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We and They: Animal Welfare in the Era of Advanced Agricultural Biotechnology

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The creatures outside looked from pig to man, and from man to pig, and from pig to man again; but already it was impossible to say which was which.

George Orwell, ***Animal Farm***

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The quote from George Orwell's famous book *Animal Farm* albeit taken out of its intended context and written with a different message in mind captures rather eloquently the essence of the profound changes that have been shaping the relation between humans and animals over the last several decades. Animals have become increasingly humanized and there is no longer a clear boundary between *us*, humans, and *them*, non-human animals. This boundary has been disappearing in two senses: one moral, the other biological.

In a moral sense, the West has become increasingly aware of the moral status of animals as beings that have the capacity to suffer and whose welfare ought to be taken into account in moral deliberation, public policy and civilized law. Speaking metaphorically, since the 19th century, animals have entered the human moral universe and have been accorded the status of moral beings which are owed concern, respect and care.

In a biological sense, the boundary between humans and animals has started to disappear even more literally. Due to the advances in animal science and agricultural biotechnology, today more than ever before we are able to shape animals according to our own will and to create and produce animals containing the characteristics *we* desire by means of selective breeding, genetic engineering, cloning and artificial insemination. In such ways, we *humanize* animals. We make *them* mirror *our* human needs, desires, aspirations and vices: from the taste for better, tender meat and greater profit to the aesthetic aspirations that led to the creation of Alba, the green fluorescent rabbit known as the "glow-in-the-dark bunny".[1] What is more, through genetic manipulations, humans have created transgenic animals that are literally "like us": they carry human genes, produce human proteins[2] and their organs could potentially be transplanted into human bodies.

As we intentionally blur the boundaries between humans and animals, we are faced with profound moral questions with far-reaching consequences. The answers to these questions in the form of practices, policies, legislation and moral sensibilities will impact not

[1] http://www.ekac.org/gfpbunny.html#gfpbunnyanchor (visited May 27, 2004)
[2] David Cooper and Robert Lanza, *Xeno* (New York: Oxford University Press, 2000), 195.

only the fate and welfare of animals but also the future of animal agriculture, the fate and well-being of humans for generations to come, and the outlook of the biosphere as a whole.

In light of these tendencies, what are the main ethical challenges that animal agriculture faces in the 21st century?

The first major moral challenge is to determine the moral status of animals and to decide whether we have any ethical obligations to them. If we do, then what are these obligations? How ought we to treat animals and how should we weigh human interests versus animal welfare? Which of the two has a higher moral weight and under what conditions? What is involved in respecting animals? For millennia, philosophers and theologians have been tackling these questions for practical, philosophical and moral reasons. The answers have varied depending on how the thinkers have understood the purpose of morality, the nature of human beings and the nature of animals. More importantly, the views of how we should treat animals have evolved due to the growing scientific information about the capacities of animals, and will continue to evolve as our abilities to transform animals through biotechnology expand.

For millennia, the Western intellectual tradition gave little, if any, moral consideration to animal welfare and saw animals largely as means to our ends. These attitudes are embodied in the stewardship view of the Judeo-Christian tradition, in its secular equivalent - the moral philosophy of Immanuel Kant - and in the mechanistic approach of Rene Descartes.

The stewardship view is laid out in the story of Genesis. According to it, human beings are qualitatively superior to animals and the rest of nature, and are permitted to use animals and nature in general, for their purposes. They are given "dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth."[3] The Judeo-Christian tradition does proscribe cruelty to animals and encourages human beings to treat animals properly. Yet, the proscription is not motivated by a pure concern for animals; it

[3] The full passage reads: "And God blessed [man and woman] and God said to them, 'Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth."

stems from a concern for God and for our duties to one another and toward our own selves. St. Thomas Aquinas argues that animal cruelty is bad because it leads to cruelty to human beings and because "injury to an animals leads to the temporal hurt of a man, either of the doer of the deed, or of another."[4] In short, on the stewardship view, animals lack independent moral worth. We are allowed to use them for our purposes and our moral duties to animals are nothing more than indirect duties to God and to our fellow human beings.

