



A2 (Beta Casein) Genotype Reports

January 23, 2023

Welcome to Lactanet's on-line report including a *Herd Summary* and *Animal Summary* that reflects the current profile of your herd for the various genotypes of beta casein, more commonly known as A2.

The information presented in these reports includes only herdbook registered females that are known to be part of your milk recording herd inventory, regardless of breed. National benchmarks are based on all registered females included in the inventory of all herds enrolled on Lactanet milk recording services.

What is Beta Casein?

Beta casein is a protein that represents $\approx 30\%$ of all milk proteins. There are two forms of beta casein, namely A1 and A2 and they differ by only one of the 224 amino acids that make up beta casein. Some research has

indicated that the digestibility of dairy products is improved with A2 beta casein proteins compared to A1.

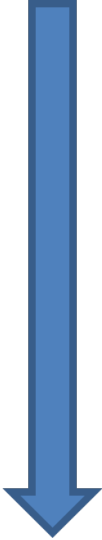
The Genetics of A2

Animals of any dairy breed can have their DNA tested to identify their beta casein genotype based on the transmission of the A1 and/or A2 forms from their parents. This A2 gene testing is frequently done at the same time as genotyping for a genomic evaluation. The possible beta casein genotypes are A2A2, A1A2 or A1A1 and the proportion of each within a breed is dependent upon the frequency of the A1 and A2 genes in that population. Some herd owners are interested in having a complete herd of A2A2 animals so they may qualify to produce “A2 Milk”. This goal is possible to achieve over time by selection of sires that have the A2A2 or A1A2 genotypes.

The Genetics section of the Lactanet web site provides [group query tools](#) that allows you to filter sires by their A2 genotype, which is also a feature of the [Compass software](#) freely available to producers across Canada.

A2 Genotype Categories

Lactanet geneticists developed an advanced calculation of probabilities based on actual A2 gene test results and all available pedigree data to assess the most likely A2 genotype of each female in your herd. Your herd inventory is divided into three groups, namely Cows (lactating or dry), Yearlings (heifers over 12 months) and Heifers (12 months of age and under). For each age category, counts and percentages are presented for seven A2 genotype groups as follows:

Known A2A2	Gene test of A2A2 or both parents have an A2A2 genotype (100% probability based on pedigree)	Decreasing likelihood of producing A2 Milk 
Most Likely A2A2	Probability of 75% to 99% of A2A2 genotype	
Likely a Carrier of A2	A2A2 genotype probability <75% but probability of carrying at least one copy of the A2 gene exceeds 50%	
Known or Likely A1A2	Gene test of A1A2 or $\geq 75\%$ probability of A1A2 genotype	
Likely a Carrier of A1	A1A2 genotype probability <75% but probability of carrying at least one copy of the A1 gene exceeds 50%	
Known or Likely A1A1	Gene test of A1A1 or $\geq 75\%$ probability of A1A1 genotype	
Insufficient Information	Not enough data available (i.e.: pedigree and/or A2 gene test results)	

How to Use the A2 Genotype Reports

The value of these reports will vary significantly from herd to herd.

Minimally, the *Herd Summary* will provide you with an overall profile of your herd status and the evolution of the various A2 genotype groups across the three age categories.

For herd owners interested in increasing the frequency of A2A2 genotype in their herd, the *Animal Summary* report provides the best indication of which females are most likely to be A2A2 or to produce daughters that may be.



By Brian Van Doormaal

Brian has dedicated his professional career of nearly 37 years involved in the genetic improvement of dairy cattle in Canada. He is well-known for his numerous extension articles and public speaking engagements in both official languages.



By Allison Fleming Ph. D.