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Abbreviations

SCC: Somatic Cell Count; TN: Total Nitrogen; NCN: Noncasein Nitrogen Content; CP: Crude Protein; SN: Soluble Nitrogen; NPN: Non-Protein Nitrogen; CN: Casein Nitrogen; TP: True Protein; SP: Soluble Protein; β-CN: β-Casein; α-CN: α-Casein; κ-CN: κ-Casein; TA: Titratable Acidity; La: α-Lactalbumin; β-Lg: β-Lactoglobulin

Introduction

Caseins are milk proteins secreted by cells of the mammary gland. ey constitute approximately 78-82% of bovine milk proteins and are divided into four main groups: α_{S1}-casein, α_{S2}-casein, β-casein and κ-casein, forming supramolecular structures known as micelles [1,2]. e protein composition of cow's milk is an important factor for the pro tability of the dairy industry. An increase in the proportion of casein, in particular α- and β-CN, results in better product yield, especially in cheese [3]. e caseins are phosphoproteins containing a variable number of phosphate radicals linked to serine (P-Se) and are concentrated in di erent regions of polypeptide chains. Based on the location of these phosphate radicals, the resulting molecule regions are more hydrophilic or more hydrophobic, and consequently, the caseins are more susceptible to proteolysis.

Proteolysis in milk is an important quality criterion that can have bene cial or detrimental e ects, depending on processing. Milk protein proteolysis can be attributed to both indigenous proteases and also proteases produced by psychrotrophic bacteria during the

[1,2]. >roteases

indigenous milk proteinase plasmin, which is associated primarily with the casein micelles [23], where it is capable of hydrolysing all caseins except κ-casein [24-26], in which contributes to increased susceptibility to defects in dairy products such as technological problems related to proteolytic enzymes include the gelling of UHT milk (Ultra High Temperature) [27,28], generation of free amino acids during cheese ripening and development of undesirable flavors and a bitter taste in milk and dairy products [29,30]. Even

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Moslehishad et al. [40] found no signi cant di erence in the

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10. Albenzio M, Caroprese M, Santillo A, Marino R, Muscio A, et al. (2005) Proteolytic patterns and plasmin activity in ewes' milk as affected by somatic cell count and stage of lactation. J Dairy Res 72: 86-92.

11. Fox PF, Mcsweeney PLH (1996) Proteolysis in cheese during ripening. Food Reviews International 12: 457-509.

12. Crudden A, Fox PF, Kelly AL (2005) Factors affecting the hydrolytic action of plasmin in milk. Int Dairy J 15: 305-313.

13. Fox PF, Kelly AL (2006) Indigenous enzymes in milk: Overview and historical aspects - Part 2. Int Dairy J 16: 517-532.

14. Sgarbieri VC (2005) Revisão: Propriedades estruturais e físico-químicas das proteínas do leite. Brasilian Journal of Food Technology. Campinas. 8: 43-56.

15. Souza MJ, Ardo Y, Mcsweeney PLH (2001) Advances in the study of proteolysis during cheese ripening. Int Dairy J 11: 327-345.

16. Larsen LB, Hinz K, Jorgensen AL, Moller HS, Wellnitz O, et al. (2010) Proteomic and peptidomic study of proteolysis in quarter milk after infusion with lipoteichoic acid from Staphylococcus aureus. J Dairy Sci 93: 5613-5626.

17. Santos MV, Ma Y, Barbano DM (2003) Effect of somatic cell count on proteolysis and lipolysis in pasteurized fuid milk during shelf-life storage. J Dairy Sci 86: 2491-2503.

18. Philpot NW, Nickerson SC (1991) Mastitis: counter attack. Babson Bro, USA.

19. Kitchen BJ (1981) Review of the progress of dairy science: bovine mastitis: milk compositional changes and related diagnostic tests. J Dairy Res 48: 167-188.

20. Fox PF, Morrissey PA (1981) Enzymes and food processing. In: Birch GC, Blakeborough N, Parker KJ (Eds) Enzymes and Food Processing. Applied Science Publishers, London, UK, 213-238.

21. Andrews AT, Olivercrona T, Bengtssonolivercrona G, Fox PF, Bjorck L, et al. (1991) Indigenous enzymes in milk. In: Fox PF (Ed) Food Enzymology. Elsevier Applied Science, New York, USA, 1: 53-129.

