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Ethics on the edge: Navigating the morality of biotechnology in animal research

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Abstract: Biotechnology involves exploiting biological systems for human benefit and animals are used in basic biological and medical research, developing new disease treatments, assessing chemical and pharmaceutical safety, and teaching biology. Over the 20th century, scientists developed methods for modifying DNA in cells to improve understanding of gene function in illness, inheritance, and biological processes. However, the use of animals in research raises concerns about transgenic animals and mammalian cloning, as well as institutional and human-animal interactions. Regulatory agencies are creating regulations to address these issues, requiring increased awareness and monitoring of animal welfare and veterinarians can play crucial role in conducting monitoring, particularly in the context of research involving the development of novel genetically modified animals, especially food animal strains.

Introduction

Preface The specialized and purposeful manipulation of living effects or specific regions of their genome to produce goods and asked results to meet mortal requirements and solicitations is known as biotechnology. However, we can see that biotechnology has been used and continues to be used throughout mortal history, if we take this broad description. The most recent uses of biotechnology are in the fields of medical and health care, followed by food and agrarian, beast lores and artificial technologies. Unnaturally, biotechnology is a major and essential factor in raising people's standard of living in the twenty-first century. It promotes a unique vision of life, one in which some effects are viewed as salutary and to be encouraged or pursued, and other effects are unnecessary and should be avoided or excluded and that vision influences choices and what's viewed as immorally applicable. A two- way inflow exists in which ethics influences biotechnology indeed while the wisdom impacts ethics. As similar, there's important to appreciate about biotechnology and its approaches, yet at the same time, other ethical considerations must be considered and addressed. At what price are some of these developments realised? With so numerous choices now accessible to some individualities, there are worries about the implicit negative goods of having inordinate options(Schwartz, 2004). The advancement and oversight of biotechnology have burned multitudinous conversations among academics across colourful fields, including political wisdom, economics, and law. Specifically, the inheritable revision of living organisms similar as cells, shops, creatures, and humans has raised significant ethical dilemmas and apprehensions. While numerous individualities remain auspicious about biotechnology's capacity to enhance our quality of life, there are notable differences in perspectives there's low support or negative passions towards the use of biotechnology in husbandry and veterinary practices; moderate backing when it comes to enhancing marketable products; and wide acceptance when the objects are related to medical advancements.

Bioethics

Bioethics explores the ethical challenges that arise within biology and drug, especially those caused by mortal conditioning in the terrain and society through the operation of biotechnological ways. Addressing enterprises from the position of individual organisms to the complexity of the biosphere, bioethics considers issues that affect all living beings and their surroundings. Ethical challenges live on colourful scales, including global, indigenous, public, community, and particular situations, as well as on lower scales. The preface of new organisms or unstable genetically modified organisms(GMOs), frequently called

manipulated organisms, poses a particular indigenous concern. It also encompasses the existent's obligation to ensure proper care, protection, and monitoring of releases are adequately managed.

Biotechnology and Genetically Modified Animals

In hopes of gaining insights into the biological activities of various species, animal models are employed to investigate specific biological phenomena. Genetic engineering technologies have numerous applications related to farm, wild, and companion animals, as well as in scientific research involving animal models. The majority of genetically modified animals are still in the research phase and have not yet been commercially released or utilized for their intended functions. To enhance food quality, farm animals or domesticated species can be subjected to genetic modification (Laible, 2009). For example, pigs have been genetically engineered to express the Δ12 fatty acid desaturase gene (from spinach) for higher levels of omega-3 acid, and goats have been genetically engineered to express the human lysozyme in their milk. Such advances may add and increases the nutritional value of animal-based products. Despite resistance to the commercialization of genetically engineered animals for food production, primarily due to unavailability of support from the public (Gaskell *et al.* 2002), a recent debate over genetically engineered AquAdvantage™ Atlantic salmon may result in these animals being introduced into commercial production (FDA, 2010).

Genetically Modified Animals and Ethical concerns

The utilization of animals in experimental studies has grown due to advancements in medical research and development technology. Annually, millions of animals are subjected to experimentation globally, with 90% of these being mice and rats, along with cats, dogs, rabbits, and primates (Phelps, 2004). Recent progress in creating genetically engineered (GE) livestock has led to the development of various new transgenic animals with advantageous production and composition alterations. GE animals have been developed to enhance growth efficiency, improve food quality and composition, bolster disease resistance, and increase reproduction rates in domestic livestock species. Additionally, GE animals are utilized for pharmaceutical production and as medical models for human diseases. Ethical issues, including concerns for animal welfare and animal handling, can arise at all stages in the generation and life span of an individual genetically engineered animal. In order to create a new line of genetically modified animals, some animals must usually be sacrificed, and others must have surgery. These practices are not specific to genetically modified animals, but they are usually necessary for their development.

