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Methodological procedures of creation and management of breeding programmes

Modul no. 3: Animal Breeding
Eva Strapáková
Slovak University of Agriculture in Nitra
Faculty of Agrobiology and Food Resources

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Livestock breeding programmes

Breeding program

- Summary of breeding, technical and organizational arrangements aimed at increasing the production capabilities of livestock populations.
- Combining all components of breeding work into one system.
- The effect is expressed by genetic gain.

Breeding goal: improvement of animal characteristics and preservation of biodiversity.

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Livestock breeding programmes

Components of a breeding program

1. Agricultural policy and trade.
2. Production system.
3. Characteristics of the animal population – **breeding standard.**
4. Farm infrastructure.
5. Defining breeding goals **– breeding goal.**
6. Breeding strategy – purebreds or crossbreds.
7. Selection and mating programme.
8. Reproductive methods.
9. Milk recording process and data collection.
10. Genetic analyzes and estimation of breeding values.
11. Monitoring and estimation of genetic gain.

Strategies

Ways and means

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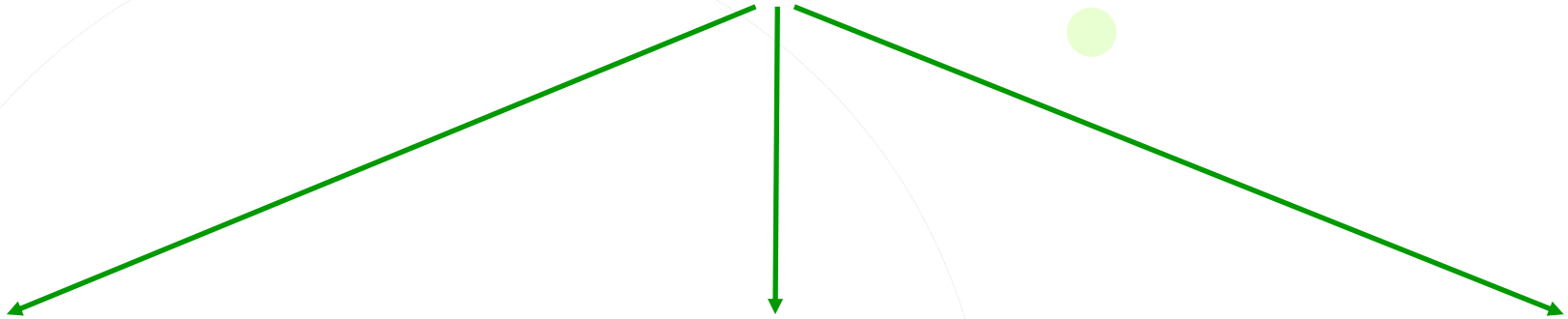
Livestock breeding programmes



