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Ethical Issues in Animal Cloning

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Abstract

The issue of human reproductive cloning has recently received a great deal attention in public discourse. Bioethicists, policy makers, and the media have been quick to identify the key ethical issues involved in human reproductive cloning and to argue, almost unanimously, for an international ban on such attempts. Meanwhile, scientists have proceeded with extensive research agendas in the cloning of animals. Despite this research, there has been little public discussion of the ethical issues raised by animal cloning projects. Polling data show that the public is decidedly against the cloning of animals. To understand the public's reaction and fill the void of reasoned debate about the issue,we need to review the possible objections to animal cloning and assess the merits of the anti–animal cloning stance. Some objections to animal cloning (e.g., the impact of cloning on the population of unwanted animals) can be easily addressed, while others (e.g., the health of cloned animals) require more serious attention by the public and policy makers.

Disciplines

Bioethics and Medical Ethics

Comments

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ABSTRACT The issue of human reproductive cloning has recently received a great deal attention in public discourse. Bioethicists, policy makers, and the media have been quick to identify the key ethical issues involved in human reproductive cloning and to argue, almost unanimously, for an international ban on such attempts. Meanwhile, scientists have proceeded with extensive research agendas in the cloning of animals. Despite this research, there has been little public discussion of the ethical issues raised by animal cloning projects. Polling data show that the public is decidedly against the cloning of animals. To understand the public's reaction and fill the void of reasoned debate about the issue, we need to review the possible objections to animal cloning and assess the merits of the anti–animal cloning stance. Some objections to animal cloning (e.g., the impact of cloning on the population of unwanted animals) can be easily addressed, while others (e.g., the health of cloned animals) require more serious attention by the public and policy makers.

What in 1996 was considered a remarkable feat—the cloning of Dolly the Sheep—is today becoming almost commonplace. To date, scientists have successfully cloned many other species, including a cat, horse, gaur, rabbit, deer, chickens, cows, mice, goats, pigs, mules, and, most recently, a rat. In the works are projects to clone primates, dogs, and a host of endangered species. Despite all of this scientific research, there has been little public discourse on the many ethical issues raised by animal cloning projects. While it is not unusual for

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scientific innovation to proceed ahead of ethical reflection, what makes the absence of public debate on this issue odd is the decidedly negative view of animal cloning held by the majority of Americans. Polling data show a full 64% of Americans believe that animal cloning is morally wrong, yet there is almost no public discussion of this science and no demand for tighter regulations or governmental control over it (Saad 2004). In the absence of such discourse, it is impossible to know whether the public is making an informed decision about this form of animal biotechnology or whether objection to animal cloning represents a knee-jerk reaction to something foreign and unknown.

One explanation for the relative neglect of this issue is that, as a society, we have not resolved even the most basic questions about the status of animals and their proper treatment. Even questions that appeared to be settled in the past are now being revisited, such as the moral permissibility of using animals in medical research. (A recent Gallup poll found that 32% of Americans believe it is morally wrong to do medical testing on animals [Saad 2004].) These new advances in biotechnology not only magnify those existing issues but introduce a whole new set of ethical questions as well. To advance this discussion, we need to review the possible objections to animal cloning and assess the merits of the anti-cloning stance. Some arguments that can be made against animal cloning can be easily refuted, while other arguments constitute serious objections to cloning science that require more public reflection and debate.

THE STATE OF ANIMAL CLONING SCIENCE

The progress in animal cloning science has been exponential. The first successful attempt at cloning was made by scientists at the Roslin Institute in Scotland in 1995, when they cloned two lambs, Megan and Morag. The lambs were cloned from cells from an early embryo. A year later, the same scientists cloned Dolly, this time beginning with a cell of an adult sheep. In the last eight years, scientists have not only cloned other species, but they have advanced the science of cloning to now include genetic modifications that serve particular pharmaceutical or agricultural purposes. One type of modification is the production of transgenic animals, animals that have genetic material from another species spliced into their genome. For example, sheep have been engineered to secrete a human protein, Factor IX, that aids in blood clotting; scientists are attempting to manufacture this protein through the sheep's milk as a treatment for people with hemophilia (Schnieke 1997). Likewise, transgenic sheep are being produced to express human alpha-1-antitrypsin with the intention of treating alpha-1-antitrypsin deficiency, which leads to emphysema (GSK 2003; McCreath 2000). Another goal of cloning research is the production of genetically modified animal organs engineered to be compatible with a human recipient. Korean scientists have launched a cloning project to create pigs with genetically altered hearts (Dow Jones Newswires 2004). Agricultural researchers have similar projects underway:

