Alpha Mannosidosis in Belted Galloways

Talk for Belted Galloway Cattle Society Members

14th March 2023 | Dr Harriet Bunning

What is Alpha Mannosidosis?

- **Genetic disorder**
- Causes:
  - Abortions
  - Stillbirths
  - Very early neonatal deaths
- Affected calves may have:
  - Hydrocephalus
  - Arthrogryposis (shortened limbs with fixed contracted joints)
  - Cleft Palate
  - Enlarged Liver and Kidneys

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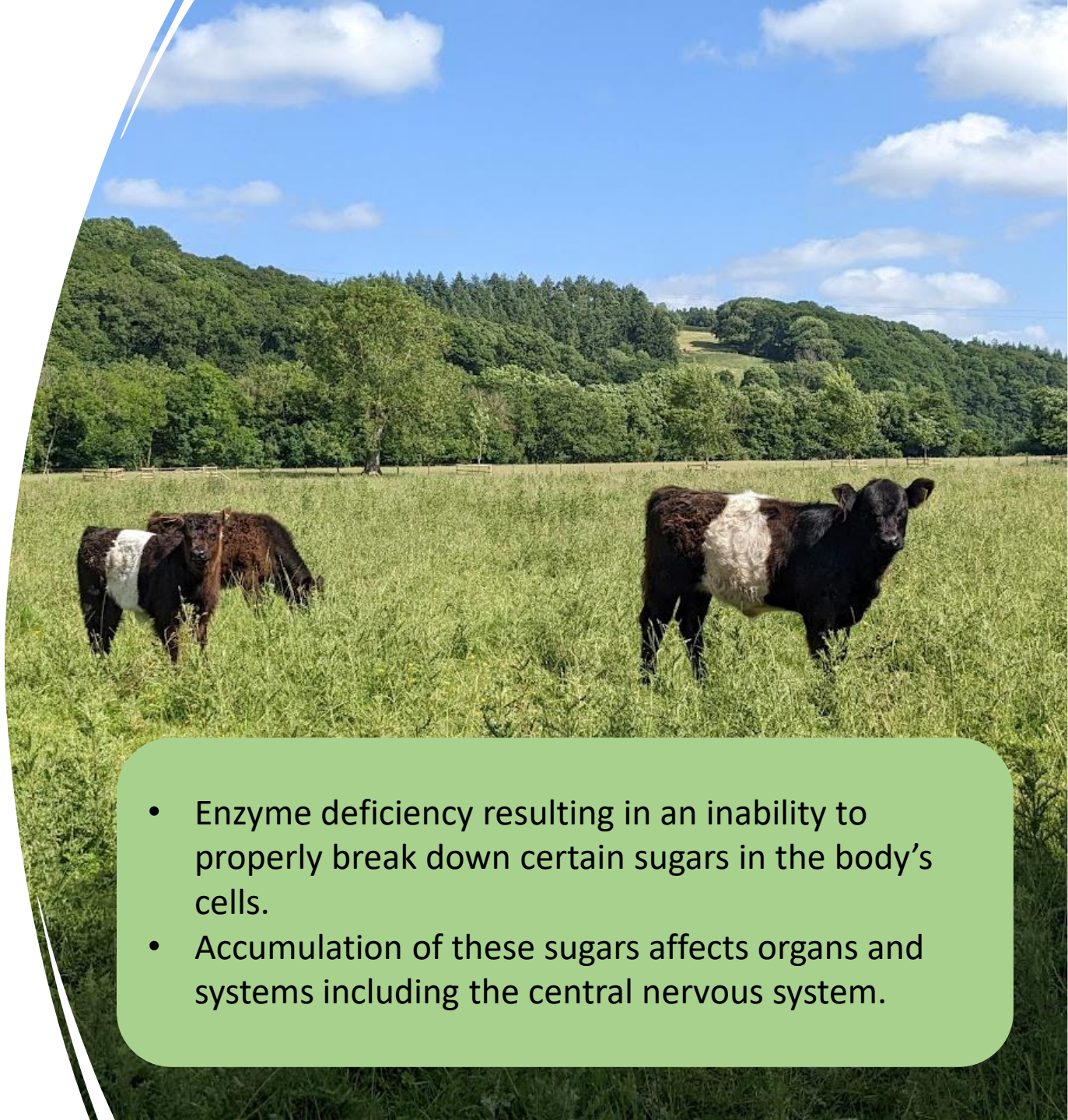

- Enzyme deficiency resulting in an inability to properly break down certain sugars in the body's cells.
- Accumulation of these sugars affects organs and systems including the central nervous system.

