

Identification of genetic protein variants in milk by MALDI-TOF analysis.

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Genetic protein variants in milk from different dairy cattle, bovine, ovine and caprine, exist in many forms due to mutations and have different expression levels due to internal and external conditions. This may be important for some technological properties, like cheese renneting and yield. In addition different protein polymorphisms may be related to important health aspects, producing various biological active peptides during human digestion. The most frequent genetic variants from bovine caseins are α S1-B, α S2 -A, β -A1A2B and k-ABE, and the whey proteins, α -lactalbumin A and β -lactoglobulin AB. The polymorphism of goats α S1-caseins have been studied intensively because of a possible relationship to coagulation problems of the milk. With regard to quantities variations, there are 6 alleles of α S₁-caseins; A,B,C,E,F,G and 0. Some of these ABC and G have been found to be associated with a high content, of α S₁-casein in milk (app. 3.6g/l), E with intermediate content (1.6g/l), F and D with weak content (0.6g/l) and α S₁-casein 0 being a true "null" allele. This means that milk with α S₁-casein 0 contain less amount of total casein, app. 20g/l contra 27g/l. High numbers of α S₁-casein 0 genotype were identified in Norwegian milk. Milk from the Norwegian goats herd showed that more than 70% of the goats contained α S₁-CN null allele. This is very unic compared to European and other countries goat herds.

Genetic variants have traditionally been identified at the phenotype level by IEF, HPLC or CE. However, these methods are time consuming and it is therefore important to find rapid and reliable methods for identification individual milk types, both of bovine and caprine variants.

Skim milk were diluted in 0.1% TFA (1:100 and 1:200) with or without urea/thiourea (UTU) solution or Guanidine-HCl/0.1M acetate (GuAc) solution. and mixed with the matrices SA (or HCCA or HCCA/DHB) then spectra were obtained by MALDI-TOF analysis. Some samples were prepared with Dynabeads RPS-Pro (standard protocol). After elution the samples were mixed with 3 volumes of saturated SA-solution and the spectra were obtained by MALDI-TOF.

We were able to separate α s1-, α s2- , β - and k-casein in goats milk and by then identify the goats that are missing the α s1-casein in the milk, which accounts for more than 70% of the Norwegian herds.