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Lassen, Jesper

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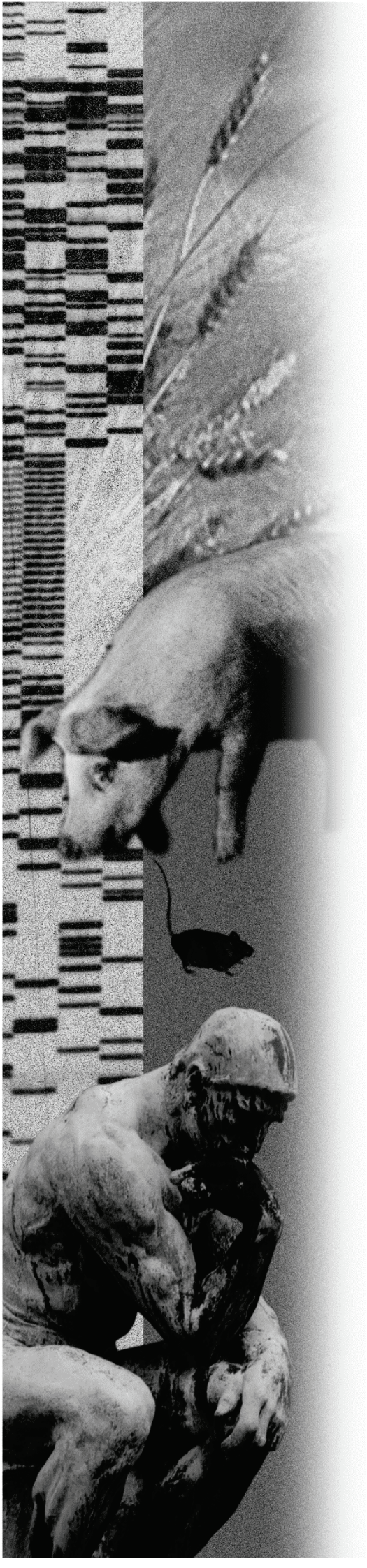

PROJECT REPORT 9

PUBLIC PERCEPTIONS OF FARM ANIMAL CLONING IN EUROPE

Jesper Lassen

DANISH CENTRE FOR BIOETHICS
AND RISK ASSESSMENT

PUBLIC PERCEPTIONS OF FARM ANIMAL CLONING IN EUROPE

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

Jesper Lassen

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Report editors: Geir Tveit & Peter Sandøe

Danish Centre for Bioethics and Risk Assessment
Rolighedsvej 25
DK - 1958 Frederiksberg C

Public perceptions of farm animal cloning in Europe

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Coordinator: Danish Centre for Bioethics and Risk Assessment (CeBRA)
http://www.bioethics.kvl.dk

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0. Executive summary

This report presents a picture of European opinion on farm animal cloning. In this report, as in the other publications arising from the project Cloning in Public, both agricultural and biomedical applications of farm animal cloning are considered. With the arrival of Dolly, animal cloning became an integral part of the biotech debate, but this debate did not isolate animal cloning as a single issue.

The report suggests that two scales are important in European attitudes to animal cloning. The first is scale of the organism: animal cloning address higher organisms, it evokes thus more concern. The second is the scale of application: medical applications generally are regarded as more acceptable than food applications. These scales suggest that farm animal cloning in the food area will be regarded with deep scepticism by the public, while applications with a medical purpose will be regarded as more acceptable, depending among other things on the purpose and the animals involved.

However, it should be borne in mind that our existing knowledge of European perceptions of farm animal cloning is somewhat limited owing to a lack of qualitative and quantitative studies focusing on this specific issue.

1. Introduction

This report is the fourth 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 report presents a picture of European opinion on farm animal cloning. The report reviews existing quantitative and qualitative studies of public perceptions of biotechnology. It looks at the few studies covering farm animal cloning, and places them within the context of animal biotechnology. Eurobarometer surveys are by far and away the most important source of quantitative data on public perceptions of biotechnology in Europe.

