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PROJECT REPORT 14

ETHICAL ASPECTS OF FARM ANIMAL CLONING

A synthesis report

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DANISH CENTRE FOR BIOETHICS
AND RISK ASSESSMENT

ETHICAL ASPECTS OF FARM ANIMAL CLONING

A synthesis report

A report from the project Cloning in Public
a specific support action within the European 6th Framework Programme, priority 5: Food quality and safety

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1 Introduction

This report is a deliverable from the project "CLONING IN PUBLIC; a specific support action within the sixth framework programme, Priority 5, Food quality and safety" (Contract no. 514059).

The overall aims of CLONING IN PUBLIC are: (a) to develop recommendations on European regulation of, and guidelines covering, research on farm animal cloning and its subsequent applications (e.g. in genetically modified animals for bio-reactors); and (b) to stimulate informed public debate across Europe on these issues in which key stakeholders, university students and members of the public participate. These aims are of equal importance. Clearly, they are also interrelated, because if regulations and guidelines are to serve their purpose, they must take public concerns into account. In addition, stimulating, informing and reporting public debate is part of the more general and long-term aim of improving communication between science, civil society and European authorities at different levels, and hence facilitating discussion, within Europe, of public affairs connected with science and technology.

The main aim of this synthesis report on ethical issues is to summarise the findings presented in three previous reports of the project and at two expert workshops in order to ask how these findings can enter the regulatory process. The objective of one of the project reports was to review the existing knowledge of public perceptions of animal biotechnology in general and farm animal cloning in specific.[1] This review formed the basis of another report containing a more thorough review of the ethical literature, in an attempt to identify the main ethical values at stake and areas of potential disagreement.[2] The third report feeding into this synthesis was aimed at exploring the goals, motives, assumptions, values and concerns among cloning scientists.[3]

In this report the term "cloning" refers to *asexual reproduction* – or, more precisely, to the production of individuals with virtually identical genetic material by asexual reproduction. In recent debates, interest has centred on cloning by somatic cell nuclear transfer (SCNT).[4] The term "farm animal" refers to farm animal species such as ruminants (e.g. cows, sheep), pigs and poultry (chicken, turkey). The term does *not* imply that an animal is kept or used in an agricultural setting or for agricultural purposes. Thus, the potential application of a cloned farm animal species may be in medicine.

[1] *Public Perceptions of Farm Animal Cloning in Europe*. The report can be downloaded at: http://www.sl.kvl.dk/cloninginpublic/index-filer/CloninginPublicEthicalReport.pdf

[2] Ethics and Farm Animal Cloning. Risks,Values and Conflicts. The report can be downloaded at: http://www.sl.kvl.dk/cloninginpublic/index-filer/SecondEthicalReport.pdf

[3] Why clone farm animals? Goals, motives, assumptions, values and concerns among European scientists working with cloning of farm animals. The report can be downloaded at: http://www.sl.kvl.dk/cloninginpublic/index-filer/CloninginPublicTechnicalReportNo2.pdf

[4] For a further explanation of the technology, please see Vajta & Gjerris (2006): Science and technology of farm animal cloning: State of the art. *Animal Reproduction Science*. 92, 210-230.

All project reports on the scientific, legal and ethical aspects of farm animal cloning as well as workshop summaries, workshop presentations, project description etc. are available at the project website: http://www.sl.kvl.dk/cloninginpublic

This report has been prepared by Mickey Gjerris, Jesper Lassen, Gitte Meyer and Geir Tveit.

The picture on the front page of this report was downloaded from
http://media.msnbc.msn.com/j/msnbc/1857000/1857884.hsmall.jpg

2 Public perceptions of farm animal cloning[5]

The development and use of animal cloning has been a minor issue on the public biotechnology agenda until the mid-1990s. Previously the focus in the public debate, as reflected in the media, was on genetically modified micro-organisms, plants and to lesser extent transgenic animals. However, the birth of the cloned ewe Dolly in 1996 changed this situation dramatically. Dolly not only marked a scientific breakthrough, but provided a straightforward link to existing popular discourses about human cloning and thus ensured that animal cloning became an integral part of the biotechnology debate.

