**Low methoxyl pectin-based milk gels: Understanding structuring mechanisms in neutral dairy environments**

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Low methoxyl (LM) pectin is widely utilized in the food industry for its ability to form gels in the presence of divalent cations, such as calcium [1-3]. While LM pectin has been extensively studied and valorized in acidic and sugar-rich matrices, its behavior in neutral dairy environments presents unique challenges and opportunities, particularly in the development of functional and texturally appealing dairy products. Indeed, alongside some traditionally used food hydrocolloids in neutral dairy environments, LM pectin which is highly appreciated by customers and consumers [3], has emerged as a promising hydrocolloid candidate for such food applications. This is justified by the fact that LM pectin can undergo gelation over a wide pH range (2.6 - 7) [2], and that dairy environments provide the necessary conditions (neutral pH, high calcium content) for LM pectin gelation [1-3]. Additionally, the presence of proteins (such as casein micelles and whey proteins) and other milk components (such as fats) constitutes significant factors that can influence and modulate the gelling properties of LM pectins in neutral dairy environments. However, although LM pectins can be employed in neutral dairy environments similarly to some traditionally used hydrocolloids, such as carrageenan, little work has been conducted to understand and control the "structure-function" relationships of LM pectins in neutral dairy systems. Thus, the objective of this study is to better understand the structuring mechanisms (gelation, interactions, etc.), both under static conditions and under shear, of milk gels formed using LM pectins with varying chemical and macromolecular characteristics.

Using an original approach that combines rheological and chemical analyses, this research highlights the critical role of interactions between LM pectin and milk proteins in the formation of neutral milk gel networks. These interactions are further modulated by the presence of fat and calcium bridges, which play a non-negligible role. The study shows that these factors strongly influence the microstructure and mechanical properties of the resulting milk gels, which are also highly impacted by the chemical and macromolecular characteristics of the pectin. By bridging the knowledge gap in this area, this work provides an in-depth understanding of the mechanisms underlying LM pectin gelation in neutral dairy environments, offering strategies to design innovative tailor-made neutral dairy desserts with desirable properties.

Refences

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