RAMAN SPECTROSCOPY FOR ASSESSING THE EFFECT OF BONE MINERAL COMPONENT ON ANIMAL BONE TISSUE

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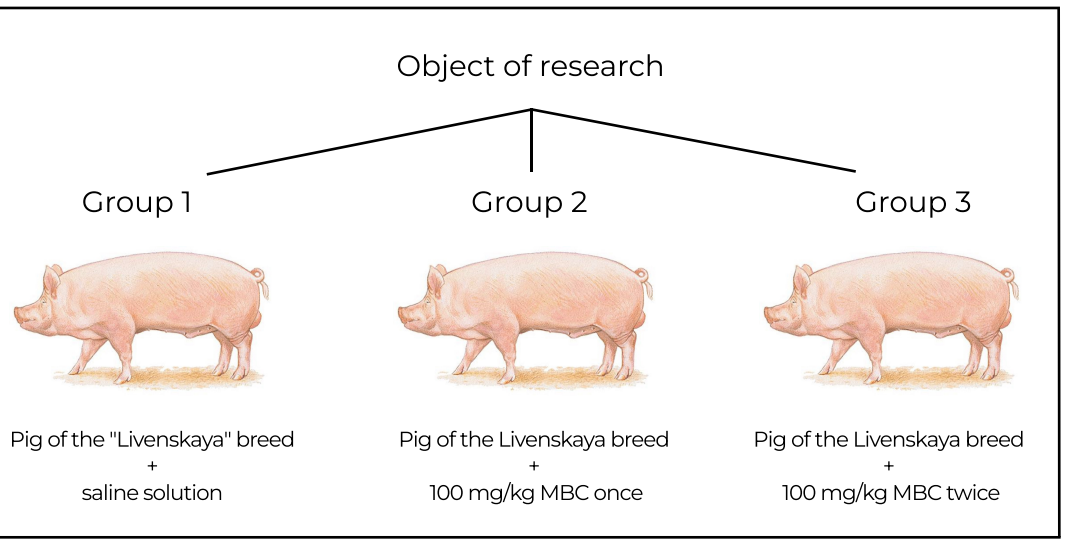
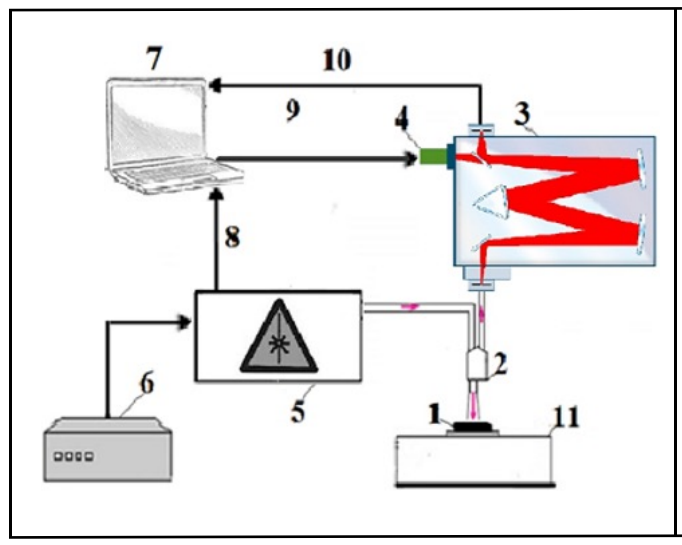
The purpose of the research: *to assess the condition of pig bone tissue (Susscrofa) after a single and double intramuscular injection of an aqueous suspension of a mineral bone component using Raman spectroscopy*

The object of research: *Experiments were carried out on pigs of the Livenskaya breed weighing 13-15 kg. Control animals (group 1) received single intramuscular injections of sterile saline solution. The pigs of the experimental group 2 received intramuscular injections of a suspension of an allogeneic mineral bone component at a dose of 100 mg / kg once on the first day of the experiment. In the third group, intramuscular injections of a suspension of a mineral bone component at a dose of 100 mg / kg were performed twice on the first and 14th days of the experiment. Further research was conducted by invitro.*

