Solutions to Exam Questions Pig Science Breeding

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Question	Maximum Points
1	6
2	4
3	4
4	3
5	3
Total	20

Question 1

What are the six components of a breeding program?

Wie lauten die sechs Komponenten eines Zuchtprogramms?

6

Solution

1. Breeding goal
2. Performance test
3. Prediction of breeding values
4. Reproduction technologies
5. Selection and Mating
6. Selection Response

Question 2

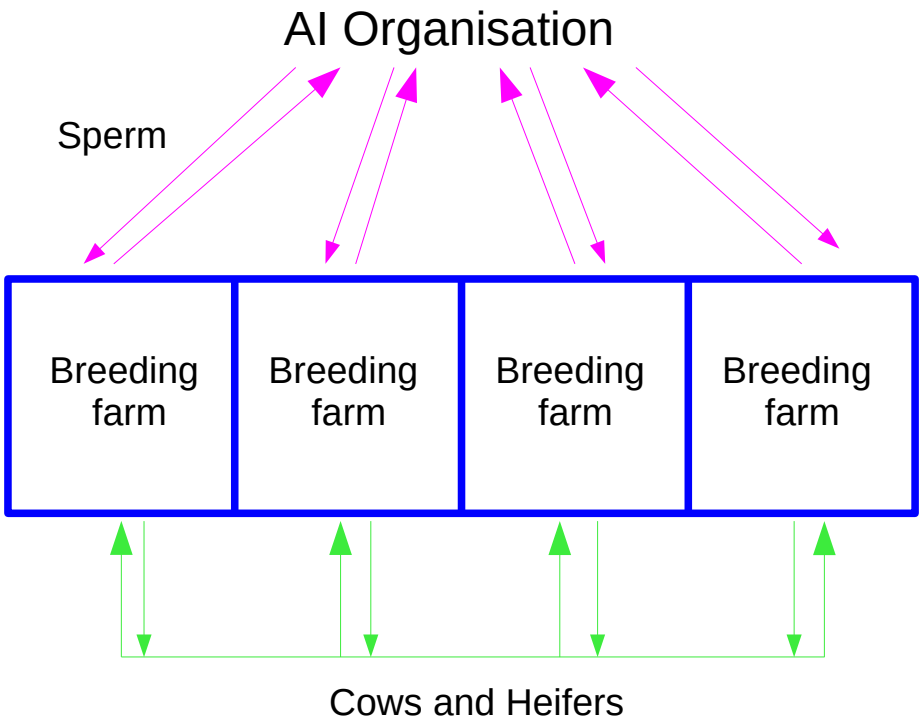
Compare a typical breeding program in cattle with a breeding program in pigs. Draw the characteristic scheme for the two types of breeding programs

Vergleichen sie ein typisches Zuchtprogramm beim Rind mit einem typischen Zuchtprogramm beim Schwein. Zeichnen sie dabei die charakteristischen Schemata der beiden Zuchtprogrammtypen auf.

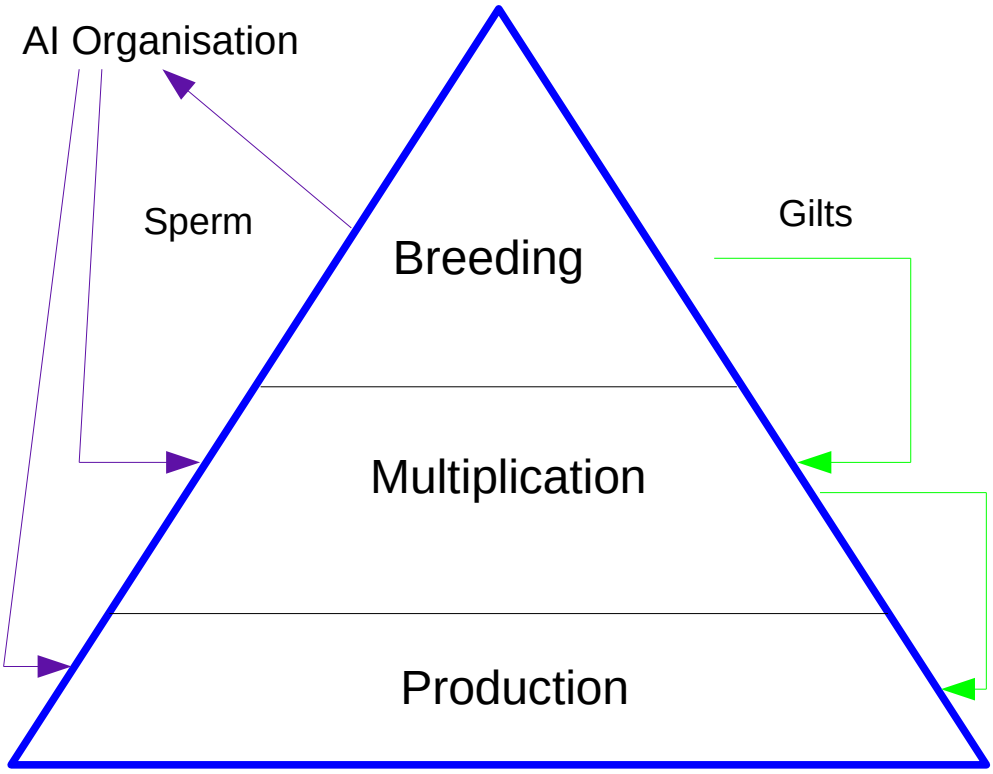
4

Solution

- Cattle: monolithic structure



- Pigs: hierarchical structure



Question 3

What is the goal of model selection and what are two well-known approximations to do model selection?

_Was ist das Ziel der Modellselektion und wie lauten zwei bekannte Approximationen um Modellselektion auszuführen?

4

Solution

- Model selection determines the best model given a certain fitting quality criterion such as C_p. This process helps to determine the most important fixed effects for a genetic evaluation
- Approximations are
  - Backward selection
  - Forward selection

Question 4

Why are variance components important in the process of a genetic evaluation? Name two methods how to estimate variance components.

Weshalb sind Varianzkomponenten wichtig im Prozess der genetischen Auswertung? Benennen sie zwei Methoden um Varianzkomponenten zu schäten.

3

Solution

- Variance components determine whether a trait has a genetic component. That means whether any of the observed variability in the phenotypes can be explained by variation observed in the genetic background of a population. This is an important pre-requisite to include a trait in a breeding goal.
- Methods: Analysis of Variance (ANOVA), Maximum Likelihood (ML), Restricted Maximum Likelihood (REML)

Question 5

What are three different models to predict breeding values?

Wie lauten drei verschiedene Modelle zur Schätzung von Zuchtwerten?

3

Solution

- Sire model
- Animal model
- SNP BLUP - marker effect model
- Genomic BLUP - breeding value model

Questions 6

What are the four components that determine the selection response per year? Which of the two components are antagonistic? What is the recently introduced breeding method that resolves the antagonism?

Wie lauten die vier Komponenten, welche den Zuchtfortschritt pro Jahr bestimmen? Welche der beiden Komponenten stehen antagonistisch zueinander? Welche kürzlich eingeführte Züchtungsmethode kann diesen Antagonismus auflösen?

3

Solution

1. Selection intensity
2. Accuraciy of breeding values
3. genetic standard deviation
4. generation interval

Antagonistic are accuracy of breeding values and generation interval

Genomic selection resolves the antagonism.