

Rheological and structural properties of enzyme-induced gelation of milk proteins by ficin and *Polyporus badius*

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ABSTRACT

Effect of milk-clotting enzymes including ficin extract and *Polyporus badius* on the rheological and structural properties of coagulant milk from ewes' samples were investigated. Sequence of experimental sweeps of time–temperature, frequency, and strain were applied for enzyme-induced gelation of ewes' milk. Different concentrations of ficin and *P. badius* extracts (1, 3 and 5%) were used to coagulate milk proteins. The ewes' samples containing ficin and mushroom enzymes were heated from 25 to 35/45°C at heating rate 1°C/min and kept them for 30 minutes. Then, the gel network structures were cooled to 25°C with the same heating rate. Results showed that the ficin-induced gels can develop stronger gels at 45 °C and 5% ficin. Similar results were also found for 5% *P.badius* extract and incubation at 45 °C. However, *P.badius* gels provide a network with more viscous characteristics and have softer texture than ficin gels. Therefore, it may conclude the induced-gels with mushroom have higher moisture and lower protein contents, which may be related to the high proteolytic activity of *P.badius*. The SEM results showed that mushroom-induced gel has a more compact structure. Both gels showed a coarser and more compact protein network by increasing the enzyme concentration. Whereas, the *P.badius* gels had more fusions and folds

which indicate the higher proteolysis occurred during gelation and more breakdown of protein can clarify its softer texture. Our findings suggest the application of ficin and *P.badius* enzymes to develop a novel procedure to coagulate milk proteins and providing new structures in food systems.