In the report, 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 in every case that the animal is kept or used in an agricultural setting or for agricultural purposes. Thus, the potential use of a cloned farm animal species may be in medicine (see: Danish Centre for Bioethics and Risk Assessment (CeBRA) (2005)).

This report forms the basis of a second *ethical* report containing an assessment of attitudes and concerns affecting perceptions of risk, benefit, and moral acceptability, and an examination of ways to balance these concerns, and to describe the values that underlie them. The second ethical report will analyse and discuss concerns relating to human health and the environment, animal welfare problems, animal integrity, and the relationship between science, technology, commercial interests and society in the light of the perceived usefulness of farm animal cloning.

CLONING IN PUBLIC materials on the scientific, legal and ethical aspects of farm animal cloning are publicly available. All project reports, as well a list of the project's deliverables, presentations, work plans and workshops are available at the project website: www.bioethics.kvl.dk/cloninginpublic.htm

The main objectives of CLONING IN PUBLIC are: (a) to develop recommendations on the preparation of 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 involving key stakeholders, university students and members of the public. These two aims are of equal importance. 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, long-term aim of improving communication between science, civil society and European authorities at different levels, and hence facilitating discussion of European public affairs connected with science and technology.

This report has been prepared by Dr. Jesper Lassen, Department of Human Nutrition/the Danish Centre for Bioethics and Risk Assessment (CeBRA) at the Royal Veterinary and Agricultural University, Copenhagen, Denmark.

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The picture on the front page of this report was downloaded from the Roslin Institute Image Library: http://www.roslin.ac.uk/imagelibrary/.

2. Public debate about animal biotechnology

It is fair to say that the development and use of (farm) animal cloning was 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 micro organisms, plants and to lesser extent transgenic animals. (For an overview of the debate in Europe, see Gaskell and Bauer, 2005; Durant et al., 1998.) From a strictly technical point of view, the relative absence of animal cloning as an issue is somewhat surprising, since cloning and other new biotechnologies, such as transgenic animals, are interconnected technologies, and since cloning can in some cases be a helpful tool in producing genetically modified animals.

This picture changed, however, dramatically and almost overnight, in 1997, as the birth of the cloned Dorset ewe Dolly was announced. As has been noticed, a number of cloning experiments had taken place in the years preceding Dolly's arrival; none of these, however, made their way into the media spotlight on a scale comparable with Dolly (Einsiedel *et al*. 2002).[1] What helped to make Dolly breaking news – and the first global biotechnology event ever – was the fact that she was the first result of somatic cloning: that is, she was produced from a body cell from an adult sheep, and not, as earlier animal clones had been, on embryos or embryonic cells.

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 was an integral part of the biotechnology debate. This debate has, like most debates, not isolated animal cloning as a single issue, but discussed it within various contexts and with reference to a variety of other debates – including human cloning, therapeutic cloning, transgenic animals, research animals and xenotransplantation. The following chapter aims to present a picture of European opinion on farm animal cloning.

[1] See also the first Technical Report from the CLONING IN PUBLIC project: *The science and technology of farm animal cloning* available at http://www.sl.kvl.dk/cloninginpublic/

3. Public opinion on farm animal cloning in Europe: sources of information.

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. Knowledge about public perceptions in this area also varies both geographically, since the number of studies differs from country to country, and historically, since the studies do not cover the development of opinions over lengthy periods of time.

Given the limited published research, a review of public opinion confined to the targeted studies would be imperfect in many ways. However, broadening the scope to include other animal-related applications of biotechnology will not only help fill in the knowledge gaps, but also provide a helpful, context in which to understand concerns about farm animal cloning. Thus this report will examine the small number of studies of farm animal cloning, and place them within the context of animal biotechnology. The sources of scientifically reliable information about public opinion on animal biotechnology can be divided into qualitative and quantitative studies.