The stewardship view has its secular equivalent in the influential moral theory of German philosopher Immanuel Kant. He believed that the norms of human morality do not apply to animals because they lack the capacity to reason, which is crucial to morality. According to Kant, morality consists of understanding and applying moral rules in a rational fashion. The rules of morality outline our duties and our rights and Kant believed that having rights presupposes having duties such as the duty to respect the rights of others. Animals lack rational capacities, they cannot follow moral rules and comprehend duties. Consequently, they cannot have moral rights and cannot lay moral claims to human beings. From Kant's perspective, the concept "animals rights" makes no sense. He writes: "If a man shoots his dog because the animal is no longer capable of service, he does not fail in his duty to the dog, for the dog cannot judge [the man, A.P.]…"[5] Still, Kant denounces animal cruelty for the same reasons stated by Aquinas five centuries earlier. Kant views animal cruelty as *inhuman* (notice the word "in-***human***"!). It shows a failure in one's duties to other human beings. Kant teaches that we must "practice kindness towards animals, for he who is cruel to animals becomes hard also in his dealings with men."[6] Kant denounces animal suffering caused for human pleasure such as hunting but justifies the use of animals for research provided it does not cause unnecessary pain. He also approves "putting animals to work" but emphasizes that they ought

[4] St. Thomas Aquinas argues that "if any passage of the Holy Writ seems to forbid us to be cruel to animals…this is either to remove man's thoughts from being cruel to other men, and lest through being cruel to animals one becomes cruel to human beings: or because injury to an animals leads to the temporal hurt of a man, either of the doer of the deed, or of another." in Thomas Aquinas, *Contra Gentiles* (London: Benzinger Brothers, 1928), Book III, Part II, Chapter 112.
[5] Immanuel Kant, *Lectures on Ethics*, translated by Louis Infield (New York: Harper & Row, 1963), 239.
[6] 239.

not to be "strained beyond their natural capacities." Kant also permits the killing of animals when necessary, e.g., for food, but teaches that this ought to be done quickly and painlessly.

The view of Renee Descartes is even harsher: he maintains that animals have no moral status because they are mere machines and do not have souls and consciousness. They may be treated in the same way in which human beings may treat unanimated objects that lack the capacity to suffer such as rocks and plants.

Since late 18th and early 19th century, our understanding of the moral status of animals changed dramatically. This was due in large part to the increased scientific knowledge but also to a wave of social reforms based on the idea of equality and to new theoretical developments within the discipline of ethics. Darwin's theory of evolution undermined the Judeo-Christian picture of the world and showed that human beings were much closer to animals than previously thought. Observation and research into animal intelligence showed, *contra* Descartes, that animals are not automata. They experience pain and suffering, have intelligence and some possess an elementary capacity for rational thinking. More recently, research on the behavior of apes suggests that at least some species of apes can engage in abstract thinking, problem solving and can use language.[7]

Today, we no longer believe that animals are mere machines or that they exist to serve human purposes. Because of this, the moral principles that guided the treatment of animals for millennia are no longer adequate. In their stead, ethicists develop the new field of animal ethics. It offers new ways of dealing with animals that take into consideration not only human interests but also the welfare of animals, their suffering and interests. The legal and political discourse on human rights has been supplemented with a discourse on animal rights and animal liberation, which epitomize the change in the moral status of animals.[8]

[7] A famous example of the intellectual capacities of apes is the case of Kanzi and Panbanisha – the bonobo chimpanzees at the Language Research Center a Georgia State University who learned to communicate using a lexigram. See Sue Savage-Rombaugh and Roger Lewin, *Kanzi: The Ape at the Brink of the Human Mind* (Wiley, 1994).

[8] Many view the emergence of animal ethics and laws protecting animals as an aspect of the larger social reform movement based on the idea of equality of all that led to the equality of women, the abolition of slavery and the regulation of labor. See Cooper and Lanza 191.

At the center of this change is the moral theory of utilitarianism developed by British philosophers Jeremy Bentham and John Stuart Mill in the 18th century. Bentham and Mill criticize Kant's moral theory for its narrow focus on rationality. One major problem with Kant's view is that if, as Kant maintains, only rational beings have moral worth and moral rights, then not only animals but also many categories of human beings will turn out to lack moral status and moral rights, including children and mentally retarded people. Yet, these are precisely the human beings that are most vulnerable and in greatest need for protection and ethical treatment. In contrast, Bentham and Mill argue that morality should not be confined only to rational, human beings. According to utilitarians, the purpose of morality is to minimize pain and suffering, and to maximize the happiness and pleasure in the world. The desire to avoid pain/suffering and to increase pleasure/happiness is something that all sentient beings share, including humans and non-human animals.[9] On these grounds, morality should be expanded to give equal consideration to every sentient being even if it lacks rational capacities. In a famous passage in *The Principles of Morals and Legislation* (1789), Bentham writes: "the question is not Can they *reason*? nor Can they *talk*? but, Can they *suffer*?" To all those who can suffer, we have a moral obligation to act in a way that decreases suffering and increases happiness.

