Morphological analysis of the antibacterial action of chitosan on gram-negative bacteria using atomic force microscopy

Belgin Erdem[1], Mustafa Kurt[2], Salih Okur[3]

[1] *Department of Biology, Faculty of Arts and Sciences, Ahi Evran University, Bagbası Campus, 40100, Kırşehir, Turkey*
[2] *Department of Physics, Faculty of Arts and Sciences, Ahi Evran University, Bagbası Campus, 40100, Kırşehir, Turkey*
[3] *Department of Material Science and Engineering, Faculty of Engineering and Architecture, Izmir Katip Celebi University, 35620, Izmir, Turkey*
E-mail address: huban_eren65@windowslive.com (B. Erdem).

Chitosan, as a cationic natural polymer, has been widely used as antibacterial, nontoxic, biocompatible and biodegradable properties. The main objective of this study was to elucidate the antibacterial effect of chitosan upon *Serratia marcescens* and *Enterobacter aerogenes*, which are food contaminated an important organism in food production. Atomic force microscopy (AFM) was used to study effect of chitosan on the bacterial morphology. The use of AFM imaging studies helped us to understand how chitosan act differently upon *Serratia marcescens* and *Enterobacter aerogenes*. Chitosan thus appeared to bind to the outer membrane, explaining the loss of the barrier function. This property makes chitosan a potentially useful indirect antimicrobial for food protection. Analysis of surface topography by atomic force microscopy (AFM) showed a significant increase in roughness of all blends relative to chitosan. Observed anti-bacterial properties of chitosan could be primarily attributed to surface topographical changes.

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Effect of xylanase and β-glucanase on *in vitro* digestibility parameters of ground barley grain

Rodica Caprita[1], Adrian Caprita[2]

[1] *Department of Biotechnologies, Banat's University of Agricultural Sciences and Veterinary Medicine from Timisoara, Romania*
[2] *Department of Food Science, Banat's University of Agricultural Sciences and Veterinary Medicine from Timisoara, Romania*
E-mail address: rodi.caprita@gmail.com (R. Caprita).

Non starch polysaccharides degrading carbohydrases are used in barley-based diets for poultry to reduce the anti-nutritive effect of water-soluble β-glucans and arabinoxylans, which inhibit nutrient digestion and absorption by raising intestinal viscosity. The aim of the study was to investigate the effect of xylanase (X) and β-glucanase (G) on *in vitro* gastric and small intestine digestibility parameters of ground barley grain: dry matter solubility (DMS), relative viscosity (RV), refractive index (RI) and released glucose (RG). The experiments were conducted with the two-step pepsin-pancreatin procedure which involves sample incubation with pepsin at 37°C and pH 2, followed by the incubation with pancreatin at 37°C and pH 6.8. In gastric digestion we observed the highest DMS and RI and the lowest RV when adding 0.02 g kg^{-1} X + G mixture, and a negative correlation between RV and RI ($r = -0.7752$). In intestinal digestion RV decreased more, with the lowest values for 0.01 g kg^{-1} G supplementation. RV was negatively correlated with RG ($r = -0.8890$ for 0.005 g kg^{-1} carbohydrases), and RI was positively correlated with RG ($r = 0.8883$ for 0.005 g kg^{-1} carbohydrases). Carbohydrases contributed to the release of encapsulated nutrients. The high positive correlation suggests that RI may be used as a simple and rapid method for estimating the released glucose during *in vitro* digestion.

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Table eggs quality, according to the storage period

Roxana Nicoleta Ratu Gavril, Marius Giorgi Usturoi, Alexandru Usturoi

University of Agricultural Science and Veterinary Medicine from Iasi, Romania
E-mail address: roxana.ratu@gmail.com (R.N.R. Gavril).

The quality of eggs is a broad term that captures aspects of physical characteristics, flavor and odor. Quality is determined using external factors such as albumen weight, albumen index, yolk index, Haugh index or air cell size. The maintenance of eggs quality is strongly affected by storage conditions from point of lay to point of consumption. For this reason in the present study we propose to study the effect of storage temperature on the quality of table eggs. The research was conducted on 3 batches of eggs (150 eggs/batch), stored for 42 days at different parameters (Lc-1 at +4°C and 90% RH; Lexp-1 stored in 6°C and 65% RH; Lexp-2 stored at 27°C and RH 50%). Compared to refrigerated storage (Lc-1), other storage options (Lexp-1 and Lexp-2), registered significant modifications. Thus, the results achieved in the group Lc-1 are obvious (eggs stored at +4°C and 90% RH), the differences of quality index are smaller indices: 18.42% for Lexp-1 and 34.53% for Lexp-2 (Haugh index) with 34.01% for Lexp-1 and 55.26% for Lexp-2 (albumen index). The results at the end of the storage period where compared with those recorded at the beginning of storage. In these circumstances it is recommended to store eggs from consumption at +4°C and relative humidity of 90%.

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Investigation of *Aeromonas hydrophila* presence in trouts and hatchery environment by targeting *alt* and *ahp* virulence genes

Laurentiu Tudor[1], Anca Maria Galis[1], Aneta Laura Tudor[2], Nicoleta Ciocarlie[1]

[1] *Veterinary Medicine Unit, University of Agronomic Sciences and Veterinary Medicine, Bucharest 050097, Romania*
[2] *Veterinary Medicine Unit, University "Spiru Haret", Bucharest 021127, Romania*
E-mail address: donlorenzofmv@yahoo.com (L. Tudor).

The aim of this study was to evaluate the prevalence of *Aeromonas hydrophila* in samples of trout collected from the hatchery and samples of water from the environment of the hatchery itself. For this, a number of 350 samples consisting of trouts were collected, along with 100 samples of water from the environment of the hatchery, in order to correlate the final results. The analysis was performed using a Real-Time PCR protocol, by targeting two virulence genes for this species: *alt* (cytotoxic enterotoxin gene) and *ahp* (serine protease gene). The results revealed that 42 samples of trouts out a total of 350 (12,8%) were positive for both targeted genes (7 *alt*-positive, 4 *ahp*-positive and 31 samples positive for both targeted virulence genes). From the total of 100 samples of water, 37 were positive, of which 7 positive only for *alt*, 6 positive only for *ahp* and 24 positive for both targeted genes. The results lead to the conclusion that both targeted genes are suitable for the detection of *A.hydrophila*, but differences may exist, due to the fact that several samples were positive for only one targeted gene. This reveals the existence of different strains of this species. Further investigation is