2.1 Summary of a review

An initial search for studies of public perceptions of farm animal cloning in bibliography databases revealed that this issue has rarely been the main focus of studies of public opinion. Instead, farm animal cloning has occasionally been included as one aspect in broader studies of perceptions of biotechnology in general. The report dealing with public opinions therefore examines the small number of studies of farm animal cloning, and places them within the context of animal biotechnology. The report draws on qualitative as well as quantitative studies, that together point towards a number of issues:

Firstly, studies of public perceptions of biotechnology suggest that there is a scale of acceptability with manipulation of humans as the least acceptable, followed by manipulation of animals, micro-organisms and plants as the most acceptable organisms to manipulate. On such a scale, farm animal cloning is placed towards the least acceptable end.

Secondly, studies show that medical applications of biotechnology are generally more acceptable than other applications, and in particular food related applications. It is, however, characteristic that if medical applications involve animals they are perceived as questionable, despite the fact that they belong to the generally approved medical area.

Thirdly, an analysis of the relation between the desire to encourage an application of biotechnology and its perceived risk, usefulness and moral acceptability, indicate that moral assessment is the most important factor behind the level of support. It should be noted here that this way of analysing and describing the results are dependent upon a specific understanding of what a moral assessment is. Here it is understood as concerns that do not fall within the categories of risks and usefulness. For instance one can hypothetically imagine that cloning of farm animals will not pose any risks to humans, not cause animal welfare problems and at the same time it is deemed very useful, but still found to be morally unacceptable because of the violation of the integrity of animals that cloning might constitute. Such moral concerns may be connected to the

[5] This chapter is an edited version of the summary of the report *Public Perceptions of Farm Animal Cloning in Europe*. The report is written by Jesper Lassen and can be downloaded at http://www.sl.kvl.dk/cloninginpublic/index-filer/CloninginPublicEthicalReport.pdf

attitude that modern biotechnology, and cloning, seems to cross an invisible border between the natural and the unnatural. Qualitative studies point to another aspect of the morally based rejection of genetically modified animals: the worry that genetic manipulation deprives animals of intrinsic features and blurs the borderline between animals and machines, or between species. According to these studies, it is important to the public that genetic technologies do not violate the integrity of the animals. In most of these studies animal cloning is not reported as a separate issue, but one might assume that similar concerns would be found about the act of cloning depriving an animal of features of its intrinsic character, such as uniqueness.

A *forth* concern addresses the issue of usefulness. An EU survey reports that 60% of the population to some extent support the statement that medically related animal cloning *"is simply not necessary"*. This finding is a little surprising, since cloning here is talked about as a means of producing medicines and vaccines. When gene technology in general is framed in this way, it is normally associated with relatively high levels of perceived usefulness contrary to applications within the food area. The relatively low levels of perceived usefulness may, however, reflect the fact that animal cloning, although presented within the medical area, is not seen as a technique that has a unique potential, but is rather looked upon as just another alternative to existing means of medical production. Qualitative research here indicates that perceived usefulness might have been judged higher if the respondents had been asked about medical uses of animal cloning beneficial to the respondents themselves.

2.2 Discussion of the public perception studies

In general, it can be concluded that our knowledge of public perceptions of animal cloning is surprisingly limited. Judged by the debate following the arrival of Dolly, one would have expected work on societal attitudes towards animal cloning to have a higher position on the research agenda. Instead studies of public perceptions of genetic manipulation have generally focused on other issues, food issues being dominant. This absence of work on public perception should not lead to the misconception that the public is not concerned about these matters. Quite the contrary is the case – ordinary people are indeed very concerned about cloning. It is a concern that the sparseness of the existing information about public perceptions may lead to political (or business) decisions that wrongly assume that the public does not care.