What is revolutionary about utilitarianism is that it places animals alongside humans in the moral universe and removes rational humans from their traditional privileged moral position. In practical terms, this means that we ought to take into account the welfare of animals whenever our actions affect them directly or indirectly. In the same time, utilitarians do not automatically condemn the use of animals for research, food or other human purposes. According to them, it is permissible to inflict some pain or suffering provided this will increase the overall happiness in the world. To find the best course of action, we need to conduct a cost/pain – benefit/pleasure analysis: actions that cause more pleasure than pain are

[9] Some critics argue on religious grounds that animals cannot suffer because suffering is a distinctly human moral experience: it is a response to God's punishment of humans for their sins.

permissible and actions that cause more suffering than happiness are immoral. For example, it would be morally right to slaughter an animal in order to feed a starving village, or to perform painful animal experiments in order to find the cure for a disease that would benefit many humans or animals. What is no longer permissible is to ignore the suffering of animals or to treat them as morally inferior to us. This conclusion requires that we extend our moral categories and laws protecting human beings to cover also animals in agriculture and science. The epitome of this change today is the movements of animal liberation and animal rights led by contemporary moral philosophers Peter Singer and Tom Regan, respectively, and the everyday philosophy of vegetarianism.

Singer and Regan developed new approaches to the treatment of animals based on the idea that animals are equal to humans in a moral sense. The views of Singer and Regan differ significantly in many respects but both agree that moral consideration is granted not on the basis of duties but on other grounds such as having the capacity to suffer and an interest not to suffer (Singer), or having an intrinsic value (Regan).

Singer, who, at one point, publicly locked himself in a cage to draw attention to the suffering of animals, argues that all those who can suffer have an interest in not suffering, in surviving and propagating.[10] This applies equally to animals and humans and, therefore, they should be given equal moral weight. These views form the foundation of Singer's theory of Animal Liberation. It involves taking animal interests as seriously as human interests and giving rights to animals even if this interferes with human interests. Animal Liberation also means abolishing all practices that cause animal suffering and death.

According to Singer, the basic rights we owe to animals are the right not to be tortured, not to be deprived of their freedom and not to be killed. Consequently, treating animals ethically involves ceasing the killing of animals for food, abolishing confinement farming and eliminating animal suffering in medical experiments. What makes these practices

[10] An important further theoretical question is whether interest is something one wants or something that is good for one, something one needs to survive. This question, however important, goes beyond the scope of this paper.

morally wrong is that they cause unjustified suffering and death to animals and place the often trivial interests of humans above the most important interests of other species. This tendency of humans to regard their own species as superior to other beings is called by Singer *specieism*. He points out that specieism is utterly irrational and grounded in a deeply rooted prejudice against other species. It is a form of discrimination similar to racism and sexism. The only difference is that specieism involves favoring one's own species (not merely one's group) over and above any other. Singer claims that speciesim has been rampant throughout human history which shows that we routinely discount the fundamental interests of animals in order to satisfy our often trivial interests. The use of animals for food, factory farming and animal experimentation are all instances of speciesm.[11] These practices are particularly objectionable because there are alternative ways for humans to satisfy their needs: "There can be no defense of eating flesh in terms of satisfying nutritional needs, since it has been established beyond doubt that we could satisfy our needs for protein and other essential nutrients far more efficiently with a diet that replaces animal flesh by soy beans… and other high-protein vegetable products."[12]

As to animal experimentation, Singer does not rule it out completely but stipulates that the benefits of the experiments must outweigh greatly the burdens to the animals. He notes that we have no more reason to experiment on animals than to experiment on humans with a comparable level of awareness, e.g., children or mentally disabled people. He proposes the following test: to decide whether and when it is appropriate to experiment on animals, we should ask ourselves whether it is appropriate to conduct the experiment on an orphaned infant. "If the experimenter is not prepared to use an orphaned human infant, his readiness to use nonhumans is simple discrimination, since adult apes, cats, mice, and other mammals are more aware of what is happening to them, more self-directed, and, so far as we can tell, at

