

HEALTH RISK ASSESSMENT OF POTENTIALLY TOXIC METALS IN SHEEP MEAT AND SHEEP MEAT PRODUCTS

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Abstract

Meat and meat products are an important source of nutrients in human nutrition. Under some unfavorable conditions for raising animals for meat production or conditions during the processing and storage of meat, contamination with toxic metals can occur. The aim of this paper is to assess the health risk of consumers from the intake of 9 metals through the consumption of sheep meat and meat products.

The research was performed on fresh sheep meat and sheep meat products obtained by boiling (temperature 70 - 75 °C, time 80 - 90 minutes), and drying (temperature 14 - 18 °C, air circulation 50 m³/min., relative humidity 85 - 88%). Mineral content of samples of fresh meat and chicken products was determined using an Optima 8000 optical emission spectrophotometer (ICP OES), Perkin Elmer, USA. After determining the content of individual metals, the values of the following parameters were determined: estimated daily intake (EDI), target hazard quotient (THQ), relative risk (RR) and cancer risk (CR) for lead and nickel by US Environmental Protection Agency. The results were statistically processed using descriptive statistics. The significance of the difference between THQ calculated and THQ dangerous to health (THQ = 1) was assessed by t-test of paired samples.

Obtained values for EDI for: Fe, Mn, Zn, Cu, Se, Cd, Pb, Mo, and Ni from fresh sheep meat were: 0.000173388, 4.37296 x 10⁻⁰⁶, 2.38083 x 10⁻⁰⁵, 0.003206472, 0.049150604, 0.0000, 0.056642576, 0.009576052, and 0.0000, respectively. These results show EDI for tested metals is lower than RfD (reference doses recommended by the US Environmental Protection Agency - EPA). Also, eating sheep meat and meat products three times a week in the amount of 0.2 kg will not have a negative impact on the population using meat in their diet. Cancer risk factors for Pb and Ni were estimated as follows: 1.92585 x 10⁻⁰⁹ and 0.00000. These values are lower than the tolerance values for these metals set by the EPA. This indicates that consuming sheep meat does not pose a cancerogenic risk for Pb and Ni.

Based on these parameters, we can conclude that sheep meat and meat products do not pose a risk for consumer's health.

Key words: Sheep meat products, Health risk, Individual metals.