the cloning of animals with genes that make their milk or meat healthier for consumers, or the cloning of animals that are disease-resistant or reduce the environmental burden. Scientists are working on cloning goats with less fatty milk, chickens with no feathers to reduce the environmental costs of poultry farming, and pigs whose manure has less phosphorus and helps reduce environmental pollution (Thomas 2003). At Texas A&M University, scientists have cloned cows resistant to brucellosis (Phillips 2002).

Animal cloning may also soon play a role in American sports. Now that deer have been successfully cloned, researchers at Texas A&M are attempting to clone bucks with larger antlers, which will be attractive to hunters (AgBiotechNet 2003). Once perfected, cloning techniques could conceivably be used to clone animals used in any competitive sport, like race horsing.

Most animal cloning projects, though not all, are aimed solely at human ends, such as the treatment of diseases, better food production, or entertainment. But some animal cloning projects are motivated by regard or concern for animals as ends in themselves. For example, many current projects are aimed at cloning endangered or even extinct species. A gaur—a type of wild ox on the verge of extinction—was cloned in 2001 but died in infancy, apparently from dysentery unrelated to the cloning process (BBC 2004). There are projects in progress to clone the extinct thylacine, Asian cheetah, and wooly mammoth (AgBiotechNet 2001). One of the most famous cloning projects, the Missyplicity Project, was created to clone a beloved dog who had died; a dog was found to be too difficult to clone, but this project eventually resulted in "CC" the calico cat (Texas A&M University 2002). Other cloning projects seek to create disease-resistant animals, which could lead to healthier animal lives and greater animal welfare.

THE ETHICAL ISSUES IN ANIMAL CLONING

Given the diverse motivations and types of animal cloning, the ethical terrain is complex. In summary, animal cloning raises two types of moral problems: it may have negative consequences to animals, human beings, or the environment; and it may violate important moral prohibitions or principles.

The first set of problems raised by animal cloning are "consequentialist" in nature and focus on the possible untoward outcomes that may result from this science (Rollin 1981; Singer 1975). The negative consequences to animals can be both narrowly and broadly construed. Narrowly construed, focusing on animals involved in cloning procedures, the most serious consequence is the pain and suffering they experience in the cloning process. More broadly construed, the negative consequences to animals include the deleterious effects of cloning on other populations of animals, such as livestock, unwanted pets, or endangered species. Human beings may be adversely affected by animal cloning either through the slippery slope of perfecting reproductive cloning techniques on animals and then applying them to human reproductive cloning, or by compromis-

ing the safety of the livestock used in food production. In both the areas of agricultural cloning and cloning for conservation, cloned animals may have a serious impact on the environment, either by breeding with non-clones or due to some unforeseen expression of a gene that has ramifications for the larger ecosystem. Each of these negative consequences will be discussed in turn.

Animal cloning might also be criticized on deontological grounds (Regan 1983). Here there are ethical concerns about "playing God," the intrinsic value of the animals, and the objectification and commodification of animals. In the area of pet cloning, there is the potential for false promises: grieving pet owners may be misled into believing that cloning will resurrect their beloved pet, and they may commit to storing their pet's DNA without understanding the true costs of cloning when the technique becomes commercially available. All of these are ethically salient issues, some addressing the moral permissibility of the science itself and others addressing issues that arise from the way in which the science is conducted or commercialized.[1]

Consequence-Based Arguments Against Animal Cloning

Perhaps the most compelling argument against animal cloning is the very real suffering endured by animals involved in this science. There are four areas of concern with regard to the pain and suffering animals experience due to animal cloning: the suffering animals undergo during cloning procedures; the obstetrical complications that occur in the surrogate animal; the health of cloned animals; and the suffering animals will be forced to endure if cloned to exhibit, for research purposes, or for certain diseases and pathologies.