[11] To show that specieism lacks any rational justification and is based purely on prejudice, Singer notes: "If possessing a higher degree of intelligence does not entitle one human to use another for his own ends, how can it entitle humans to exploit nonhumans?" Peter Singer, *Animal Rights and Human Obligation*, (Englewood Cliff, NJ: Prentice Hall, 1976).
[12] Peter Singer, in Louis Pojman, *Life and Death* (2002), 404.

least as sensitive to pain as any human infant."[13] In other words, if we are prepared to justify the exploitation of animals in scientific research due to their supposed lack of mental capacity, then there is no reason not to exploit human babies, infants, or the mentally ill in a similar fashion. Indeed the thrust of Singer's argument is not that we should start experimenting on vulnerable human beings but that we should stop using non-human animals for this purpose.

Now, Singer recognizes that the moral equality of humans and animals does not mean an actual equality. He recognizes the differences between humans and animals, and even between the individuals within a single species. Animals are not literally equal to humans and they are not to be given the same moral rights such as the right to free speech or the right to vote. He grants that self-conscious beings such as humans and apes have higher worth. However, with respect to pain and suffering, all sentient beings are on a par since all of them are interested in avoiding suffering. Hence the equality of animals and humans in a moral sense.[14]

While many consider Singer's view revolutionary and even extreme, others like philosopher Tom Regan criticize it for not going far enough to protect the rights of animals.[15] Rather than judging the morality of animal treatment by its consequences, as classical utilitarians do, and instead of grounding animal rights in animals' ability to suffer as Singer does, Regan takes a different approach. According to him, the traditional treatment of animals is immoral not merely because it causes suffering but because it regards animals as a resource at our disposal. This is fundamentally wrong because humans and animals have equal status. Their equality is based on the fact that both humans and animals are subjects of a life. A subject of a life is anyone who has a mental life including perceptions, desires, beliefs, memory and expectations, and who care about his/her life. Since every subject of a life cares

[13] Singer.
[14] Philosopher Joel Feinberg agrees that animals have interests, even more than some mentally incapacitated humans, but he thinks that only individuals can have interests and thus rejects the idea that entire species have interests. Feinberg argues that if the criterion for having moral status is the ability to make moral claims against others, animals would qualify since they can make moral claims through the legal system, by being represented by humans in the courts.
[15] Tom Regan, *Animal Rights, Human Wrongs* (New York: Rowman & Littlefield, 2003).

about his or her life, that life has inherent value equal to the value of any other life. The moral worth of a subject of a life, be it human or animal, does not depend on the level of self-consciousness and the moral rights of this subject do not depend on anything other than the fact that she has inherent value. Because of this, each subject of a life is to be treated justly and with equal respect.[16] Regan calls for three radical steps: (1) banning the use of animals in science; (2) abolishing commercial animal agriculture and (3) the eradication of hunting and trapping for commercial and sport purposes.[17] Regan's view forms the philosophical basis of today's radical animal rights movements such as People for the Ethical Treatment of Animals (PETA) and radical veganism.

Most ethicists and policy makers today adopt moral principles that are less radical than the equality views of Singer and Regan (see footnote 16) and while people are much more sensitive to the welfare of animals, very few are prepared to abandon animals as a source of food and to close the chapter of animal agriculture in human history. In the same time, most nations in the West recognize that animals have at least some rights and deserve a humane treatment. This is expressed in animal welfare laws and policies that protect animals and regulate our dealings with them on the farm, in the research lab and in the wild. These laws and policies acknowledge the sentient nature of animals, their capacity to experience pain, their awareness of themselves and the environment, and the need and obligation on the part of humans to treat animals (including farm animals) in a respectful and humane way. This has led to the development of husbandry practices and rules of housing, transporting, breeding and killing farm animals that aim to minimize the suffering and enhance the well-being of animals. Yet, just when the West seems to have arrived to a shared awareness of the rights and

[16] A reaction to the radical views that grant equal rights to animals is the position of Mary Ann Warren. She notes that animals have a narrower range of moral interactions than humans. One major criterion for moral capacity, and respectively, moral status is autonomy. Animals can never reach such a level of autonomy and only humans will have full moral rights. In the same time, Warren acknowledges that many animals have the intelligence of human children and the same or greater capacity for suffering and they should have some rights. People have greater capacities and their rights will have more moral weight. Animals will have only partial rights that can be overridden by human rights (Mary Ann Warren, "Human and Animal Rights Compared," *Environmental Philosophy: A Collection of Readings*, edited by Robert Elliot and Arran Gare, State College: Pennsylvania State University Press, 1983).