An admittedly simplistic interpretation of the perception studies points to the existence of two scales of importance in the judgement of farm animal cloning. Basically there seem to be two different parameters that are important when evaluating the technology: What kind of organism is being used and for what purpose? These scales reflect judgements of perceived usefulness and need; and risk and ethical or moral problems. Firstly, the types of organism involved in genetic manipulations seem to be on a scale, with humans being the most controversial, followed by animals, then plants, and then micro-organisms as the least controversial. Areas of application make up a second scale, with medical uses at the least controversial end, food-related uses at the other, problematic end, and other applications occupying the space in-between.

On the first of these scales, cloning sits towards the controversial end, since its object is animals. On the second scale the position depends on the purpose and application of the cloning being considered. Taking both scales into consideration, one would expect to find farm animal cloning in food production to be controversial in all respects. Such applications can be expected to be met with considerable public resistance, since they combine the controversial issue of using biotechnology on animals with the controversial issue of using biotechnology in food production. On the other hand, however, about applications of cloning for medical purposes, public judgement is much less predictable, since it largely will depend on the existence of alternatives and on the perceived usefulness. Here it can be anticipated that applications that can be categorised as more efficient replacements of traditional technologies to produce medicine will largely be rejected; whereas applications that represent an opportunity to produce a new medicine or novel type of therapy will be greeted more positively.

Regarding the knowledge of public perceptions of farm animal cloning in Europe two aspects should be emphasized. Firstly, more studies of both quantitative and qualitative kind are necessary to draw a more nuanced picture. Secondly, it should be remembered that this research can be used in different ways and for different purposes.

At one extreme the purpose of the research can be seen as a way of figuring out what the majority of the population thinks about the subject – and then following that opinion in the regulation process. At the other extreme it can be used as information about what opinions people carry that should be changed, thus functioning as a tool in an educational campaign to further the public support of farm animal cloning. We will advocate a third position where the research into public perceptions of biotechnology is used as a way of uncovering what concerns, hopes and doubts that the public harbours. These issues can then be brought into the general discussion about the technology and evaluated by all participants.

Whether one belongs to one or the other extreme or understands one's position as a third one, it is crucial that it is made explicit that *the way* the research is used is a political choice based on values.

Finally it is worth noticing that a new Eurobarometer[6] was carried out in 2005, after the report on public perception of farm animal cloning was written. This survey is not included in the present summary, partly because it does not include questions about farm animal cloning; and partly because the general conclusions of the survey do not conflict with the arguments put forward here.

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[6] Gaskell et al. (2005): *Europeans and Biotechnology in 2005: Patterns and Trends. Eurobarometer 64.3. A report to the European Commission's Directorate-General for Research.* http://www.ec.europa.eu/research/press/2006/pdf/pr1906_eb_64_3_final_report-may2006_en.pdf

3 Ethical concerns about farm animal cloning[7]

The underlying report for this chapter identifies the main ethical issues raised by farm animal cloning. It discusses ethical concerns that have often been expressed in the debate and other, significant concerns that are likely to play a role as the debate unfolds. The goal of the report is to facilitate and inform further debate by providing a framework for understanding the different values that underlie the views of different participants in the discussion. The report also discusses how values relate to factual issues and come to be expressed in the form of concerns.

The most prominent distinction in the report is between concerns that reflect the ethical importance of animals themselves and concerns relating solely to human interests. The report also draws a distinction between concerns connected with narrow and broad conceptions of animal welfare and concerns based on animal integrity. Finally, a distinction is made between risks to human health and other, indirect risks to humans: risks, that is, to the environment, and risks arising from the socio-economic impact of the technology.

3.1 Concerns related to animals

The concerns relating directly to animals reflect two prominent ways of understanding the concept of animal welfare. Within the narrow perspective a pair of positions can be identified: one focuses on negative psychological experiences that the technology might cause and the other concentrates on the physical health of the animal. As the report shows there are many problems with the cloning technology today.[8] Cloning often causes the cloned animals pain, suffering and physical problems. It is shown how the relatively low level of existing knowledge and the inevitably value-laden interpretations of both the importance of animal suffering and the expected benefits of the technology will inevitably figure in discussions and conflicts in this area in the future. Within the broader perspective — a perspective also focussing on the ability of the animal to lead a natural life, fulfilling its species-specific potentials — it is shown that although the concept of naturalness leaves many questions to be answered, it is contradicted by the asexual character of reproduction by cloning.