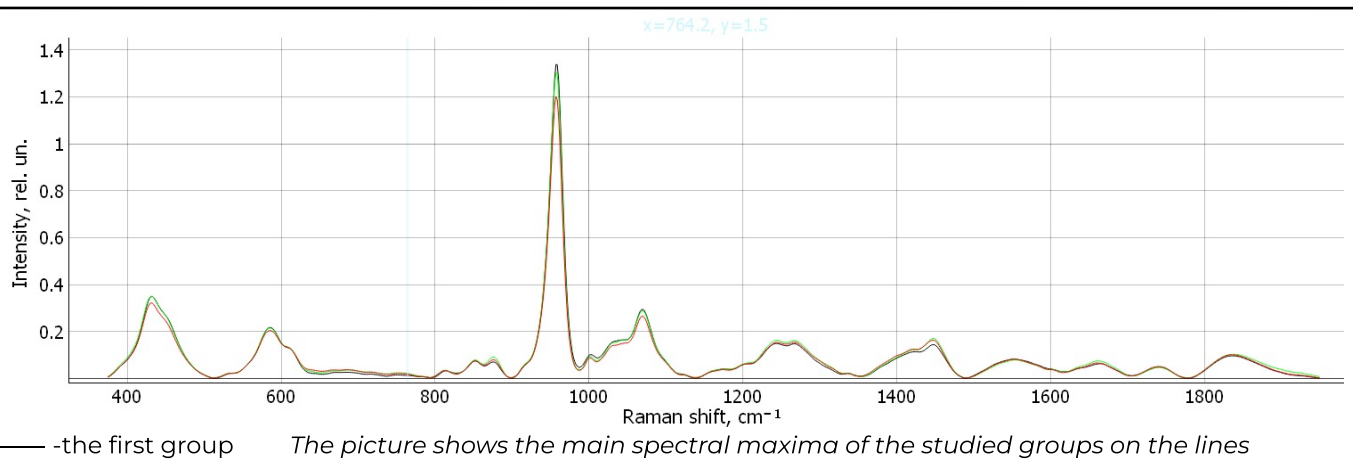


Picture 1. The method of constructing the experiment



1 - object;
2 - KR probe RPB785;
3 - LuxxMasterRamanBoxx laser module;
4 - power supply of the laser module;
5 - Shamrock SR-303i spectrometer;
6 - Built-in cooling chamber DV420A-OE;
7 - computer;
8, 9, 10 - information electrical cables;
11 - optical table