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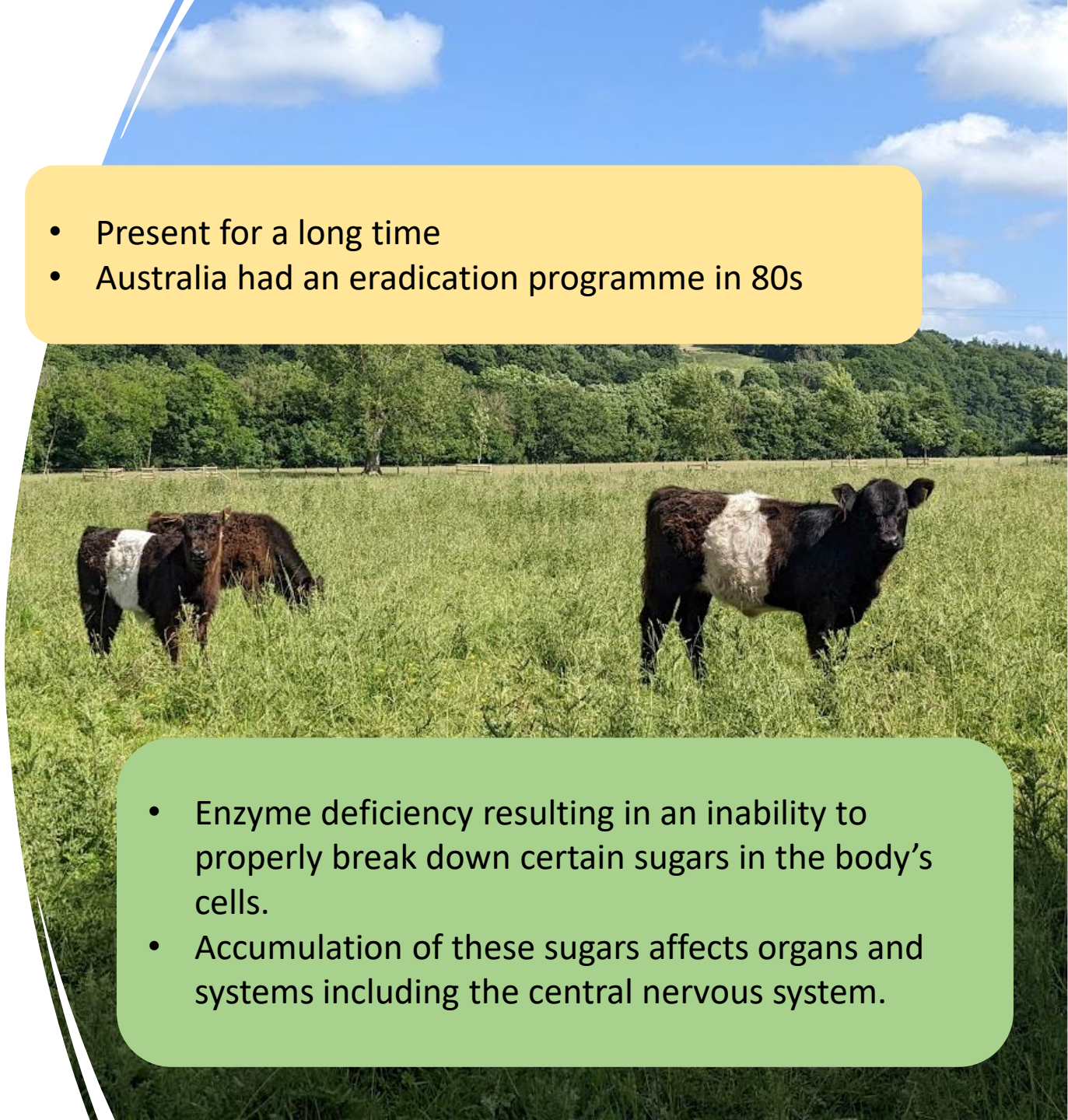
- Present for a long time
- Australia had an eradication programme in 80s



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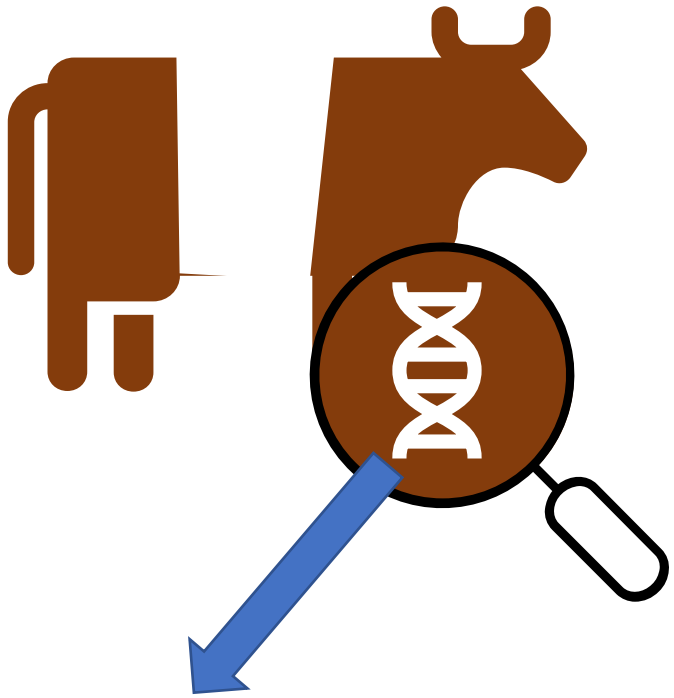
Genetic Disorder

- Change in the DNA sequence
- Means the gene doesn't work

- Every animal has two copies
- Only animals with two defective copies have symptoms



…ATCCCACTCGTCATCCCTCCCCATCTCCAGATGGGTTTTGAC
GGCTTCTTCTTTGGAC**G**CCTGGATTATCAAGACAAGAAGGTG
CGGAAAAAGACGCTGCAGATG…

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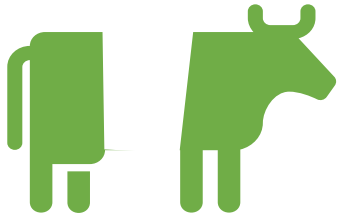
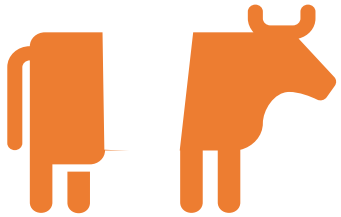
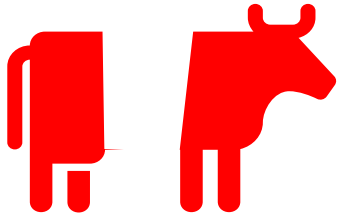
Inheritance



Clear: Two healthy copies | Healthy animal
Can not have an affected calf



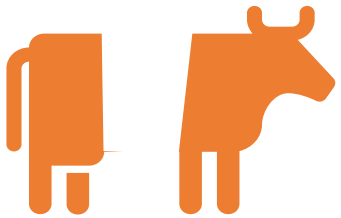
Carrier: One healthy, one mutation | Healthy animal
Can only have an affected calf when mated to another carrier

