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Implementation of a marker-assisted selection programme in the Chinese-European Duochan pig population

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The Chinese-European populations developed by the French pig breeding organisation ADN

Use of the Meishan breed

Advantages

- Sow productivity
- Maternal abilities

Disadvantages

- Growth performance
- Carcass characteristics

Production of the 25% Chinese lines

Objective : production of parental sows

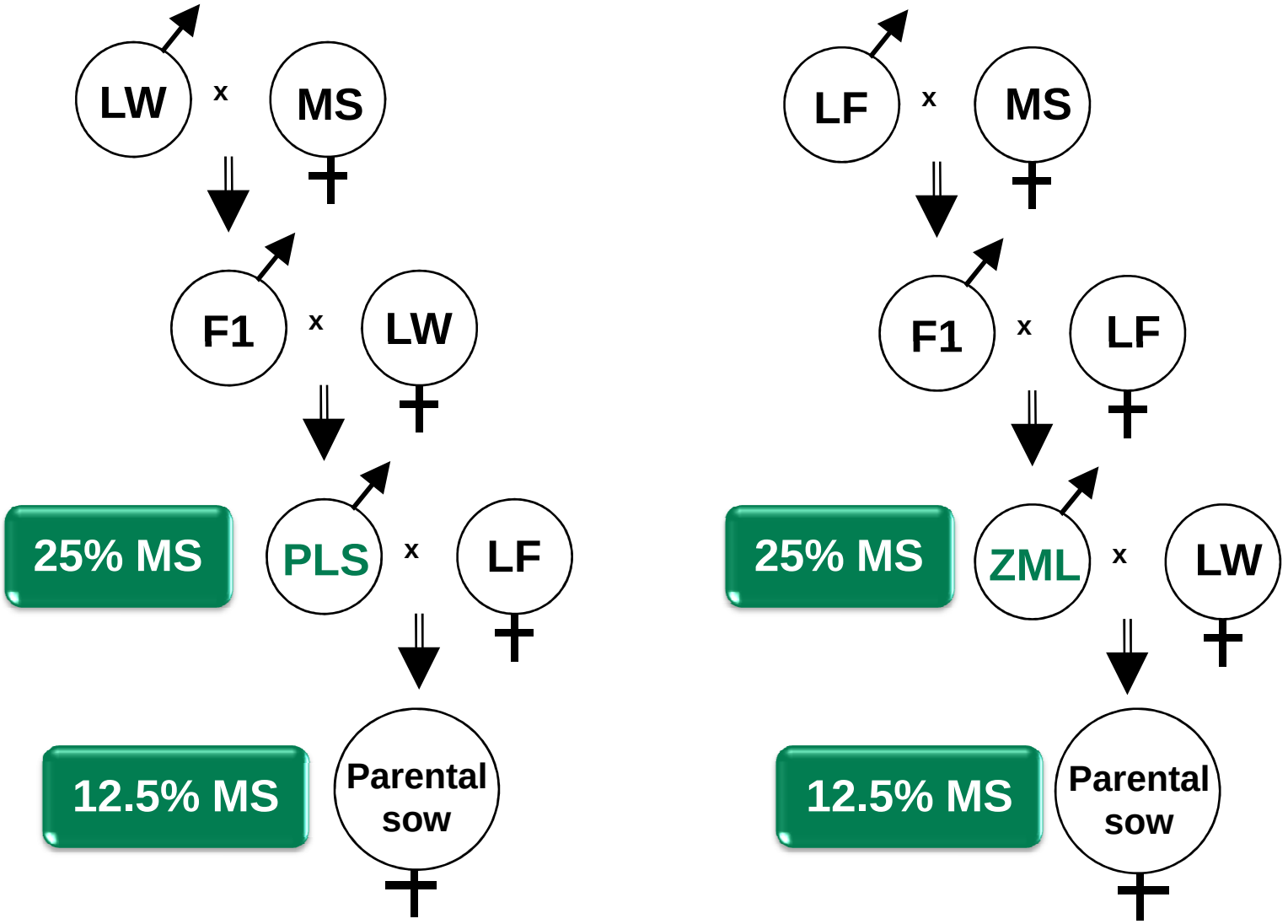
1998 - 2004

- Discontinuous crosses (Pailarshan, Zhumeilan)