[17] Tom Regan, *The Case for Animal Rights* (Berkeley: University of California Press, 1983).

welfare of animals, a powerful new factor has emerged that poses new big challenges to animal ethics and animal welfare. This factor is the rapidly advancing agricultural biotechnology.

In my view, the next big task for all those who deal with animals is to identify and resolve the ethical issues that arise from the application of advanced biotechnology to animals. The possibilities are endless. Cloning allows to produce genetically identical copies of a single animal as it was done with the famous sheep Dolly. Genetic engineering makes it possible to modify the genes of animals in order to achieve any desirable characteristic: from more muscle mass to glow-in-the-dark fur. Animals can be engineered to carry human genes, synthetic genes or genes from other species (transgenics). Pigs with human genes have already been engineered and can be used in medicine as a source of organs for transplantation in humans (xenotransplantation). Sheep or cattle may become biopharm animals. These animals, also called "bioreactors," are genetically modified to produce a human or veterinary drug, a food additive or another substance that can be collected from the animal's milk, blood, or tissues instead of using synthetic sources.[18] The main ethical questions here are: What is the effect of these technologies on animal welfare? Are the advances in biotechnology compatible with the principles and values of animal ethics? If there is a conflict between morality and biotechnology, how should the conflict be resolved and what considerations should prevail?

In what follows, I focus on specific ethical problems that arise from the current or foreseeable applications of agricultural biotechnology to farm animals. The new technologies that are most pertinent to animal production are genetic engineering and animal cloning. Patenting is another relevant issue that poses its own moral problems and concerns. Patenting is closely connected to the developments in biotechnology and has been greatly accelerated by it. Agricultural biotechnology makes it possible to extend patenting to living organisms and to patent new genetic combinations and the animals that carry them. The driving forces behind

[18] Stuart Pape and Paul Rubin, *Encyclopedia of Ethical, Legal, and Social Issues in Biotechnology*, edited by Thomas Murray and and Max Mehleman (New York: John Wiley & Sons, 2000) 91.

the uses of advanced technologies in animal production are low cost, increased productivity and increased profit. Yet, ethicists, animal rights activists and the public at large are concerned that many of these practices are morally problematic. They tend to undermine the welfare of animals and to enforce insensitive and exploiting human attitudes to animals. In addition, some applications of advanced biotechnology and patenting may have a negative effect on the well-being and freedom of producers.

The ethical implications of animal genetic engineering. Genetic engineering allows to change and manipulate the genetic make-up (genome) of farm animals in new and profound ways. Some of the changes affect only individual animals but they are not passed on to the future generations (somatic cell therapy).[19] Other changes involve germ line modification and can be inherited (transgenesis). Both types of modifications can be used to promote animal food production through increased productivity, faster growth, improved ability to digest lower quality cheaper foods, improved quality of animal products (cattle with more muscle mass and less fat), and increased disease resistance.[20] The process of genetic engineering involves the insertion of DNA into a single cell embryo or direct modifications to the eggs or sperm. Most often, the technology also requires a series of chemical and surgical procedures to be performed on the animal and these procedures cause pain and distress. In some cases, the animals used in the process have to be killed or they die of complications. All this raises the question whether the result justifies the means. Others ask whether it is moral to genetically engineer farm animals in the first place. Yet others question whether the need for greater productivity is a good enough reason to modify animals.

If we evaluate genetic engineering from the perspective of animal welfare, it is obvious that, at least in theory, some of the modifications will improve animal welfare because the acquired traits are beneficial to the animal, e.g., disease resistance. In other cases,

[19] Somatic cell therapy is a method of genetic engineering which modifies specific cells of an individual animal to produce desired characteristics without changing the heritable traits of the animal.
[20] The information on the specific uses of agricultural biotechnology is based on data from the Report of the Food Ethics Council of Great Britain, "Farming Animals for Food: Towards a Moral Menu" 2001.

