

Likeness between relatives and  
inbreeding depression, correction  
of records for non genetic factors

## Relationships and inbreeding

An animal frequently said to have 50 or 25% of the blood of another. This of course can not really be true, but these percentages actually do apply to the average fraction of genes in common from a common ancestor. Example, a calf receives a sample half of the genes of its mother . The relationship is then 50 %. The relationship of an animal to itself or to its identical twin is therefore 100%, its relationship to its offspring is ordinarily 50%.

Relatives	Relationship (%)
Parent	Parent-progeny
Parent-progeny	50
Full brothers or sisters	50
Grand parent-grand progeny	25
Great grand parent-great grand progeny	12.5
Full aunt-niece	25
Full cousins	12,5
Half brothers or sisters	25
Half aunts-niece	12,5
Half cousins	6 1/4
if identical twins Noninbred animal to itself identical between	100

# Inbreeding

Mating of related individuals produces an inbred offspring. Usually a large degree of inbreeding is not desirable, since vigor, reproduction and even production are lowered by inbreeding.

The inbreeding coefficient of an animal is one half of the relationship between its parents.

## Example

If a bull is mated to his own daughters, what will be the inbreeding of the offspring?

The relationship between father and daughter is 50%. Therefore, the offspring are  $\frac{1}{2}$  times 50% or 25% inbred.

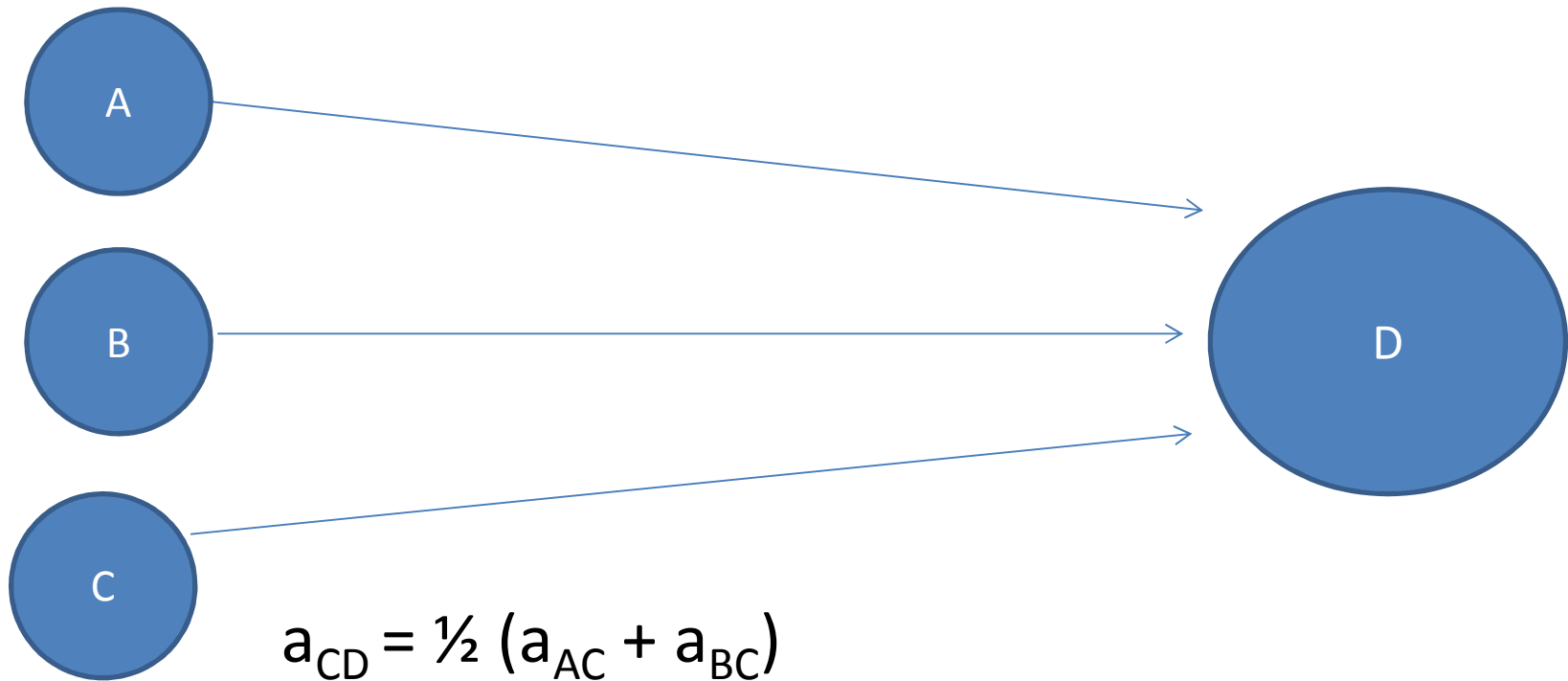
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# Computing relationships