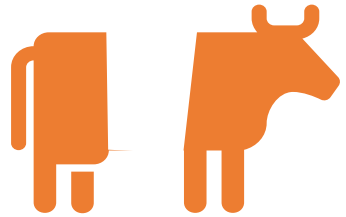


Affected: Two copies of mutation
Born dead or die shortly after birth

Inheritance

Carrier x Carrier

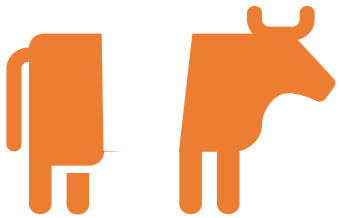


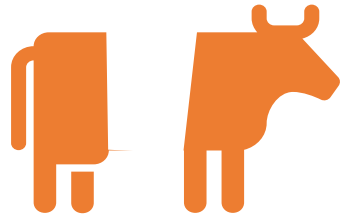


	Healthy	Mutation
Healthy		
Mutation		

Inheritance

Carrier x Carrier





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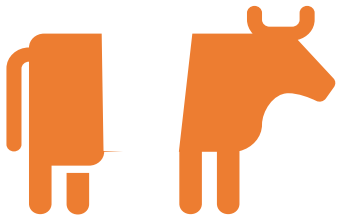

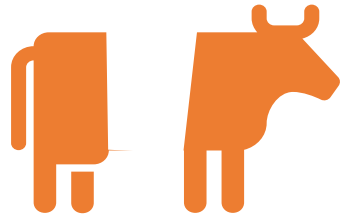

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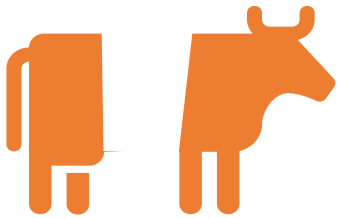

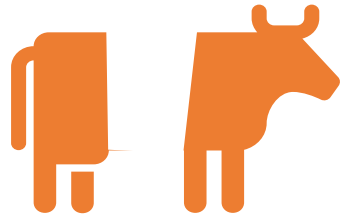

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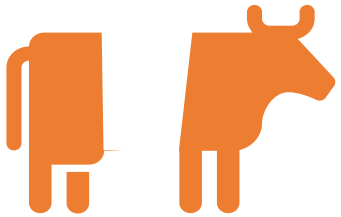

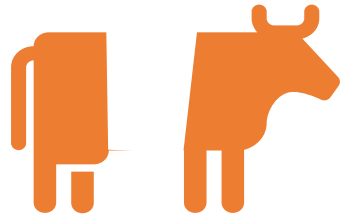

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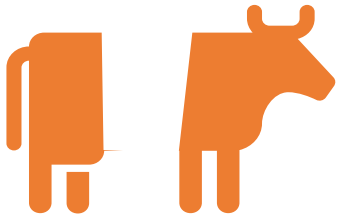

