Abstract

Keratin Extraction from Wool and Feathers Using Natural Deep Eutectic Solvents †

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The wool of Țurcana sheep, the Romanian national breed, has not been fully investigated and valorized up to now. This can be achieved by applying the approach of cascade processing and closing the loop for this value chain: lanolin and keratin are extracted from raw wool for the cosmetic industry, and the exhausted fibers can be used as agricultural fertilizers for new food crops. This work is focused on keratin extraction from two types of lateral agroeconomical flows: raw wool from Țurcana sheep and chicken feathers. The process is based on a pretreatment with dithiothreitol (DTT) or Na2S [1,2] for breaking the disulfide crosslinks [3] and subsequent keratin extraction with a natural deep eutectic solvent (NaDES), reline (choline chloride:urea, 1:2 molar ratio). The extraction from chicken feathers gives at least ten times more keratin than from Țurcana wool. This can be explained by the differences in protein structure, β-sheets (feathers) being easier to denature than α-helix (wool). High concentration of Na2S (0.5 M) completely dissolves both feathers and wool. At lower concentrations (0.05 M) of Na2S or DTT applied during pretreatment, the keratin structures are only partially dissolved and the subsequent extraction with NaDES shows no difference between the Na2S and DTT pretreatment. In conclusion, the pretreatment agent and its concentration, but also the keratin structure, have a significant influence on keratin extraction yield. The process for keratin extraction from Țurcana wool needs to be optimized, including by testing other NaDESs.

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References


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