This approach will also help with another problem with any attempt to uncover public perceptions of animal cloning: namely, that cloning always exists in a context. Animal cloning is, by and large, a 'stand-alone' technology only at the basic research level, where the focus is on developing the technique itself. In most other arenas, animal cloning operates within the context of its application. Potential applications are reportedly in food production, molecular pharming, xenotransplantation, the pet sector, sporting animals, protection of endangered species and so on. For an assessment of the relevance of farm animal cloning to these applications, see Danish Centre for Bioethics and Risk Assessment (CeBRA) (2005). In any attempt to uncover public perceptions of animal cloning, the problem often is that these other areas of biotechnology, such as laboratory animals, transgenic animals or xenotransplantation are themselves are controversial. It can be extremely hard to say to what extent this affects the perception of cloning.

Our knowledge of public perceptions derives from two different types of study. *Quantitative studies*, such as surveys, display data on the distribution of perceptions in a population based on representative samples. In addition, quantitative studies can – when the same design is repeated over the years – describe developments in opinion. While the strength of quantitative studies lies in their ability to characterise opinions in a population, and to show how opinions about different issues relate to each other or to demographic characteristics, their weakness lies in their inability to account for in-depth knowledge of the arguments behind the different opinions.

Eurobarometer surveys are by far and away the most important source of quantitative information on public perceptions of biotechnology in Europe. Since 1989 these surveys have been carried out within the frameworks set by the EU Commission at three year intervals. The most recent survey was conducted in 2002. The surveys cover a population of 1000 persons in each EU country. Since 1996 a number of non-EU countries have been included. The

Eurobarometers have, over time, incorporated various questions addressing issues related to animal biotechnology. However, few of these questions is included in more than one Eurobarometer, so the surveys cannot be used to describe developments in attitude over the relevant years. In addition to the Eurobarometer surveys, a number of national surveys have been carried out in EU member states. The quantitative data drawn upon in the following review will, however, chiefly is drawn from Eurobarometers.

Secondly, *qualitative studies* complement quantitative studies by offering in-depth information about the nature of public opinion – e.g. information about prominent kinds of argumentation and discourse. The methods used in these studies are different forms of interview. Often focus groups are set up, where a small group of interviewees (most often 6-10) is guided through a structured discussion. Due to the relatively small population of respondents in qualitative studies, such studies suffer from a lack of statistical representativity. Hence a combination of qualitative and quantitative data will often provide the best picture of public opinion.

Most qualitative studies of public perceptions of biotechnology cover only one or a few countries. A few studies do, however, include four or more countries. One study covers 10 European countries, and was carried out as a follow-up study to the 1999 Eurobarometer (Gaskell and Bauer, 2005). Another includes five European countries (Marris *et al*. 2001). The qualitative side of the following review will be based on these later studies as well other studies conducted in single countries.

The reader is reminded that the differing nature of the knowledge produced by different methods means that, while survey results sometimes appear homogeneous across countries (e.g. the majority of lay people in most countries are sceptical about GM foods), qualitative studies may reveal that the thinking, or argumentation, behind this scepticism depends very much on the national or local context – as it has been suggested in relation to national debates following the arrival of GM soy in Europe in 1996 (Lassen *et al*. 2002a). Hence the findings of qualitative studies may be difficult to generalise from country to country, despite apparently similar quantitative profiles.

4. Europeans and farm animal cloning

Although there is no simple solution to the problem that cloning always operates in a context, the few studies that explicitly cover animal cloning tend to connect animal cloning with its outcomes and isolate it from associated technologies. This happened in the 1999 Eurobarometer, in which a battery of questions was designed to uncover perceptions of different applications. One of the applications to be considered was "*Cloning animals such as sheep to get milk which can be used to make medicines and vaccines*". Here the outcome/ product (milk with medicine/ vaccines) is included, but it is not mentioned that this outcome also depends on the development of transgenic sheep.