Recent data on the success rates of cloning procedures and the health and survival statistics of animal clones present a fairly grim picture. There is a large body of literature citing high rates of miscarriage, stillbirth, early death, genetic abnormalities, and chronic diseases among cloned animals. These problems occur against a backdrop of what in cloning science has been called "efficiency," the term used to talk about the percentage of live offspring from the number of transferred embryos. The efficiency of animal cloning has typically been about 1 to 2%, so for every 100 embryos that are implanted in surrogate animals, about 98 of the embryos fail to produce a live animal offspring (Coleman 1999; Paterson 2003). Even when efficiency rates are at their best, the overwhelming majority of attempts fail. One study explicitly touting a "highly efficient" method for cloning pigs claims efficiency rates of only 5 to 12% (Walker 2002). This is still a failure rate of between 88 and 95%. These numbers have serious

[1]Some may object to the inclusion of certain issues under the rubric of "ethical" (as opposed to legal or religious). I argue that it is in our best interest to cast as broad a net as possible when trying to flesh out the ethical issues of a new area, and that hairsplitting about which normative domain the issue really belongs to can lead us to overlook issues that ought to be decisive in helping us navigate this moral terrain.

consequences for both the donor and surrogate being impregnated: surgery must be used to remove the donor animal's eggs and then another surgical technique used to implant the embryos into the surrogate. In the least "efficient" processes, for every one or two live cloned offspring, 100 eggs must be harvested and 100 embryos implanted. For unknown reasons, cloned fetuses often exhibit a high birthweight, frequently necessitating a C-section delivery, again causing pain and suffering to the surrogate animal.

Of the live clones born, many experience compromised health status or early death. In one study of cloned pigs, researchers reported a 50% mortality rate for the live offspring, with five out of 10 dying between three and 130 days of age from ailments including chronic diarrhea, congestive heart failure, and decreased growth rate (Carter 2002). In some studies, cloned mice experienced early death due to liver failure and lung problems (Ogonuki 2002). In others, they had a high tendency to develop morbid obesity (Tamashiro 2002).

These adverse effects on the animals involved in cloning procedures have prompted national animal welfare organizations to take a strong stance against animal cloning. The U.S. Humane Society (HSUS), for example, has requested a ban on products coming from cloned animals or their offspring. Michael Appleby, the HSUS vice president for farm animals, argues that the animal welfare problems that already exist in factory farming will be exacerbated with the new biotechnology, for example, disease vulnerability. He argues: "Already animals are suffering from maladies at a rate unheard of before we applied biotechnology to the barnyard. It would be disastrously premature to put this technology into commercial practice" (HSUS 2002).

Proponents of animal cloning argue that efficiency rates are constantly improving, and other studies show much better health outcomes for the cloned animals. One study on the health of cloned cattle reported normal growth rates of the cloned offspring and concluded that the surviving clones in this study were healthy two years after birth (Pace 2002). A closer look at the findings, however, shows that there were only 106 live births for 2,170 implanted embryos, and of the 106 live offspring born, 24 of the calves died soon after birth; 11 of these 24 had severe physiological abnormalities, including digestive abnormalities, skeletal problems, deformities in the urinary track, or respiratory failure. A meta-review of the health status of clones reported that 77% of cloned animals showed no developmental abnormalities throughout the period of follow-up, though the percentage of healthy clones ranged across studies from 20 to 100% (Cibelli 2002). Given the current stage of development of cloning science, even the highest efficiency rates and best health outcomes entail a significant cost in animal welfare.

