Universiteit Utrecht

BovReg
Understanding cattle genomes

# Ethical game changers and grains of sand: on how to do ethics of livestock breeding

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# The need for ethical discussion about breeding

**1. Breeding as a solution to societal problems?**


EFFAB (2020b)

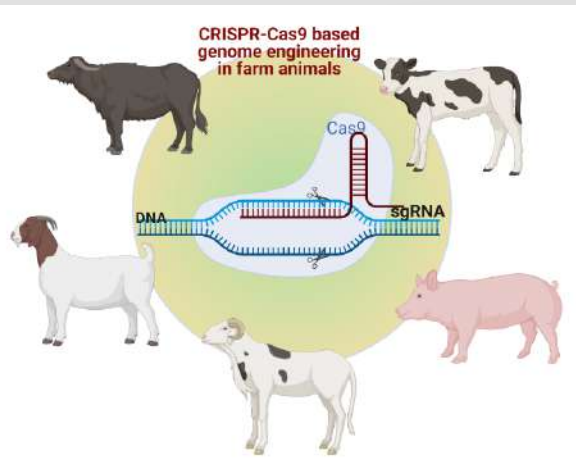
# The need for ethical discussion about breeding

**2. Breeding as a solution to ethical problems within animal agriculture?**

- Resistance to common diseases (e.g. African Swine fever, mastitis)
- Resistance to other health/welfare problems (e.g. lameness)
- Robustness against environmental stress

# The need for ethical discussion about breeding

3. **Some technologies that could be applied to advance breeding goals are socially and ethically controversial**

# The need for ethical discussion about breeding

**Observation: developments are often more gradual**

- Phenotypic traits selected for and relative weight
- Number and type of (epi)genetic markers
- Improved data and statistical methods

# The need for ethical discussion about breeding

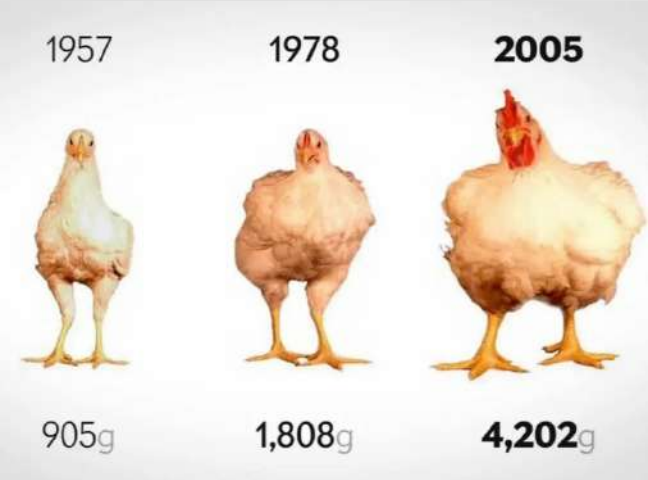
**Are only 'game changers' ethically significant?**

- 'Genomic selection just exploits existing genetic variation (and '
- 'Genome editing just speeds up breeding'
- 'The combined use of ovum pick-up, in vitro embryo production, and genomic selection ethically unproblematic because it is just a development from traditional breeding practices.' (cf. Lund et al. 2021)

# The need for ethical discussion about breeding

**4. Even gradual developments can have significant implications**

Incremental selection for productivity associated with many welfare issues (e.g. Rauw et al. 1998, Fernyhough et al. 2020)

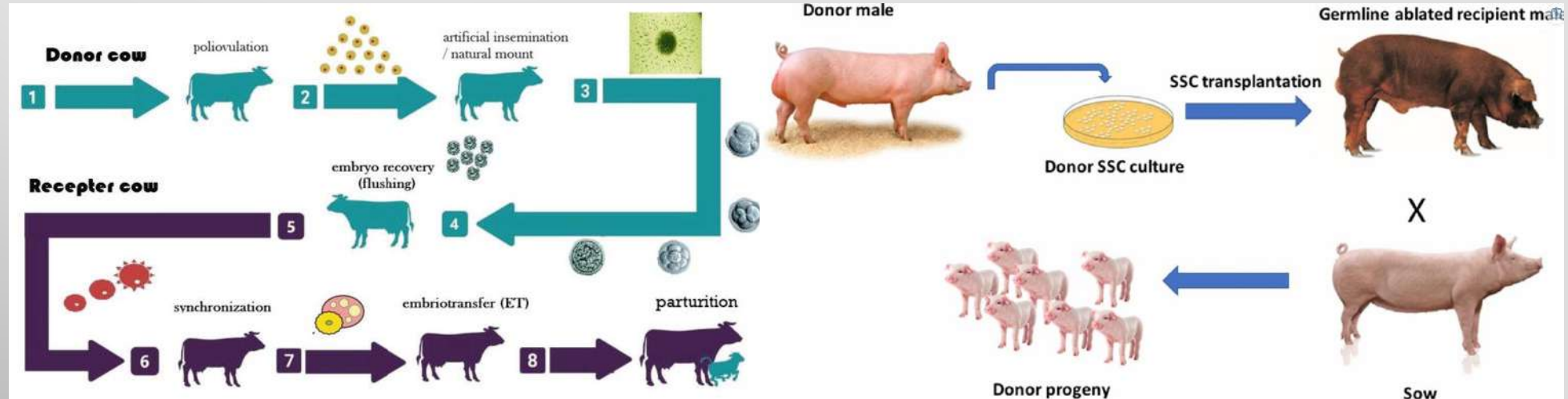




# The need for ethical discussion about breeding

**4. Even gradual developments can have significant implications**

Artificial reproduction procedures intensified incrementally(?)



