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## An Ethical Appraisal of Animal Biotechnology

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nonaggression, and rectification) and he defined them as follows<sup>7</sup>:

#### 1. Principle of defense

A principle that permits actions in defending both basic and non-basic needs<sup>8</sup> against the aggression of others, even if it necessitates killing or harming the others unless prohibited.

#### 2. Principle of nondefense

A principle that prohibits defending non-basic needs against the aggression of others that is undertaken as the only way to meet basic needs, if one can reasonably expect a comparable degree of altruistic forbearance from those others.

#### 3. Principle of (aggression for) preservation

A principle that permits aggression when necessary against the basic needs of others for the sake of basic needs unless prohibited.

#### 4. Principle of nonaggression

A principle that prohibits aggression against the basic needs of others either (1) to meet non-basic needs, or (2) even to meet basic needs if one can reasonably expect a comparable degree of altruistic forbearance from those others.

#### 5. Principle of rectification

A principle that requires compensation and reparation when the other principles have been violated.

### Appeals from the Biocentric point of view

There are 4 appeals possible from the biocentric point of view (listed in the order of importance): (1) the livestock breeding must be reconsidered. Especially, meat eating and restricting the freedom of livestock animals must be denied, if these needs are not basic needs for human. (2) Even if meat eating were human basic needs, we must not violate the need of livestock until they clash. We should not establish any dangerous system that violates basic needs of living things, for example, a system that allows nuclear power plants to be built. (3) Humans have duty to consider the needs of livestock. (4) The judicial classification system (such as Pet Animals and Farm Animals) is insignificant. All animals must be treated as equal moral objects.

The possible recommendations from a Biocentric point of view are very similar to that of an Animal welfare approach. Animal welfare aims to prevent the suffering or inhumane killing of animals as much as possible. The Five Freedoms listed below are international standards of animal welfare.<sup>9</sup>

1. **Freedom from hunger and thirst** - by ensuring access to fresh water and a diet to maintain full health and vigor.

2. **Freedom from discomfort** - by providing an appropriate environment including shelter and a comfortable resting area.

3. **Freedom from pain, injury, and disease** - by means of prevention or rapid diagnosis and treatment.

4. **Freedom to express normal behavior** - by providing sufficient space, proper facilities, and company of animal's own kind.

<sup>7</sup> James P. Sterba (1998) "A Biocentrist Strikes Back" In *Environmental Ethics*, Vol. 20, winter, pp. 363-368.

<sup>8</sup> Basic needs are those needs related to one's own survival.

<sup>9</sup> Farm Animal Welfare Council (<http://www.fawc.org.uk/freedoms.htm>)

5. **Freedom from fear and distress** - by ensuring conditions and treatment which avoid mental suffering.

Now we can offer actions based on 5 freedoms from the point of view of animal welfare. Livestock must be free from pain caused by starvation, injury, disease, fear, or distress. They must be able to receive decontamination as with pet animals and to live out their days. We should euthanize only dying, suffering, and irrecoverable animals. Also, government should prepare a special law for the treatment such as the law for Foot and Mouth Disease that occurred in Miyazaki prefecture.<sup>10</sup> We simply have laws concerning euthanasia of non-human-fed animals and infected animals.

At the same time, we must consider issues from biocentric perspective. It may require more time.

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## An Ethical Appraisal of Animal Biotechnology

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### 1. Introduction

In the last century, a number of scientific discoveries such as information technology, genetic engineering and biotechnology marked the arrival of a new era of scientific advancement. Biotechnology has a long history. Since the beginning of the civilization when human beings learned the art of 'planting crops' and 'breeding animals', they also learned, at the same time, how to ferment fruit-juice into wine, beer, and cheese, how to convert milk into yoghurt, and how to make spongy-bread by using bacteria and yeast. All these activities are the nascent stage of biotechnology. During the last few decades, biotechnology has ushered into various technologies; some of these are: (i) bio-processing such as using in vitro manipulation of cells, (ii) recombinant DNA technology, and (iii) monoclonal antibodies. One of the main objectives of biotechnology is to invent new ways of producing adequate food for the world. This article endeavors to reach the conclusion that biotechnology, specially the field of animal biotechnology, has got a variegated splendor. In this article, the following issues are addressed: is modern animal biotechnology compatible with the norms of animal welfare, environment, and public health? In order to spell out the answer to this question, this article will explore two lines of ethical controversy — intrinsic and extrinsic arguments. Finally, through the analysis, this article will

