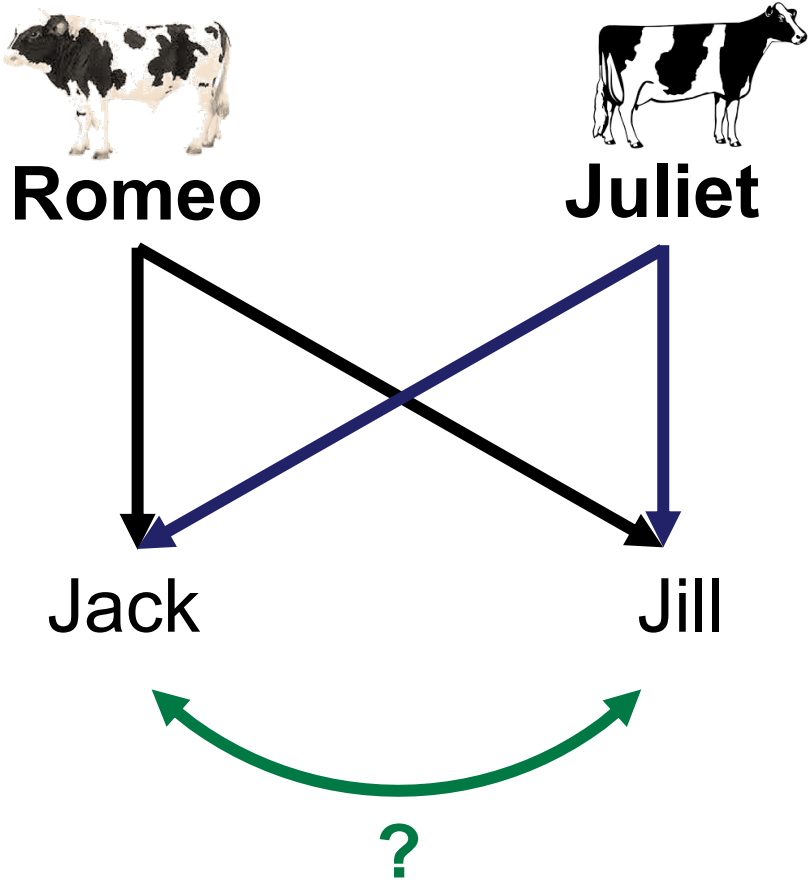
Milking the genome

Donagh Berry

Teagasc, Moorepark, Ireland

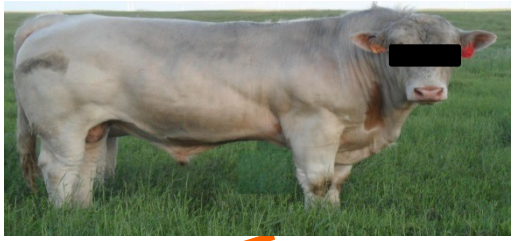
donagh.berry@teagasc.ie

How well do you know breeding?



How well do you know breeding?

50% LM : 50% HF
(assuming parents are pure)



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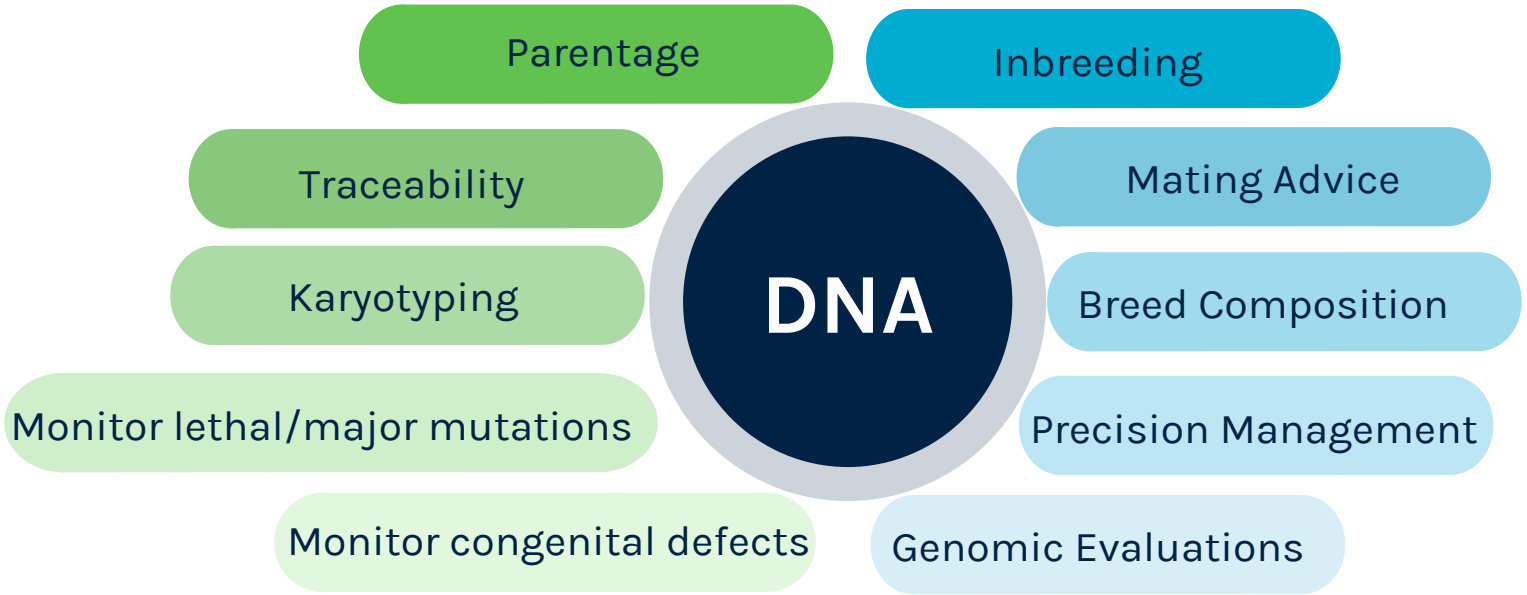
Uses of DNA information