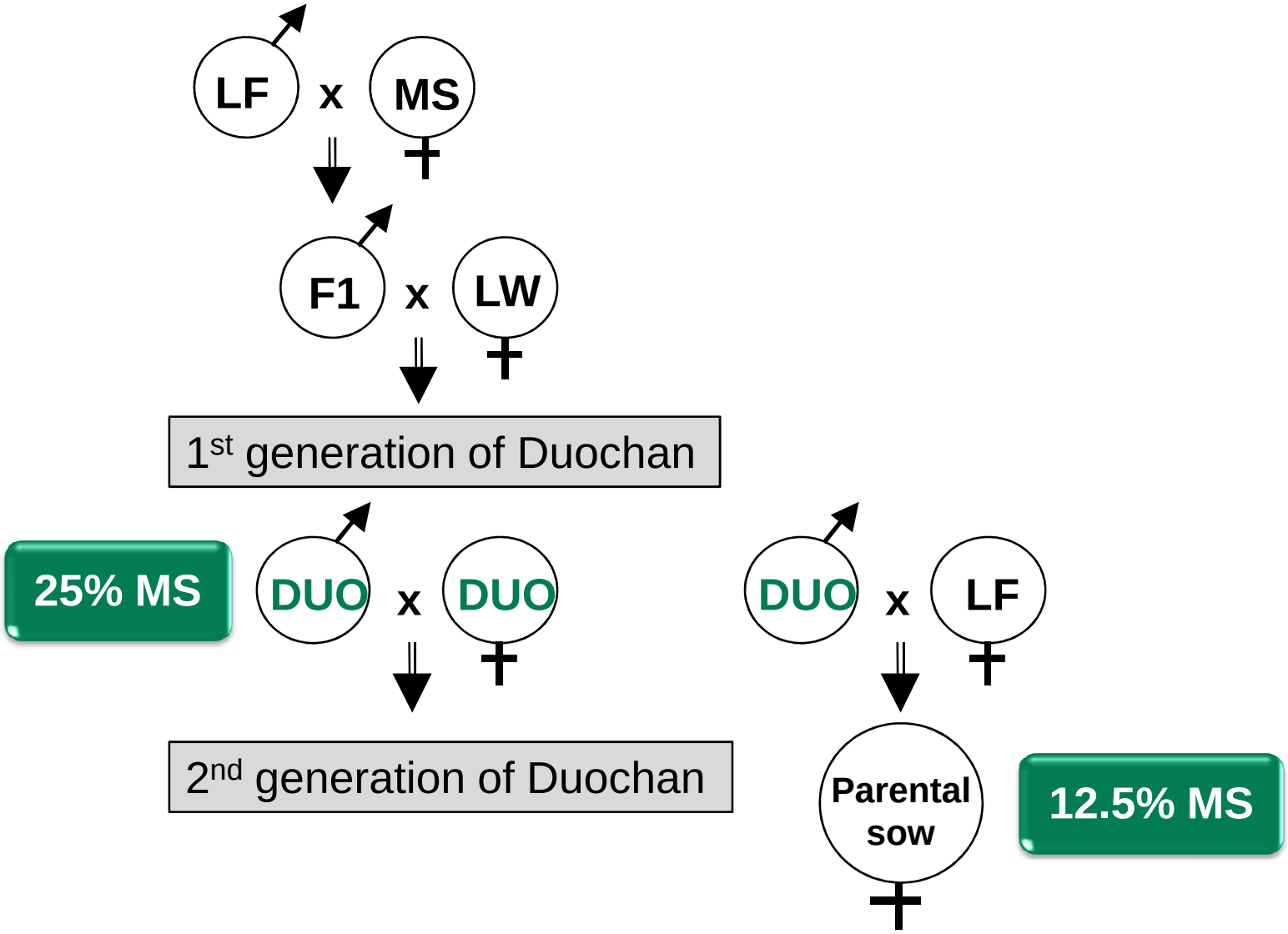
Since 2004

- Composite line (Duochan)

Crossbreeding scheme of Pailarshan and Zhumeilan boars



Crossbreeding scheme of Duochan boars



The marker-assisted selection programme

Why did ADN set up a MAS programme ?