Biological part

- Estimation of genetic parameters
- Estimation of breeding values

Technical part

- Material – technical equipment
- Test equipment
- Milk recording system

Ekonomic part

- Financial costs for implementation

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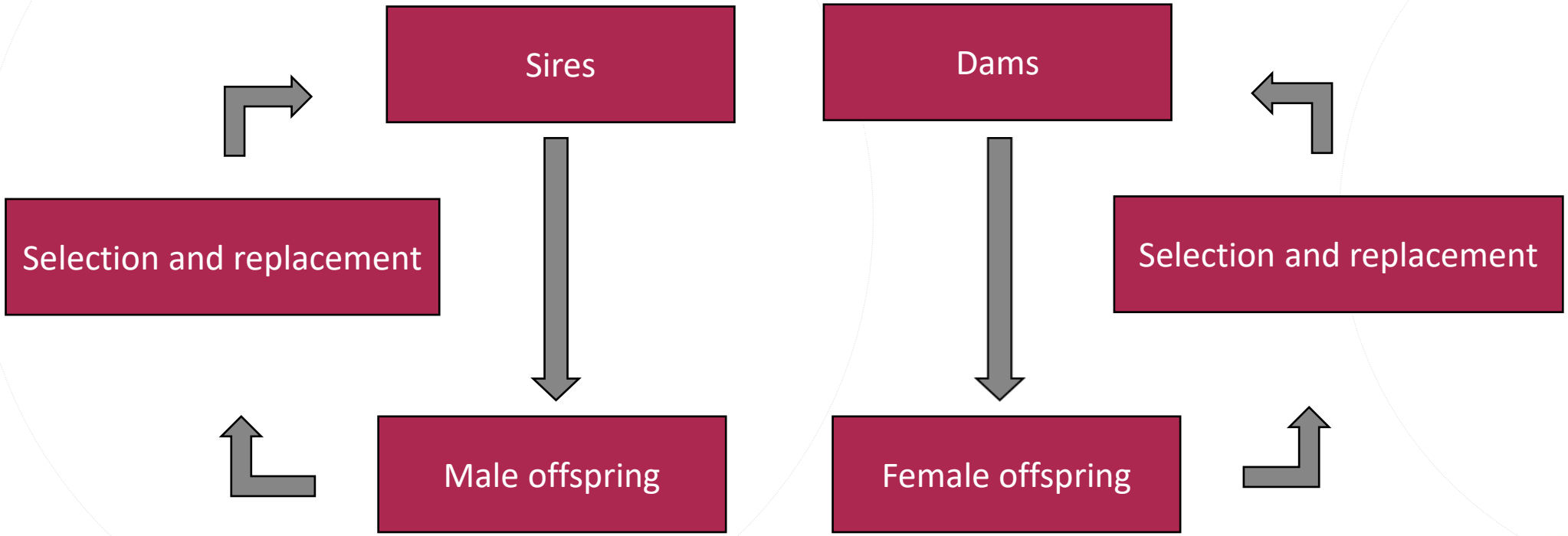
Classic breeding programmes

Selection of phenotypically above-average animals on the basis of Milk recording system and control of hereditary characteristics - estimation of breeding values.



Simple breeding program

Zdroj: Candrák, J., Miluchová, M., Bujko, J., Strapáková, E., 2014. Šľachtenie hospodárskych zvierat. Nitra : SPU, 147 s., ISBN 978-80-552-1288-3

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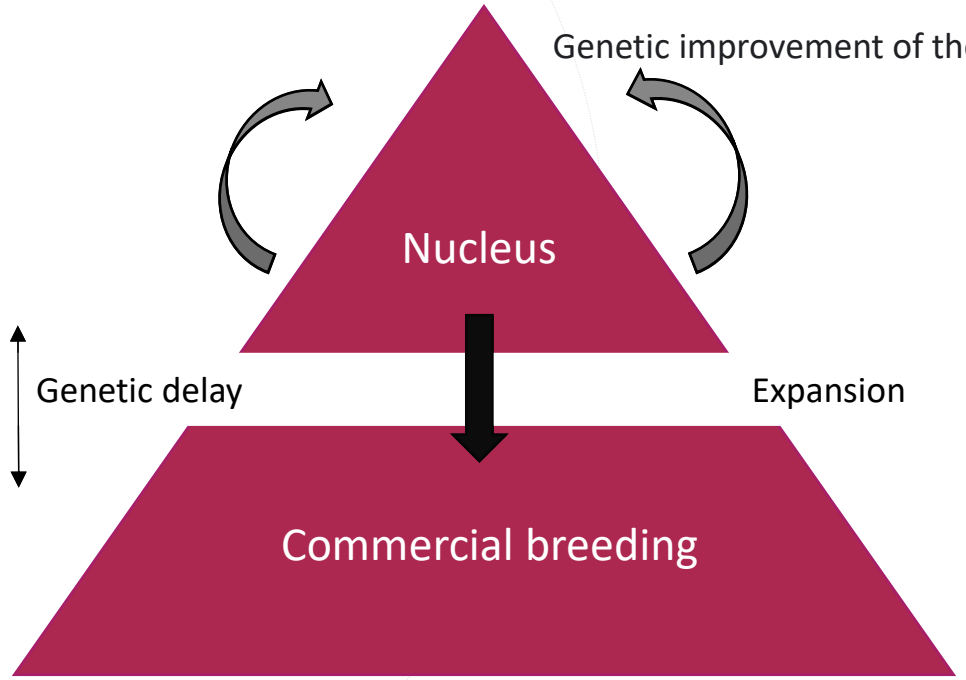
Classic breeding programmes

The initial genetic improvement of the characteristics takes place only in the nucleus, the transfer to commercial breeding is delayed.