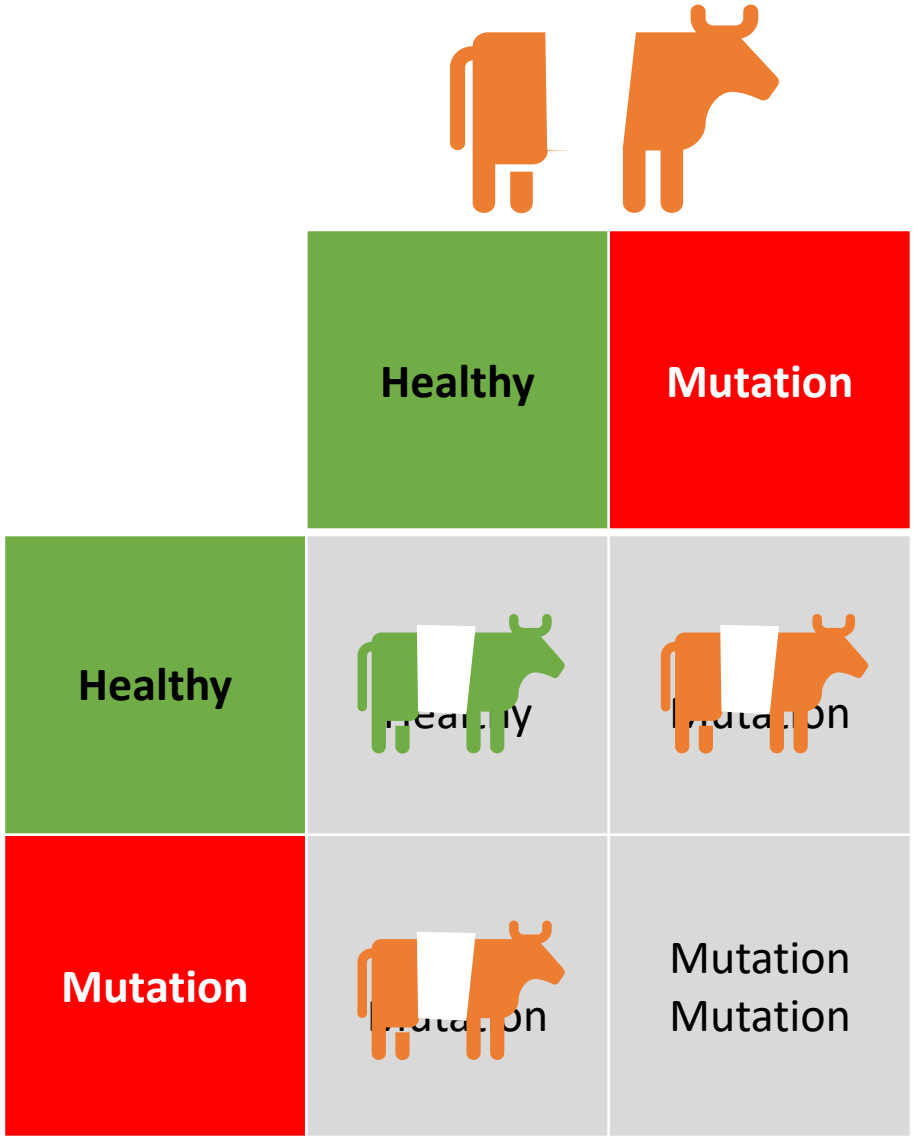

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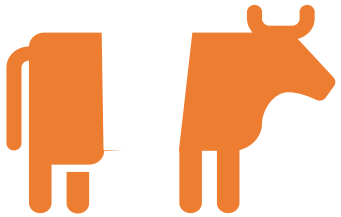
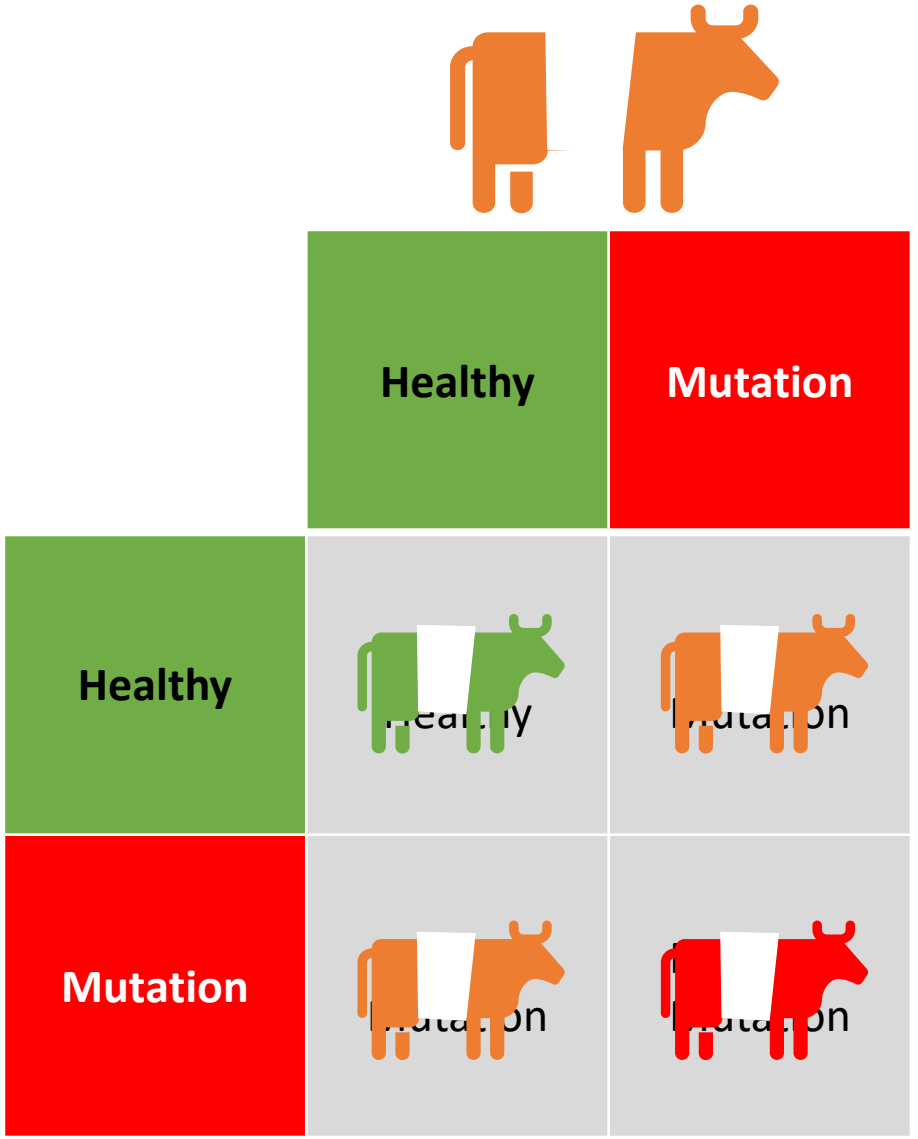