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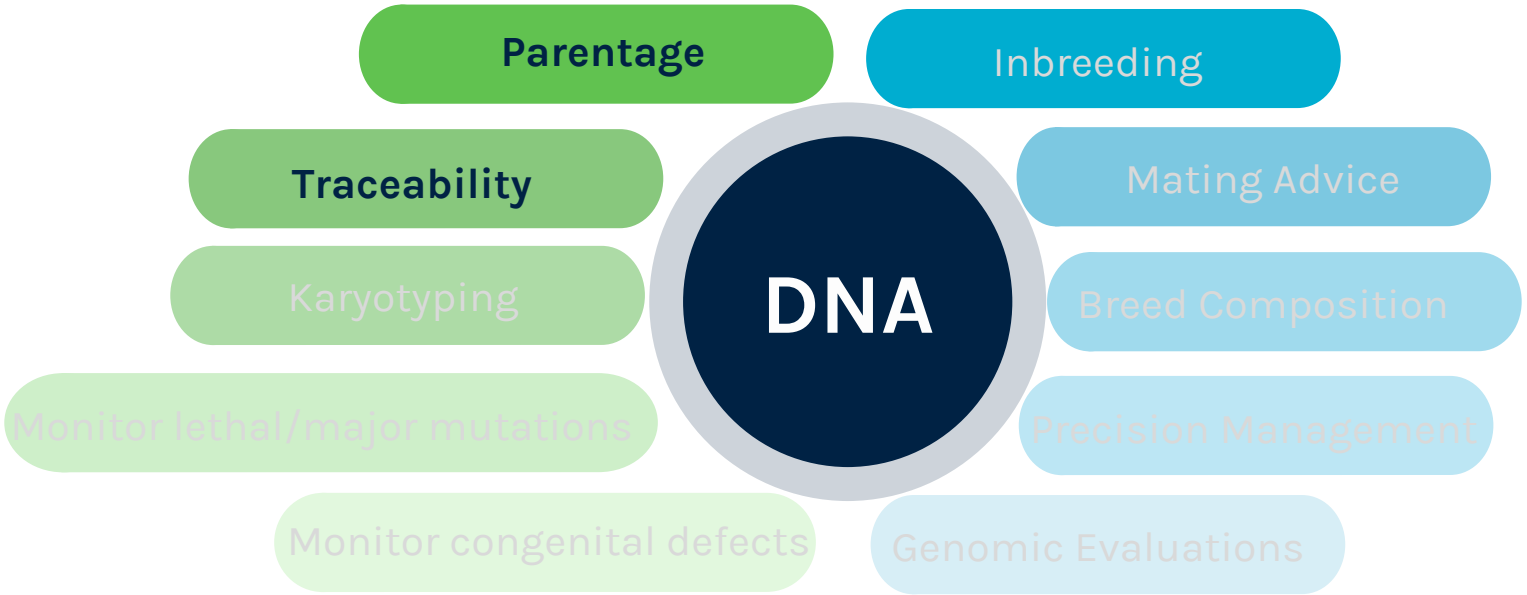


Parentage

Sire

.....TCACCGCT GAG.....

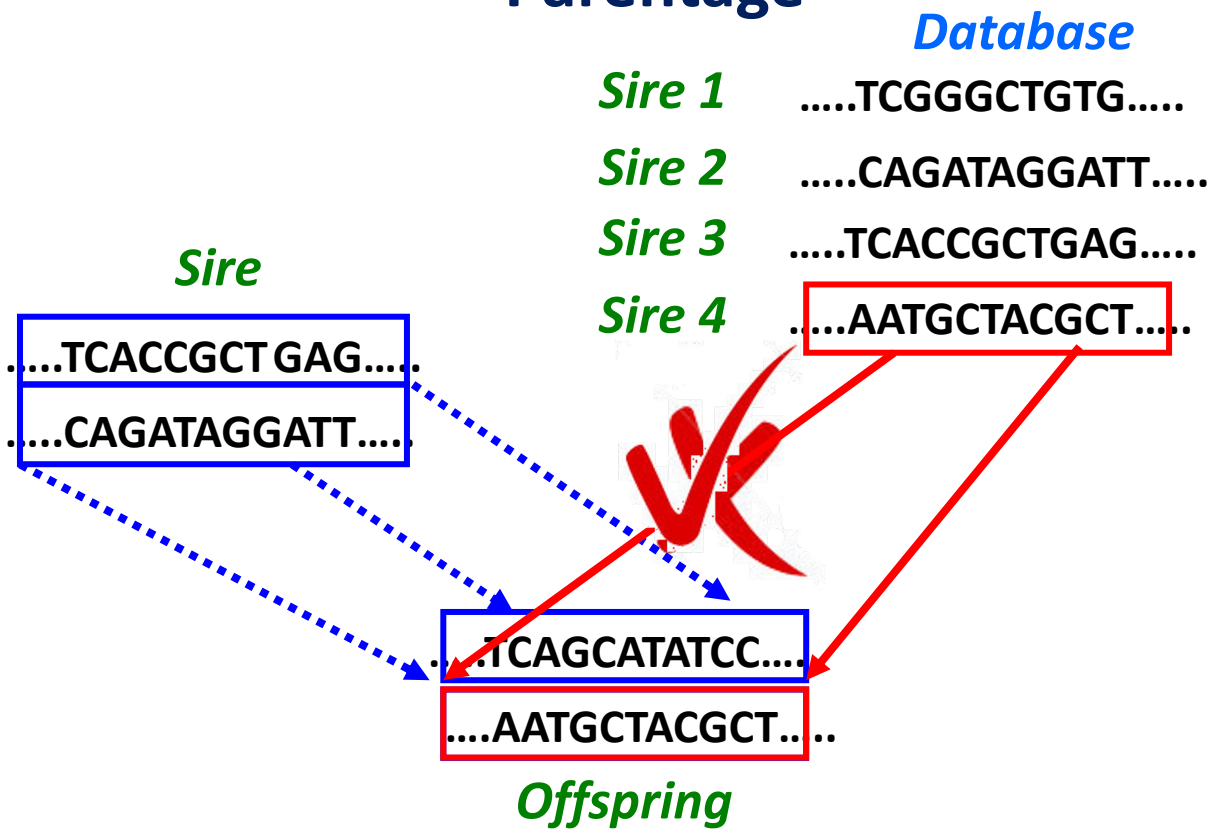
.....CAGATAGGATT.....

.....CAGATAGGATT.....

.....AATGCTACGCT.....

Offspring

Parentage


Database
Sire 1
.....TCGGGCTGTG.....
Sire 2
.....CAGATAGGATT.....
Sire 3
.....TCACCGCTGAG.....
Sire 4
.....AATGCTACGCT.....
Sire
.....TCACCGCT GAG.....
.....CAGATAGGATT.....
.....TCAGCATATCC.....
.....AATGCTACGCT.....
Offspring

Traceability

Animal

…..TCACCGCTGAG…..