Two-stage breeding program

Zdroj: Candrák, J., Miluchová, M., Bujko, J., Strapáková, E., 2014. Šľachtenie hospodárskych zvierat. Nitra : SPU, 147 s., ISBN 978-80-552-1288-3

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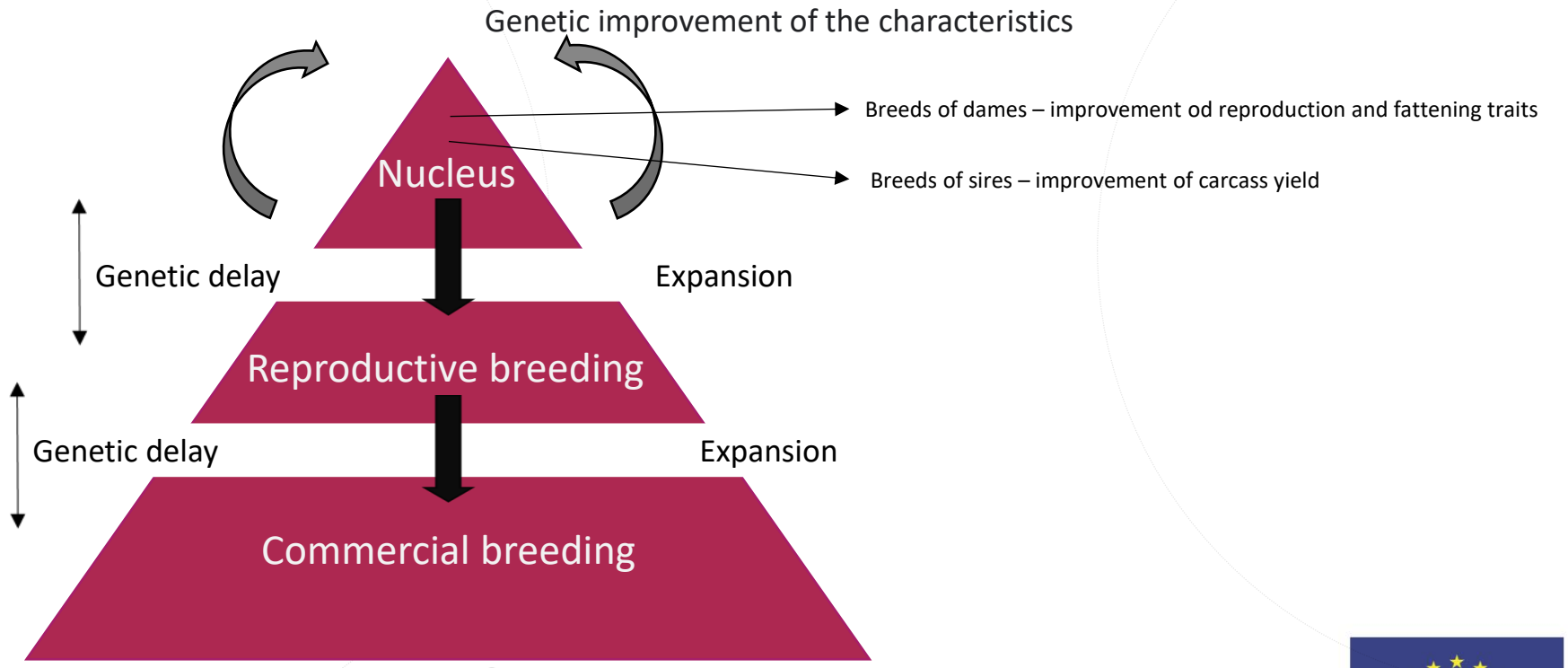
Classic breeding programmes

Most used in pig and poultry breeding. It is used successfully in animals with a shorter generation interval.