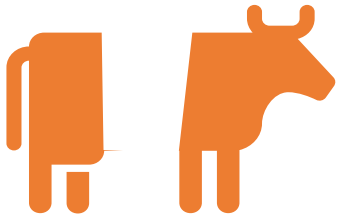
Inheritance

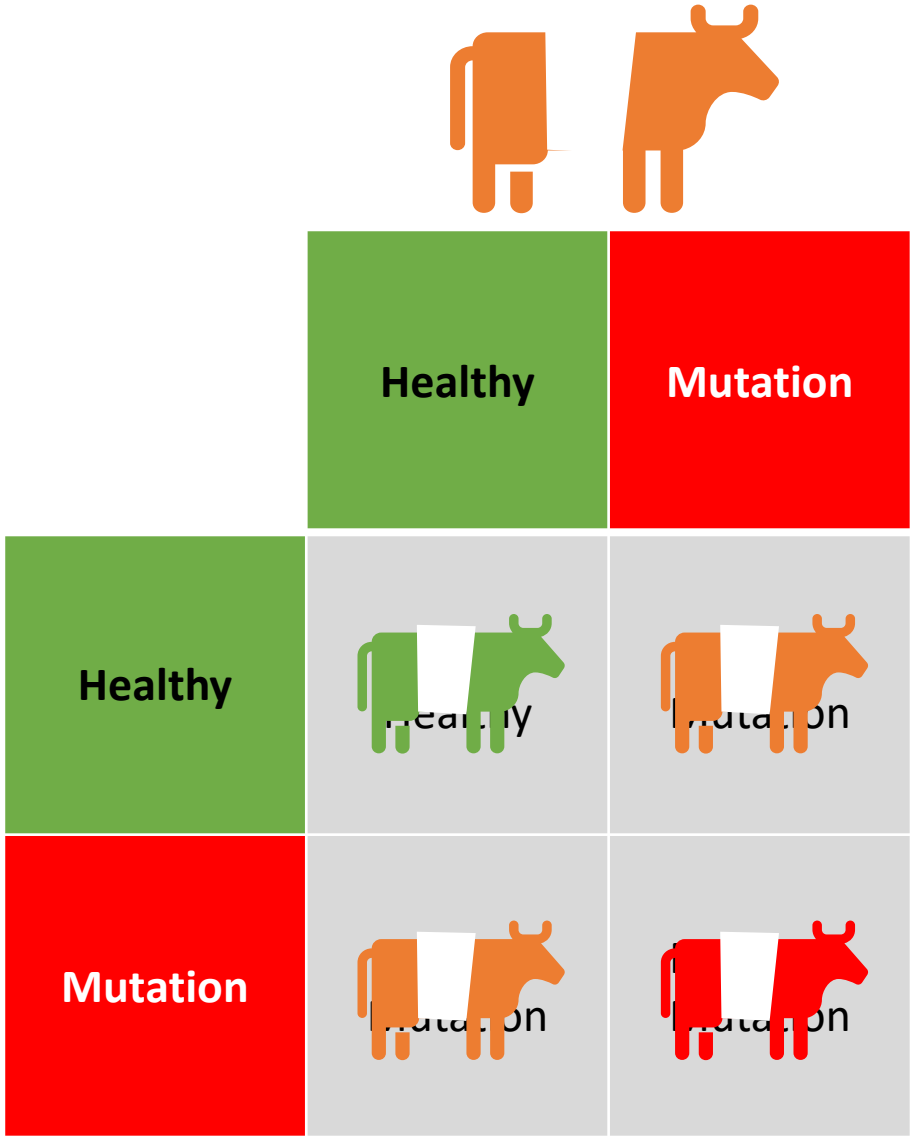
Carrier x Carrier

25% chance clear calf

50% chance carrier calf

25% chance affected calf





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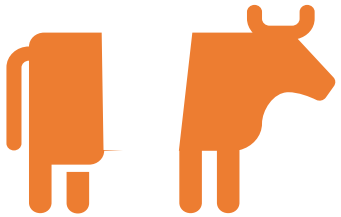
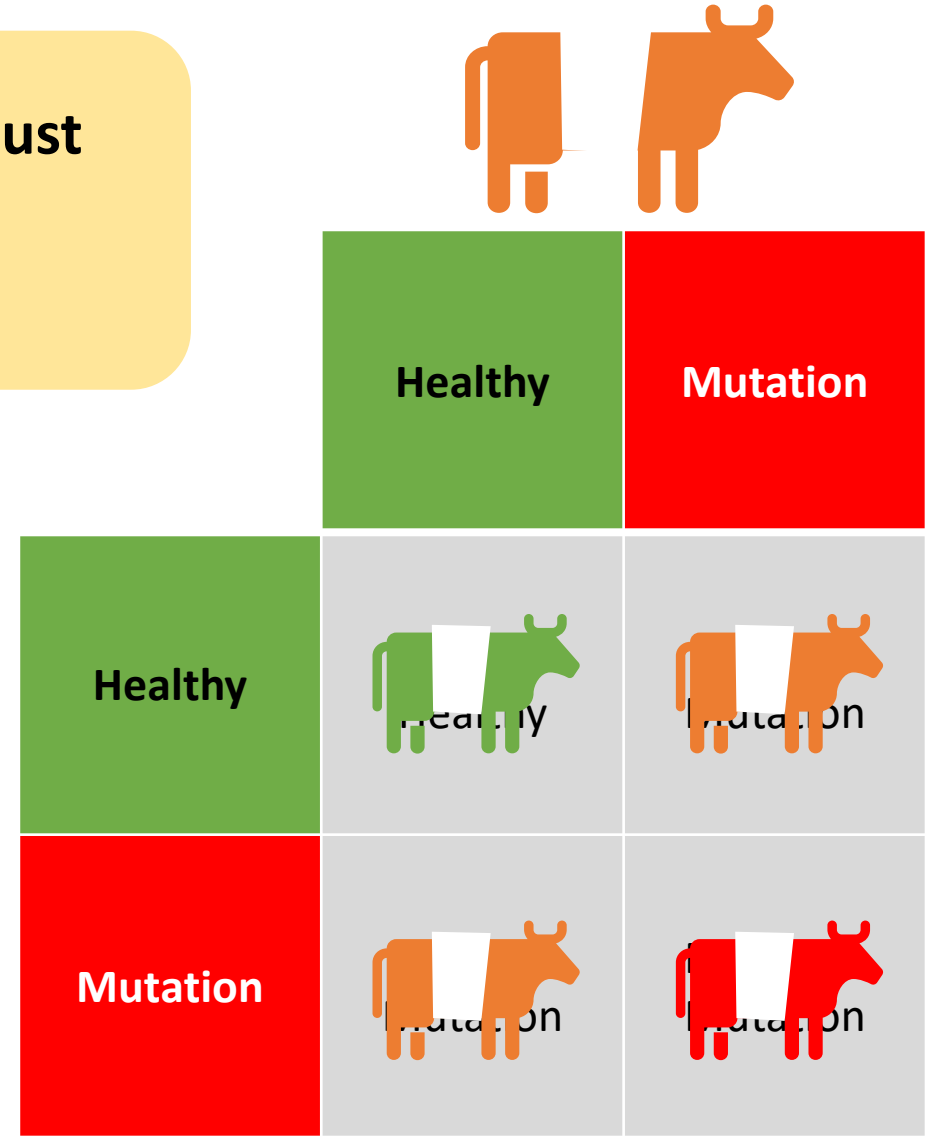


Affected calves **must** inherit from both parents



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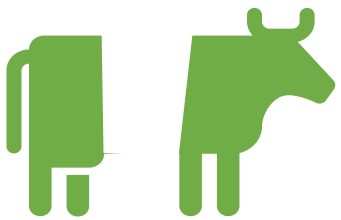