Finally two notions of animal integrity are discussed. The first is biologically informed and related to the concept of genetic integrity. It is shown that cloning fundamentally changes the natural method of reproduction, but that it remains to be convincingly argued that this is necessarily an ethical problem. The second is based on an understanding of animal integrity as a concept that seeks to clarify limits to the human use of animals by looking at the independence of animals from humans.

[7] This chapter is an edited version of the summary of the report *Ethics and Farm Animal Cloning. Risks,Values and Conflicts*. The report was prepared by Mickey Gjerris and can be downloaded at http://www.sl.kvl.dk/cloninginpublic/index-filer/SecondEthicalReport.pdf

[8] A further discussion of this can be found in: Vajta & Gjerris (2006): Science and technology of farm animal cloning: State of the art. *Animal Reproduction Science*. 92, 210-230

It is argued in the report that all of these concerns rely on deep ethical convictions about what entities should be included in the ethical community and thus treated with respect.

3.2 Concerns related to humans

Key concerns relating to human health and the environmental and socio-economic impact are discussed in this section of the report. It is argued that risk assessment research on negative consequences for human health has so far failed to find any significant differences between products from cloned animals and their offspring and products from non-cloned animals. The uncertainty of this kind of research, and the amount of research required to draw conclusions in different areas of research and conflict, are then discussed, as well as the importance of such research to the ethical evaluation of farm animal cloning and the issue of labelling.

It is further argued that although risk assessment is an important part of ethical evaluation, disagreements will undoubtedly arise as a result of different understandings of core concepts in risk analysis. These understandings are grounded in different ethical perspectives. Finally it is argued that current knowledge of the potential environmental and socio-economic impact of farm animal cloning is very hard to evaluate. This is because there is considerable uncertainty over the future of the technology. Although it is estimated that socio-economic impact will be minor, the conflicts described above will probably surface in this area as well.

4 Goals, motives, assumptions, values and concerns among European farm animal cloning scientists[9]

Seen from the outside, scientific researchers in the area of farm animal cloning may appear as a sort of consortium, rationally working to realise a specific project: a target has been set, and now the scientific researchers are on the move to achieve it. That picture is, however, grossly misleading. European scientists who are involved in the development and use of cloning techniques in relation to farm animals differ on crucial questions concerning specific applications as well as purposes. Their ideas about how those techniques may be put to use do not compose a single, coherent picture that might be referred to as the truth about what the scientists really are trying to do. That is an overall conclusion from the report.

The report has been based on in-depth interviews with European scientists from the area of farm animal cloning. Judging from the interviews there seems to be an agreement among the scientists on the realism and desirability of a few specific goals and applications. The scientists do not, however, agree regarding the possible future production of cloned farm animals as part of European agriculture and husbandry. Nor do they agree upon the future of human, reproductive cloning. Moreover, while some of them focus on agricultural applications, others focus on applications for human medical purposes. Thus, scientists who are involved in farm animal cloning are not involved in a common, clearly defined, technological project. No such project has been defined in relation to farm animal cloning.

Another conclusion of some consequence relates to an area of possible consensus among the interviewees and, possibly, among scientists on a wider scale. This concerns attitudes towards the public at large and, in particular, assumptions about the possibility of having a reasonable public discussion on issues related to the research and its applications. There is an apparent consensus among the interviewees that the public at large is incapable of discussing questions regarding the research. The report points to this assumption as a challenge to EU authorities, to national authorities and to European civil society.

4.1 Multiple assumptions, motives and goals

Seven interviews with nine scientific researchers from five European countries form the basis of the report. All of the interviewees are attached in some way or another to public research institutions. Their contact with industry and agriculture vary from no contact to rather close contact.

