

EXAMINATION OF QUALITY AND HYGIENIC CORRECTNESS OF THE BY-PRODUCTS OBTAINED IN MANUFACTURING VEGETABLES AND FRUITS

Valentina Pavlova¹, Goce Cilev^{2*}, Nikola Pacinovski³, Bojana Ristanovic⁴, Arse Petreski¹

¹Faculty of Technology and Technical Sciences, University St. Kliment Ohridski, Dimitar Vlahov bb, 1400 Veles, Macedonia

²Veterinary Faculty, University St. Kliment Ohridski, Prilepska bb, 7000 Bitola, Macedonia

³Institute of Animal Science, University St. Cyril and Methodius, Ile Ilievski 92A, 1000 Skopje, Macedonia

⁴Faculty of Agriculture, University of Pristina, Pristina-Lesak, Jelene Anzujske bb, 38228 Zubin Potok, Serbia

*e-mail: goce_cilev@yahoo.com

Abstract

The subject of this work is of special interest for the Republic of Macedonia because the by-products obtained from agro industry range from 5 to 10% for tomatoes, 25 to 30% for peppers and 20 to 25% for grapes. To examine the by-products quality and hygienic correctness were taken the food samples who origin from different regions of Macedonia.

In the food samples basic chemical composition was established by standard methods. The calcium content was established by spectrophotometric method (ISO 6490/2:1983), and the total amount of phosphorus by colorimetric method. On the basis of the results obtained on the nutrients content, applying suitable formula, the metabolic energy was counted (Alderman [4] and Grbesha [15]). To establish the mycotoxins content in samples of by-products the thin layer chromatography method was performed, and the standard multimycotoxicologic method according to Balzer *et al.* [8]. The heavy metals content (Pb, Hg, As, Cd) was established by flaming atomic absorption spectrophotometry on the apparatus Perkin-Elmer 3300. The content particular of amino-acids in proteins was established by chromatographic method on automatic aminoanalyzer according AOAC. Food samples for microbiological examination were inoculated in tiogluconant mix and physiologic solution from which further series dilution was made. Enumeration and identification of present bacteria and fungae was performed by standard microbiological methods.

The chemical analysis of the by-products obtained in manufacturing grapes from vine production, peppers from ajvar production and tomatoes from ketchup production, indicates that they contain great amounts of proteins (grapes - 12.66%, peppers - 18.77%, tomatoes - 21.15%), fats (grapes - 10.60%, peppers - 13.20%, tomatoes - 8.18%) and cellulose (grapes - 39.16%, peppers - 39.31%, tomatoes - 37.78%) where the proteins have an unfavourable amino-acid composition. Results from microbiological analyses (number and presence of: *Bacillus* spp., *Staphylococcus* spp., *E. coli*, *Salmonella* spp., *Clostridium* spp., *Aspergillus* spp., *Penicillium* spp., *Fusarium* spp.), heavy metals examinations (As, Pb, Hg, Cd) and mycotoxins content (aflatoxin B1, ohratoxin A, zearalenone, T-2 toxin) showed that the by-products obtained in the manufacturing vegetable and fruits are hygienically correct and safe food.

Key words: *By-products obtained in manufacturing tomatoes, Peppers and grapes, Quality, Hygienic correctness, Animal nutrition.*