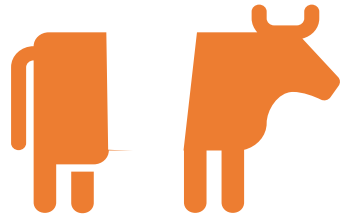

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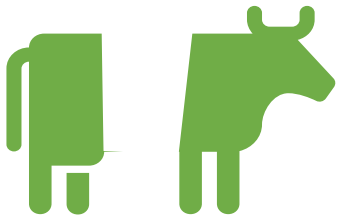

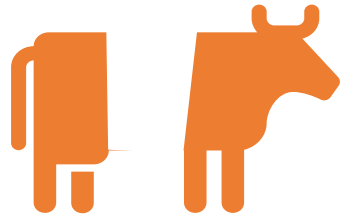

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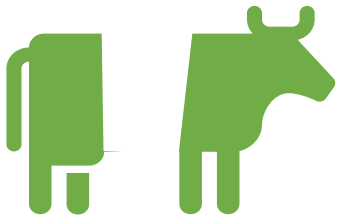

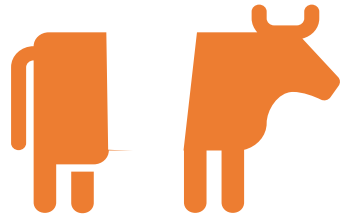

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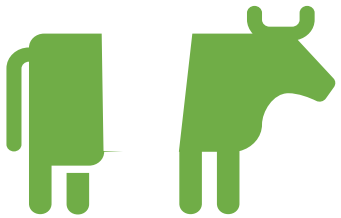

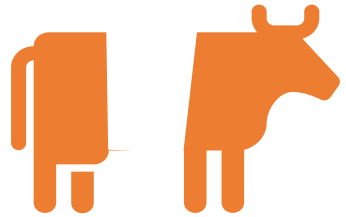

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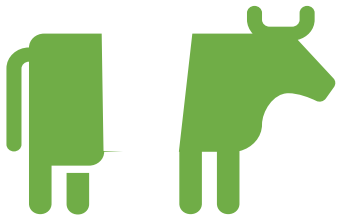
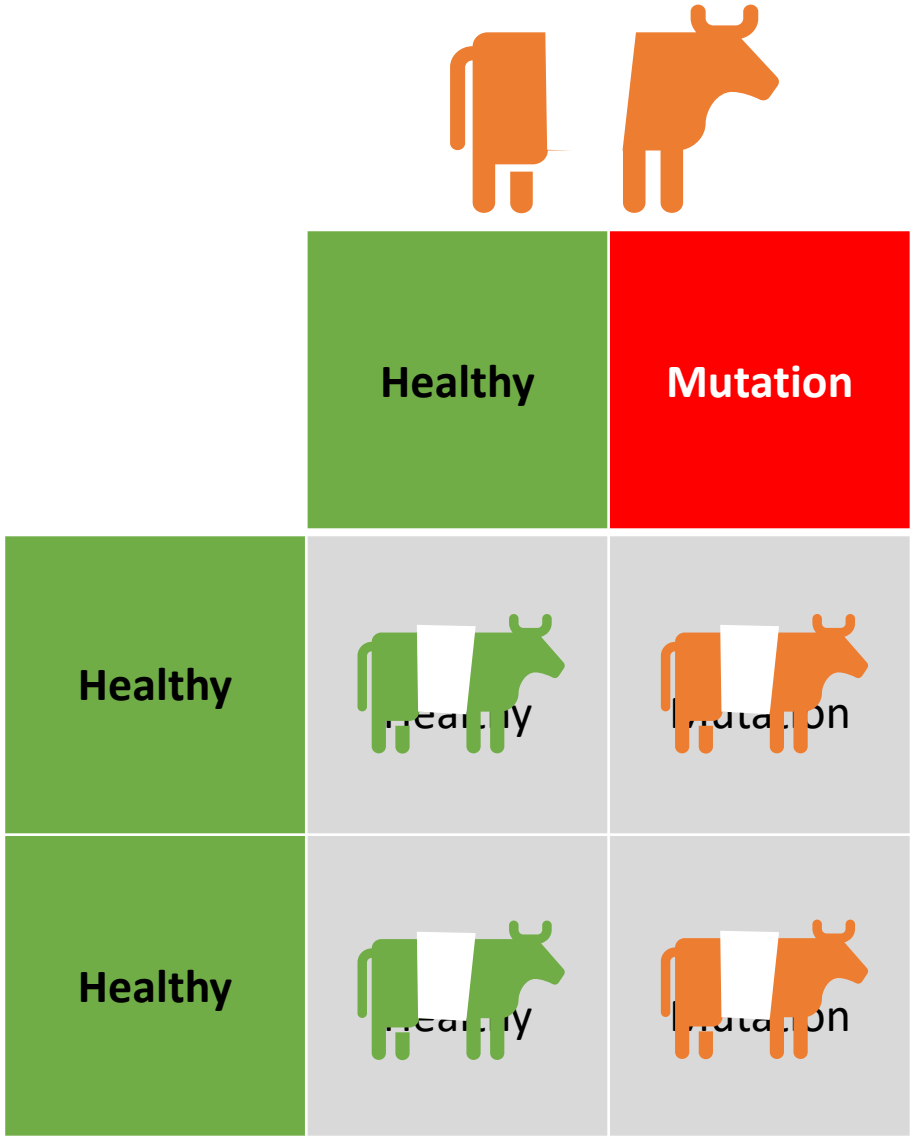


