 7 and 5, 2 minutes immersed in water and after drying at room temperature, the temperature was 260 ° C until the sample is fully grillingand atomic absorption instrument is placed in the desired temperature is measured.Digested sample solution and subject to measurement Pb, Cd and Fe, in accordance with national standards, No. 9266 was performed.

The method of measuring metals in atomic absorptiometry

Measurement Pb, Cd and Fe in atomic absorptiometry: absorption of light (wavelength for each element)solution subject to the same conditions as described for the standard solution,Measured based on the calibration curve is plotted, and the element concentration in the solution was determined by the subject.Each element concentrations Pb, Cd and Fe in the sample, calculated according to the following formula:

$$C = \frac{(a - b) * v}{m}$$

In which:

C: Concentration of the element in the sample in Mg/kg.

a: The concentration of the element in a solution of subjects, in milligrams per liter, that is obtained from the calibration curve.

b: The average value of the element concentration in the solution, in milligrams per liter, that is obtained from the calibration curve.

v: The volume of the solution prepared by the participants, that is 1,000 ml.

m: Sample weight in grams.

The population and experimental design

The population of the liver after treatment of the samples prepared according to the methods listed below:

T1: Raw liver

T2: grilled raw liver

T3: Raw liver two minutes immersed in citric acid and then grilled

T4: Raw liver five minutes immersed in citric acid and then grilled

T5: Raw liver seven minutes immersed in citric acid and then grilled

T6: lemon juice (citric acid). The experiment was conducted with three replications in a completely randomized design.

RESULTS

Experimental results demonstrate that the grilling statistically significant effect on the level of 1% of the metals Fe, Pb and Cd have been found in raw liver.In other words, grilling and soak in citric acid, then grilling raw liver on the metals studied in the statistical effect (Table 1).

Pb levels in raw liver were determined by averaging 1.8500 ppm,liver this rate fell to 1.5967 with grilling.With soak Liver in citric acid increased the amount of lead in samplesas a treatment for 7 minutes and then soak raw liver grillingthe highest Pb levels 1.9233 ppm was assessed (Fig. 1).By measuring the amount of Pb in the metal 0.1973 ppm citric acid levels were measured,that may be due to increased levels of lead in Liver samples immersed in citric acid in the presence of the metal in the treatment of 6 states (Fig. 1).

Cd levels in raw Liver treatments grillingand soak then grilling was statistically significant at the 1% level (Table 1).Grilling raw Liver increases the Cd in the sample,as the amount of Cd in the raw Liver was evaluated 0.2957 ppmthe extent to grilling raw Liver and soak in citric acidand more time immersed in the ascending trend of Cd were found in the samples (Fig. 2).Citric acid is used with little amount of Cd that was against 0.0533 ppm. The test results indicate that the increased amount of Cd grilling in the treatment of raw Liver (Fig. 2).

The amount of Fe in the Liver, raw and treatments are statistically significant at the 1% level (Table 1).As the amount of iron in raw Liver samples increased with grilling.Raw liver and grilling dipping treatments reduces the amount of Fe in the samples wasbut with more time, Soaking raw Liver in citric acidthe amount of Fe in the sample is less than Soaking time increased (Fig. 3).The value of this element is treated with a mean grilling 333.53 ppm and minimum on the treatment of pure citric acid with a mean 11.600 ppm obtained (Fig. 3).

Table 1: Results of the grilling on the effect of heavy metals Pb, Cd and Fe in the liver, raw

sov	df	Pb	Cd	Fe
T	**5**	**193.41****	**73.13****	**2635.0****
E	**12**			
Total	**17**			

