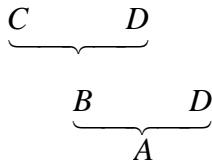


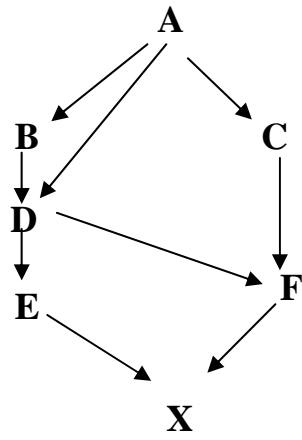
Genetic relationships and close inbreeding - exercises

1. The following pedigree is given



- a) Calculate the inbreeding coefficient for A
- b) What is the additive relationship between the individuals D and A?
2. You are the owner of one of the few pure-bred Tuli herds in the region. You recently bought a new bull (D) and plan to mate him to your best young heifer (S). When checking the pedigrees, you find out that the bull's father (O) is the maternal grand-sire of the heifer! They do not seem to be related in any other way.
- a) What is the additive relationship between the bull and the heifer?
- b) What would the inbreeding coefficient of progeny of the bull and the heifer be?
3. What do the following concepts express:
- a) The inbreeding coefficient (F_Z) for an individual?
- b) Coefficient of coancestry (f_{XY}) between two animals X and Y?
- c) The additive relationship (a_{XY}) between two animals X and Y?
- d) What are the mathematical associations between F_Z , f_{XY} and a_{XY} if X and Y (not inbred) are parents of Z?

4. We have the following family tree:



Calculate the inbreeding coefficient (F_x) for individual X.

5. This is a citation from a letter sent to the university:

“2069 Mountain (2069 M) blood lines have been widely used in the breeding company, 40% the last 5 years, which could cause problems with inbreeding.

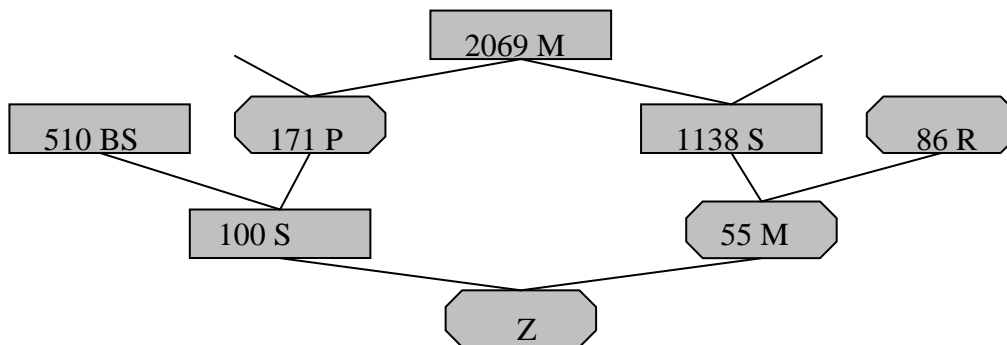
At the X-valley dairy farm we have 50 cows out of which 40 are descendants of 2069 M and 89 heifers out of which 88 are descendants of 2069 M.

I would be grateful if you could answer the following questions as a help in our breeding planning”.

a) We would like to inseminate a heifer (B) who has 2069 M as paternal grandsire with semen from a bull (A) who has 2069 M as maternal grandsire. What inbreeding coefficient would the calf (X) have?

b) If this calf (X) is a female and it is inseminated with semen from a bull (F) who also has 2069 M as maternal grandsire, what inbreeding coefficient would the calf (Y) get?

c) A heifer (Z) has the following pedigree:



What would the inbreeding coefficient be for an offspring of Z and 1138 S?

d) What recommendations would you give the dairy farmer concerning the matings planned?