Such questions, comparing different biotechnologies, have been included in all Eurobarometers since 1996. The choice of applications asked about varies, however, from survey to survey (see Table 1). In this battery of questions the respondents are asked to state to what extent they found the different applications useful for society; risky for society; and morally acceptable; and to what extent the applications should be encouraged. Despite the variation in the included applications, the questions offer an opportunity to characterise the judgement of different types of biotechnology over time. Furthermore, since different applications involving animals are included in all three surveys, the surveys enable some of animal-related applications to be compared.

Table 1 shows the extent to which different applications should be encouraged according to the Eurobarometers in 1996, 1999 and 2002. If the desire to encourage is taken as an indication of the level of support of the different applications, some general conclusions can be drawn. It emerges, *secondly*, in Table 1 that some medical applications score low or very low on the support scale. It is characteristic that these applications (items 6, 7 and 9) are the only medical applications that also involve animals, whereas the others (to the extent that they mention the manipulated object) involve plants, micro organisms and even human cells. This seems to indicate that the mere involvement of animals makes an application questionable, despite the fact that it belongs to the generally approved medical area.

Table 1. Mean scores in the judgement of the extent to which different applications of biotechnology should be encouraged in the 15 EU countries.

	Now let's talk about using modern biotechnology in the production of foods, for example to make them higher in protein, keep longer or change the taste. From now on I am going to call this GM food, that is genetically modified food. Please tell me whether you strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree or strongly disagree with each of the following statements?	"Should be encouraged" Mean score in 15 EU countries -2= negative +2=positive attitude		
		2002 a)	1999 b)	1996 c)
1	Using genetic testing to detect diseases we might have inherited from our parents such as cystic fibrosis, mucoviscidosis or thalassaemia	0,69	0,67	0,91
2	Introducing human genes into bacteria to produce medicines or vaccines, for example to produce insulin for diabetics	na	0,51	0,81
3	Developing genetically modified bacteria to clean up slicks of oil or dangerous chemicals	na	0,51	na
4	Cloning human cells or tissues to replace a patient's diseased cells that are not functioning properly, for example, in Parkinson's disease or forms of diabetes or heart disease	0,49	0,33	na
5	Using genetically modified organisms to produce enzymes as additives to soaps and detergents that are less damaging to the environment	0,23	na	na
6	Developing genetically modified animals for laboratory research studies, such as a mouse with genes that cause it to develop cancer	na	na	0,22
7	Introducing human genes into animals to produce organs for human transplants, such as into pigs for human heart transplants	0,13	na	-0,22
8	Taking genes from plant species and transferring them into crop plants, to make them more resistant to insect pests	0,08	0,03	0,34
9	Cloning animals such as sheep to get milk which can be used to make medicines and vaccines	na	-0,17	na
10	Use modern biotechnology in the production of foods, for example to make them higher in protein, keep longer or improve the taste	-0,26	-0,31	-0,11

REFERENCES: a) European Commission (2002) *Eurobarometer 58.0* (The data set). ; b) INRA (Europe) (2000) *Eurobarometre 52.1.* (The data set) c) Durant, J., Bauer, M.W. & Gaskell, G. (eds.) (1998): Biotechnology in the public sphere – a European sourcebook. Science Museum. London.

NOTE: "na" in the table indicates that this question was not included in this Eurobarometer.

Similar findings have been made in quantitative studies in Spain and the US. These findings show a scale of acceptability with manipulation of plants as the most acceptable, followed by bacteria, animals, human somatic cells and human embryos as the least acceptable (Lujan and Moreno 1994). The notion that transgenic animals evoke particular unease is supported in qualitative studies carried out in the UK (Macnaghten 2001), where focus group participants, with few exceptions, reacted negatively to a list of applications involving transgenic animals.[2] The negative reaction here was found to be based on arguments about issues such as unnaturalness; need/usefulness; unforeseen effects; and lack of respect for nature. A psychometric study of perceptions of gene technology on plants, animals and humans in Japan showed the same pattern (Tanaka 2004).