That said, proponents of animal cloning make two compelling arguments: first, any criticism of the pain and suffering involved in animal cloning must be made against a backdrop of standard practices involving animals, such as research, companion animal breeding, or agriculture, which also involve a great deal of suf-

fering; and second, the net good of animal cloning science must be weighed against the pain and suffering of animals if the analysis is to be truly "consequentialist" in approach. On the first point—that animal pain and suffering due to cloning may be indistinguishable from animal pain and suffering in other traditional areas of animal use—proponents argue that cloners and cloning science should not be held to a higher standard of preserving animal welfare than is the current practice in the various areas of animal use. On this argument, proponents appeal to the fact that currently animals are eaten, hunted, experimented on, and confined. Whatever the standards are for humane treatment of animals in the different arenas in which they figure in modern life—agricultural, research, sport, etc.—those must be the same standards, and no higher, that govern the realm of animal cloning. Mark Greene (2002) calls this the "Accepted Practice Standard." Animal cloning science ought not to be condemned for causing animals pain and suffering if that same level of pain and suffering is morally permissible in areas outside biotechnology research. By extension of this argument, we ought not to selectively condemn cloning researchers for cloning animals destined to live their whole lives in cages if we accept that other research or agricultural animals fare no better. Of course, the assumption in the proponents' argument is that those practices are morally acceptable: if those traditional practices are morally acceptable, and animal cloning represents no significant increase in suffering over the benchmark set by them, then animal cloning would indeed be morally acceptable, at least with regard to the moral criterion of pain and suffering. But if the pain and suffering involved in traditional breeding, factory farming, or medical and pharmaceutical research is morally unacceptable, then animal cloning is as morally suspect as those practices (though, arguably, no worse than those practices). This is not a question that can be settled here because we no longer have societal consensus about the moral legitimacy of those other practices. Factory farming, for example, has come under a great deal of criticism in recent years with many mainstream groups calling for significant reform. What can be said with certainty is that a critique of animal cloning on these grounds has much larger implications for animal use and treatment, and the argument cannot be confined to animal biotechnology, such as cloning or transgenesis.

On the proponents' second rejoinder—that a consequentialist analysis must involve a balancing of means and ends—it is already clear that the potential benefits of animal cloning to human medicine, food production, pharmaceutical applications, and even to animal species themselves are enormous. Given our current ambivalence (or confusion) about the moral status of animals, it seems reasonable to argue that if the cost to research animals is small enough and the gain for human beings or animals is large enough, then animal cloning may well be worth pursuing, at least until a consensus forms about the proper treatment of animals in research. As cloning efficiency rates rise and health status improves, the minimal suffering of a limited number of cattle or sheep may be outweighed by the treatment benefits to human beings (and animals) that may be derived

from proteins expressed in their transgenic milk. In summary, then, it seems at this point unreasonable for cloning opponents to deem all forms of animal cloning impermissible.[2]

On the other hand, while the pain and suffering animals endure from cloning procedures might be justified by noble ends (such as curing human or animal diseases, or preserving endangered species), animal welfare issues are harder to ignore when cloning is undertaken for ends that seem frivolous or even, by some lights, inhumane. A prime example would be the quest to clone deer with larger antlers so that they are more attractive to hunters or the creation of novelty pets or chimeras as art objects.

A second consequence-based argument against animal cloning involves the consequences to animals much more broadly construed, focusing on the effect of cloning on animals not involved in cloning procedures. Opponents of pet cloning, for example, cite the millions of unwanted pets in the United States as an argument against research intended to produce what are, in effect, identical twins of deceased pets. In support of this concern, the data on the number of companion animals euthanized in American shelters are sobering. The National Council on Pet Population Study and Policy found that in 1997 alone, more than 2.3 million dogs and 1.7 million cats entered shelters, and between 50 and 70% of these animals were euthanized (NCPPSP 1994–97). According to the ASPCA, the numbers of animals entering shelters is much higher now. By their estimates, 8 to 12 millions companion animals enter shelters, and 60–70% are euthanized (ASPCA 2003). A similar number is cited in the 2001 Humane Society report on the state of animals in the United States. According to that report, 4 to 6 million dogs and cats were euthanized in shelters in 2001 (Irwin 2001). These figures do not include the millions of stray animals in the country: the ASPCA (2003) estimates that 70 million stray dogs and cats live in the United States.