the engineered animals will be sufficiently expensive and valuable and this will ensure good veterinary care and optimal living conditions. However, for animal ethicists this outcome is not sufficient to justify the modifications because the improvements are motivated by the wrong reason (profit-seeking rather than respect for animals). In reality, even modifications like disease resistance that by their very nature enhance the welfare of the animal can *de facto* compromise welfare. The experiments to date show that the process of insertion of genes for disease resistance can have negative effects on the animal. As to the improved veterinary care for high value animals, the benefit may be offset by limitations on the natural behavior of the animal, restricted freedom of movement and socializing, as well as indoor confinement. The use of genetic engineering to increase productivity through increased animal size and growth are equally, if not more, problematic. In cattle, increased muscle size leads to increased size of the litter and calves and requires Caesarian section for delivery (in cattle) or causes great stress on the ewes (in sheep). In pig production, genetic modifications will aim to increase the uniformity of animals, which would decrease genetic diversity. Another concern has to do with the fact that it is not possible to control fully the effects of the new genes on the animal. Our scientific knowledge and technical capabilities are imperfect. This results in unforeseen effects: unpredictable mutations, miscarriages or deformities. In the USA, the most notorious example of genetic engineering gone wrong is the case of the Beltsville pigs. In 1985, researchers at the USDA Beltsville Research Center announced the first genetically modified animals now known as the Beltsville pigs. They were engineered to produce large quantities of human or bovine growth hormone. The purpose was to produce pigs that grow faster in order to create larger profits for the food industry. The result was terrible: the GE animals had vision problems, deformed skulls, and some had difficulties walking. The experiment also demonstrated the danger of long term negative effects: two generations later, animals were having stomach ulcers, arthritis, enlarged hearts and kidney damage. The faith of the Beltsville pigs generated much criticism by the public. The experiment violated (albeit

unwittingly) the major principles of animal ethics. It treated animals as mere objects. The experiment did not benefit the animals and sacrificed their interests and well-being for the sake of science and corporate profit. In this sense, the experiments betrayed the specieist attitude criticized by Singer. There were no major benefits that could justify the high cost in terms of animal suffering and decreased welfare of several generations of animals. Singer's criterion helps us to grasp the ethical magnitude of the experiment: would it be justified if it involved human infants? If not, then what could justify experimenting on pigs given the abundant evidence we have of their intelligence?

Let us suppose for a moment that we perfect genetic engineering so that it no longer causes suffering or unwanted mutations. Better yet, suppose that we are able to use genetic engineering to produce animals that are resistant to diseases and their capacity to feel pain is reduced greatly. Can such positive applications of genetic engineering be morally problematic? For many animal ethicists, the answer is yes. Genetic engineering is morally problematic even if it has seemingly positive applications in sofar as it alters the natural capacities of animals. This is because animals are believed to exhibit their own integrity and naturalness. When these characteristics are violated by genetic engineering, this creates a strong presumption against the technology.[21] To see what is wrong with genetic engineering, consider a scenario offered by philosopher Garry Comstock: imagine that, as an alternative to intensive farming that crams many birds and animals in a very small space, we engineer chickens that won't suffer because they have no central nervous system and look like headless lumps of flesh. All they do is drop eggs on a conveyor belt.[22] The creation of such headless chickens would be morally wrong not because it violates the welfare of the birds but because it violates their integrity and reduces them to egg-producing machines. In response to such possibilities, a new moral imperative has emerged. It requires those who practice animal

[21] See Jeremy Rifkin, *The Biotech Century* (New York: Putnam, 1998).
[22] Garry Comstock, "What Obligations Have Scientists to Transgenic Animals?", a discussion paper by the Center for Biotechnology, Policy and Ethics, 8, College Station, TX: Texas A&M University, 1992, cited in B. Bovenkerk, F. Brom and B. J. van den Berch, "Brave New Birds," *Hastings Center Report* (January-February 2002), 16.

biotechnology to respect and preserve the integrity of both farm animals and animals for research. The principle became part of the *Experiments on Animals* act adopted in the Netherlands in 1997 which commands respect for the intrinsic value and integrity of animals. The challenging issue here is to determine what is involved in this. What constitutes "integrity"? What makes a cow "a cow" and what constitutes the pigness of a pig? The concept of integrity is somewhat vague, open to interpretations: it signifies unity, wholeness, and an ability to function optimally in one's environment.[23] One way of applying the principle of integrity is to state that an animal should not be modified to the point where it cannot be recognized as a pig or a cow. The notion of integrity would include also natural behavioral instincts and wellbeing.