…..CAGATAGGATT…..

…..TCACCGCTGAG…..

…..CAGATAGGATT…..

Meat sample

Animal

…..TCACCGCTGAG…..

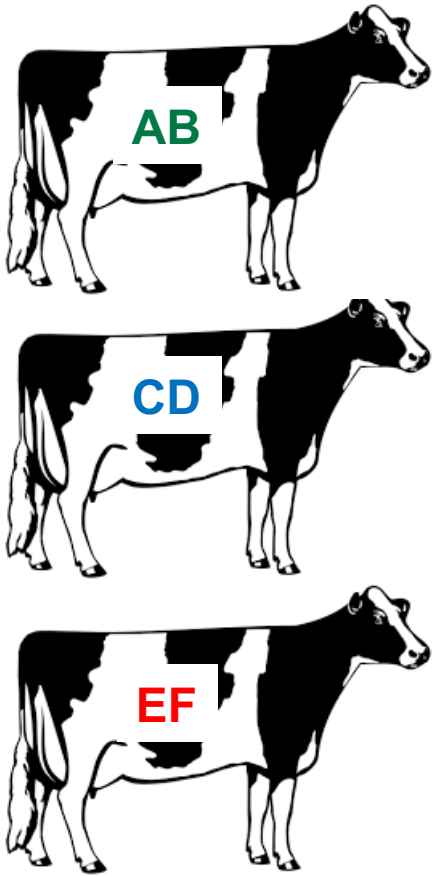
…..CAGATAGGATT…..

…..TGTATTAGAAG…..

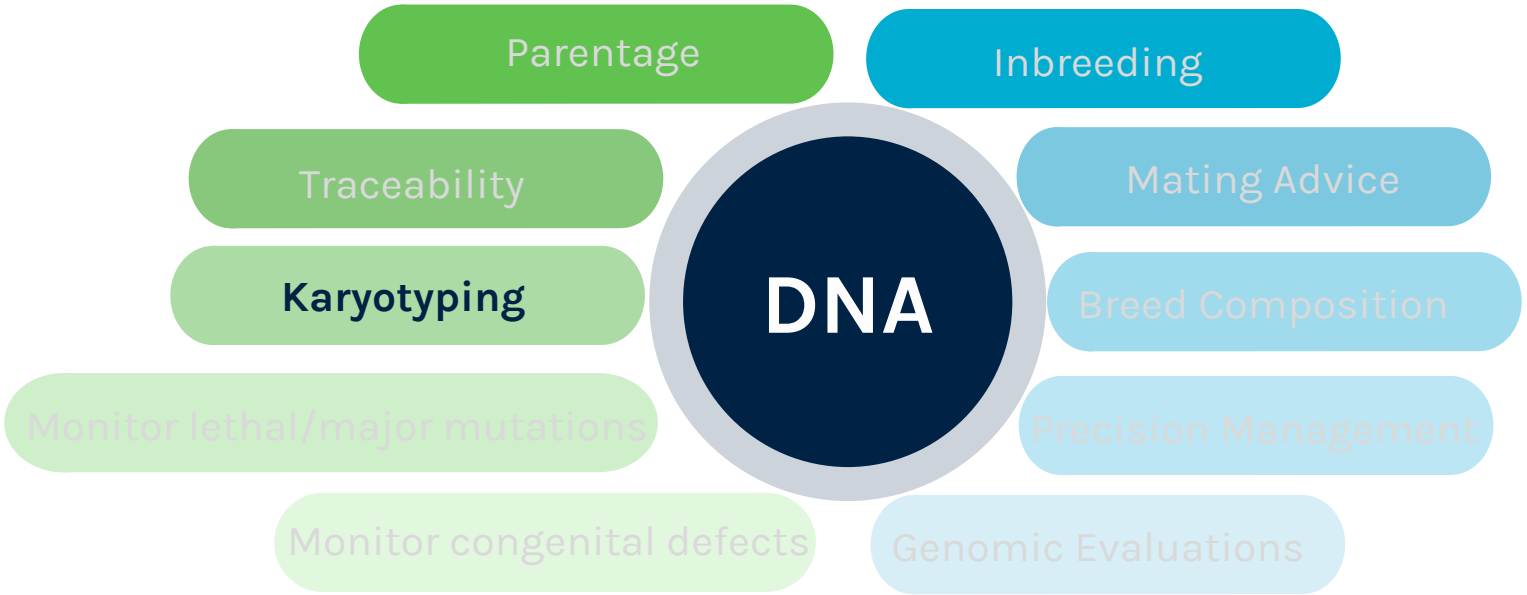
…..CAGATAGGATT…..

Meat sample

Traceability



Uses of DNA information



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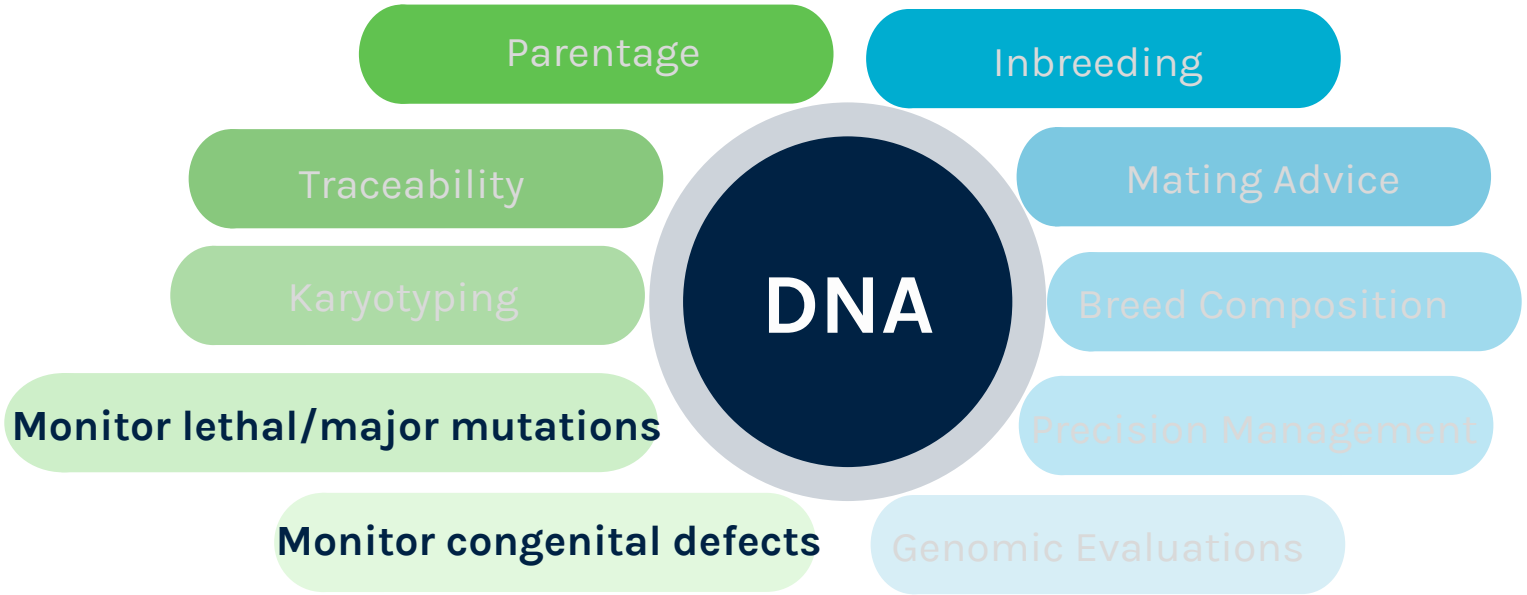



