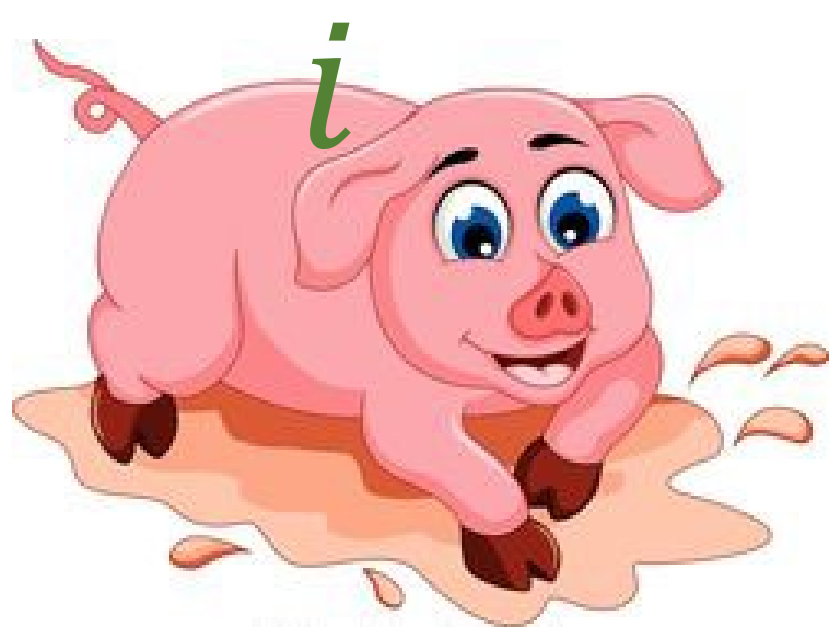




# WHAT ARE SOCIAL EFFECTS ?

Social effects occur when performance of an individual depend on characteristics of other individuals



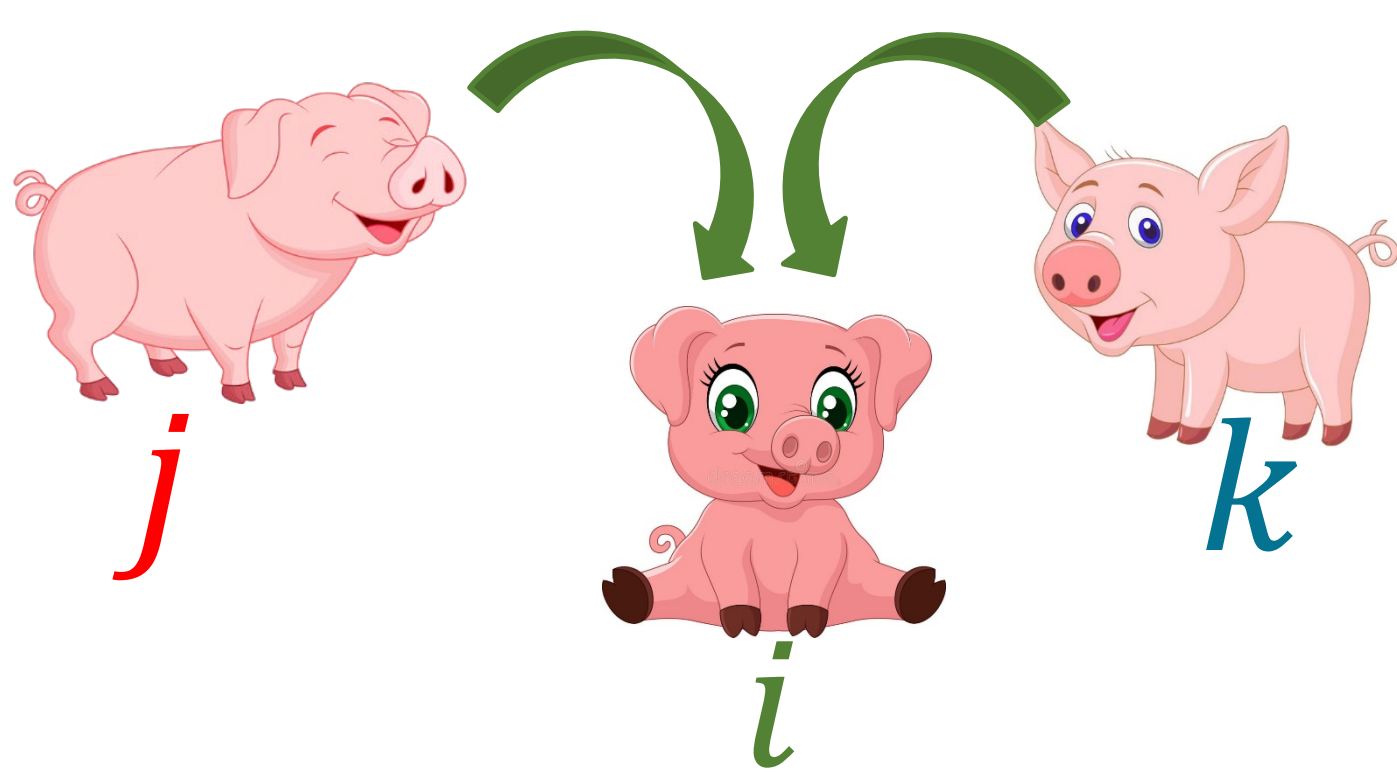
Animals reared alone : No social effects