Three-stage breeding program

Zdroj: Candrák, J., Miluchová, M., Bujko, J., Strapáková, E., 2014. Šľachtenie hospodárskych zvierat. Nitra : SPU, 147 s., ISBN 978-80-552-1288-3

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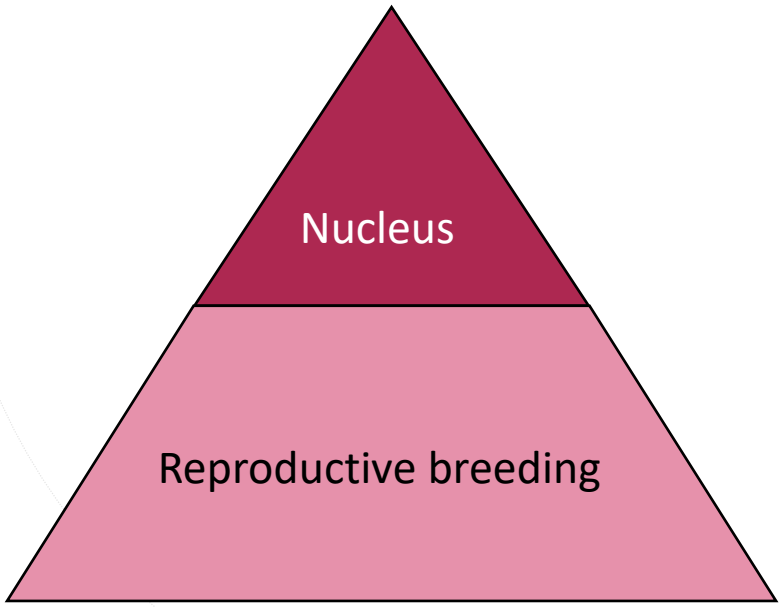
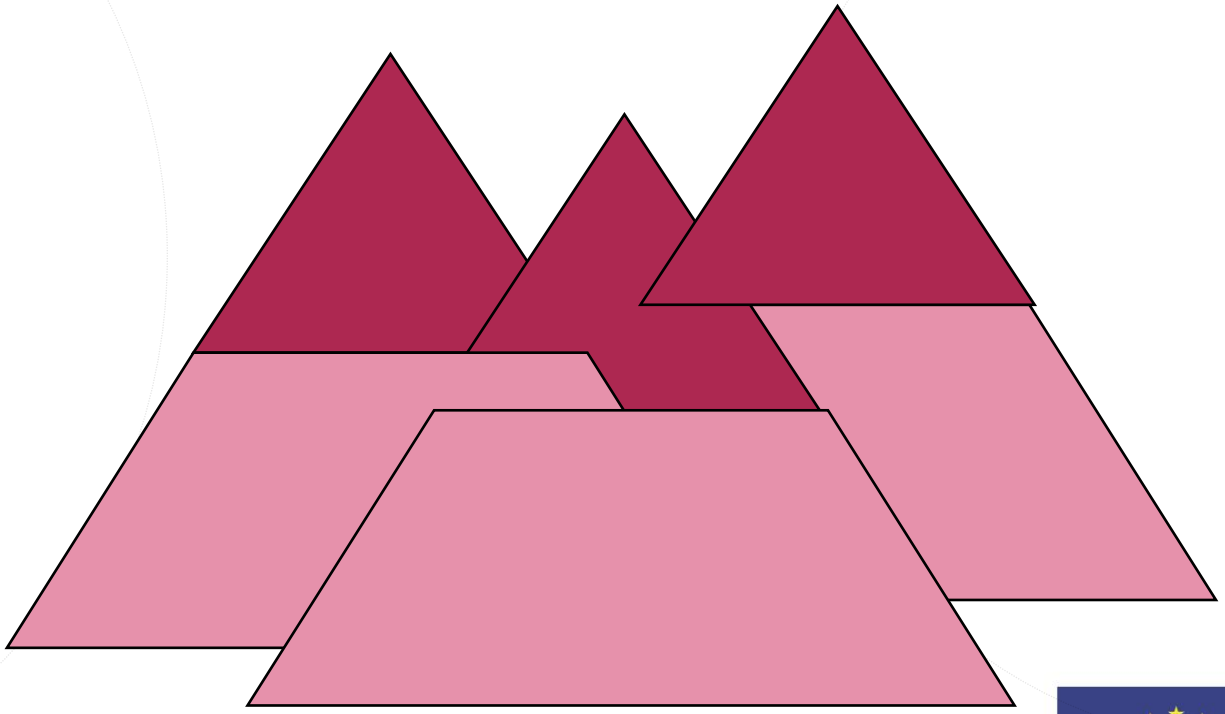
Classic breeding programmes