Critics of the notion of integrity and the correlated moral principle note that the integrity objection is based on an assumption of species' rights, and according to some philosophers, only individuals can have rights. Others point out that the integrity-based objections to biotechnology and genetic engineering in particular seem to be equally applicable to other more traditional changes which we've been doing for a long time. Docking a dog's tail or selective breeding are examples of such modifications that transform animals in unnatural ways yet the changes usually are not considered violations of animal integrity. This is seen as evidence that "integrity" is somewhat subjective. Still, the concept and the moral principle of animal integrity are very useful especially in moral discussions of biotechnology. The principle of animal integrity is grounded in the view that animals should not be used as mere instruments of human needs and wants without regard to their nature and naturalness. The concept of integrity allows ethicists to capture moral intuitions and concerns that cannot be expressed merely in the existing utilitarian terms of animal interests and welfare or in terms of animal rights (Regan's subject-of a-life criterion). The headless chicken example does not violate Singer's view since the interests of the animals are not violated. Instead, genetic

[23] Bovenkerk, Brom and van den Berch.

engineering allows us to change the interests by changing the animals' constitution. This prevents them from suffering in extreme conditions. As to Regan's rights approach, it requires some minimal awareness for an organism to have rights. The headless chickens would lack consciousness and would have at most a dubious status as right-holders that might be compatible with the modification. Since animal biotechnology allows us to modify animals so as to change their needs and interests and to adapt them to our own needs, it is no longer sufficient to use the notion of rights or interests to criticize biotechnology. Certain applications of biotechnology can be criticized only through the notion of integrity. It allows us to account for the moral intuition that a particular practice or technology is morally repulsive even if it does not violate a right and does not cause pain or suffering.

The ethical implications of animal cloning. Simply put, cloning consists in producing genetically identical animals from a single cell of an adult animal. Its application to farm animals would allow producers to grow an unlimited number of animals who have a particular desirable trait attained through genetic engineering or natural selection. The first successful instance of cloning was the production of the famous sheep Dolly in 1997. The procedure through which Dolly was cloned involves harvesting egg cells from adult animals through a surgical procedure (laparotomy). Prior to this, the animals receive injections of hormones to stimulate ovulation. Once the egg cells are available, their genetic material is removed and replaced by the genetic material of another animal that is to be cloned. Next, the cells are placed in a live sheep. In seven days, when the cloned embryos are developed enough to be transferred to another sheep, the animal is killed. The transfer also involves a surgical procedure to the recipient sheep that carries the cloned embryos until they are ready to be born. This technique has a very low success rate but there are reports of successful cloning of cattle, pigs and goats.[24]

[24] Food Ethics Council Report 29. Dolly was the only live animal born from the experiment which involved 277 attempts.

The cloning of farm animals raises a number of welfare concerns identified by the Farm Animal Welfare Council of Great Britain.[25] Firstly, it may result in large offspring and may lead to other birth abnormalities. Secondly, it leads to a great waste of life due to the low success rate and the high rate of embryonic and fetal deaths. Thirdly, cloning may result in shorter life span due to the fact that the cloned animal is produced from the DNA of an adult animal. Further, the process of cloning has a negative impact on the welfare of the adult animals. They are subjected to invasive and stressful surgical procedures (e.g., laparotomy), receive drugs with bad side effect and suffer complications from the procedures and medications. For these reasons, many countries have adopted recommendations that confine animal cloning to the scientific laboratories and place a moratorium on the cloning of farm animals at least until the technology is improved to address the welfare issues. Once this is achieved and the technology is perfected, the regulations will likely be loosened and cloning will become part of animal agriculture because the technology allows to reproduce the most valuable animals and to maximize profit.

The morality of animal patenting. The last issue I wish to address here is the morality of animal patenting. The moral justification of patenting is to allow the scientists and corporations which make a large investment in research and technology to receive compensation and guaranteed return of their investment. This is believed to stimulate further scientific development.

The development of gene technology to enable genetic manipulation of animals also allows genetically modified animals to be patented.[26] The patenting of living organisms have been raising ethical concerns ever since it became possible. Some objections are directed to the patented technology, others denounce the very idea of patenting living organisms, yet

[25] Farm Animal Welfare Council, "Report on the Implications of Cloning for the Welfare of Farmed Livestock" (London: MAFF, 1998)

[26] Under the USA law, the patentability of inventions is regulated by the Patent and Trademark Office (USPTO) in the Department of Commerce. DNA products are patentable if they have been "isolated, purified, or modified to produce a unique form not found in nature" (http://www.ornl.gov/sci/techresources/Human_Genome/elsi/patents.shtml).