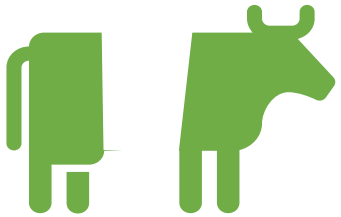


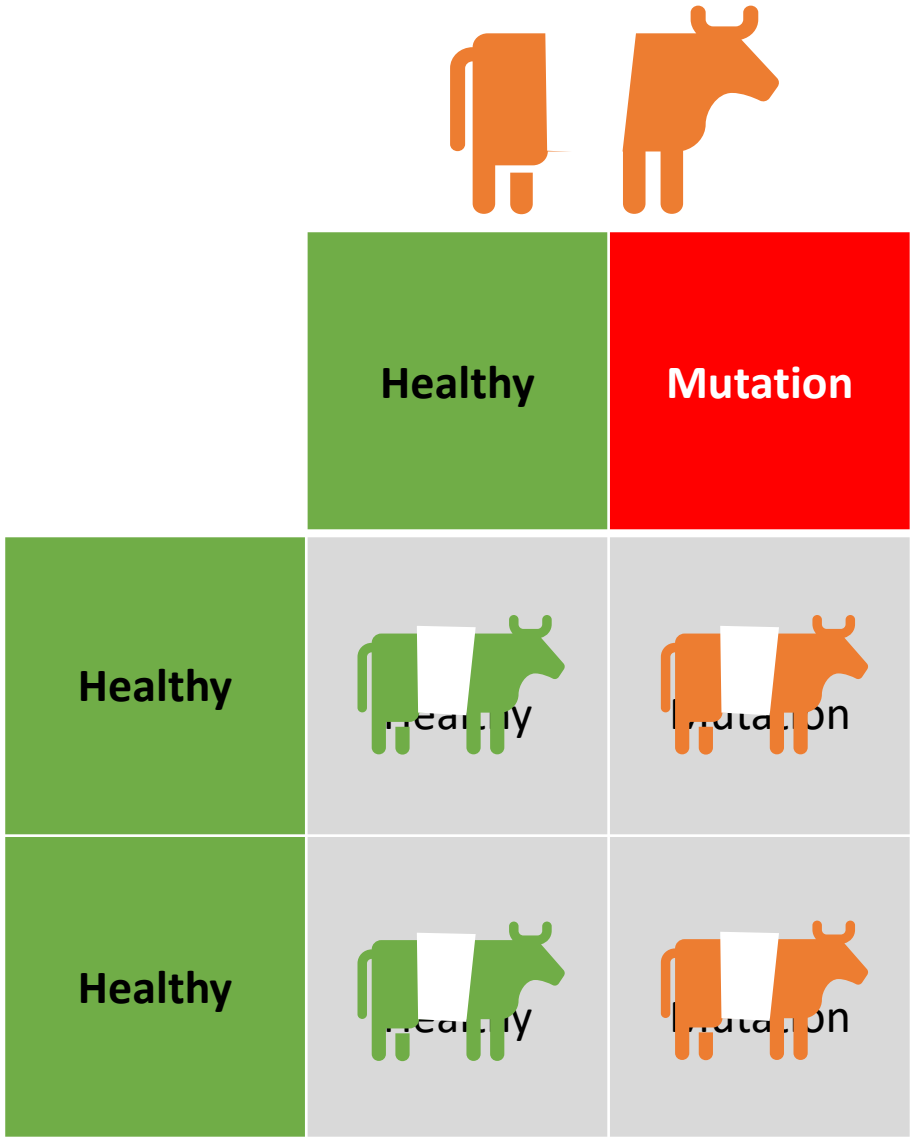
Inheritance

Carrier x Clear

50% chance clear calf

50% chance carrier calf





Inheritance

Carrier x Clear

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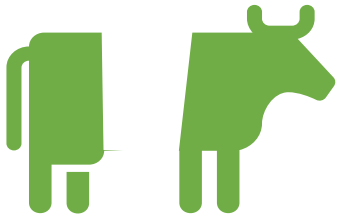
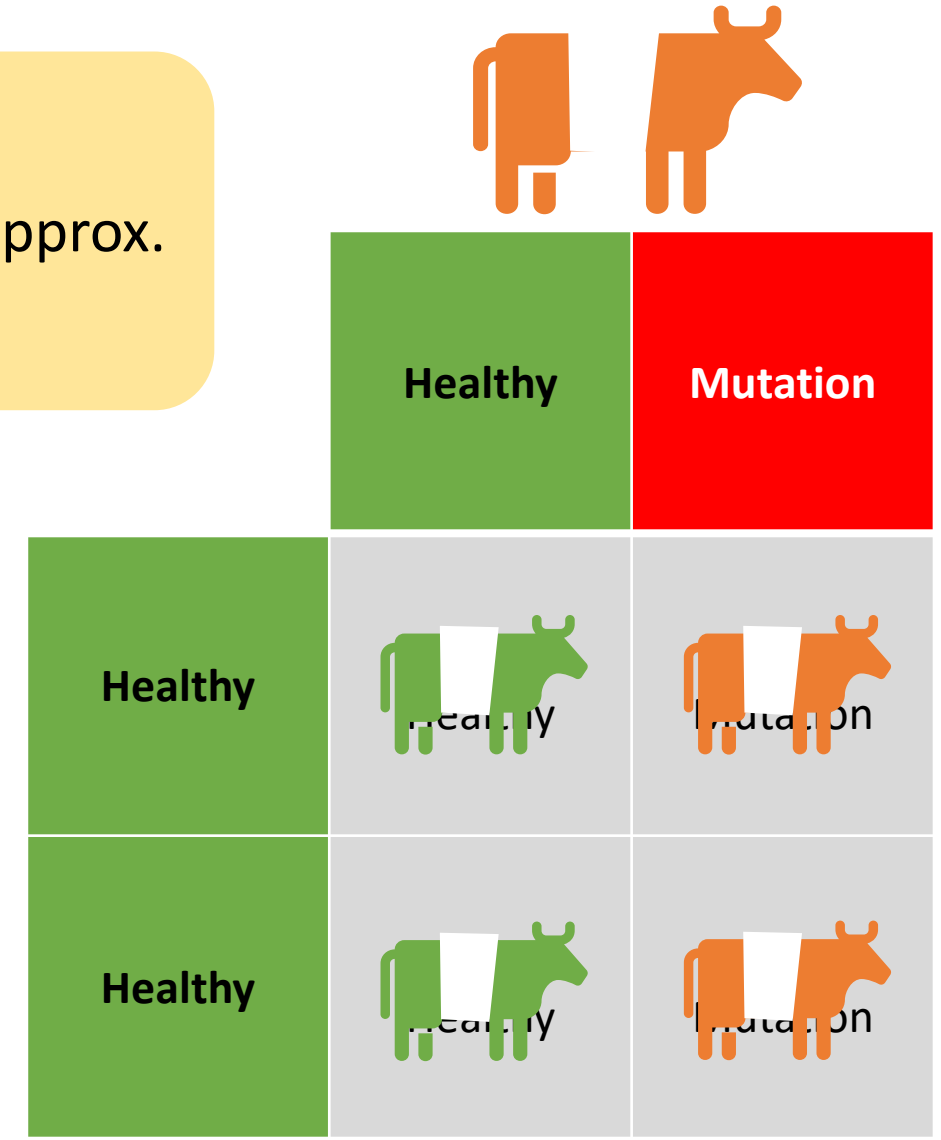
Carriers pass the mutation on to approx. half their calves