Returning to the Eurobarometer data, it should be noted that the only animal application explicitly mentioning cloning (item 9 in table 1*: Cloning animals such as sheep to get milk which can be used to make medicines and vaccines*) is the second least supported application – surpassed only by GM foods. This seems to indicate that cloning is a particularly controversial technology. However, the scepticism may reflect not only the above-mentioned 'animal-factor', but also the historical context of the late 1990s. Hence there is a clear resemblance between the application asked about and the, at that time, well known and in many countries alarming, arrival of Dolly the sheep. The low score may thus partly reflect generally negative discourse about Dolly in particular and cloning in general that prevailed in many EU countries in the late 1990s.

Thirdly, statistical analysis of the relation between the desire to encourage an application and its perceived risk, usefulness and moral acceptability, show that moral assessment is the most important factor behind the level of support. This was interpreted as a moral veto: *"First usefulness is a precondition of support; second, people seem prepared to accept some risk as long as there is a perception of usefulness and no moral concern; but third and crucially, moral doubts act as a veto irrespective of people's views on use and risk"* (Wagner *et al*. 1997). Although the analysis of Eurobarometers suggests the existence of a moral veto, the Eurobarometers offer little help when it comes to breaking down what the respondents actually mean when they respond to the question whether an application is morally acceptable or not.

An indication of some aspects of moral concern and perceived usefulness in relation to animals emerges from the 1999 survey, which included a series of questions about *"cloning animals, for instance to get milk which can be used to make medicines and vaccines"*. It should be noted that, once again, the focus of the Eurobarometer is only on medically related cloning, and that farm animal cloning for food purposes is excluded. First of all, the generally negative attitude to animal cloning is reconfirmed: almost two in three respondents agree to some extent that cloning of animals is a dreadful idea (see Table 2). An analysis of the group

[2] The stimuli for this section of the study did not mention animal cloning, but included the following eight examples: "Cows that produce milk with lower cholesterol and enhanced nutrients. Faster growing farm animals and faster growing fish. Farm animals with reduced sentience to make them less distressed by farm conditions. Cats that do not cause human allergies. Cats that have their hunting instinct reduced/ removed. Mosquitoes that cannot transmit parasitic diseases such as malaria which are breed to replace, at least locally, wild populations. Sheep or cows that make pharmaceutical products in their milk. Pigs that are breed to produce organs, such as hearts, that can be xenotransplanted into humans." (Macnaghten 2001)

of respondents found to be most supportive of biotechnology revealed that even this group was sceptical about the cloning of animals. Thus 64% of the supporters believed that cloning threatened the natural order; 72% that even though there are benefits cloning is unnatural; and 48% of supporters thought that cloning poses a risk to future generations (Gaskell *et al*. 2000). In addition, and not surprisingly, the most recent Eurobarometer on Social Values, Science and Technology (European Commission, 2005) shows that support for medical cloning is a little higher among those who believe we have the right to exploit nature; and similarly, a little lower among those who do not agree with this.[3] So 36% of those who disagree that we have the right to exploit nature also say that we could never allow medical cloning. This compares with an EU average of 31%. In all 12% of those who agree that we have the right to exploit nature also say that medical cloning is acceptable in all circumstances. This compares with an EU average of 8%.

There is little doubt that concerns about unnaturalness are an important aspect of the moral category in the Eurobarometers. Indeed a number of qualitative studies have stressed the importance of perceived unnaturalness in trying to understand public concerns (e.g.: Macnaghten, 2001; Madsen *et al*., 2002; Marris *et al*., 2001; Wagner *et al*., 2001; Grove-White *et al*., 1997). Modern biotechnology seems to cross an invisible border between natural and unnatural. According to some of these studies, it is recognised that, for example, modern farming too is unnatural; modern biotechnology, however, adds some qualitatively new features, such as crossing barriers between species and speeding up natural processes, that make it particularly unnatural. Although none of these qualitative studies explicitly mentions, let alone addresses, the cloning of farm animals, it is likely that what makes this technology unnatural in the eyes of the public is the fact that it bypasses sexual reproduction.