<sup>10</sup> The Japan foot-and-mouth outbreak occurred in 2010 in Miyazaki prefecture, affecting cattle, swine, sheep, and goats. About 290,000 livestock were put down. After a similar outbreak that occurred in 2000, Japanese government established Specific Domestic Animal Infectious Disease Quarantine Guideline on Foot-and-mouth Disease in 2004. In 2011, revised guideline was published as a result of outbreak in 2010.

come to the conclusion that none of the ethical tools or theories can materially represent the problems to solve the ethical debate about animal biotechnology that will satisfy everyone.

## 2. Ethical Challenges of Animal Biotechnology: Pros and Cons

In order to develop micro-organisms, improved plants or animals, and to modify food-products, biotechnologies have been used in a wide range of production. This technique is used for transgenic animal's production, commercial products, food production, plant tissue culture, DNA profiling/finger printings, animal tissue culture, pollution control, to safe plants and animal's extinction, prevention-diagnosis, and cure of diseases. According to its use, different kinds of biotechnologies can be mentioned as following: **a.** Industrial biotechnology, **b.** Environmental Biotechnology, **c.** Biotechnology as Human Application, **d.** Health Biotechnology and **e.** Agricultural Biotechnology. All these types of biotechnology are not my area of focus. Rather, I will focus on animal biotechnology.

Different kinds of technologies have been improved in the area of biotechnology. All of these technologies have given a great opportunity to human beings. Biotechnologies have made it possible to produce more nutritious food and medicine and also to develop a way for growing more food in saline water, nearly drought land, and in stressed conditions. Despite these contributions of animal biotechnology, different controversies have been raised in this regard. All of these bring forth different ethical challenges. During the last few decades there have been different types of arguments are discussed in this regard. Critics have generated different arguments while opposing this technology, which may conveniently be divided into two kinds: (1) intrinsic arguments and (2) extrinsic arguments.<sup>11</sup>

### 2.1 Intrinsic Arguments against Animal Biotechnology

Intrinsic arguments against biotechnology maintains that biotechnology is "objectionable in itself"<sup>12</sup>. And extrinsic argument focuses on the "allegedly harmful consequences of making GMOs"<sup>13</sup>. In this sense, animal biotechnology is ethically problematic because "it is unnatural to genetically engineer plants, animals and foods" (Comstock, 2002:76). The argument goes like this, biotechnology is the form of 'redesigning an animal' which is the "Playing with God". (Animals) biotechnologies are also break down the natural species boundaries.

#### i. The Argument for Playing with God

The argument of Playing with God is based upon the concept of 'God's will' and on the relationship among God, nature, animals, and human beings. It is found in the *Bible*. To some extent, this argument is the adherent

version of Christianity (Kaiser, 2005:77). C.A.J. Coady (2009) uses the term in a religious sense. He thinks that the view that God himself sets out a plan and makes designs for the universe and human beings is being assigned to observe it. God as an omnipotent and omniscient being, has set out a specific 'roadmap' for the universe, animal kingdom, and nature (Coady, 2009:155-180). But, animal biotechnology tempers the animals' design by inserting a new gene into a species. Thus, in a way (animal) biotechnology breaks down the boundary between the 'realm of God' and the 'realm of humans'.

Is the 'playing with God' argument enough to oppose animal biotechnology? We get responses to such a question in Ronald Dworkin's book *Sovereign Virtue* (2000) in which he argues that in the bio-political context 'the argument for Playing with God' is not 'morally and intellectually honest'. This is not a recent phenomenon to sustain the fight against hostile nature. Human beings, for their necessity and needs, rearrange nature in the way they find it suitable for them. Biotechnology is such a technology that has essentially become a part of human life. Therefore, the argument for Playing with God is not a strong stand to stop biotechnology.