Problem

- Heterogeneous parental sows
  - ➢ variable size
  - ➢ variable carcass composition

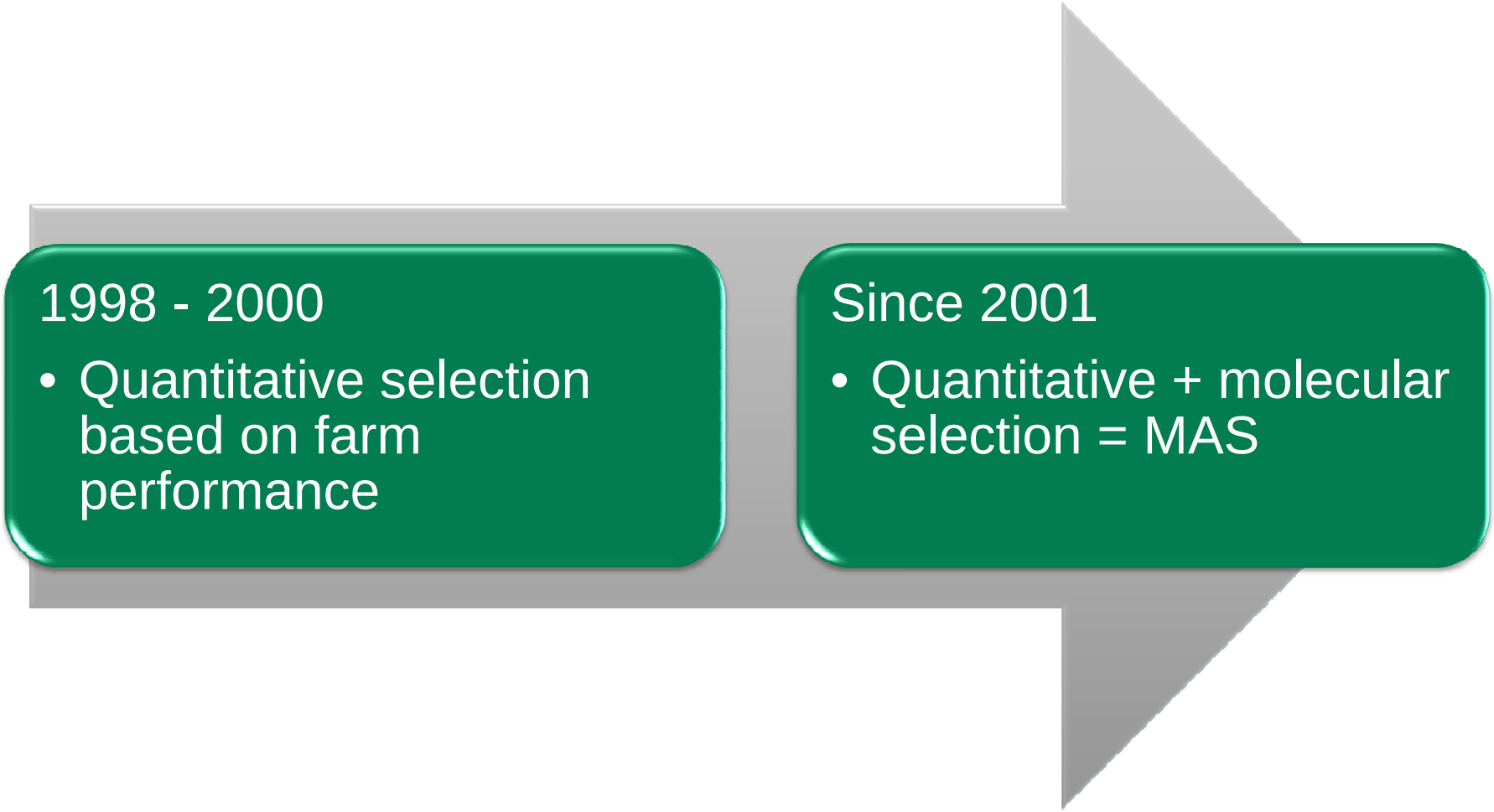
Context

- Advances in the mapping of QTLs affecting economically important traits in pigs

Solution

- Crossbred boars selected to produce parental sows using a MAS programme

Evolution of the breeding programme



The MAS programme : Step 1

Phenotypic selection

- Individual farm performance on the basis of :
  - Growth
  - Carcass composition
  - Teats
  - Leg soundness
- Classification on phenotypic index + breeding value (BLUP)

Choice of candidates

- The best third of each contemporary batch genotyped on the basis of blood samples