Although animal welfare is generally known to be an issue of importance in many European countries, the issue has played a surprisingly limited role in debates about the new biotechnologies. These debates have addressed mainly physical harm (e.g. increased occurrence of mastitis due to the use of BST) and questions of integrity. Integrity and dignity are important components of the morally based rejection of GM animals found in qualitative studies (e.g. Lassen *et al*. 2005; Macnaghten 2001). Concerns in this category include 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. Again, cloning is not reported as a single issue, but it is reasonable to assume that, in connection with animal cloning, this would translate into a concern about the act of cloning depriving an animal of features of its intrinsic character, such as uniqueness.

When it comes to usefulness (items 2 & 3 in table 2), 60% to some extent support the statement that cloning *"is simply not necessary"*. One explanation of this negative evaluation could be a low expectation of benefits to be brought by the technology: thus only 24% believe to some extent that cloning will bring benefits to a lot of people. This finding is a little surprising, since cloning here is talked about as a means of producing medicines and vac-

[3] The wording of the two claims the respondents were asked to tell to what extent they approved of was*: "Cloning animals such as monkeys or pigs for research into human diseases"* (options: In all circumstances; Only if it is highly regulated; Only in exceptional circumstances; Never) and *" Right to exploit nature for the sake of human well-being"* (options: Agree; Disagree)

cines. When gene technology in general is framed in this way, it is normally associated with relatively high levels of perceived usefulness.

The question of perceived usefulness, however, is not a simple one. Qualitative studies have suggested that people operate with rather different understandings of usefulness when they consider genetic engineering; and furthermore, that the context needs to be taken into consideration. The PABE study (Public Perceptions of Agricultural Biotechnologies in Europe) employing focus groups in five countries (I, UK, F, D & E) found that participants distinguished between need in medical biotechnology and need in the food area (Marris *et al*., 2001). The generally accepted medical applications were talked about as means to solve problems where no other available alternatives exist, and thus seen as useful. By contrast GM food was not seen as needed because food, in the developed world is available. Furthermore there are alternatives to GM foods as a means to alleviate hunger in the third world, namely relocation of some the surplus in rich countries. Similarly a study in Denmark (Lassen *et al*., in press; Lassen and Jamison, in press) revealed a distinction between societal usefulness, self-interested usefulness (i.e. benefit to the individual) and economic usefulness (i.e. technical and financial usefulness to business). This study found that GM animals can be legitimised if they fulfil a societal need. However, participants were divided in their understanding of societal need: some saw, for example, obesity as a self-inflicted problem and hence not as a suitable argument for GM animals (in the presented case GM rats to be used in obesity research). Others argued that obesity is comparable to deceases and/ or presents a societal problem of a scale making it a good argument in favour of gene technology.

Table 2. Judgements about animal cloning in the 15 EU membership countries in 1999.