#### ii. Break-down of Natural Species Boundaries

Recently, a conceptual study, "Ethical Aspects of Agricultural Biotechnology"<sup>14</sup> has shown that any sort of biotechnology is morally unacceptable because of its 'unnaturalness'<sup>15</sup>. A report published by the European Commission agrees with the idea that (animal) biotechnology is unnatural. This theory also indicates that the application of biotechnology breaks the natural order of different kinds of species. Something natural is assumed to be valuable and good. But, all kinds of biotechnology or genetic technology temper nature where species boundaries are crossed. The term, 'Natural', is somehow different from the concept 'Unnatural'. The difference can be shown as follows:

"Nature and all that is natural is valuable and good in itself; all forms of biotechnology are unnatural in that they go against and interfere with Nature, particularly in the crossing of natural species boundaries; all forms of modern biotechnology are therefore intrinsically wrong".<sup>16</sup>

Something, which is natural also means that it is 'normal', 'right', 'appropriate', and 'suitable'. On the contrary, 'unnaturalness' refers to something which is human-made, artificial, or which is dependent upon our interference with the natural world. 'Unnaturalness' has got a broad spectrum in our modern life. For example, most of the food production, animal farming, clothing, and used materials are the result of unnatural interference of nature. 'Naturalness' and 'unnaturalness' can be characterized as 'non-anthropocentric view' and 'anthropocentric', respectively. The anthropocentric view proposes a careful management of resources along with interference of nature. On the other hand, the eco-centric

<sup>11</sup> Kaiser. M., 2005. "Assessing Ethics and Animals Welfare in Animal Biotechnology for Farm Production", *Rev. Sci. Tech. off Intl Epiz*, 24 (1), p.75.

<sup>12</sup> Comstock, G., 2000. *Vexing Nature? On the Ethical Case against Agricultural Biotechnology*, Boston: Kluwer, Academic Publishers, p. 76.

<sup>13</sup> Comstock, 2000: 76.

<sup>14</sup> BABAS, 1999, *Ethical Aspects of Agricultural Biotechnology*, Bioethical Aspects of Biotechnology in the Agro Food Sector, Cambridge Biomedical Consultants, The Hague

<sup>15</sup> AEBC 2002. Agriculture and Environment Biotechnology Commission (AEBC), *Animals and Biotechnology*, AEBC, London. Available in [www.aebc.gov.uk/aebc/pdf/aebc0117.pdf](http://www.aebc.gov.uk/aebc/pdf/aebc0117.pdf), accessed on 5 June 2010.

<sup>16</sup> BABAS, 1999, p.10

view generally holds the view non-interference in relation with nature. The ecocentric view accompanies the view of 'respect for nature', which does not allow any biotechnological tool as a means of the interference of nature. As an anthropocentric means, biotechnology is the viable example of unnaturalness by which natural integrity of species and the species boundaries are breached.

## 2.2 Is Intrinsic Argument Consistent?

Regarding the intrinsic argument we can explore the following two points at least:

**Firstly**, the central theme of intrinsic argument is that every species has got its own shape and structure, which it gains in a natural way. Natural diversity refers to the existence of particular characteristics of every species. Some animal biotechnologies such as transgenesis and Xenotransplantation break-down the natural diversity of animals, which is not right way of treating them. In response to this criticism, we can mention here Darwin's theory of evolution. According to this theory, the structure and the phase of every species is not static. According to Darwin (1859), phenotypes of species change from one generation to the other over a long period. Various new types of species arose from the species of the past through a process of gradual change. The period of change might be as long as hundreds or thousands of years or even more than that. Species are also changing their physiological structure, either by natural selection or by their adaptation to the environmental changes.

Sometimes, the course of change in the animal occurs in its inner genetic mapping. Most of the theorists of evolution regard this change as a natural process. The natural change of animals might occur slowly over the years. There is another example we can explicate here. Some of the viruses have capacity to bear genetic materials which are very much helpful for gene transformation to another species. This gene can bring a radical change in the new species. This is a natural process of change as it occurs through biotechnological process. So, the idea that is not based on strong arguments as such a breakdown of natural species has always been occurring in the animal kingdom.