Opponents of pet cloning make two anti-cloning arguments: first, pet owners so devoted to their animal companions that they would spend thousands of dollars to produce their beloved pets' identical twins are precisely the type of people who could save an already-existing animal's life through pet adoption, sparing one more dog or cat in the United States from euthanasia; and second, the money and energy now being spent on the development of pet cloning, like

[2]Our inconsistency in the treatment of animals across different domains is striking, even within the same animal species or breeds. For example, one beagle might end up as a companion animal with owners who believe it to be eminently reasonable to afford him a kidney transplant if the need arises (at the price of approximately $14,000); another beagle may end up as a research animal in a cornea lab, where he will have surgical procedures done to his eyes and then will be euthanized. The radically different life trajectories of these two animals depends completely on random chance, despite the fact that the two beagles are indistinguishable in capacities, needs, characteristics, etc. In other words, the grounds on which we normally determine moral status are alike in both cases, but these "like" cases are treated as anything but "like." It is this type of example that justifies my claim that we are confused and inconsistent about the moral status of animals, whatever it turns out to be.

the $3.7 million Missyplicity Project, is a terrible waste of financial and intellectual resources that could much better serve animal welfare interests if redirected to better causes. But champions of pet cloning, including cloning scientists and investors, are quick to point out there will only ever be a small number of pets cloned even after the technology is perfected and widely available. On this argument, the number of animals who would be spared euthanasia in shelters if pet owners chose pet adoption instead of cloning would not have any measurable effect on the tragic numbers of animals euthanized.

In response, objectors could argue that this argument misses the mark: the criticism assumes that only one animal life is at stake either way, one cloned or one non-cloned. But the opponent to pet cloning is making a utilitarian argument about distributive justice: the $20,000 (or $50,000) that one will have to spend to create one clone could save the lives of literally thousands of non-clones. The pet cloning issue also speaks to the moral status of animals. If animals have an intrinsic worth that merits this kind of expenditure, then it is criminal that we would allow so many of the same creatures to die; resources simply need to be redistributed in a way that makes better ethical sense. Of course, proponents of pet cloning will point out that the money in question can't in fact be redistributed like this: pet owners who are willing to shell out $20,000 to clone their own beloved pet are not going to use that money to fund animal shelters should they decide not to go ahead with the cloning. But this anti-cloning argument has another serious flaw: if the argument is truly about redistribution of scarce resources, then why limit the attack to those who would spend $20,000 to clone a pet? There are hundreds of ways people could spend $20,000 on luxury items that could be used instead to save the lives of animals in shelters—or donated to other noble causes. As a society, we embrace the idea that (post taxes) individuals may spend their money on whatever they choose, so this anti-cloning argument is a nonstarter.

Two other consequence-based arguments can be made against animal cloning in general: it may have negative consequences for the environment, and it may have negative consequences for human beings. Concerns about the environment involve two different categories of animal cloning, cloning for conservation purposes (the cloning of endangered or extinct species) and the cloning of livestock. Both concerns are motivated by the effect of clones on the ecosystem. The question here is whether there will be an adverse effect or an unanticipated impact on the environment from the interaction of clones with the environment. This question may be even more pressing with regard to the re-creation of extinct species than with regard to endangered ones. History has shown that tampering with ecosystems has often wreaked havoc on the animal and plant life living in those systems.[3] While animal cloning projects may not pose any more of a threat

[3]Although there are exceptions in which alternations in the ecosystem can be argued to have produced a net good (Crosby 2003), given the many untoward consequences of so-called biological exchange, these exceptions should not temper our concern.

to an ecosystem than the introduction of non–genetically modified organisms into a foreign habitat, this does not ameliorate concerns about environmental consequences of animal biotechnology. This ethical issue affects only a limited number of animal clones (since most clones will live their entire lives in confinement), but for those clones that may not be confined, this is a pressing ethical issue that needs to be addressed through strict regulatory policy.

