

Milk is a liquid, which is produced by mammals, and which is serving the newborns as food and contains all nutrients newborns need for development. Thus, it is very hard to substitute milk as an ingredient in foods. But unfortunately, milk is an allergen food and food ingredient as well. Milk contains average 3.2% protein, in which main fractions are caseins (82.62%: 30.85% α S1-casein, 7.45% α S2-casein, 44.33% β + κ -casein in proteins) and whey proteins (17.38% in proteins). Bovine blood plasma contains 7.9% protein, in which main fractions are albumins (41.77% in proteins), immunoglobulins, α - and β -globulins (53.17% in proteins) and fibrinogen (5.06% in proteins). Custard is a perfect test matrix for investigation of substituting milk by blood plasma, because it is simple to handle and has only a few ingredients. Custard dessert consist of two phases: 1.) a continuous aqueous phase containing starch and/or carrageenan and

2.) a dispersed phase of oil. The role of proteins is to stabilize the dispersed phase. Thus, firstly the effect of blood plasma and milk proteins can be considered through texture properties. First factor of this research, which was investigated, was the protein depending on the raw material: 1.) milk and 2.) blood plasma. Second aim was to investigate the effect of milk and blood plasma on attributes of sponge cake with different sweetener, because a lot of consumers, which exclude milk from their diet, find the glycaemic index and energy content of foods important. Colour, pH and rheological attributes were measured. Anton-Paar Physica MCR 91 (Anton-Paar GmbH, Germany) viscometer was used for rheological measurements. The behaviour of samples (especially theoretical viscosity) was measured under variable speed shear stresses with concentric cylinders (CC27) and Couette type method. The RPM of the inner cylinder varied between 1 and 1000 min⁻¹. The outcome of the measurement was a flow curve, to which a model was fitted.

Means of rheological parameters (τ^0 – theoretical yield point [Pa], C – consistency index [Pa s^p], p – and power of law index [-]) of different sample groups

Protein source	Sweetener	τ^0 (Pa)	C (Pa s ^p)	p
Blood plasma	Sugar	8.81	4.78	0.52
Blood plasma	Sweetener	18.55	9.07	0.92
Milk	Sugar	3.43	1.68	0.64
Milk	Sweetener	5.22	0.97	0.7

Based on this research the allergenic milk can be substituted by non-allergenic blood plasma in simple food products like custard, but it causes a significant change in sensory attributes. The used protein source as well as sweetener determine the colour, pH and texture of the final product. The caused colour change is clearly visible to the naked eye, but each sample was nearly white and another flavouring and/or colouring matter can mask this change.

Total colour differences (ΔE^* – total colour difference [-]) of different measured sample groups (Darker red colour marks higher difference.)

	Vanilla custard with milk and sugar	Vanilla custard with milk and sweeteners	Vanilla custard with blood plasma and sugar	Vanilla custard with blood plasma and sweeteners
Vanilla custard with milk and sugar	0,00	2,06	20,90	35,25
Vanilla custard with milk and sweeteners	2,06	0,00	19,92	34,64
Vanilla custard with blood plasma and sugar	20,90	19,92	0,00	15,55
Vanilla custard with blood plasma and sweeteners	35,25	34,64	15,55	0,00