

Farm Animal Cloning from an Animal Welfare Perspective

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Compassion In World Farming

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Two ways to view farm animals

- They have inherent, intrinsic value and their lives matter
- They are functional, to be viewed only in terms of their purpose

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Sentient animals have feelings which matter to them



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Functional view: motives

- **Basic biological research**
- **Commercial production of animals**
 1. to reproduce large numbers of high value, elite animals
 2. as a method to create and /or disseminate genetically engineered animals e.g. pharming

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Flaws in functional view

- “Can I?” rather than “Should I?”
- Perpetuate selective breeding
- Pharming – but alternatives available



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Functional view

- Cloning will quickly produce more elite productive animals.
- Farming may be more profitable e.g. increased milk yields.
- Identical carcasses very marketable.



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Adverse economic effects of functional view

- Cost of cloned animals – only wealthy farmers can afford them
- Small farmers cannot compete

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Long-term unsustainability of cloning

- Identical animals will be equally vulnerable to disease
- Loss of biodiversity
- Inherited weaknesses possible in cloned line

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Welfare concerns over cloning

- Invasive reproductive interventions
- Suffering of pregnant surrogates
- Abnormal fetal development
- Late pregnancy mortality
- Postnatal mortality
- Health problems of cloned animals

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Invasive reproductive interventions

- Oocyte extraction
- Surgical/non-surgical interference
- Embryo transfer



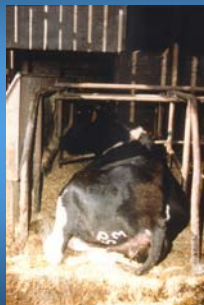
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Suffering of surrogate mothers

- Hormonal disruption
- Abortion
- Large offspring
- Difficult births
- Caesareans



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Abnormal fetal development

- High frequency of abnormalities
- Fetal death
- Late stage deaths



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Post-natal mortality of clones

- Altered physiology/ metabolism
- Defective systems:
 - cardiovascular,
 - musculoskeletal,
 - neurological
- Weakened immune systems
- Infections

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Suffering of clones



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Health problems of cloned animals

- Respiratory problems
- Immune deficiency
- Sudden death



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“The incidence of enteritis, umbilical and respiratory infections are certainly increased in cloned livestock”

DN Wells OIE 2005

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Wastage of life

- Embryos
- Fetuses
- Source animals
- Temporary surrogates
- Surrogates

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Estimate for achieving 100,000 identical clones

- 2,000,000 successful fusions of donor cell and oocyte required
- 400,000 embryos to be transferred to surrogate mothers - i.e. 4 surrogate mothers for 1 clone

Lewis *et al.* 1998

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Welfare concerns: Cattle

- Large offspring syndrome
- Caesarean births
- Musculo-skeletal disorders
- Lameness

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“Post-natal survival of cloned calves can be as low as 33% in some studies, and we have experienced similar losses in cloned piglets.”

Jeff Carroll. USDA ARS Oct. 2005

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Cloned gaur calf died after 48 hours



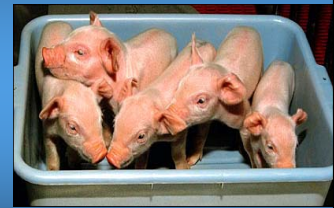
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Welfare concerns: Pigs

- Surgical oocyte extraction
- Surgical embryo transfer
- Unexplained sudden deaths



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Piglet morbidity/mortality

Immerge Biotherapeutics/ Univ Missouri 2002

- 3 sows implanted with 100 embryos
- 7 cloned piglets born by caesarean
- 2 die after birth
- 1 dies at 17 days
- 3 survivors with serious abnormalities

Lai *et. al.* 2002.Science

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Welfare concerns: Sheep

- Superovulation: hormone injections/tampons
- Temporary surrogates
- Peri and post-natal loss
- Aid for genetic engineering

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Dolly, the world's first cloned mammal



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Summary of pathology of cloned lambs born dead (from Rhind *et. al.* 2003)

<i>Physical defects</i>	<i>No. cases that suffered from the defect (out of 8)</i>
Body wall	4
Musculoskeletal	3
Renal	8
Pulmonary	5
Cardiovascular	4
Hepatic	4

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“I’ve looked at the immune response of hundreds of young pigs and I’d never seen anything that low until I looked at a clone” *Jeff Carroll, USDA*

(New Scientist 06/11/04)

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“Any underlying frailties in cloned animals may not be fully revealed until the animals are stressed in some manner”

DN Wells OIE 2005

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Council Directive 98/58/EC concerning the protection of animals kept for farming purposes:

Annex 21:

“No animal shall be kept for farming purposes unless it can reasonably be expected, on the basis of its genotype or phenotype, that it can be kept without detrimental effect on its health or welfare”

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“Until the problems of oversized offspring, embryonic and fetal losses and birth abnormalities, and the possibility of problems associated with aged DNA, have been satisfactorily resolved, there should be a moratorium on the use of cloning by nuclear transfer in commercial agricultural practice”

Farm Animal Welfare Council Report 1998

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Compassion in World Farming's View

- There should be a moratorium on the cloning of farm animals for commercial purposes for the following reasons:
 - Suffering caused to source animals, surrogates and clones
 - Poor quality of life of many 'abnormal' clones
 - High morbidity and mortality rates of clones
 - Failure to view animals as sentient beings with intrinsic value

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