MacG
Jun '16

Beta Casein

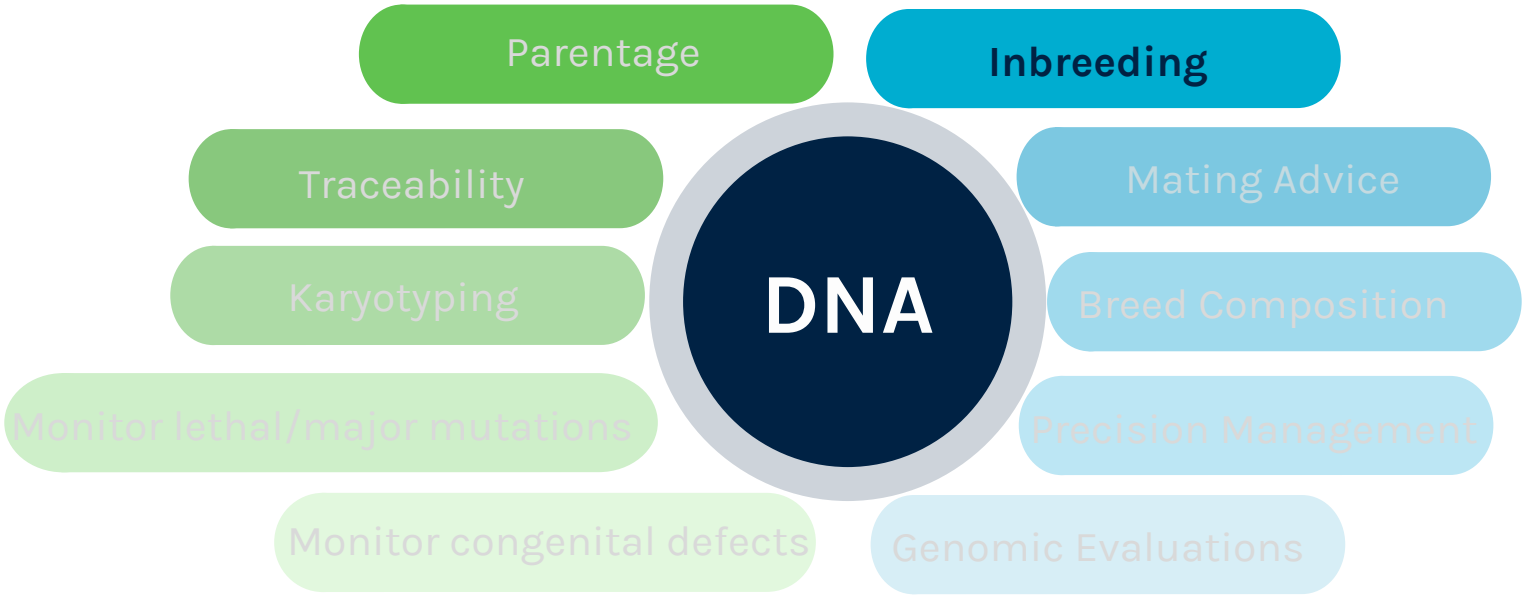
Beta Casein Variant	Allele Frequency
A1	27.43%
A2	51.16%
A3	0.12%
B	3.96%
C	0.001%
E	0.02%
F	2.86%
I	14.21%
Unknown	0.25%

Beta Casein Type	Number of Animals	Percentage
A1 A1	36,114	12.26%
A1 A2	129,148	43.85%
A2 A2	128,117	43.50%

Disease/congenital defects

- Colour
- Fertility
- Polled
- Congenital defects
  - CVM. BLAD, DUMPS, Brachyspina, dwarfisms
- Milk proteins
  - α-casein, β-casein, κ-casein
  - β-lactoglobulin
- ……