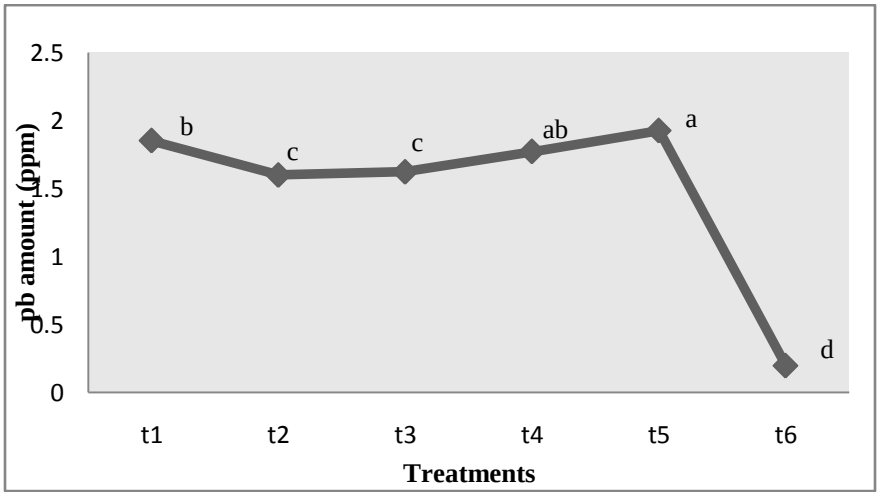

Figure 1: The heavy metal lead in raw Liver tests and treatments, citric acid

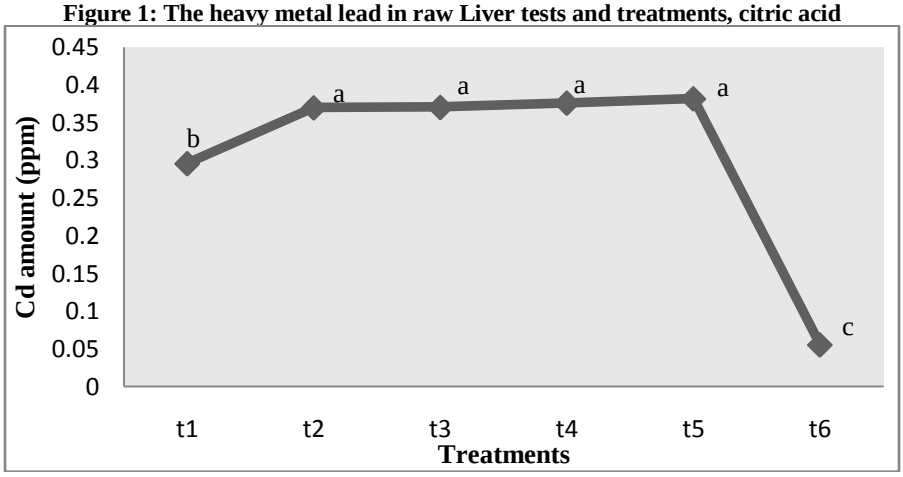

Figure 2: The amount of Cd in Liver treatments, raw, grilled and citric acid

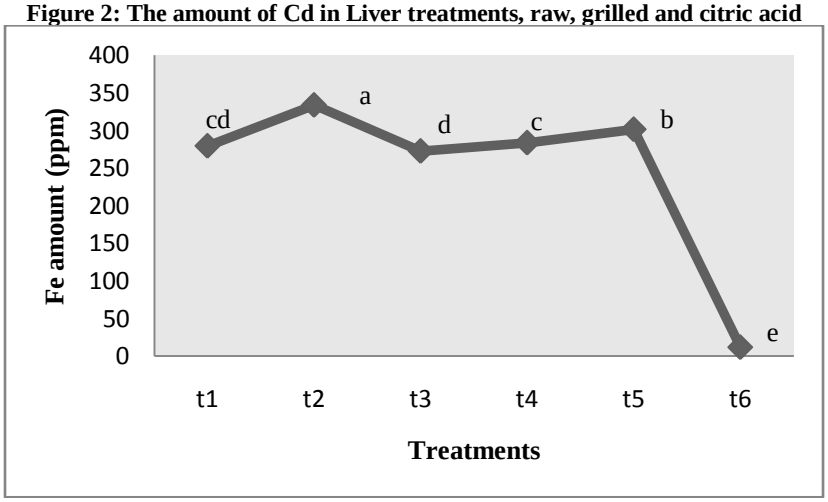

Figure 3: The amount of iron in the treatment of raw Liver, grilling and pure citric acid

DISCUSSION

Heavy metals in different ways, such as mining, smelting process, combustion of fuels and industrialization have found their way into the environment (Filazi *et al*., 2003), obviously, in order to control the amount of residues in foodthe need for a variety of different foods is the maximum of these metals.Authorities in Europe and America have developed standards in this area. For example, the maximum allowable lead in some foods of animal origin in mg/kg, Europe standard for raw milk and heated was 0.020, beef, lamb, pork and poultry 0.10, Liver and kidney of cattle, sheep, pigs and poultry 0.50 and fish is 0.30 (European Commission, 2006).The results of measurements of Pb content in samples of raw Liver in the present study showed the 1.8503 mg/kg,compared with the results Korenekova *etal*., in (2002); Farmer and Farmer in (2000) and Rudy in (2009) showed higher rates.Considering the limit to the amount of 0.50 milligrams per kilogram,WHO[1] (1992) = 0.5-1.5 ppm, FAO (1983) = 0.5 ppm, EC (2005) = 0.2 ppm, FDA[2] (2001) = 5 ppm, New Zealand (1983) = 2 ppmRaw liver sample experiment according to certain standards have lead poisoning heavy metal which grilling rate fell to 1.5967this treatment has the least amount of lead compared to other treatmentsand according to some standards have been Pb limit, for this purpose, in places where there is a risk of Pb contamination in cattle,grilling raw Liver and its use is recommended.The results of measurements of Cd content in the samples of raw Liver in the present study showed the 0.2956 mg/kg,compared with the results Korenekova *et al*., in (2002); Sedki in (2003); Baxter and Kienhols in (1983) showed a lower rate.On the other hand, in comparison with Farmer and Farmer in 2000 showed higher rates.Cd levels permitted in food standard WHO (1992) to 0.2 mg Klvgrm, FAO (1983) = 0.5 ppm, EC (2005) = 0.05, FDA (2001) = 1ppm, New Zealand (1983) = 1 ppm are,compared with the crude Liver toxicity Cd has been used,despite an increase in the amount of Cadmium of treatments grilling, but the lower limit isbut the treatment of grilling because it provides increased the heavy metal,in places where the sheep to the metal poisoning is not recommended.

Fe, Zn and cu are essential elements in the human diet, nutrient deficiency can cause problems for humans,however, a great deal of them are unhealthy and should be observed moderation in the consumption of these elements (Qasemi *et al*., 2012). The results of

[1]World Health Organization
[2] Food and Drug Administration

measuring the Fe content in the samples of raw Liver,in the present study we determined the amount of 279.20 mg/kg,According to grilling raw Liver to increase the amount of iron in the sample was 333.53 ppm,so in places where there is a risk of iron deficiency in cattle Liver grilling recommended.The amount of iron in the Liver compared to the results of this test Korenekova *et al*., (2002) show higher rates.It is noted that rate of absorption of Zn and Cd on Fe absorption rate has the opposite effect (Wentink *et al*., 1992).In this experiment, we can reduce the heavy metal Cd is to increase the amount of Fe.According to the results of the grilling and soak in citric acid, then grilling lamb Liver,in places where the likelihood of exposure to Cd and Fe cattle is not recommendedbecause it increases the concentration of these metals in the Liver but, on the grilling sheep Liver may reduce the amount of Pb than the rest of the treated,the possibility of poisoning livestock in places where there is an element of this way of cooking is recommended.

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