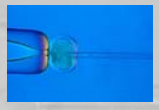
The Ethics of Animal cloning



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PLAN

- Animal cloning – state of the art
- Public perceptions
- Ethical considerations
- Conclusions

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But first:

- **Why focus on ethics?**

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- Marketing
  - To a certain extent it pays off to be ethical
  - To a certain extent it pays off to seem ethical
- Prudence
  - Reflecting on ethical issues is a way to prepare for the future and insure investments
- Conscience
  - Almost all people desire to be good and do good
  - To do ethics is to seek to navigate responsibly in a complicated world

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Animal cloning – State of the art

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Clones of Holstein Friesian bull Carol Prelude Mtoto (Laboratory of Tecnologies of Reproduction, Italy 2001)

CLONING

An emerging technology

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- **Low and varying efficiency (0,1 – 20 %)**
- **Great loss through whole procedure**
  - **missing embryo development, increased fetal loss, more abortions**
  - **at birth: increased weight, malformations, reduced viability etc.**
- **Growing understanding of the importance of epigenetic factors**
- **Questions raised about the possibility to ”copy” complex traits**

FETAL DEATH 5TH MONTH OF PREGANCY

Day192

Day 258

Pig cloning in Denmark

Sow no. (12)	No. of cloned embryos	No. of born piglets	No. of living piglets after 1 week
1327	54	3 (08/06-06)	3
1539	46	10 (21/06-06)	10
1309	58	4 (16/08-06)	1
1433	202	2 (08/07-06)	2
1553	89	3 (28/09-06)	2
1452	85	6 (30/10-06)	5
1867	68	7 (28/08-07)	7
1777	70	1 (29/08-07)	1
1856	56	2 (29/08-07)	2
1904	60	3 (18/01-08)	3
2002	57	4 (30/01-08)	1
1955	65	7 (13/02-08)	1
Total	**910**	**52** (5,7%)	**38** (4,2%)

Applications

- Cloning is used as an enabling technology for the production of genetically modified animals for use in biomedical research and in ”pharming”
- Cloning is useful in some forms of basic research – especially foetal development and reproduction
- So far relatively few attempts to commercially utilise cloning in farm animal breeding – and none in Europe
- Agricultural cloning met with scepticism from consumers, regulatory system and breeders (European Forum for Farm Animal Breeders).

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Public perceptions

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EUROPEAN ATTITUDES TO BIOTECHNOLOGY

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- Since 1991 the Eurobarometer surveys have examined the attitudes of the European public
- According to my interpretation of the surveys members of the European public
  - Differentiate between medical and agricultural applications
  - Do not become more positive towards biotechnology the more they know about it
    - The knowledge deficit model
  - Are most sceptical towards biotechnology when it is applied to animals or food-production

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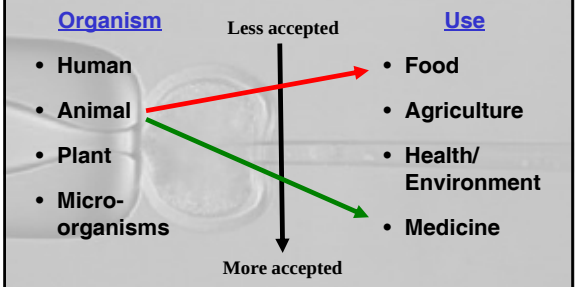
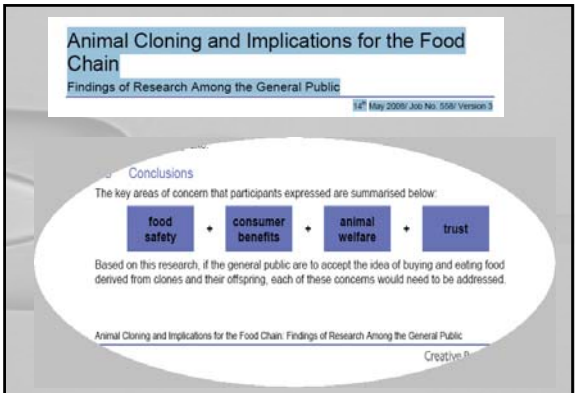


Arguments for and against biotechnology



The Knowledge Gap Model

- **The discrepancy between the opinion of experts and the opinion of the public regarding the risks of agricultural biotechnology are caused by a *lack of knowledge* in the public and can be dissolved by *information***

