

The available review articles have very well-described properties of biochar (BC). With its high porosity and large surface area, biochar can be an excellent adsorbent. It has tremendous potential as a medication against intoxication and bacteriological or viral diseases. Further, dietary BC improves digestion, feed conversion ratio, weight gains and mitigates odour emission. The own research carried out so far has shown that biochar as a feed additive improves eggshell resistance to crushing and eggshell thickness, which are critical parameters in poultry production. However, although livestock diet supplementation with BC has been known for some time, there is a lack of information in the scientific literature on the molecular mechanism of biochar action on livestock, particularly poultry.

Thus, the research hypotheses are:

- supplementation of laying hens' diet with biochar affects the expression of uterus genes related to eggshell formation, which is positively correlated with biochar surface area,
- increased gene expression caused by biochar, with a specific surface area, leads to a higher concentration of proteins responsible for the eggshell formation,
- dietary biochar inducing increased concentration of proteins responsible for eggshell formation contributes to improving eggshell quality, structure and better resistance to mechanical damages.

Our research will investigate the dietary BC of different surface areas to analyse its effect on eggshell formation efficiency and uterus protein secretion since this parameter was not studied so far. In addition, we will focus on the period from the peak of laying to the end of the production cycle because during this period, the problem with the strength of the eggshells increases.

Moreover, the relationship between the surface area of BC and its influence on the gene expression of proteins involved in eggshell formation will be investigated for the first time.

The project's innovative nature results from describing the processes coded by the differentially expressed genes (DEGs) and proteins during eggshell formation guided by biochar. Furthermore, the proposed project's effects can be multidirectional influencing animal science and fisheries as well as biology science disciplines development, mainly because dietary biochar has a positive effect on eggshell quality, which is essential both from a biological (hatching) and commercial (table eggs) point of view.