The most pressing concern about the way that animal cloning could have untoward consequences for human beings is through the slippery slope of reproductive cloning progress. Many express fear that once reproductive cloning techniques are perfected in primates, it will be a very short time until those techniques are applied to human beings. There are already reports that scientists are experimenting with human reproductive cloning, and animal cloning techniques create a possible blueprint for accomplishing this troubling feat. In South Korea, for example, scientists recently reported that they had created human embryos through cloning, demonstrating that it is scientifically possible to reach at least the blastocyst stage (Amos 2004).[4] These developments provide clear evidence for the need to establish an international ban on human reproductive cloning.

A second concern about the effect of animal cloning on human beings involves food production from cloned livestock. The obvious question here is part-ethics and part-science: will this food be safe to eat? In late October 2003, the FDA issued a preliminary statement claiming there was no evidence that food and milk from cloned animals was unsafe (Neergaard 2003). But a few days later, on November 4, 2003, they issued another statement claiming that they lacked enough information to state that it *was* safe (AP 2003). The FDA has not yet issued a recommendation about whether products from cloned animals need government approval before going to market. Meanwhile, the current voluntary moratorium on releasing these products into the market remains in place. Many watch-dog groups believe the FDA has underestimated consumer concerns about eating these products, and they may remain wary even if the data demonstrate food safety. Consumers are already suspicious of genetically modified foods, especially in certain markets, and food producers will have a high bar to reach in assuring the public that agricultural products from cloned animals are not only safe but appealing to eat. (The magnitude of this problem is already being felt by producers of genetically modified organisms and by their investors; see Collins 2004.)

With the majority of Americans believing that animal cloning is morally wrong, it won't be surprising if Americans are unwilling to eat products from cloned animals. But then the real ethical issue here is not the safety of the agri-

[4]The South Korean scientists were attempting to clone human embryos for the purpose of therapeutic cloning—in other words, to harvest stem cells, not to produce a human fetus (Amos 2004).

cultural products but the moral permissibility of producing animal clones in the first place, however that moral critique is explained.[5]

In summary, the consequentialist arguments against animal cloning raise important concerns, but they do not constitute a justification for a blanket rejection of animal cloning. In the case of adverse effects to human beings and the environment, the solution appears to be tighter regulation of the industry as opposed to a banning of animal cloning. In the case of adverse effects to animals, consequentialist arguments show that projects are morally permissible if the costs in animal suffering are small and the benefits (to human beings and animals) are large. To assess the moral permissibility of animal cloning on consequentialist grounds, then, the moral permissibility of each cloning projects needs to be decided on a case-by-case basis, and clearly some types of animal cloning will not pass this cost-benefit analysis.

Principle-Based Arguments Against Animal Cloning

Apart from the ethical issues that arise because of the potential consequences of animal cloning, there is a significant set of ethical concerns about cloning that are based on deontological considerations. Critiques of animal cloning using this approach claim that cloning science violates an important moral prohibition or duty. This is the type of argument some have called an "intrinsic" objection, in which the activity is objectionable in and of itself, irrespective of the consequences (Comstock 2001).

The most well-known of these deontological arguments, and quite possibly the prime source of the public's condemnation, is the "playing God" problem: ought we to be creating life in this matter? Is it our place to do this? On this view, cloning is a hubristic attempt by human beings to be divine. Cloning and many types of genetic engineering cross an important line between facilitating the creation of life (as in assisted reproduction) and engineering life (see Rifkin 1983). In the first case, human beings are the builders using a God-given blueprint; in the second, they are the architects. While many individuals making this type of argument come from a religious tradition, thus anchoring their arguments in theology, not all of them do. There is also a secular version of this moral concern that argues that we dehumanize ourselves and devalue the natural world

[5]It seems unlikely that a consequentialist critique lies behind the overwhelming moral condemnation of animal cloning by the American people. With the exception of the adverse consequences to animals, the other consequences of animal cloning are purely hypothetical and have received little mention in public discourse. The untoward consequences to animals are unlikely to be the source of this moral critique, because twice as many Americans condemn animal cloning as condemn the use of animals in medical research (Saad 2004); at this point there is no reason to believe that the consequences of cloning are worse than the consequences of using animals for medical research. The public's critique of animal cloning is more likely to be deontological in approach, as discussed below.