Central nucleus



Scattered nucleus



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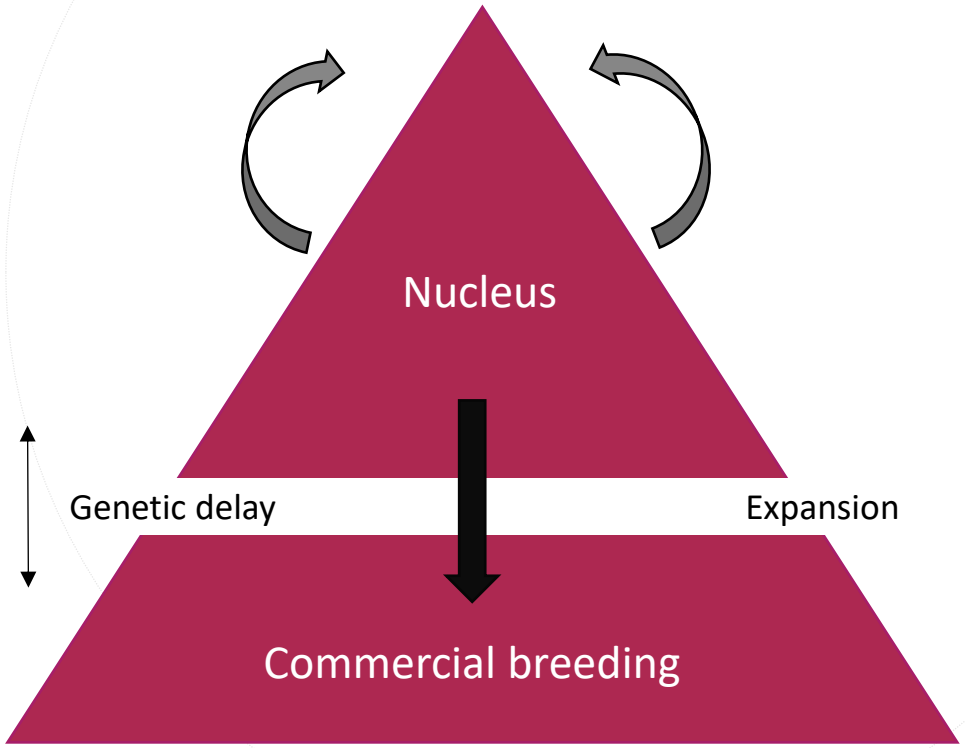
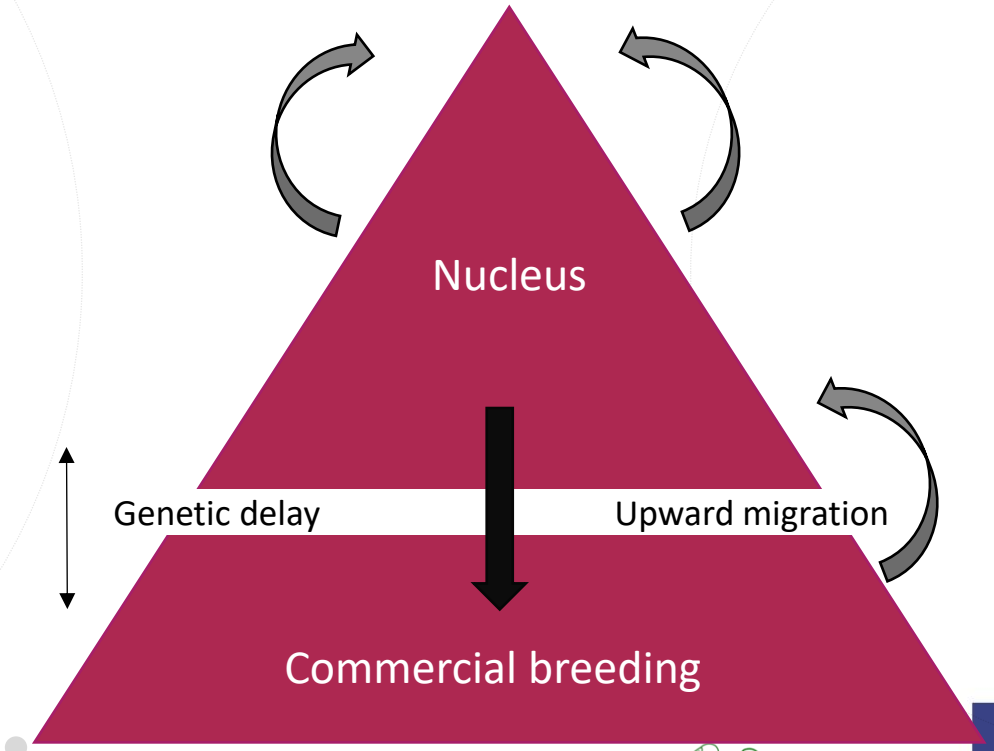
Classic breeding programmes