others are concerned for the welfare of both animals and producers. The group Global Action in the Interest of Animals objects to animal patenting on grounds of justice. The group argues that gene patenting is wrong because it patents something that belongs to all and that the common genetic heritage belongs to the commons.[27]

Andrew Trew argues against patenting of genetically engineered animals because of its effects on the animals. According to him, patenting is objectionable because it leads to the commodification of life.[28] Patenting encourages us to view animals as objects of profit and as morally insignificant which in turn affects our treatment of them. He also notes that patenting of animal genes gives great power to corporations to control the availability of such animals and to make profit from them. Michael Fox of the United States Humane Society warns that through patenting, "the wholesale industrialized exploitation of animal kingdom will be sanctioned, protected and intensified."[29] He is concerned that patenting encourages more research and that in and of itself tends to increase animal suffering.

Another concern is that patenting is granted for "inventions." When this criterion is applied to animal biotechnology, the very notion of a patent is seen as an expression of human arrogance that puts humans in a position of masters. In the case of genetic engineering, the technology behind the patent is seen as violation of the integrity of animals. According to the critics, it consists in unfair modifications of the nature of non-human living beings to suite human needs. For this reason, patenting itself is condemned.[30]

In general, the patenting of genetically engineered animals is a process that benefits one stakeholder (humans) and leaves out the other (animals). A closer look, however, reveals that patenting works in favor of large corporations against the welfare or animals and the interests of farming communities and small to medium-size farmers. The higher cost of patented life stock is likely to hurt small farming and to concentrate corporate agriculture[31] at the expense of small farming and farming communities. Through patenting, the control of multinational

[27] Michele Svatos, "Patents and Licensing, Ethics, Ownership of Animal, and Plant Genes," *Encyclopedia*, 848.
[28] Andrew Trew, *Encyclopedia*, 97.
[29] Michael Fox in *Atlanta Journal and Constitution* (1987), cited by Michele Svatos 846.

agribusiness of agriculture increases and allows large corporations to impose their products on small farmers and to eliminate competition and alternatives. Another danger of patents is that they will prevent small- and medium-size farmers from breeding their own animals. Currently, the law has an exemption from breeding restrictions for small farmers in Europe but there is no such an exemption in USA.[32] Without adequate protection, farmers will be forced to engage in laborious record keeping and will have to allow frequent inspections to prove that they do not breed patented animals.

The underlying moral problem pertaining to the patenting of farm animals is that it does not promote animal welfare and allows considerations of corporate profit to guide the treatment of animals. In the same time, patenting of livestock undermines the autonomy and privacy of farmers. Critics call this situation "bioserfdom" and denounce it because it worsens the living conditions for both animals and farmers.[33]

Policy protections in USA: a brief overview and evaluation. In closing, let me outline the state of affairs in the United States of America. For a number of cultural and historic reasons, the public is largely ignorant of the condition in which farm animals are raised and of the impact of biotechnology on the field. There is very little public debate of the issues and a very strong lobby of meat producers who exert power on politicians in favor of large-scale farming and for regulations designed to protect the interests of meat producers and to increase their profit. The Animal Welfare Act does not protect farm animals in USA. It also does not cover 80% of the species used in medical research such as mice, rats and birds, and more recently, pigs.[34] Despite the rapid advances in biotechnology, in the USA, there have been no new laws governing specifically biotechnological products. Control and regulation of such products is left to the Food and Drug Administration under the existing laws. Any genetically

[30] Another concern that is perhaps less applicable to farm animals but makes an important point is that certain patents may be morally objectionable because they are designed to cause suffering in animals, e.g. the creating and pateneting of a hairless mouse species prone to cancer (the Harvard University OncoMouse).
[31] See Goran Hermeren, *Encyclopedia* 823 and Svatos 848.
[32] Svatos 848.
[33] Svatos 848.
[34] F. Barbara Orlans, *Encyclopedia* 1023.

modified animals intended for food use are to be treated as new animal drugs and are to be regulated by the FDA.[35] This approach is an expression of the view that objectifies animals and views them primarily as objects of use. This is particularly true for farm animals since laboratory animals enjoy greater protection and public oversight. In light of all this, it is both understandable and also regrettable that, in 1999, USA refused to ratify the Biosafety Protocol for the trade of genetically engineered organisms, which was ratified by over 120 countries.

[35] Stuart Pape, Paul Rubin, *Encyclopedia* 90.