22. Datta N, Deeth HC (2001) Age gelation of UHT milk-a review. Food and Bioproducts Processing 79: 197-210.

23. Politis I, Barbano DM, Gorewit RC (1992) Distribution of plasminogen and plasmin in fractions of bovine milk. J Dairy Sci 75: 1402-1410.

24. Eigel WN (1977) Effect of bovine plasmin on alpha-S1-B and kappa-A caseins. J Dairy Sci 60: 1399-1403.

25. Grufferty MB, Fox PF (1988) Milk alkaline proteinase. J Dairy Res 55: 609-630.

26. Le Bars D, Gripon JC (1993) Hydrolysis of as 1-casein by bovine plasmin. Lait 73: 337-344.

27. Rauh VM, Anja S, Mette B, Richard I, Marie P, et al. (2014) Plasmin activity as a possible cause for age gelation in UHT milk produced by direct steam infusion. Dairy J 38: 199-207.

28. Rauh VM, Johansen LB, Ipsen R, Paulsson M, Larsen LB, et al. (2014) Plasmin activity in UHT milk: relationship between proteolysis, age gelation, and bitterness. J Agric Food Chem 62: 6852-6860.

29. Fernandes AM, Moretti TS, Bovo F, Lima CG, Oliveira CAF (2008) Effect of somatic cell counts on lipolysis, proteolysis and apparent viscosity of UHT milk during storage. Int J Dairy Technol 61: 327-332.

30.

58. Nudda A, Feligini M, Battacone G, Macciotta NPP, Pulina G (2003) Effects of lactation stage, parity, ß-lactoglobulin genotype and milk SCC on whey protein composition in Sarda dairy ewes. Italian Journal of Animal Science 2: 29-39.

59. Albenzio M, Caroprese M, Santillo A, Marino R, Taibi L, et al. (2004) Effects of somatic cell count and stage of lactation on the plasmin activity and cheese-making properties of ewe milk. J Dairy Sci 87: 533-542.

60. Gouldsworthy AM, Banks JM, Law AJR, Leaver J (1990) Casein degradation in Cheddar cheese monitored by capillary electrophoresis. Milk Science International 54: 620-623.

61. Hames BD, Rickwood D (1998) In: 4th edn, Gel Electrophoresis of Proteins: A Practical Approach, Oxford University Press, pp. 98-145.

62. Trejo R, Harte F (2010) The effect of ethanol and heat on the functional hydrophobicity of casein micelles. J Dairy Sci 93: 2338-2343.

63. Zafalon LF, Nader FA, Carvalho MRB, Lima TMA (2008) Infuence of bovine subclinical mastitis on milk protein fractions. Arq Inst Biol São Paulo 75: 135-140.

64. Rogers SA, Mitchell GE (1994) The relationship between somatic cell count, composition and manufacturing properties of bulk milk. 6. Cheddar cheese and skim milk yoghurt. Aust J Dairy Technol 49: 70-74.

65. Oliveira CAF, Fernades AM, Neto COC, Fonseca LFL, Silva EOT, et al. (2002) Composition and sensory evaluation of whole yogurt produced from milk with different somatic cell counts. Aust J Dairy Technol 57: 192-196.

66. Aslam M, Hurley WL (1997) Proteolysis of milk proteins during involution of the bovine mammary gland. J Dairy Sci 80: 2004-2010.

67. Barbano DM, Clark JL (1990) Kjeldahl method for determination of total nitrogen content of milk: collaborative study. Journal AOAC International 73: 849-859.

68. Considine T, Healy A, Kelly AL, Mcsweeney PLH (2002) Proteolytic specifcity of cathepsin G on bovine α- and -caseins. Food Chemistry 79: 59-67.

69. Lima MCG, Sena MJ, Mota RA, Mendes ES, Almeida CC, et al. (2006) Somatic cell count and physicochemical and microbiological analyzes of raw milk produced in the wild type c region of Pernambuco state. Arq Inst Biol 73: 89-95.

70. Walstra P, Vliet VT (1986) The physical chemistry of curd making. Netherlands Milk and Dairy Journal 40: 241-259.