Uses of DNA information



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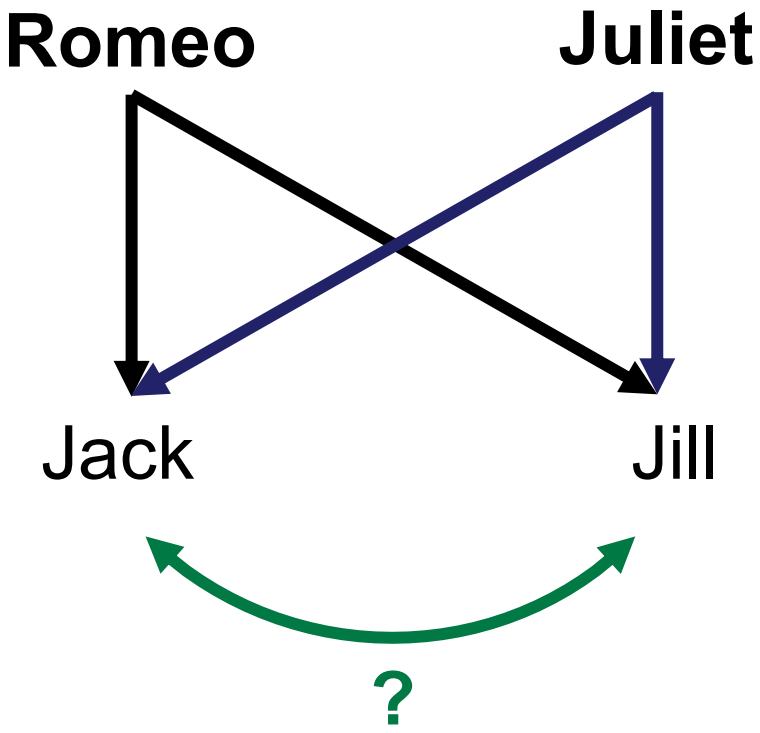
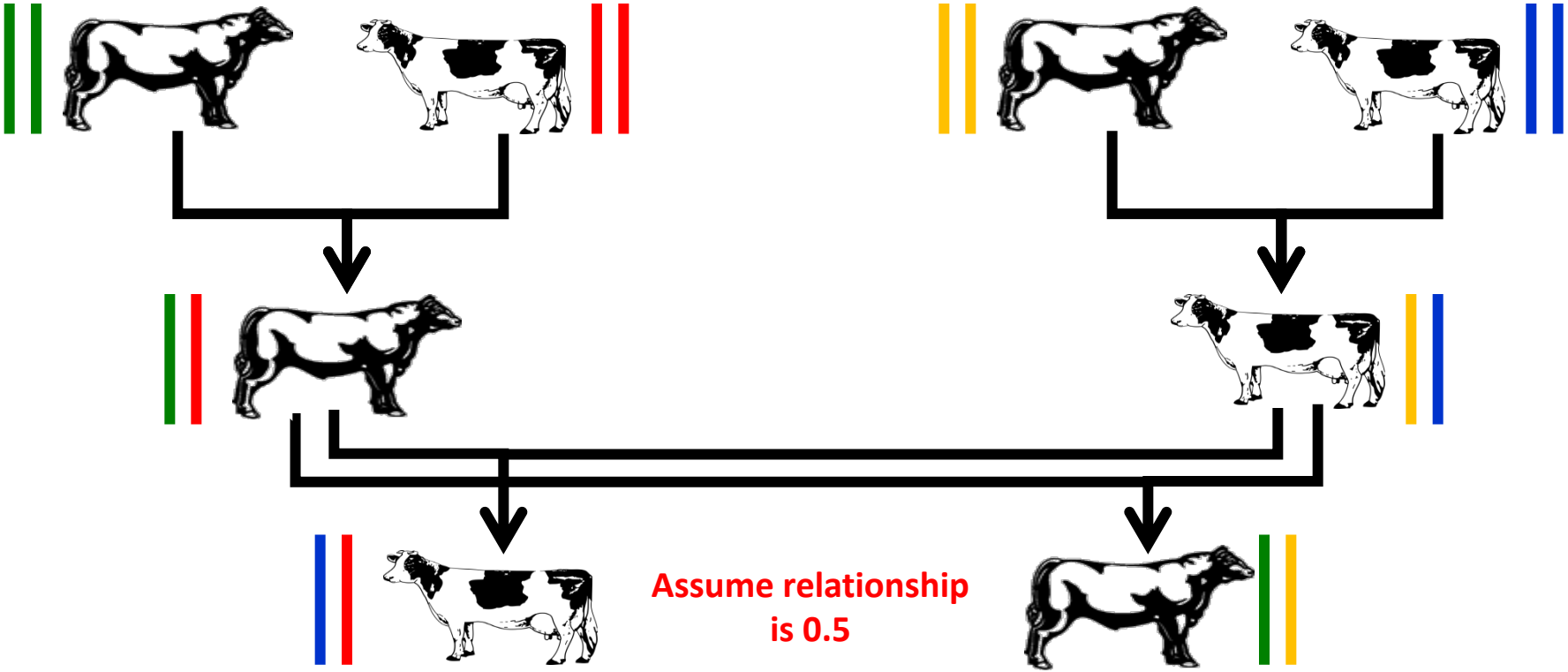


Pedigree is all wrong!?!?!!