[9] This chapter is identical to the summary of the report *Why clone farm animals? Goals, motives, assumptions, values and concerns among European scientists working with cloning of farm animals.* The report is written by Gitte Meyer and can be downloaded at: http://www.sl.kvl.dk/cloninginpublic/index-filer/CloninginPublicTechnicalReportNo2.pdf

The interviews have focused on questions of why, and not only on questions of what and how. They provide an opportunity to look into rationales and argumentations that are current among the interviewees, indicating that their thinking and arguing are likely to be of wider importance to the way this particular field of scientific research is carried out. Thus, the interviews may be used to cautiously draw conclusions about possible areas of consensus, but the strongest sort of evidence that can be derived from them concerns disagreement. The interviews document the existence of multiple – and to some extent conflicting – assumptions, motives, goals and concerns among scientists within this field.

The following goals may be extracted from the series of interviews: There is a goal of using new knowledge in an indirect way, in order to understand causes of pregnancy problems and of stillbirth in domestic farm animals, in order to remove such causes by some means or the other, but not by cloning. In relation to humans there is an almost similar goal of understanding the mechanisms of stem cells in order to get a grip of principles that may be used in the treatment of human diseases, not by creating human embryos by cloning techniques, but by other means. Other goals imply the direct use of cloning techniques. Prominent among these are the production of animals – combining, as a rule, transgenesis and somatic cell nuclear transfer (the latter supporting the former) – which may be used as models in the study of human diseases. Along the same lines there is a goal of using cloned animals for experiments on the possible uses of stem cells in the treatment of (human) disease.

Several goals are related to the use of cloning techniques in production, without having any aims of gaining new basic knowledge attached to them. The production of genomic copies of valuable breeding bulls is mentioned in all the interviews. So is the production, combining transgenesis and somatic cell nuclear transfer, of animals – bioreactors – that can produce valuable pharmaceutical or other substances in the milk or in the blood. Also, the production of genomic copies of cows, to be used for the testing of breeding bulls, has been pointed to. Furthermore, the application of cloning techniques in order to produce herds of genetically identical domestic animals is mentioned as a continuation of present breeding techniques. The same goes for the production of human beings as an extension of the present techniques and services regarding assisted human reproduction. These two latter applications are mentioned as long term rather than short term goals because of the present inefficiency of the techniques. Both of these possible applications are subjected to clear dissent among the interviewees. Finally, the possible use of cloning techniques in order to safeguard species or breeds of animals is mentioned.

It should be emphasized that the above list, moving from indirect to direct applications of cloning techniques, has been made by pooling the interviews. Each of the possible applications has been mentioned by one, some, or all of the interviewees, but none of them has produced the list, and it should not be read as an expression of consensus among the interviewees about what they are trying to do. Rather, the various statements about goals and applications tend to dissolve any picture of scientists working to realise a common and well defined set of goals. Although sharing a belief in a few particular applications, they are engaged in many different, personal projects which are related to a variety of national and other contexts.

4.2 Questions for reflection and discussion

The interviews disclose an array of open questions for reflection and discussion. A set of these questions are of direct relevance to current European decision-making and regulation. They concern the brief list of short term goals and applications that seem to gather consensus among scientists as realistic and as warranted from a societal and ethical point of view. The questions for public and political deliberation are: To what extent are these applications realistic in a societal and economic context? Are they warranted? What side-effects might occur? Other, long term applications do not gather consensus among the interviewees. Again, the questions for public and political deliberation relate to aspects of realism, desirability and side-effects.

At a deeper level the interviews point to disagreement and open questions about the purposes of animal science and of husbandry and agriculture at large. These aspects remain outside the sphere of formal decision-making in so far as they cannot be solved by way of formal decisions. Nevertheless, they are highly relevant to public and political deliberation, because motives and purposes form the foundation of the development of technologies. They inform the direction of specific research projects that may result in specific goals and applications.