# The need for ethical discussion about breeding

## 5. Breeding technologies that are used today are not uncontroversial

- Survey among 1,646 members of the German general public (Pieper et al. 2016): majority views advanced reproduction techniques negatively

| | | |
|---|---|---|
| Independent of your opinion whether the method influences milk quality or not: Are there procedures that you disapprove of and that, in your opinion, should not be used for getting a cow pregnant?[1] | | |
| Yes, specifically | | |
| Special artificial insemination with prior selection of semen cells so that only female calves are born | 878 | 53.3 |
| Regular artificial insemination | 249 | 15.1 |
| Transfer of an embryo (i.e., fertilized egg) that was produced by fertilization in a Petri dish | 947 | 57.5 |
| Transfer of an embryo that was produced by cloning | 1,324 | 80.5 |
| Hormone treatment of a cow to increase her fertility | 1,066 | 64.8 |
| No, I do not disapprove of any of these | 70 | 4.2 |
| No answer | 111 | 6.7 |

# The need for ethical discussion about breeding

**5. Breeding technologies that are used today are not uncontroversial**

- Survey among 2036 Danish citizens (Lund et al. 2023): at least a sizeable minority views advanced reproduction techniques negatively

**Table 5.** Share of participants who reject breeding methods (n = 2,036)[1]

| Are there any of the breeding techniques that you think should not be used to make a future or current dairy cow pregnant with? (It is possible to check several boxes.) | % |
|---|---|
| AI: Semen drawn from bulls not present at the milk producer's farm is transferred to the current or future dairy cow. | 13 |
| (Sexed semen): AI where it is ensured that a heifer is born: Using genetic information, sperm cells are selected, which ensures that the dairy cow to be pregnant will most likely give birth to a heifer (and not a bull). Fertilization takes place in the same way as AI (point 1). | 23 |
| In vitro fertilization and embryo transfer: In a laboratory an egg from a dairy cow is fertilized with semen from a bull. The fetus is then transferred to a foster mother who gives birth to the offspring. | 28 |
| Transmission of fertilized eggs from a cow to foster mothers: A cow with particularly good traits is stimulated with hormones (so she produces many eggs) and fertilized with semen drawn from bulls. Next, the fertilized eggs are rinsed out and put into several other cows that then function as foster mothers. | 39 |
| Hormone therapy: a dairy cow is given hormone therapy to become more fertile. | 52 |
| Cloning: Cells from a dairy cow (or a bull) are cultivated. One of the cells is used to make a fetus that is genetically identical to the dairy cow (or bull). The fetus is then transferred to a foster mother who gives birth to the offspring. | 58 |
| No: all the technologies are okay in principle. | 22 |

[1]The data are weighted (see Statistical Analysis section for details) so that the reported frequencies are representative of the Danish population.

# The need for ethical discussion about breeding

**5. Breeding technologies that are used today are not uncontroversial**

- Naab et al. (2021): Focus group participants were critical of applications of genomic selection which:
  - do not serve animal welfare, and/or
  - change animals' species-specific characteristics, and/or
  - adapt animals to undesirable production practices

# How to have an ethical discussion about breeding

**Broadening discussions about breeding, in 3 senses:**

1. About a broad range of relevant topics (not just 'hot' innovations)

2. Covering a broad variety of ethical perspectives (including approaches for evaluating gradual developments in breeding)

3. Including a broad range of publics

# Main steps taken:

- Deliverable 8.1 Report 'The societal context of innovations in cattle genomics'
- Deliverable 8.2 Report 'Ethical dimensions of livestock genomics'
- Deliverable 8.3 Article 'The ethics of innovations in genomic selection: on how to broaden the scope of discussion'
- Deliverable 8.5 Report 'Ethical framework tool to enable professionals to address societal dimensions of livestock breeding'

# Ethical tool – part I

**Answer questions that determine scope of discussion**

- Which innovation(s) or practice(s) to discuss?
- An ideal or a realistic vision for breeding?
- Which alternatives deserve consideration?
- Focus on new or existing ethical issues?

# Ethical tool – part II

## Answer questions corresponding to ethical concepts selected in part I

**Animal interests**

- ✓ Welfare
- ✓ Integrity
- ✓ Species-typical traits and behaviours
- ✓ Dignity
- ✓ Naturalness
- ❑ Other: …

**Human-animal relations**

- ✓ Instrumentalization/objectification
- ✓ Care/stewardship
- ❑ Other: …

**Interhuman concerns**

- ✓ (Economic) justice
- ✓ Power relations and authority
- ❑ Other: …

**Human interests**

- ✓ Food security and quality
- ✓ Public health safety
- ✓ Economic freedom and prosperity
- ❑ Other: …

**Environmental issues**

- ✓ Biodiversity
- ✓ Environmental sustainability
- ❑ Other: …

# Ethical tool – Part III

## Select and apply approach for prioritizing ethical considerations identified in part II, draw a conclusion

| Approaches for weighing ethical considerations individually |
|---|
| ❑ Setting principled ethical limits |
| ❑ Relating innovation *X* to an ideal vision for breeding |
| ❑ Maximizing (human and animal) wellbeing |
| ❑ Assessing innovation *X* in terms of good and bad human attitudes |
| ❑ Prioritizing/scoring ethical considerations intuitively |
| ❑ Other:… |

| Approaches for reaching ethical conclusions as a group |
|---|
| ❑ Settling on one of the approaches for weighing ethical considerations individually |
| ❑ Seeking convergence between different approaches for weighing ethical considerations individually |
| ❑ Seeking agreement about the reasons for disagreement |
| ❑ Establishing a procedural solution (voting, vetoing, etc.) |
| ❑ Other:… |

# Ethical tool

**Available for free as a Google Form**: https://forms.gle/qjrJZFBkW6w8joEw5

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*Thank you for your attention*

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