by engaging in such activity. The sense that something is being lost or something profound is being compromised by cloning is part of what lends credence to Leon Kass's (1997) famous but underdeveloped "wisdom of repugnance" claim. Individuals in this camp emphasize the widespread intuition that something is deeply wrong with this enterprise, however difficult it is to say precisely what the moral prohibition is. They point to cases like the Chicago-based artist Eduardo Kac, who commissioned the creation of a transgenic rabbit that is green and glows under special lighting (Allmendinger 2001; Boyce 2002). Kac (2002) described his goal as being to create a "new art form based on the use of genetic engineering to transform natural or synthetic genes to an organism, to create unique living beings"; he also protested that he did not regard the transgenic rabbit "as an art object in the sense that one would create a sculpture or a painting. It's not about making an object. I invent situations" (Boyce 2002). Opponents of cloning, however, would argue that the irreverence about living beings represented by Kac and others shows us unfit to play the architect's role. Although some have argued that "playing God" arguments are not "ethical" but "religious," this is a spurious distinction meant to derail the argument by placing it in a nonsecular, and inferior, normative category (as in the argument, "Religion should not enter public policy"). Ethical concerns about hubris can be traced all the way back to the ancient Greeks, and anyone who makes such an argument sees it as legitimately "moral": for example, it is the central argument of the President's Council on Bioethics, headed by Leon Kass, and it is likely to be the explanation for the view held by the majority of Americans that animal cloning is morally wrong (Saad 2004).

Proponents of animal cloning offer two rejoinders to these anti-cloning claims. First, they argue that we have been modifying organisms throughout human history: the creation of new species through modification is not new (Burkhardt 1998). If the modifications of the past were morally permissible, what is the morally relevant difference in the current science? If it is the means of the modification, then the real argument is about the negative consequences to the animals, not a deontological prohibition against playing God. If there is a legitimate deontological consideration here, it will need more extensive articulation to persuade proponents of animal cloning that the entire science is morally flawed. On the other hand, until this argument is adequately addressed by cloning proponents, it will likely be the central impasse in garnering widespread public support for this kind of animal biotechnology.

A second claim made by cloning proponents may offer a way to address these concerns: on this argument, proponents claim that objectors overlook the respect for and awe of nature that lies behind the work of many cloning scientists. They argue that unlocking the mysteries of the natural world only makes scientists more humbled by those complexities. In this view, the scientific enterprise is sanctioned by God, evidenced by the intellectual acuity humankind was granted by its creator. Gary Comstock (2001), for example, coming from the perspective

of an evangelical Protestant, argues that God wants human beings to pursue science and endorses scientific endeavors like biotechnology. Cloning isn't playing God—it's doing what God has given human beings the mental gifts to do. Animal cloning researcher Randall Prather makes a similar argument in an essay on animal biotechnology, written for a conservative Christian publication:

> But does biotechnology sound as if it could be unbiblical, evil, or an enterprise with which we Christians should not associate? . . . Is this a form of "creating new life," tampering with something sacred, somehow playing God? . . . Should reproductive biotechnologies be used on domestic animals? Since God does not command against it, and it can increase the quality of life and help prevent famine and human suffering, the answer is then: "Yes, these technologies should be perfected and applied." (Prather 1988, pp. 139–40)

If arguments like these enter the public discourse, they may well defuse this type of deontological objection to animal cloning.

A second deontological argument is that cloning negates the intrinsic value of animals through both objectification and commodification. In this view, cloning treats animals as mere things, rather than living, breathing, sentient subjects. While cloning opponents admit that animals are already considered property and products, they argue that cloning takes this objectification to new levels. Life for animals in agriculture, research, and the pharmaceutical industry is already bad enough, it's argued; cloning will desensitize us further from the suffering of these entities, placing them even more firmly in the "thing" category. If animals are simply objects that we can create, then how different are they from disposable products like automobiles or telephones? When animals were first being cloned in the mid- to late-1990s, the animals were given personal names, emphasizing their subjecthood and uniqueness. More and more, cloned animals are referred to by impersonal numbers and letters, rather than names Andrea Bonnicksen writes: "The fact that Polly, Morag, Megan, and other creatures with personal monikers are fading in the wake of the impersonally named [animals] foretells a normalcy of genetic and cloning combinations in biotechnology" (Bonnicksen 2001, p. 267). She cites as examples the cattle cloned in 1998 that were designated "ACT3," "ACT4," and "ACT5," not three years after the first sheep were cloned (Cibelli et al. 1998). Of course, the proponents' argument is already made by the opponents: animals are now and have historically been considered objects, both legally and in practice, so cloning science simply reaffirms the status quo, it does not change the status of animals. Livestock and research animals are already referred to by numbers, not names. If this is acceptable practice in non-cloning breeding, then it constitutes no argument specific to the cloning of animals.

