ALGIMED TECHNO

ISO 9001:2015 ISO 13485:2016

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Reagent kits

# ALG-CASEIN A1/A2 MAX

to detect allelic variants of the bovine β-casein gene

## Description

β-casein is a protein consisting of a chain of 224 amino acids, which accounts for about 30% of all milk proteins. There are two major variants of β-casein: A1 and A2. Variant A1 differs from A2 by only one amino acid. As a result, dairy products containing A1 or A2 β-casein are digested differently. As a result of β-casein metabolism «opioid peptide» BCM-7 appears and about 25% of people are sensitive to this component. Some people who believe they have milk intolerance may be sensitive to A1 β-casein. Consumption of milk with A2 β-casein reduces acute gastrointestinal symptoms of milk intolerance, while regular milk with A1 β-casein reduces lactase activity and enhances gastrointestinal symptoms.

**The formation of a genetically safe group of highly productive dairy cattle herd is one of the successful approaches in modern animal husbandry to increase the productivity and A2 milk yield without A1 impurities.** This approach will not only guarantee the "healthy" A2 milk production, but also completely displace and eliminate the production of A1 milk within 10 years.

A1/A2 status is determined in cows and bulls by a pair of genes on the 6th chromosome, namely, polymorphic variants of the β-casein gene β-CNA1 and β-CNA2, respectively. Each cow and bull carries two copies of this gene, and two main variants are distinguished - the A1 and A2 β-casein alleles. Regardless of the breed, a herd of cattle is formed by three types of animals: A2A2 homozygous genotype, A1A1 homozygous genotype and A1A2 heterozygous genotype. Figures 1 and 2 show the frequency of alleles and genotypes occurrence in various breeds.


| Breed | Genotype | | | Number of tested animals A1A1 |
|---|---|---|---|---|
| | A1A1 | A1A2 | A2A2 | |
| Holstein | 16 % | 49 % | 35 % | 4603 |
| Ayrshire | 29 % | 48 % | 23 % | 287 |
| Jersey | 3 % | 32 % | 65 % | 752 |
| Brown Swiss | 5 % | 38 % | 57 % | 107 |
| Guernsey | 28 % | 19 % | 53 % | 145 |

To form a prosperous group of high-yielding dairy herd of cattle, it is advisable to select and sort animals and to form a separate herd of only homozygous type A2A2 cows and bulls, which give only A2 milk, gradually increasing the number of such animals and completely excluding the production of A1 milk.

Official distributor
Algimed Trade, LLC

33, Kalvariyskaya st., room 302, Minsk, 220073, Belarus
+375 17 392 72 92
mail@algimed.by

At the current stage, expensive sequencing methods or time-consuming approaches using gel electrophoresis are mainly used for genotyping and certification of cattle. Unlike other cow genotyping technologies based on β-casein variants, real-time PCR analysis is the fastest, most convenient and affordable method that allows sensitive and specific detection of A1 and/or A2 DNA in samples.
This approach is implemented in the **«ALG-CASEIN A1/A2 MAX».**

## Kit content

**«ALG-CASEIN A1/A2 MAX»** – complete reagent kit; includes reagents for all stages of the study: DNA extraction and polymerase chain reaction (PCR).
The reagent kit is designed to study 96 samples.

## Test principle

The test principle is based on DNA extraction from material samples and subsequent amplification of a specific DNA site with allele-specific probes.
The accumulation of specific amplification products is recorded by measuring the intensity of the fluorescent signal in real time using the FAM and HEX channels in real time.

## Research material

- ***Bos Taurus*** tissue samples (blood, cartilage tissue);
- whole milk;
- ***Bos Taurus*** semen.

## Time of the research

**DNA extraction:**
- from **30 minutes.**

**PCR analysis:**
- time for manual manipulations – **5-15 min**;
- PCR protocol time - **71 min,**
- total time for analysis - **90 min.**

## Detection threshold

- 7.5 genomic copies per reaction;
- detection of up to 1 individual carrier of the A1 allele out of 50 in pooled milk samples.

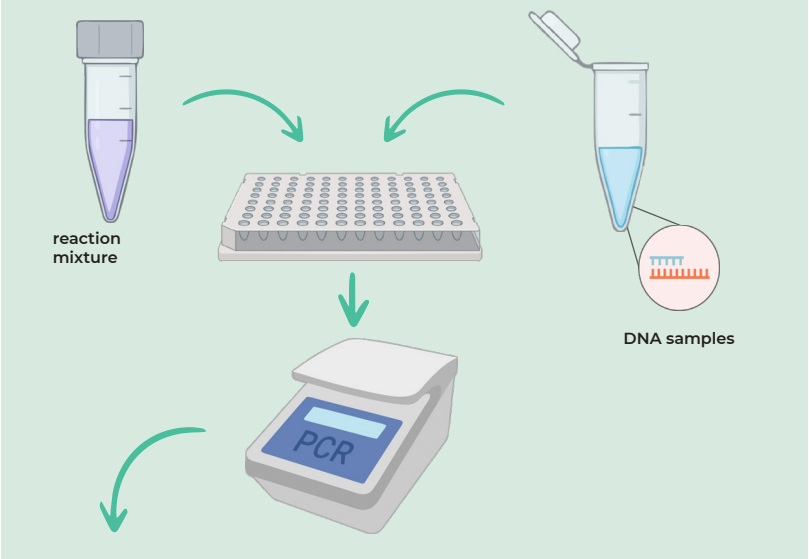
## Shelf life

12 months

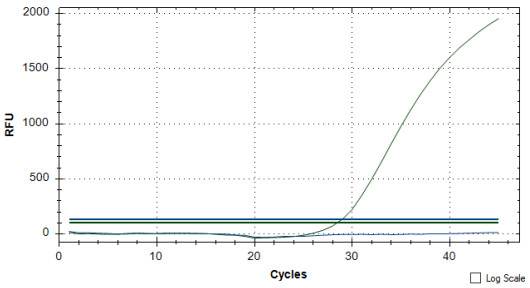
## Advantages

- low cost;
- a turnkey solution that includes reagents for all stages of PCR analysis;
- time input reduction (automation of DNA extraction stage);
- fast, reliable and highly sensitive result;
- easy result analysis;
- analysis of A1 and A2 alleles percentage in whole milk.

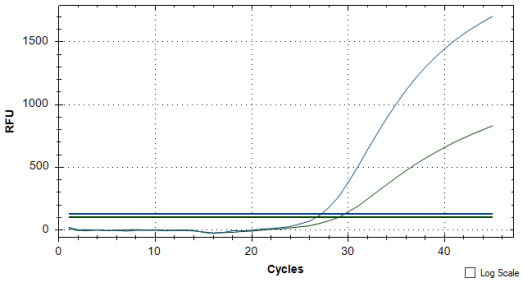
*We express our gratitude for the joint development and validation studies on animal samples to the employees of the applied-research laboratory «DNA-technologies» of Grodno State Agrarian University.*



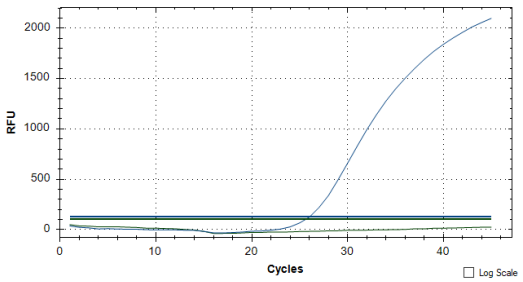

HEX
A1A1 homozygote




FAM / HEX
A1A2 heterozygote




FAM / HEX
A2A2 homozygote

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