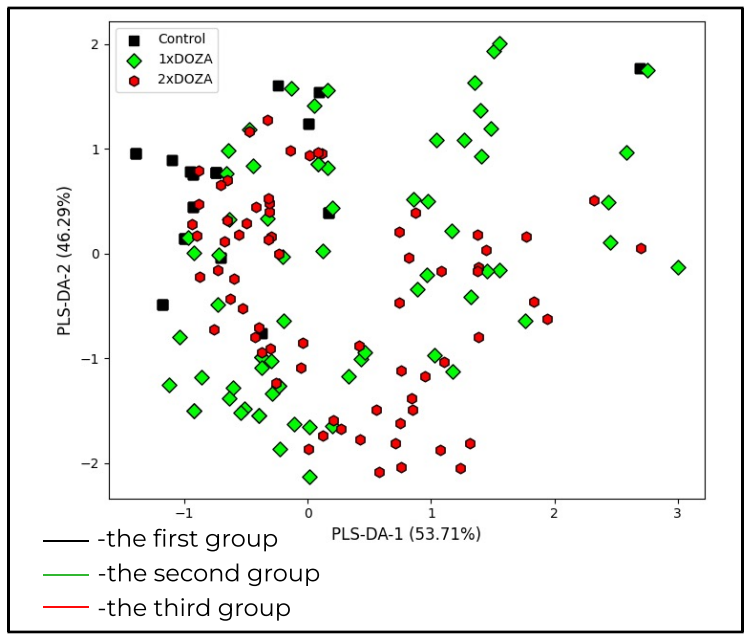
Picture 2. Experimental stand



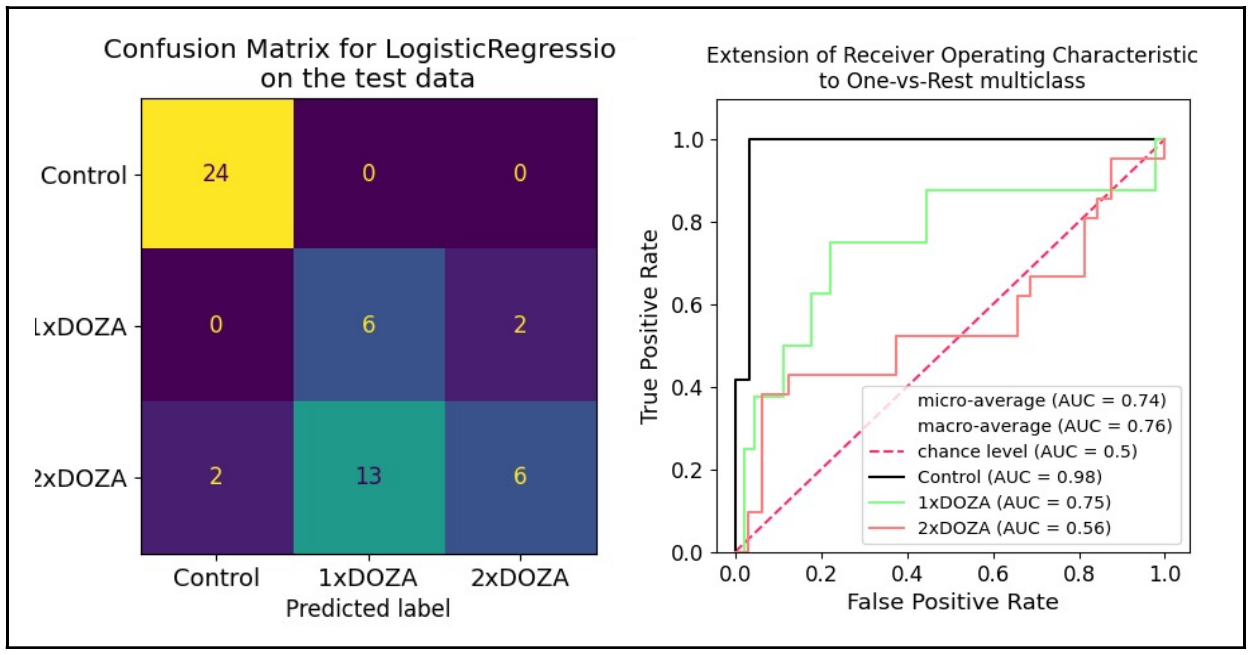
The picture shows the main spectral maxima of the studied groups on the lines of RAMAN ~958-960cm 1 (PO43- (v1) (P-O symmetricstretch)), ~1075 cm-1 (CO32- (v1) B-typesubstitution (C–O in-planestretch)), which correspond to the mineral components of bone tissue and the Raman lines on the lines ~1129-1242 cm-1 (Amide III), ~1537-1587 cm-1 (Amide II) and ~1651 cm-1(Amide I) and ~1745 cm-1 (Phospholipids) correspond to the organic components of bone tissue.

Picture 3. The average Raman spectra of the bone tissue of the studied groups

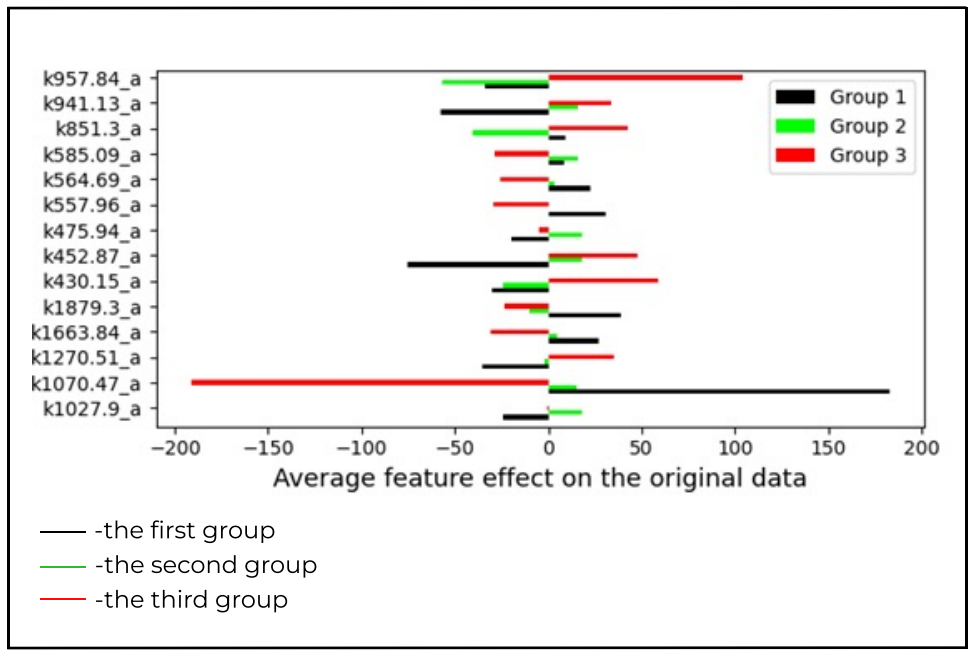
It can be seen from the picture that there are no spectral differences between the studied groups in the entire studied spectral range.



Picture 4. Two–dimensional graph of the values of the linear discriminant LDA functions



Picture 5. Decision Matrix and ROC



Picture 6. A graph of absolute averaged values for the most significant variables

Conclusions*: As a result of the conducted studies on the effect of the administered dose of MBC on the composition of pig bone tissue using Raman spectroscopy, it was found that the administered dose of MBC (100 mg per kg of weight), both with single and double administration of the drug, does not affect the composition of bone tissue, which is clearly visible from the Raman spectra.*

It was found that in the entire studied spectral range from 380-1900 cm-1, no spectral changes were observed between the studied groups. MBC with single and double intramuscular administration had no effect on most biochemical parameters of pig blood.

The results obtained can be used in the future as a prerequisite for testing this drug on larger animals and moving to clinical trials.