$$P_i = G_i + E$$

Observed phenotype individual i = genotype individual i + environment

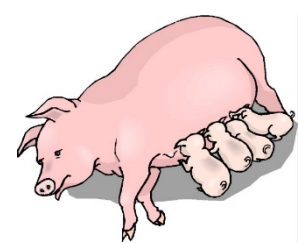
Animals raised in group : Potential social effects

Cooperation among individuals

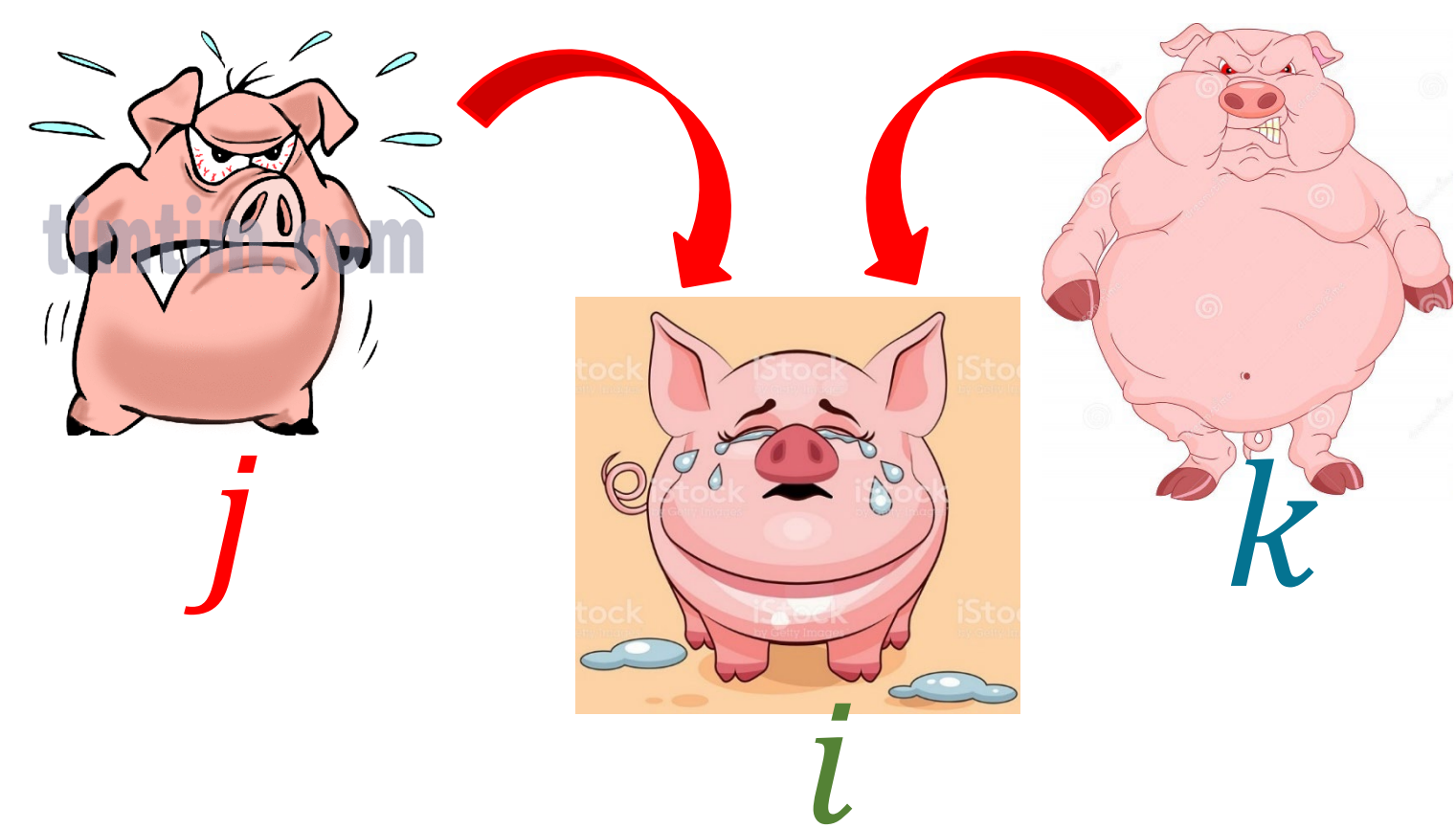


Unobserved phenotypes of animals *j* and *k* have a **positive impact** on the observed performance of animal *i*

Ex: maternal effects



Competition among individuals



Unobserved phenotypes of animals *j* and *k* have a **negative impact** on the observed performance of animal *i*

Ex: competition to access to feed  
Cannibalism

Observed phenotype  $P_i$  of individual *i* depends on its unobserved direct effects  $P_{D,i}$  and on the unobserved associative effect  $P_{S,j}, P_{S,k}$  of its group mates

$$P_i = P_{D,i} + P_{S,j} + P_{S,k}$$

Direct phenotype of interest of the focal animal *i* has a genetic background

$$P_{D,i} = G_{D,i} + E_{D,i}$$

Unobserved associative phenotypes  $P_{S,j}$  and  $P_{S,k}$  of mates participate to the environment of the focal individual and have also a genetic background (called indirect genetic effects IGE).

$$P_{S,j} = G_{S,j} + E_{S,j}$$

$$P_{S,k} = G_{S,k} + E_{S,k}$$

Thus

$$P_i = G_{D,i} + G_{S,j} + G_{S,k} + E$$

Objectives of genetic studies for socially affected traits

- Estimate the direct and social heritabilities
- Estimate their genetic correlation
  - Is there a genetic antagonism or a positive genetic relation between the 2 traits
- Take into account IGE for selection

Feed-a-Gene



Feed-a-Gene is a European H2020 project involving 23 partners which aims to adapt feeds, animals and feeding techniques to improve the efficiency and sustainability of pig, poultry and rabbit production systems. It is coordinated by INRAE (France), started in March 2015 and will last 5 years. The project aims to reduce the environmental impact of monogastric livestock production by improving and diversifying animal diets and feed technologies and by integrating new selection criteria for these animals. The Feed-a-gene project further aims to develop new management systems for precision feeding and precision farming and to evaluate the overall sustainability of the different management solutions proposed in the project.



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