Item no.	*"Now let's talk about cloning animals, for instance to get milk which can be used to make medicines and vaccines. From now on I am going to call this cloning. Please tell me whether you strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree or strongly disagree with each of the following statements?"*	%					
		strongly agree	somewhat agree	neither agree nor disagree	somewhat disagree	strongly disagree	Dont know
1	I dread the idea of cloning animals	35	26	16	12	7	5
2	Cloning animals will bring benefits to a lot of people	6	18	19	22	24	11
3	Cloning animals is simply not necessary	36	24	16	11	4	9
4	Cloning animals threatens the natural order of things	44	30	11	6	3	6
5	Even if cloning animals has benefits it is fundamentally unnatural	51	26	9	5	3	6
6	The risks from cloning animals are acceptable	4	13	16	25	30	12
7	If anything went wrong with cloning animals, it would be a worldwide catastrophe	33	25	15	11	4	13
8	Cloning animals poses no danger for future generations	4	9	16	24	31	16
9	Deciding on the issue of cloning animals is so complex that public consultation about it is a waste of time	12	18	16	20	24	10
10	If the majority of people were in favour of cloning animals, then it should be allowed	7	17	18	22	28	9
11	Even if it means missing out on some of its benefits, cloning should be introduced more gradually	13	25	19	12	18	12
12	Whatever the risks from cloning animals, you can avoid them if you really want to	15	22	17	13	14	20
13	Of all the risks we face these days, the risk from cloning animals is quite small	6	20	20	21	18	14

REFERENCE: INRA (Europe) (2000) *Eurobarometre 52.1.* (The data set)

The relatively low levels of perceived usefulness (Table 2, item 3: "*Cloning animals is simply not necessary*") found in the Eurobarometer may reflect the fact that animal cloning, although presented within the medical area, is not seen as a unique technique, but is rather looked upon as an alternative to existing means of medical production.[4] 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. This might have been the case, for example, if the respondent or a close relative the respondent, was seriously ill. Such threats might lead people to leave concerns about xenotransplantation behind in order to "outwit death" (Sanner 2001). Similarly, the absence of alternatives generally affects judgements about usefulness, as has been confirmed in qualitative studies of xenotransplantation. In 2004, a review of 35 qualitative studies covering 23 countries (Hagelin 2004) concluded that if xenotransplantation was the only choice (i.e. only alternative), the proportion of acceptance increased.

[4] Note that the wording of the question present cloning neutrally, and not as a unique technology.

5. Farm animal cloning and the US public.

The American public has a more positive perception of biotechnology than the European public. A survey, conducted by Texas A&M University, which is in many ways equivalent to the 1999 Eurobarometer, revealed that some 52% of the US public held the optimistic view that genetic engineering "would improve the quality of life" (Eyck et al 2001). The comparable figure for Europe was 41%. These high expectations in the US are confirmed in a time-series study conducted by International Food Information Council (IFIC 2005). This shows that, since 1999, between 59% and 64% were of the opinion that biotechnology would provide them benefits within a five-year timeframe. It should, however, be noted that these relatively high expectations had decreased from 78% in 1997.

However, the IFIC survey also shows that the US public is somewhat reluctant to use animal biotechnology in agriculture: in 2005 27% found it favourable; 32% not favourable; 10% neither favourable nor unfavourable; and 30% were not able to form an opinion about the issue. This kind of hesitation about animal biotechnology is reflected in US opinion about the cloning of animals in general: in 2005 74% found this unfavourable and only 15% found it favourable (10% answered "neither nor" and 2% "don't know"). In a follow-up question, respondents were asked how likely they were to buy food products from cloned animals if it was determined by the Food and Drug Administration (FDA) that they were safe to eat. Two-thirds (64%) stated that they were unlikely to buy such products, and just one-third (34%) said that they would be likely to do so. These figures seem to mirror the situation in Europe. They suggest that that rejection is not based primarily on safety risks. This suggestion receives support from statistical analysis of the data from the Texas A&M University survey in 1999. This analysis reveals that in the US moral acceptability is a better predictor of encouragement that risk or usefulness (Eyck et al 2001).

6. Concluding remarks

In general, it can be concluded that our knowledge of public perceptions of animal cloning is surprisingly limited. Going by the debate following the arrival of Dolly, one would have expected work on society and 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. 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, and 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 GM animals and GM foods. On the other hand, however, with applications of cloning for medical purposes, public judgement is much less predictable, since it largely will depend on the existence of alternatives, and on 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 will be rejected; whereas applications that represent an opportunity to produce a new medicine or novel type of therapy will greeted more positively.

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