



## Milk Antibody Collection

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Didier Dupont, Eric Beuvier

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## Milk Antibody Collection

O. Rolet-Répecaud<sup>\*a</sup>, V. Echasserieu<sup>b</sup>, O. Tranquet<sup>b</sup>, C. Arnould<sup>a</sup>, D. Dupont<sup>c</sup>,  
E. Beuvier<sup>a</sup>

<sup>a</sup> UR 342 Technologie et Analyses Laitières INRA Poligny, France

<sup>b</sup> UR 1268 Biopolymères Interactions Assemblages INRA Nantes, France

<sup>c</sup> UR 1253 Science et Technologie du Lait et de l'Oeuf INRA Agrocampus Ouest Rennes, France

Milk and milk-products are an important source of protein of the diet and milk proteins are widely used in food industry. The four major proteins in milk are  $\beta$ ,  $\kappa$ ,  $\alpha$ S1 and  $\alpha$ S2 caseins. They are associated into a supramolecular structure, the micelle. Milk also contains natural proteins and peptides with biological activities. Food process have an important impact on these supramolecular structures and on the proteins and peptides composition of the product and consequently change its biological activities and technological properties. Immunochemical tools, due to their sensitivity and specificity, are well suited to analyse specific proteins or peptides in a complex matrix like milk or cheese. They allow the detection, the quantification and the characterisation of caseins, seric proteins, peptides and enzymes from milk, rennet or microorganisms.

In order to develop immunoassays, INRA-URTAL has produced numerous monoclonal and polyclonal antibodies. This collection contains antibodies specific of endogenous components of milk, *i.e.* caseins,  $\alpha$ -lactalbumin, lactoferrin, plasmin / plasminogen, cathepsin D and of cheese manufacturing auxiliaries : chymosin, thermophilic starter (peptidases). We have also produced monoclonal antibodies directed against the enzyme cleavage site of caseins which allow to monitoring proteolysis phenomena in milk and cheese. During cheese making and ripening, proteins are hydrolysed. This proteolysis contributes to the elaboration of final quality of cheese.

Using polyclonal and monoclonal antibodies directed against lactoferrin, we developed a sandwich ELISA to determine bovine lactoferrin concentration in milk, whey and cheese. We showed that lactoferrin concentration in cheese depended on the cheese-making process, with higher values in Swiss-type and semi-hard cheeses than in soft cheeses.

A collection of monoclonal antibodies was obtained by immunisation of mice with CN micelles contained in fresh milk. This strategy of immunisation was chosen in order to produce a panel of monoclonal antibodies mainly specific towards the four caseins as structured within the micelle casein. The collection obtained has been used to study the supramolecular protein assembly of casein micelle and to monitoring the evolution of some epitopes during milk proteolysis. This study demonstrated that immuno-dominant epitopes of the micelle supramolecular structure were totally different from those known for the purified caseins.

The Milk Antibody Collection is a genuine toolbox to study proteins and peptides from milk in relation with food process.

\* odile.rolet-repecaud@poligny.inra.fr