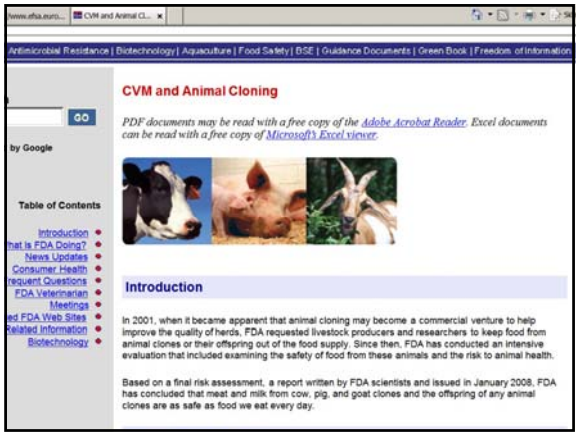
- **It is thus often claimed by scientists, representatives of industry and civil servants that people do not accept biotechnology because they lack knowledge**
- **However, sociological studies have not been able to verify the view that there is a clear connection between level of knowledge and acceptance**
- **Some of the very negative populations in Europe have a relatively high level of knowledge, and some of the populations with a low level of knowledge have a relatively positive attitude**
- **Information helps opinion formation**

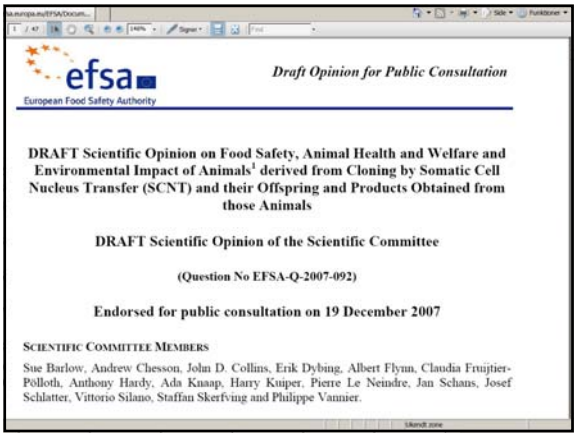
Ethical considerations

Three groups of concerns

- Concern for humans
  - Biosafety
  - Slippery slope concerns
- Concern for society
  - Industrialisation of agriculture
  - Estrangement from food products
- Concern for animals
  - Animal welfare
  - Animal integrity

Official reports





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- Slippery slope: Will animal cloning lead to human cloning?
  - Legally and practiccally a distinction can be upheld
  - The better we get at cloning mammals, the easier it will be to clone humans
- Increased industrialization of agriculture
  - Will cloning add to the development of fewer and larger companies within the breeding industry and fewer and larger animal producers?

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Estrangement from food products

- To some the quality of the product is also decided by the process behind it: The history it tells
- Values like naturalness, unprocessed, non-technological, as in the old days plays a role here
- Cloning signals a degree of human interference with the product which is unsatisfactory

What is *Integrity* ?

- Integritas: Wholeness, intactness
- Problem:
  - Reducing the animal to a mere product, a thing to design to be as useful as possible
  - Cloning extends an ongoing development - The straw that broke the camel´s back
  - Could lead to increased criticism of existing breeding practices – which are largely unknown to the public.

Animal integrity

What is ethically acceptable?

- The debate must allow all concerns to be heard and discussed. However, it is unlikely that there will be consensus
- Two main views:
  1. Cloning is a technology like any other an should be allowed as long as it is safe
  2. Cloning is ethically problematic and should only be allowed if substantial benefits are at stake, i.e. for biomedical and basic research but not for food production
- A disagreement about values – not facts

Conclusions

- Biological realities do not match technical dreams when it comes to animal cloning
- The consumption of meat and other products from cloned animals or their offspring seems to pose no risk
- However, difficult to see serious benefits from a public perspective (wrong strategy)
- Cloning of animals for agricultural purposes will be met with scepticism by the European public
- Serious ethical concerns regarding welfare and integrity of the involved animals

THREE POSSIBLE DEVELOPMENTS

1. Basic research and biomedicine applications in and outside the EU
2. Basic research and biomedicine applications in and outside the EU, and agricultural applications outside the EU
3. Basic research, biomedicine and agricultural applications in and outside the EU

AT PRESENT 3. SEEMS LESS LIKELY THAN 1. AND 2.

Thank you for your attention