

Influence of micro and nanofibrillated cellulose on yogurt production and storage

NEVES CUNHA C. (1), BARROSO DOS ANJOS PINTO C. (1), MARIA MEDALHA COLTURATO V. (2), LEILA BERTO G. (3), ARANTES V. (3), DA SILVA BARUD H. (2), TULER PERRONE (1), STEPHANI R. (1)

1 Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil

2 Universidade de Araraquara, UNIARA, Araraquara, Brazil

3 Escola de Engenharia de Lorena, Universidade de S Paulo, Lorena, Brazil

OBJECTIVE

This work aimed to evaluate the effect of adding three hydrocolloids in the form of a vegetable cellulose colloidal suspension on the physicochemical characteristics of yogurts during production and storage.

METHODS

Three different cellulose fibrillated were produced, using bleached eucalyptus kraft pulp as initial substrate: (i) cellulose nanofibrillated (CNF) and (ii) microfibrillated cellulose (MFC) were isolated exclusive by mechanical defibrillation using disc ultra-refiner and (iii) enzymatic cellulose nanofibrillated (Enzy-CNF) was a combination of mechanical defibrillation and enzymatic post treatment of CNF. Four formulations of yogurts containing 9%w/w sucrose 81%w/w milk were prepared: T1= 10%w/w water (control); T2= 10%w/w MFC; T3= 10%w/w CNF and T4=10%w/w Enzy-CNF. Parameters such as acidity, pH, syneresis, consistency, particle size distribution and scanning electron microscopy were analyzed after 1, 15, 30 and 60 days after production, the fermentation curve was also monitored.

RESULTS

The profile of the yogurt fermentation curves, titratable acidity and pH during storage showed no significant differences ($p < 0.05$) for the four treatments. The consistency measurement after 1 day of production showed that T1 reached the lowest values (represented by the highest flow distance), followed consecutively by: T4, T3 and T2. The applied statistics indicate that the result obtained by T1 was significantly different from the other treatments for $p < 0.05$. The results of syneresis for the yogurt samples showed that T2, T3 and T4 presented less syneresis ($p < 0.05$) in the evaluation at 15 days. Observing the evolution of particle size, at d90 it is possible to note significant difference ($p < 0.05$) between the initial analysis and the other times only for T1, indicating an initial stability to the particle size in treatments T2, T3 and T4. The images of the microstructures of the yogurt gels show that formulations T2, T3 and T4 have a more heterogeneous protein network compared to the control yogurt.

CONCLUSIONS

The addition of cellulose colloidal suspensions to yogurt contributed positively to consistency and syneresis. Scanning electron microscopy showed that the yogurts that received the addition of these hydrocolloids presented a more heterogeneous and compact protein network than the control yogurt. Physicochemical parameters such as pH and acidity were not affected.