**Secondly**, sometimes animal biotechnology is considered as unnatural, which is intrinsically wrong. Do we think that in the natural world anything natural is normal or ethical? Regarding this question, we can refer to some of natural phenomena such as earthquakes, cyclone, storm, drought, flood, and many other such natural calamities which usually take place in nature and create an abnormal phenomenon. Although it is described as 'natural' should we consider it as normal or intrinsically good? Of course, we do not consider these as normal phenomena. So, something that is natural or formulated by natural law does not always mean that it is arranged or created by the law of order or in a disciplined way. In this sense, the concept, 'natural' does not mean good or normal as it is attributed by the critics of animal biotechnology.

If we look at the agricultural crops and food by which we live, we can realize that these are the results of biotechnological formulation. The system of production of agricultural crops is the best instance of biotechnology. Even in the animal kingdom naturally and artificially there is a variety of forms of biotechnology. We mould the

nature for our suitable use by applying certain techniques upon it. So, the techniques for processing nature, the techniques for producing crops, and the techniques for creative survival and progress of dwelling are the essential features of our living. In that sense intrinsic argument cannot be a strong defence against the animal biotechnology.

## 2.3 Extrinsic Argument Against Animal Biotechnology

In the sense of extrinsic argument, animal biotechnology is ethically wrong because of its negative consequences on human beings, animals, and environment. Extrinsic arguments deal with two potential questions: i. Does animal biotechnology violate the criteria of 'animal welfare'? ii. What are the effects of biotechnological application upon the environment?

**i. Animal Welfare.** Before finding out the answer to the first question, at first, we shall have to make the concept of 'animal welfare' clear. Some of the exponents focus on the physical environment such as shelter and feeding; they also need to measure how the animals are coping with the existent environment.<sup>17</sup> Besides, there are people who think it is important to maintain the psychological status of animals. They are of the opinion that animals have various psychological states such as fear, frustration, and pain, which need to be addressed. It should be taken as part of their primary needs.<sup>18</sup> But, application of animal biotechnology involves such procedures that can cause different types of sufferings for the animals. Peter Singer states about the sufferings that there is no tolerable life for the animals that are in intensive livestock farming. There, throughout the year, animals are crowded in a battery cage, or in the cases of a breeding sow, there they are unable to walk or turn around, there is no way of socializing, sometimes they are thrown out and killed. All these steps are evidences of ill-treatment of animals as these confines them to a limited boundary.<sup>19</sup>

**ii. Environmental Concerns.** A study on 'animal biotechnology and environment' by Krinsky and Wrubel<sup>20</sup>, claims that animal biotechnologies have got an enormous amount of environmental benefits. They argue that in the traditional milking system more cows give less amount of milk and occupy more agro-land, more cows also produce more slurry and manure. On the other hand, the use of biotechnology is helpful in reducing the amount of land required; thus it can keep the land for non-agricultural purposes. Another study has shown that a genetically modified animal generates 'low phosphorus manure'<sup>21</sup>. Thus, the use of biotechnology turns into a great environmental benefit.

<sup>17</sup> Broom, DM., 1991. 'Animal Welfare: Concepts and Measurements', *Journal of Animal Science*, 69, p.4167-4175.

<sup>18</sup> Duncan IJH., 2002. "Poultry Welfare: Science or Subjectivity?" *Br. Poultry Science*, 43, pp.643:652.

<sup>19</sup> Singer, Peter, 1989. Evidence to Committee, 11 Aug, 1989, Australian and New Zealand Federations of Animals Societies, Evidence, 9470.

<sup>20</sup> Krinsky, Sheldon and Wrubel, Roger P., 1996. *Agricultural Biotechnology and the Environment: Science Policy and Social Issues*, Urbana: University of Illinois Press.

<sup>21</sup> Goloven, S.P., et al., 2001. "Pigs Expressing Salivary Phytase Produce Low-Phosphorus Manure", *Nature Biotechnology*, 19, pp. 741-745)

#### 2.4 Are the Extrinsic Arguments Consistent?

Regarding the concept of 'extrinsic argument', it has been argued that new technologies used in animals cause pain and sufferings in different ways. But, there are also opposite views to it. Animal biotechnology such as cloning or transgenic technique does not necessarily cause pain to an animal. Rather, it reduces the animal's pain. Furthermore, it can be said that in the conventional system of animal breeding an animal experiences severe pain.<sup>22</sup> Not only that, the conventional style of domestication also violates 'animal integrity' and 'animal welfare'. For example, in the domestication system, animals are infringed in a limited boundary; its movement is confined to that area, and its feeding and natural requirements are met and determined from the outside. However, to get a balanced life and physiological growth animals need suitable environment where they can grow naturally and smoothly.