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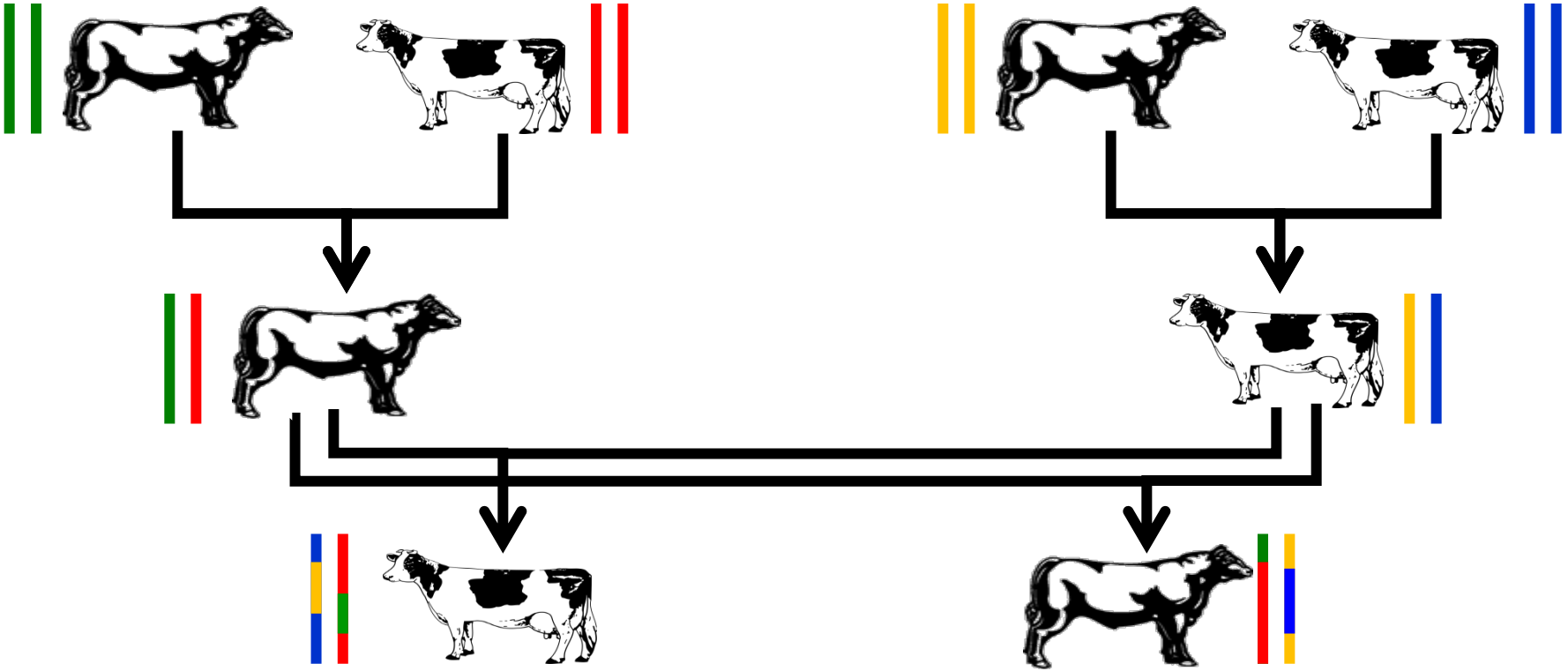
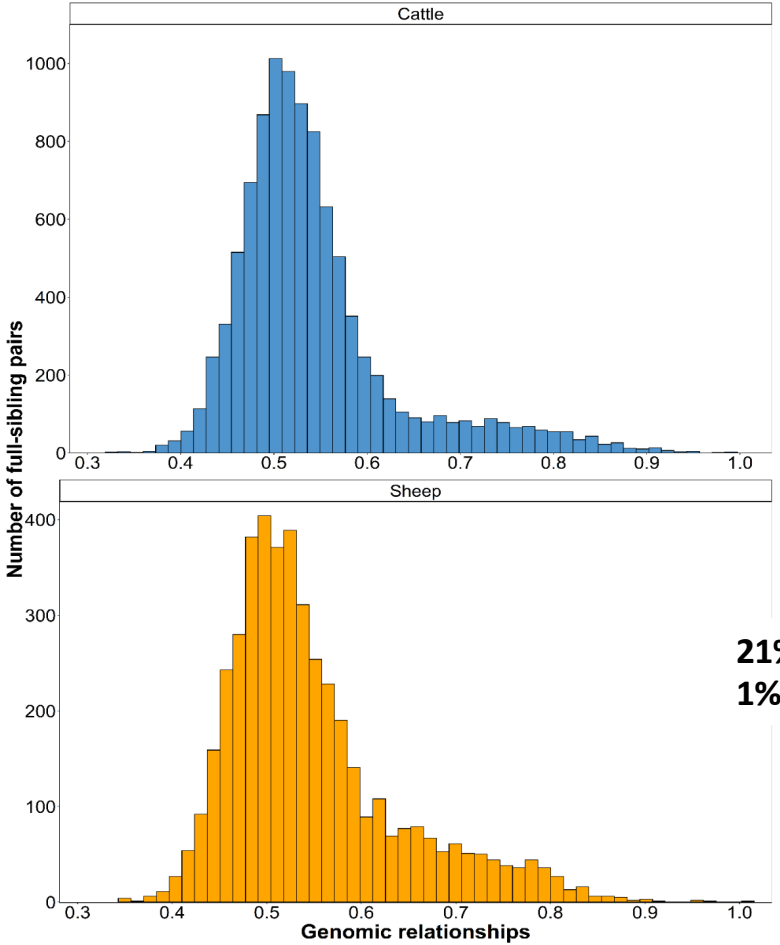
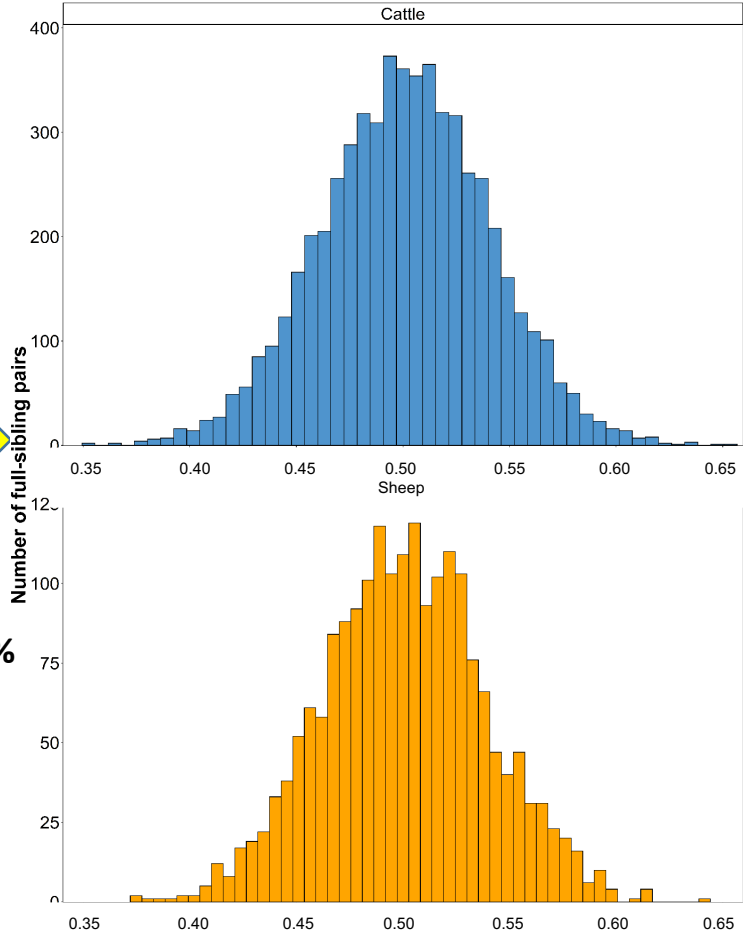


