β-CASEIN GENE POLYMORPHISMS IN DAIRY COWS REARED IN CENTRAL ITALY

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INTRODUCTION

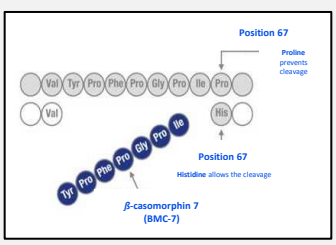
CASEINS IN BOVINE MILK *(chromosome 6)*

- *alphas1 casein (CSNS1 gene)*
- *alphas2 casein (CSN1S2 gene)*
- **beta casein** (CSN2 gene): 45% → **12 genetic variants (A1,A2,A3,B,C,D,E,F,G,H1,H2,I) A1 e A2 are the most common** → *ß-casein content in bovine milk seems to influence milk's technological characteritics and may interfere with human health*
- *kappa casein (CSN3 gene)*

ß-casein A1 and B → **Casomorphin-7 (BMC-7) release** *following proteolytic cleavage of ß-casein chain during food processing and gastrointestinal digestion* → **INTOLERANCES**, **HUMAN DISEASES**

ß-casein A2 → *Mutation at codon 67 of ß-casein gene* → *Aminoacid change Histidine (A1 and B variants) → Proline (A2 variant)* → *prevents* **BMC-7 release**

ß-casein A2
ß-casein A1



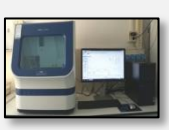
ß-CASEIN A2 presence in milk is desirable because it seems to increase milk digestibility → *ß-casein gene polimorphisms* → *Discrimination of the main variants of ß-casein*

The potential negative role of ß-casein A1 on human health has stimulated the planning of cattle breeding programmes based on ß-casein gene polymorphisms

AIM OF THE STUDY

Evaluation of the allele frequencies of β-casein gene variants with the aim to select a population of A2 homozygous animals in Italian dairy cows reared in central Italy

MATERIALS AND METHODS

1723 blood samples Italian Holstein Friesian dairy cows → ***Genomic DNA extraction*** →  ***PCR*** *CSN2 gene* → ***EXON 6*** *(274 bp)*, ***EXON 7*** *(547 bp)* →  ***DNA Sequencing*** → ***Bioinformatic analysis***

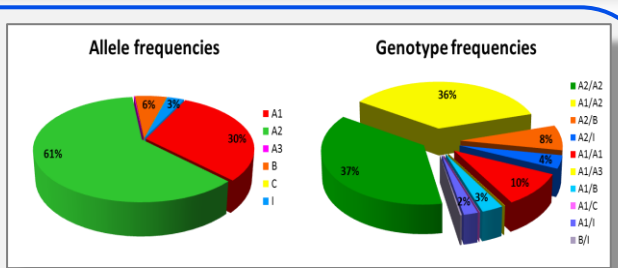
In order to discriminate the main ß-casein variants, codons 36 and 37 in exon 6 and codons 67, 72, 88, 93, 106, 122, 138 in exon 7 have been analyzed → **Polimorphisms of particular interest** P67H, M93L and S122R in exon 7 E37K in exon 6

RESULTS AND DISCUSSION

ß-casein most frequent variants : **A1** *(30%) and* **A2** *(61%)*

Other variants : **A3***:0,15%;* **B***: 6,0%;* **C***: 0,03%;* **I***: 3,0%*

Homozygous animals **A2A2** *frequency : 37%*
A2 allele *is present in eterozygosity in 47% of the animals, the most of which are* **A1A2** *(36%)*



In many countries A2A2 cow's milk has already been commercialized as a product with beneficial properties obtaining also an economic gain.
The results of this project may be used for the planning of breeding selection programmes based on genetic analysis.
The identification of A2 carrier cows will allow to manage animal couplings with the aim of increasing A2 allele frequency and producing a milk containing only β-casein A2 variant.

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