By extension of the objectification argument, opponents to cloning argue that cloning further commodifies animals. Even if they are already seen as products for purchase, they are—at least sometimes—seen as ends in themselves as well.

Cloning connotes "pure product" and implies that no attention need be paid to them as subjects. Opponents ask where this ultra-commodification will take us in terms of animal welfare. The distinction opponents may be trying to make here is between being a "pure" means and a means while also at the same time an end. For example, if traditional farmers argued that they "cared" about their animals, then even if they sold them or had them butchered for food, they could plausibly have been described as treating the animals as subjects or ends in themselves—while at the same time as a means for the farmer to sustain his life, physically or economically. This treatment of food animals as ends in themselves may have waned with the rise of factory farming, but does cloning exacerbate this trend? Does it delude us into believing that animals are no different from machines? Parallel to the problems with the consequentialist arguments about animal suffering, these deontological arguments attack many forms of contemporary use of animals and are not specific to animal cloning. But that does not necessarily undermine their efficacy or seriousness. Society's view of the moral status and proper treatment of animals is in flux, and the deontological arguments against animal cloning might be used to critique animal treatment more broadly construed. The success of this argument rests with the public's perception of the moral status of animals, and it may someday become the most compelling anti-cloning argument. For now, cloning proponents must at least take seriously this type of objection.

On a completely different type of deontological argument, specific types of animal cloning are criticized on grounds of fraud or false promising. Pet cloning, in particular, is vulnerable to this type of objection. Opponents argue that grieving pet owners are deceived into believing that cloning is a way of resurrecting a deceased and beloved pet. There is great potential for false promises here, since cloning the animal would never replicate the exact pet due to the many environmental factors that influence personality and even appearance ("CC," the cloned calico cat, does not look like the mother, for example). Owners who seek to clone a deceased pet may have unrealistic expectations based on an assumption of genetic determinism that may not be entirely disabused by the pet cloning firms. Pet cloning websites vary in their treatment of this problem. The Genetic Savings and Clone Website, for example, says: "Before gene banking your pet, we urge you to answer one question as honestly as possible: do I want to bank my pet's DNA because I'm distraught and want the SAME pet back, or because my pet had a special genetic endowment that ought to be preserved? . . . If your honest answer is that you are grieving your pet's loss and seeking an identical replacement, then we respectfully discourage you from using our services" (Genetic Savings and Clone 2004a). At rival Perpetuate's Website, customers are explicitly told that the cloned animal will be an identical twin, although the site cryptically offers the following reason to clone the animal: "The possibility of cloning a valued pet provides its owner with a degree of hope" (Perpetuate 2003).

Of course, proponents of pet cloning argue that the handful of individuals who have received cloned pets do not believe they were deceived about the "products" they got. In testimonials, they claim that their new clone has remarkable similarity to the original pet. So far, there is no evidence that clients feel they have been the victims of fraud or false-promising.

Conclusion

A review of the ethical issues in animal cloning shows that both consequence-based and principle-based objections to cloning science constitute a serious critique that proponents of cloning need to consider. The public's negative view of animal cloning can be understood on either consequentialist or deontological grounds, and to build societal consensus around animal cloning, these objections need to receive more attention in the public discourse. Neglect of these issues has had no ill effect on cloning science to date, but ignoring public sentiment on animal cloning could have serious implications for the commercialization and acceptance of cloning products from agriculture to the medical-pharmaceutical industry.

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