Full sib kinship – true versus realised

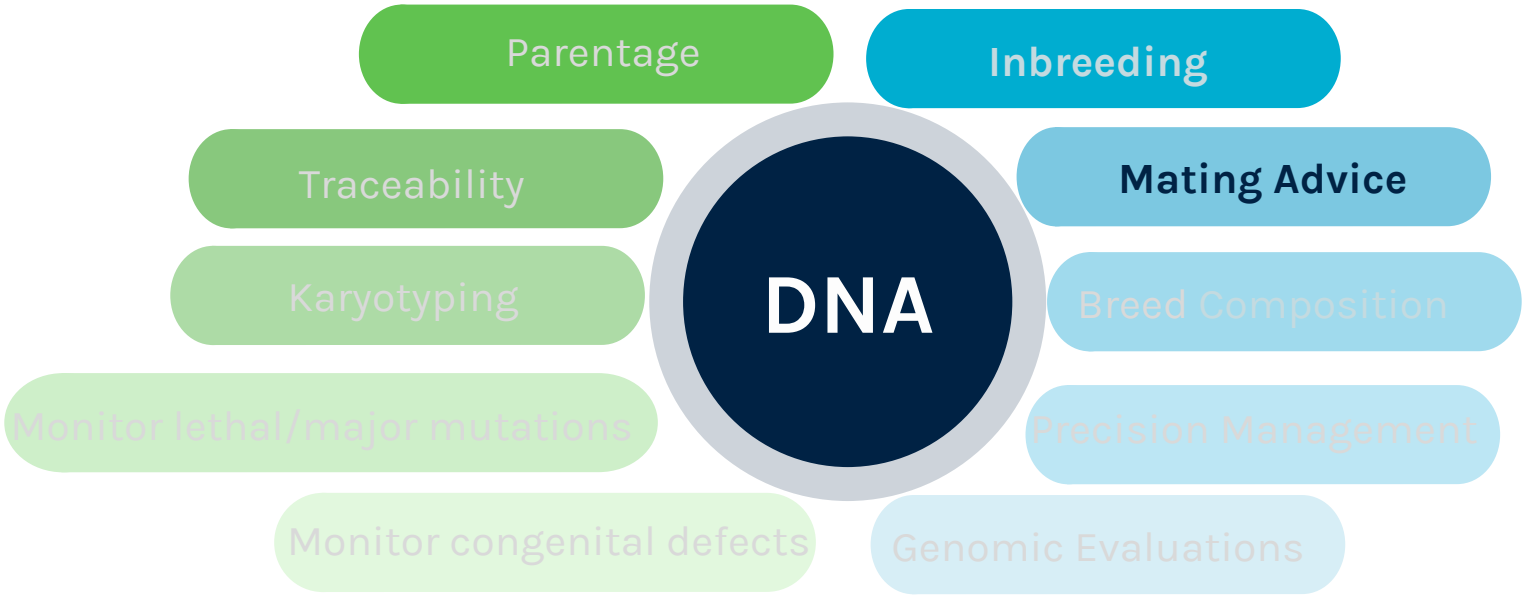


Adjusted for inbreeding

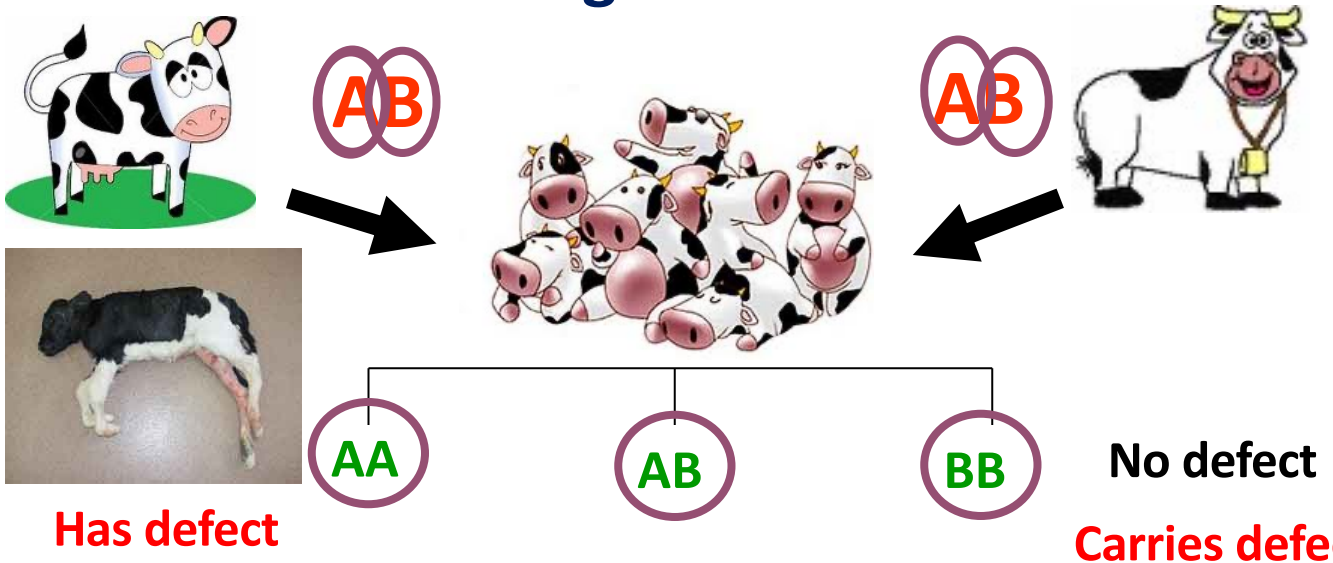
21% of full sibs differ by >10%
1% of full sibs differ by >20%