[Bio]Technology (whether it is animal or agricultural) is one means of our living today. We cannot deny or oppose it all suddenly. We need to be careful as well as critical in this regard. Therefore, it is an imperative that we select tools for better assessment for evaluating [bio] technology.

#### 3. Concluding Remarks

Throughout our discussion, we have found two different outlooks on biotechnology. On the one hand, it can be said that it has got various and wonderful splendors, which can be enhanced in many different ways. Its enormous contribution to life and it's some particular achievement in the medical sector and in the food varieties has given this technology a tremendous input to human life. We can mention here the following: this (bio) technology has made it possible to save a child from polio by inventing polio-vaccines; it can save life of those people who are affected by infectious diseases; it is also able to provide protein and food at reasonable prices. On the other hand, it should also be mentioned that as a technology it has got a lot of adverse effects upon human health, the environment, and the individual's autonomy. This is why it should be discouraged in every way possible. In this circumstance, where should we stand? Should we ban any kind of practice of animal biotechnology? Or, should we encourage this technology? The ethical concerns involve a broad spectrum of decisions. For example, today biotechnologically developed animals are used for human benefits and purposes. Some particular ethical concerns, specifically animal welfare, animal freedom, and animal integrity, are involved in this issue. Ethical concerns such as the well-being of humankind, food safety, and fair access to the products are connected with the idea of human beings as users of animal biotechnology. Environment is an important issue of animal biotechnology. In this arena of thinking, environmental pollution, degradation, biodiversity, and sustainability are some of the key issues. It is, therefore,

imperative to follow ethical norms in animal biotechnology.<sup>23</sup>

## Climate Change and Its Impact on Animals and Humans

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Climate change, mainly global warming, is not a myth (Verma, 2008), though some have taken it so. In the earth's history climate changes have taken place several times, but the present change is being catalyzed by human activities; hence the need to ponder on how the process of increasing warmth may be retarded, so that organisms have more time to get adapted to the change, and there would not be frequent extinctions and much loss of biodiversity. Global warming is affecting animal life in different ways, as may be seen in a few examples, cited in the following sections of this review.

#### The freshwater seals

Lake Baikal in Siberia is the largest and deepest freshwater lake in the world. It is the home of a seal, which is the only freshwater seal known. The number of this seal has been declining. The reason for this is that the female of the species raises her young ones on floating ice sheets in the lake, where they are well protected from terrestrial predators. With growing warmth the ice sheets are melting away, and the female is forced to bring up her pups on shores, where the young ones often fall pray to predators; hence the seal population is on decline (Verma, 2008).

#### The Antarctic Penguins

Dr. Heather Lynch of the Department of Ecology and Evolution at the Stony Brook University, has extensively studied the breeding habits of three species of Antarctic penguins, Adelie, Chinstrap, and Gentoo, using data collected through field observations and the satellite imagery technique. It has been noted that Adelie and Chinstrap migrate to the Antarctic Peninsula for breeding, but Gentoo use for breeding the main land of the Antarctica, where they live year-round (Stony Brook University Release of March 21, 2012). The Antarctica is the world's most rapidly warming region. This has raised the pace of the penguins' breeding cycle. The gentoo need less ice cover for their breeding. As a result of the warming such preferred areas for gentoo's breeding have been increasing. This factor plus the increased pace of the breeding cycle are favouring rapid growth of the gentoo population. Adelie and chinstrap need the Antarctic krill for food. (Krill are small shrimp like

<sup>22</sup> EGE Report, 2008. *Ethics of Modern Developments in Agriculture Technologies*, Opinion: 23 & 24, the European Group on Ethics in Science and New Technologies to the European Commission, p.22.

<sup>23</sup> This article is the part of my Masters dissertation. I would like to thank Prof. Anders Nordgren, Linkoping University, Centre for Applied Ethics, Sweden, for his valuable comments which have enabled me to make this paper much clearer.