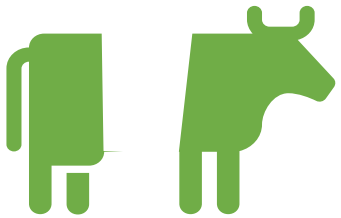


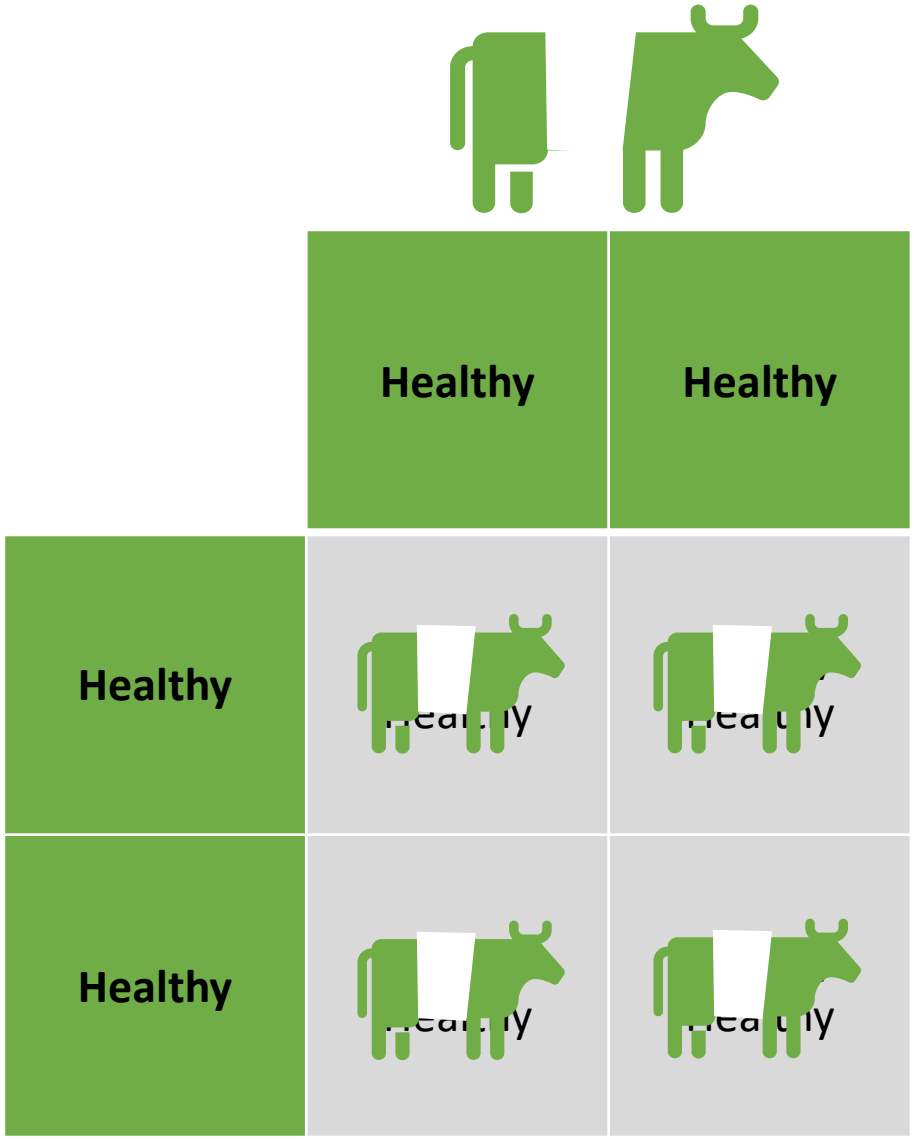


Inheritance

Clear x Clear

100% clear





Key Points

- Affected calves **must** inherit from **both** parents
- **Two carriers** have a **25% chance** of having an affected calf
- **Carriers** pass the mutation on to approximately **half** their calves

BGCS Strategy

1. **All newly registered bulls must be tested clear (from Nov 2022)**
   Society to cover this additional cost

2. All AI bull adverts must include AM test results

3. Encourage testing of females and older bulls
   Carriers may still be used for breeding

DNA Testing

- DNA test is available through Weatherbys
- Important to use **Galloway variant (AM-662)**, not Angus (AM-961)
- £30 per test
- Request sample bag from Christina
- Society maintain records of results but these will only be shared with the owner

Results so Far…

Important: Many of these herds testing suspect they have a problem, so we expect the incidence to drop as more animals are tested

81 out of 335 are carriers (24%)

AI bulls: 1 out of 13

Seems high, but if we mate these animals randomly, across the breed we expect only 1.4% of calves to be affected

However herds will be affected disproportionately

Importance of testing your own herd, especially stock bulls

Any Questions?