Uses of DNA information

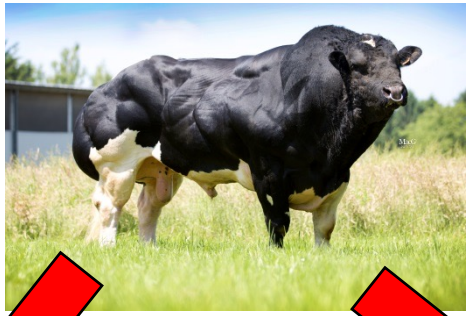


Recessive genetic disorders



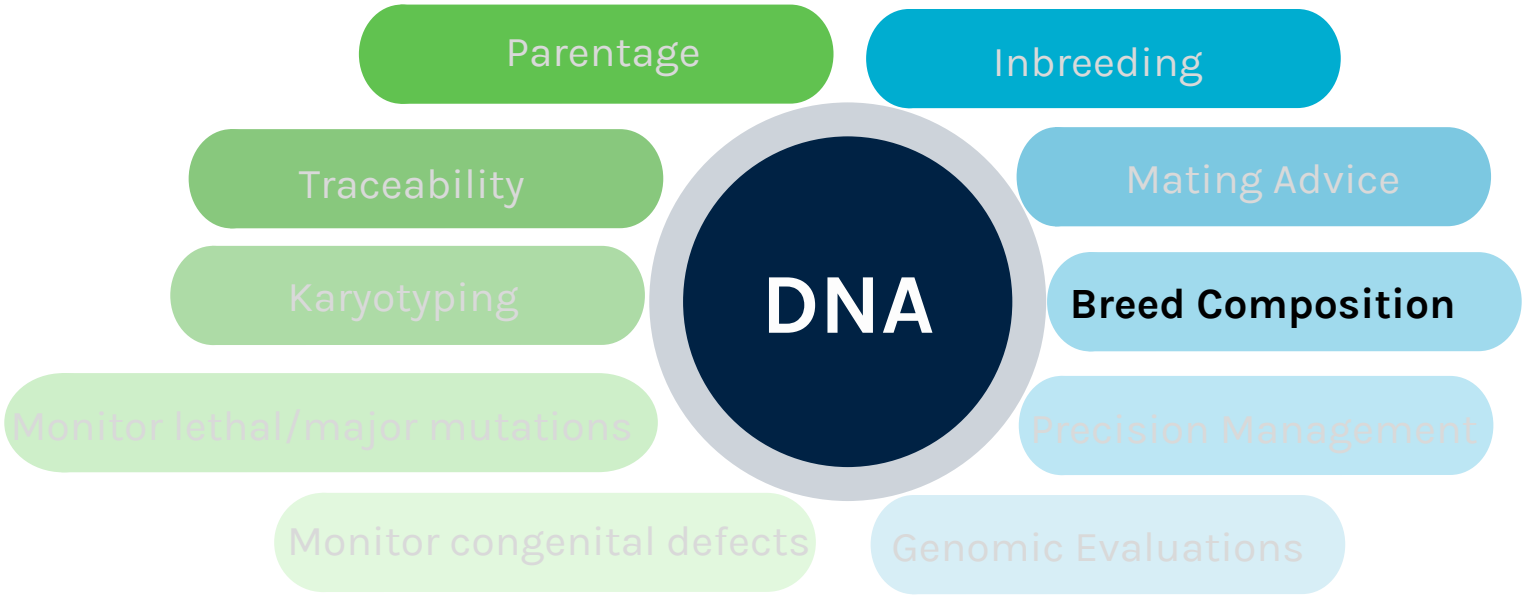
- Non-defect variant (B) expressed whenever present
- Defect variant is recessive “hidden” when with non-defect variant

Genome-enabled mating advice



OK calving difficulty proof

Uses of DNA information



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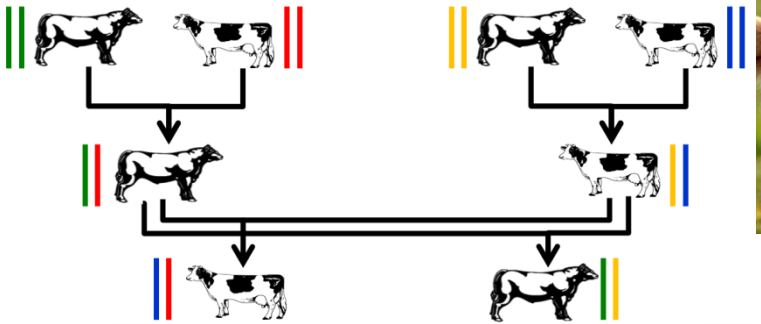
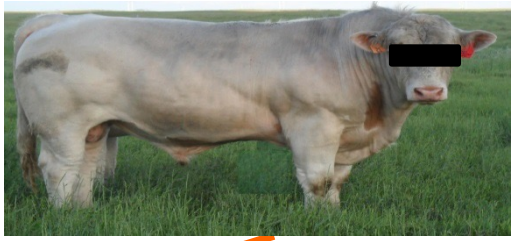


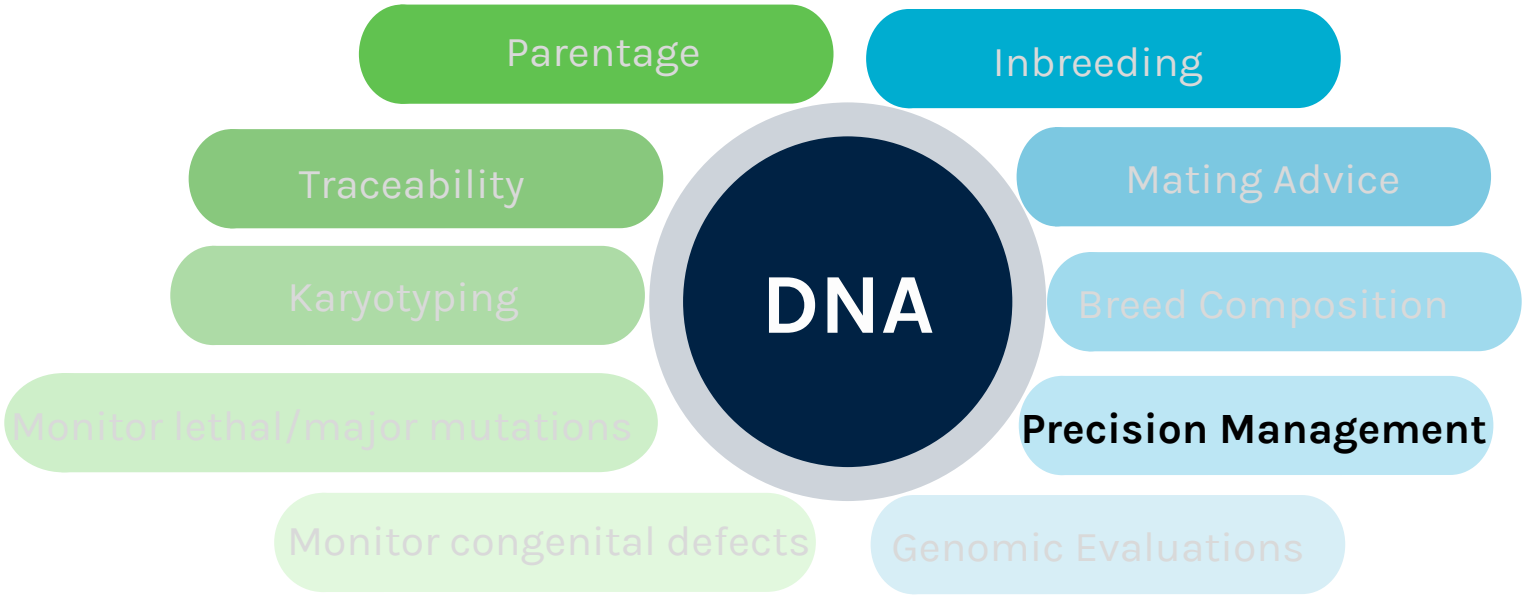


50% CH : 25% HF : 25% LM

50% CH : 50% HF : 0% LM

50% CH : 0% HF : 50% LM

Uses of DNA information



Real-life examples

- **BRAC1 & BRAC2**
  - **5 times the risk of breast cancer**
  - **10-30 times risk for ovarian cancer**

- **Enhanced screening**
- **Prophylactic treatment**
- **Management/chemoprevention**

Take home message