Closed nucleus



Open nucleus – higher genetic improvement by up to 15%



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Modern breeding programmes

Using the latest biotechnological knowledge and reproduction methods.

Goal: shortening the generation interval and increasing female reproduction.

- Marker-oriented selection (MAS)
- MOET
- Genetic engineering
- Genomics

Breeding programmes in organic or ecological farming systems belong to a separate group.

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Modern breeding programmes

MOET – Multiple Ovulation Embryo Transfer

System of multiple ovulation and embryo transfer - used in cattle.

- Increase of the reproductive capacity of animals.
- Refinement of the estimation of breeding values.
- Increase of the selection intensity.
- Shortening of the generation interval.

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Modern breeding programmes

Juvenile system

- **Selection by pedigree value**
- Short generation interval
- Selection of heifersand bulls aged 13 months
- Insemination and embryo transfer (ET)
  - insemination at 15 months
  - offspring from ET at 22 months
  - own offspring at 24 months
  - 34 months – completed lactation

Adult system

- Insemination of heifers at the age of 15 months
- Calving at 24 months
- Completed lactation at 34 months
- **Selection of both male and female at 35 months**
- Production of embryos
- Generation interval 3.7 years

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Implementation and optimalization of breeding programmes

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Implementation

- Evaluation of the population in terms of decisive traits and characteristics.
- Determining of the breeding goal.
- Selection of characteristics.
- Selection a mating: simultaneous and MAS.
- Breeding program.
- Control and monitoring (population size, inbreeding, genetic gain).
- Biological a economic assesment of the new offspring generation.
- Correction and adjustments to the breeding objective and selection of traits.
- Recommendations for breeding in the following period.

Optimization

- Selection of animals for given characteristics.
- Transfer of genes to the next generations.
- Economic modeling – evaluation of the economic efficiency of the breeding program.

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Partners:

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Mendel University in Brno

Siedlce University of Natural Sciences and Humanities

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Thank you for your attention!

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Eva Strapáková

eva.strapakova@uniag.sk

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