- Unfortunately there is no easy way to compute the relationships and inbreeding of cows in dairy cattle herd, but the computations can usually be performed by following a few simple rules. The method is based on the fact that if two animals are related, then one or both of the parents of the younger of the two must also be related to the older animal of the pair.

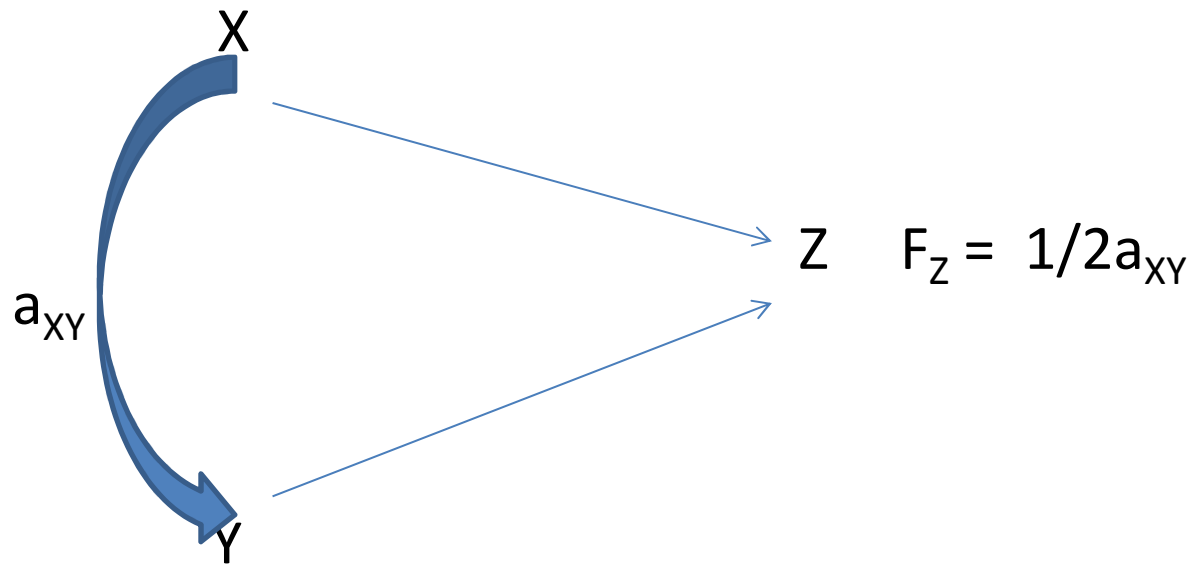
If C and D are two animals and A and B are parents of D, the relationship between animals C and D is one half the relation between A and C plus one-half the relationship between B and C.





# inbreeding coefficient

Similarly, the inbreeding coefficient of an animal is calculated as one-half the relationship between its parents.



## Inbreeding depression

Most of research has shown that each percentage of inbreeding leads to an approximate 25 kg decrease in milk production, as well as increased expression of lethal factors since inbreeding increases the fraction of homozygous loci. Inbreeding also tends to depress vitality in early life but has only small effects later in life.

Inbreeding has numerous detrimental effects, especially the increase in mortality and fertility problems that results from increased inbreeding.

As a rule; never to inbreed by more than 12,5 %.

## Average Change Resulting from a 1% Increase in Inbreeding Coefficient

Trait	Change
Milk yield	-25 kg
Fat yield	-0,75 kg
Fat , %	+0.005
Weight	
at birth	-0.12 kg
at 1 year	-0.75 kg
at 2 years	-1,5 kg
at 4 years	-2.5 kg
at maturity	?
Height	Slight decrease
Girth	Slight decrease
Mortality to first calf (% above noninbred)	+2
Conseption	
number of services	+0.05
days from first service	+3
failed to concieve (%)	0.5
Age at puberty	delayed