The MAS programme : Step 2

Genotypic selection

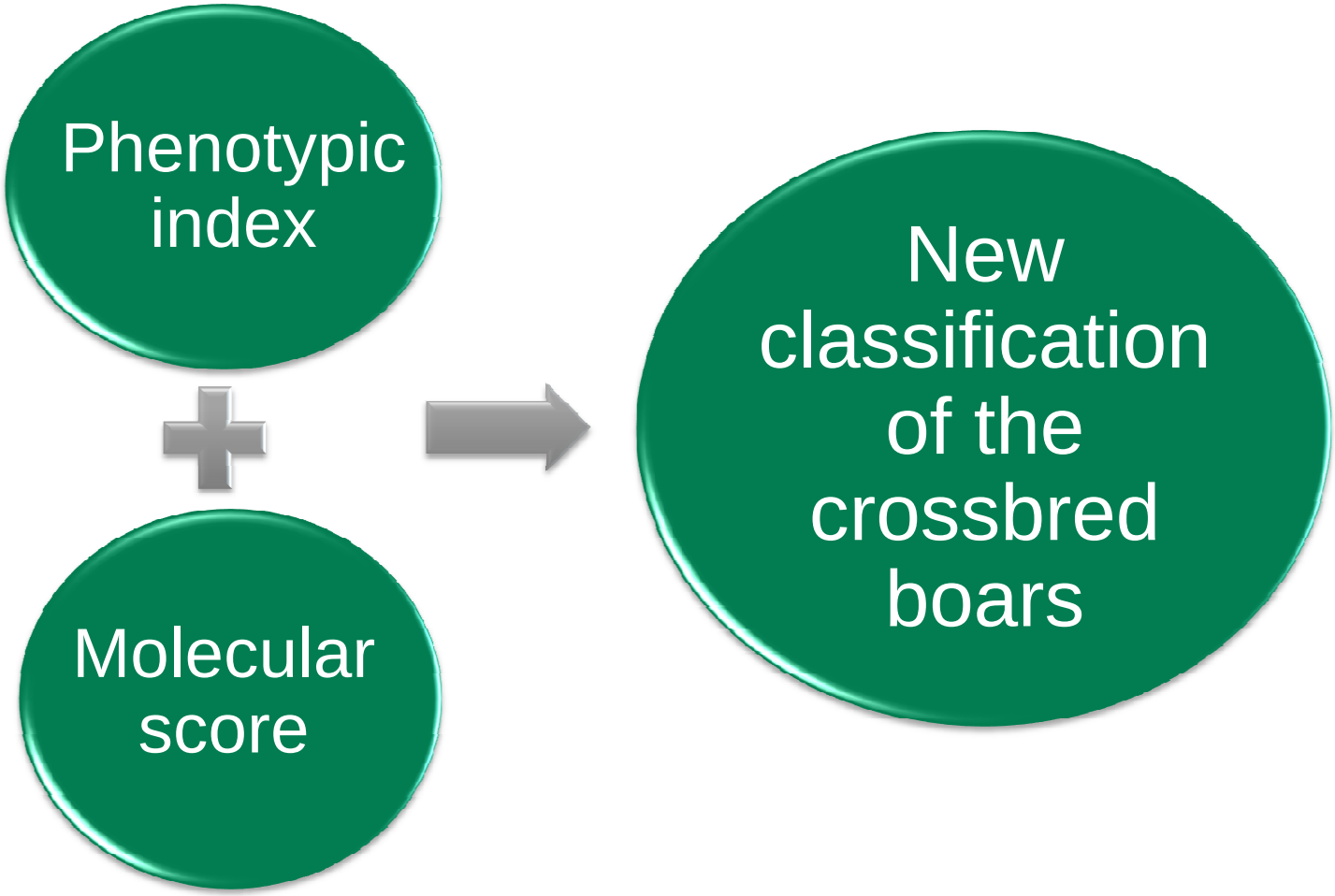
- 16 markers, 4 QTLs (SSC1, 2, 4 and 7)
- 2 groups of traits :
  - Growth : weight, age
  - Carcass composition : backfat thickness, loin eye muscle depth

Molecular score

- Calculated for each boar
- Depending on :
  - Genotypic effect of QTL
  - Economic weight of the trait
  - Breed origin

$$Sc = \Sigma a_k (pij * E_{QTLijk})$$

The MAS programme : Decision and Result



Result : homogeneous parental sows

Future prospects

Genomic data base

- DNA of all the Duochan is stocked = 10,000 animals
- Duochan performances are recorded
  - Production
  - Reproduction
  - Maternal abilities

MAS programme evolutions

- Re-evaluation of the QTLs effects
- Increase of the number of QTLs
- Selection on the teats
- Within-line Duochan MAS