



140 Riverlea Road
Private Bag 3016
HAMILTON.

Phone: (0800) 436 362
Fax: (0800) 329 436
Email: genemark@lic.co.nz

A2

What is A2?

- Milk protein is made up of 80% casein proteins and 20% whey proteins.
- There are 4 different kinds of caseins, one of which is β -casein (Beta casein)
- Beta casein comes in two different structure types, A1 and A2

What does the A2 gene do?

- The A2 gene determines whether A1 or A2 protein is produced in cow's milk
- Every animal has two copies of the gene
- A2/A2 animals produce A2 milk with the A2 variant of Beta Casein protein
- A1/A1 animals produce A1 milk with the A1 variant of Beta Casein protein
- A1/A2 animals produce a mixture

How is A2 inherited?

- An animal receives one copy of the gene from its sire, the other from its dam
- Therefore an A2/A2 sire (or dam) will always give one copy of A2 to its progeny
- Likewise an A1/A1 sire (or dam) will always give one copy of A1 to its progeny
- An A1/A2 sire (or dam) can give either A1 or A2 to its progeny

What is frequency of A2 gene?

- ~30% NZ dairy animals are estimated to contain the A2 gene and ~70% A1

What is A2 milk?

- A2 milk (exclusively containing the A2 protein) is sold in the NZ and Australian markets. It has been priced ~NZ\$0.30 cents above the price of normal milk in NZ

What health research has been done on A2 milk?



- A patent has been lodged that claims that beta casein A1 causes Type I diabetes,
- Some research has shown correlation between countries with high proportions of A1 milk e.g. NZ, Britain and Finland and high rates of heart disease & diabetes

How do I test for the A2 gene?

- Phone GeneMark on 0800 436 362 for a request form and instructions for sending samples

DNA Basics



Full A2 cow + Full A2

A2	A2
A2	A2/A2
A2	A2/A2

All the offspring are A2/A2 as neither parent has an A1 gene to pass on.



A1/A2 cow + Full A2 bull

A2	A2
A2	A2/A2
A1	A1/A2

Half the offspring are A2/A2 as in half the cases the mum will pass on the A1 gene to

Full A1 + Full A2 bull

A2	A2
A2	A1/A2
A1	A1/A2

None of the offspring are A2/A2 as in all the cases the mum will pass on the A1 gene to them.

DNA Basics

A1/A2 cow + A1/A2 bull



	A1	A2
A2	A1/A2	A2/A2
A1	A1/A1	A1/A2

A quarter of the offspring are A2/A2 as in 2/3 of the cases either the mum or dad will pass on the A1 gene to them.

Full A1 cow + Full A1 Bull



	A1	A1
A1	A1/A1	A1/A1
A1	A1/A1	A1/A1

None of the offspring are A2/A2 as neither parent has an A2 gene to pass on.