Thus, there is plenty of room for discussion, but it is a major challenge to EU authorities, to national authorities and to European civil society that the interviewees appear to be distinctly dismissive regarding the possibility of having a reasonable, public discussion on the cloning of farm animals. The dismissive attitude towards public discussion seems to be rooted in the assumption that questions about the research and its possible applications are technical rather than political. On that assumption, only scientists are qualified to take part in discussing them, and the contributions of other citizens would be distrusted as incompetent. This raises the question of what kind of steps might be taken in order to create conditions more favourable to the aim of a principled, public discussion on the use of cloning techniques as well as on other technological challenges.

5 Ethics and regulation

Farm animal cloning raises a range of ethical concerns about risks to human health and animal welfare, violation of animal integrity and continued commodification of nature just to name a few. The urgency of these concerns depends on several things: the ethical perspective the technology is being evaluated from; whether one is looking at the risks to humans or those to animals; whether one focuses on narrow risks to the physical health of humans and animals or broader risks to society or the way that we, as human beings, relate in general to animals.

It is these concerns that initially pose the question of whether farm animal cloning should be regulated. Regulation of technology can be seen (ideally) as a way of protecting the members of the ethical community (and who that is, is a discussion in itself) against the negative consequences and as a way of furthering the positive consequences. It should be remembered that it is very much contested just what should be seen as positive and negative consequences – and whether these consequences are realistic at all. Thus when figuring out if and how to regulate the technology, it is necessary to make an ethical evaluation of it

Depending on the ethical values that guide each of us through life, we will accept some of these potential benefits and risks and reject others, either because we believe that they are more or less likely to occur or because we find them more or less relevant. Some might put the emphasis on the expected benefits within human medicine. They might conclude that the expected reduction of human suffering justifies the animal pain and suffering that they acknowledge will be incurred. Others might find that the expected benefits are speculative, with the state of the technology taken into consideration. They might therefore decide that these claimed benefits do not outweigh the violation of animal integrity that cloning involves.

Within each combination of ethical perspectives and values, judgments will, of course, be made. These judgments can certainly be discussed. It will be possible to dismiss some, because they rest on obvious misinterpretations of the issue or factual errors; but others will not be so easily dismissed. Some of the remaining judgements are bound to be hard to reconcile with (and some will even flatly contradict) others. In ethics there is no guarantee of harmony and agreement, even when all aspects of an issue have been examined. Personal interpretations of the issues will inevitably differ and cause disagreement.

This also means that there is no clear-cut way to “use” ethics in the regulatory process. What ethics can do is make clear what values are expressed in the aims of the regulation. This contribution is, however, not unimportant. All regulation is focused on certain aims that can only be understood by pointing to the values that they express. Values that are ethical in the sense that they contain our visions of good and evil/ right and wrong. These values should be made explicit in the regulatory process to ensure the transparency of the regulation and the openness of the discussion. It is of course impossible to incorporate all values into the regulatory framework, since humans hold

mutually exclusive values. To some people animals are just meat factories that can be used for anything regardless of the consequences to the animals. To others animals are beings that deserve respect and cannot be used to further human ends, no matter what the purpose. But even these extremist views should be present in the discussion, in order to show the scope of possible views and to secure a voice also to those who hold minority views.

Too often attempts are made to make value decisions seem like rational, objective choices, thus building a false contradiction between facts and values. Facts are of course different from values when seen at a very basic level. It is not a value that the current technological level of farm animal cloning produces welfare problem for the cloned animals – that is a fact.[10] But how this fact is interpreted, what weight it is given in the overall evaluation of the technology and in the regulation of it, those are decisions based on values. Values that should be put forth and discussed openly.

Ethics should thus not be seen as a kind of hammer that can solve the problems of disagreements about value questions or the different interpretations of facts. Ethics is basically a flash-light that can enlighten the discussion by making the underlying values visible, thus ensuring the transparency of the regulatory process.

[10] The relationship between facts and values is one of the most contested in the ethical literature. For the purpose of the discussion in this report, it is not necessary to be familiar with this discussion, but it should be remembered that facts can be seen as experiences interpreted in a specific way based on certain values – and thus not as totally independent of human values.