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Milk protein k-casein genotypes and milk productivity of Latvian Native breeds

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Introduction - Latvian native breeds

- **Latvian Blue (LZ)** under recording in 2008 were 643 cows.
- Milk production in 2008: milk yield 4292 kg; fat content 4.40%; protein content 3.37%.
- LZ cows were popular in private farm due to they modesty and hair colours.

- **Latvian Brown (LB)** under recording in 2008 were 63 163 cows.
- Milk production in 2008: milk yield 5103 kg; fat content 4.44%; protein content 3.36%.
- LB cows were improved by Europe breeds Danish Red, Angler, Holstein Red, and Swedish Red-and-White.

Materials and methods: Genotypes of 30 LB and 65 LZ genetic resources cows were estimated for k-casein locus by restriction fragment length polymorphism analysis (PCR-RFLP) of amplified DNA (Alexander LJ, at al;1998).

The objective of this study was: to evaluation gene frequency at the k-casein locus in the Latvian genetic resources cattle populations; to evaluation relationship between the polymorphism of the k-casein gene and milk productivity traits.

Results

Table 1. Allele frequency at the k-casein locus in Latvian blue, Latvian brown and other red breed cows

κ-casein allele	Latvian Blue	Latvian Brown	German Red	Danish Red
	n =65	n =30	n =28	n = 169
A	0.970	0.833	0.814	0.810
B	0.003	0.167	0.174	0.190
E	-	-	0.012	-
Reference	-	Paura et al., 2008	Zaton-Dobrovolska et al., 2007	

- In LZ and LB cattle were found k-casein A, B alleles.
- The k-casein A and B allele frequencies were 0.816 and 0.184 in LB and 0.97 and 0.03 in LZ breed, respectively.
- The k-casein E allele was not found in population.
- A variant prevails in Holstein Friesian, Ayrshire, Danish Red and its frequency is near 60-85% (Ikonen et.al, 1996; Zaton-Dobrovolska et al., 2006). B variant is predominant in Jersey breed (McLean et al., 1987).
- The LB population has a structure that is typical for red dairy cattle population.

Table 2. Milk productivity traits 1st lactation LZ cows

Genotype	Genotype frequency	Milk productivity traits		
		Milk yield, kg	Protein, %	Fat, %
AA	0.908	4326.4±177.83	3.30±0.069	4.35±0.064
AB	0.062	4867.7±324.97	3.21±0.056	4.43±0.106
BB	0.031	3479.0±127.00	3.33±0.019	4.56±0.107

Table 3. Milk productivity traits 1st lactation LB cows

Genotype	Genotype frequency	Milk productivity traits		
		Milk yield, kg	Protein, %	Fat, %
AA	0.733	4029.8±145.40	3.25±0.030	4.48*±0.069
AB	0.200	4371.8±231.45	3.39*±0.091	4.29±0.055
BB	0.067	4633.0±179.61	3.02*±0.014	3.90*±0.012

* - P<0.05

- In LZ the frequencies of k-casein genotypes AA and AB were 0.908 and 0.031, respectively.
- In LZ cow's population the k-casein BB genotype was associated with the higher fat and protein content and low milk yield (table 2).

- In LB the frequencies of k-casein genotypes AA and AB were 0.733 and 0.200, respectively.
- In LB cow's population the k-casein AB and AA genotypes were associated with the higher fat and protein content and low milk yield (table 3).

Conclusions:

- In Latvian Brown and Latvian Blue cows genetic resources populations were found k-casein A and B alleles and genotypes AA, AB and BB.
- Only some cows had preferable genotype BB, genotype EE was found not found in population.
- The k-casein A allele were associated with highest milk yield and low protein content.