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Potential Usage of Keratinolytic Enzymes from *Bacillus cereus* in the Leather Industry

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Microbial keratinases have become biotechnologically important in recent years especially for the leather industry, where they advantageously can be used as clean technology dehairing agents. Traditional dehairing processes are some of the most pollutant operation steps in leather manufacturing. Alkaline proteases, including keratinase, collagenase, and elastase can be used to minimise the need for sulphide and reduce the organic waste load of the dehairing process. Keratinolytic proteases selectively degrade the keratin tissue in the follicles in the hides and skins and keratinolytic activity combined with mild collagenolytic and elastolytic activities could result in a proteolytic dehairing process, which is gentle towards the proteins forming the leather.

We have isolated two keratinolytic strains of *Bacillus cereus* named IZ-06b and IZ-06r from wool (Adıgüzel et al. 2009) and investigated their production of keratinolytic enzymes as biotechnological dehairing agents for the leather industry. Both strains produced a mixture of keratinolytic, collagenolytic, and elastolytic activities when grown in batch culture. Mixtures of these crude enzymes were tested in experimental beam house processes, especially for dehairing of sheepskin but also their potential usage in soaking was investigated. Cultures of *B. cereus* IZ-06b and *B. cereus* IZ-06r were grown in conical flasks for 24 h. At this point, their keratinolytic activities were maximal, and cells and culture supernatants were separated. After pre-soaking for 2 h in water, pieces of 25 cm² sheepskins were incubated for 48 h in 5 different concentrations of the keratinolytic enzymes from the 2 *B. cereus* strains and shaken at 110 rev min⁻¹ in an orbital shaker at 30°C. Microbial activity was inhibited by 0.1% of the addition of the commercial bactericide Gemacide LP. Every 2 hours, the force needed to remove individual hairs from the sheepskins was measured by a computerised force sensor. By this way, the action of the enzymes was recorded as a decrease in the force needed to remove hairs from the skins over time. From the results, it was clear that these enzymes do reduce the force needed to remove hairs from skins and hides, indicating that enzymatic preparations from these two keratinolytic bacteria are useful alternatives to present beam house chemicals and potential clean technology agents for dehairing of hides and skins.

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