Association of kappa casein polymorphism with genomic breeding values for dairy traits in Croatian Holstein cattle population

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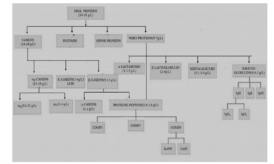
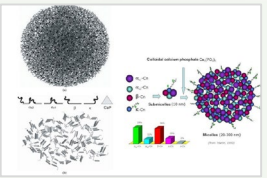
Say cheese





- Kappa Casein – important role in cheese production
  - Influence the amount of clotting that occurs and the resulting cheese yield
  - Stabilizing factor that determines how well and how quickly the milk coagulates to form a curd
- Genomic selection – SNP's
  - Estimation of genomically estimated breeding values (GEBV)
  - Information of genotypes for monogenic traits

Source: http://courseware.cutm.ac.in/wp-content/uploads/2020/06/2.-Milk-Protein-Casein.pdf
https://www.health.com/high-protein-cheeses-8603571

κ-CN Genotypes

- Nine different forms – A, B, and E being the most common
- Six different κ-CN genotypes
- Cheese production
  - **BB** genotype –most favorable
  - **AA** genotype – less favorable
  - **EE** genotype – the most undesirable

Objective

- To determine
  - The frequency of κ-CN genotypes and alleles
  - Association of genotypes with genomically estimated breeding values (GEBVs) for milk production traits (milk yield – MY, fat yield and fat content – FY and FC, and protein yield and protein content – PY and PC)

Material

- 334 Holstein females
  - From 23 herds
  - Progenies of 56 sires
- Illumina BovineSNP50K BeadChip – 52,445 SNPs

- Results of genotyping – information of genotypes for monogenic traits such as κ-CN

Method

- Calculation of allele and genotype frequencies
  - '*genetics'* package

- Inferential statistical analyis
  - '*glm'* procedure GEBVs ~ κ-CN genotpyes (One-Way ANOVA)

Results

Frequency of alleles and genotypes

	Allele			Genoptype					
	A	B	E	AA	AB	BB	AE	BE	EE
N	285	313	70	51	139	76	44	22	2
Frequency (%)	43	47	10	15	42	23	13	7	1

Association of genotypes with GEBVs

- The BB genotype
  - Positively related to GEBVs for PC ($P<0.05$)
  - Negatively related to GEBVs for MY ($P<0.05$)
- No statistically significant differences between poymorphisms of κ-CN and GEBVs for other examined dairy traits

Conclusions

- Breeding for favourable κ-CN BB genotype would improve the overall PC in milk, but on the cost of MY
- More emphasis needs to be put on optimising future selection strategy if beneficial propertyes of κ-CN BB genotype is to be exploited

Future activities

- Selecting for κ-CN BB or AB sires will gradually increase the frequency of BB cows
- These sires can be identified using filtering features of the GEBV informations on the HAPIH web-site
- https://www.hapih.hr/cs/aplikacije/vrednovanje/web/cattle/_int/deh/2402/hol_deh_a1.html

Thank You For Listening

https://www.icbf.com/?p=5831