In recent times, there has been a notable rise in the creation of animals through genetic engineering, alongside a growing concern regarding the ethical implications of this scientific approach and its impact on animal welfare. Various livestock species, poultry, fishes and seafoods have undergone genetic alterations aimed to enhance their production efficiency and overall yield. For instance, pigs have been engineered to express bovine α-lactalbumin, a type of whey protein present in mammalian milk. A study on transgenic gilts showed a slight r ise in α-lactalbumin and lactose during the initial stages of lactation, contributing to great er milk production (Bleck *et al.* 1998).

As the global population continues to rise alongside escalating basic needs, there has been a steady surge in the demand for animal-derived protein in diet. This heightened demand has been met not only by increasing the population of livestock and related animals but also by applying substantial selective pressures to enha nce the productivity of each animal. Recent years have witnessed the significant advancements through selective breeding, intensive farming approaches, groundbreaking researches in veterinary sciences, as well as in assisted reproductive techniques. Furthermore, the advent of biotechnological tools has made it possible to create breeds that would have been unattainable through traditional selective breeding methods, or that would require centuries of practices to develop.

Although the benefits of genetically modifying organisms might seem numerous, it is important to understand that this technique is both extremely advanced and relatively new, and the risks involved are not fully recognized and may be disregarded (Bawa *et al.* 2013). The test subjects are living things with the ability to procreate, migrate, grow, and interact with their surroundings and other living things. This implies that compared to chemical investigations, the dangers are intrinsically more hazardous, persistent, and potentially unpredictable. It is practically

impossible to recall or lessen the effects of Genetically Modified Organisms (GMOs) once they have been introduced into the environment due to the unpredictability of living things.

A live organism's genetic engineering may be viewed as morally problematic in and of itself for several reasons, such as because of the way it is produced or the source of its genetic material, which may be viewed as immoral or at the very least questionable. But genetic engineering may also be thought of as morally and ethically problematic because of its desirable consequences. Kaiser (2005) argued that all variants of intrinsic arguments against animal biotechnology could be summarized and concluded in the following claim: It is unnatural to genetically engineer plants, animals and foods. The commonly most well-known argument of this sort is the so-called "Playing God-argument" (Dabrock, 2009).

Major risks related to GMOs:

Because of the unpredictable and undesirable nature of living organisms, once a GMO has been released into the environment, it is nearly impossible to control (Prakash *et al*. 2011). Their novel activities, including the production of metabolic products, enzymes, proteins and toxins will occur as long as the GMOs remain metabolically active and interacts with the environment. Genetic material can enter the human body through food, bacteria, viruses, vaccines, air and medications. There may be allergenic effects - especially in people who are predisposed to allergies - or other adverse effects on human health.

Ethical issues associated with GMOs

Although the usage of genetically modified organisms (GMOs) has increased rapidly in recent years and has resulted in the creation of new goods and solutions that benefit people, there are some ethical concerns with this practice as well. There has been a lot of discussion and worry about GMO safety. Firstly, it is a common fear that genetic modification may result in unintended consequences, such as the creation of new allergens or toxins, the spread of modified genes to wild relatives, or the development of antibiotic-resistant bacteria. Secondly, health concerns that GMOs may contribute to the development of new diseases or the spread of any existing diseases. Also, the idea of manipulating the genetic makeup of living organisms raises ethical questions about the ownership of life.

Many Organizations, pressure groups and ethical groups have objections to the use of animals in scientific testing and experiments. They recognize that animals have interests, and that these interests should not be violated at any cost for gaining human needs. One argument for why animals have interests is because they have the ability to suffer (Dogan, 2010), but wonder if animal rights should be protected at the expense of human rights.

Brambell Committee (1965) in Europe has established well-known "five animal freedoms":

- Freedom from discomfort by providing an appropriate environment including shelter and a comfortable resting area.
- Freedom from pain, injury or disease by prevention or rapid diagnosis and treatment
- Freedom to express normal behaviour by providing sufficient space, proper facilities and company of the animal's own kind.
- Freedom from fear and distress by ensuring conditions and treatment which avoid mental suffering.
- Freedom from hunger and thirst by ready access to fresh water and a diet to maintain full health and vigour.

Some religious critics see genetic engineering as "playing God" and reject it because life is sacred and delicate and should not be altered for human use; some secular opponents, such as the outspoken supporter Jeremy Rifkin, contend that changing DNA compromises the basic "dignity" of humans and other living things, in any situation (Ormandy *et al.* 2011); some people think that passing genes from one species to another is unethical and undesirable; and some people hold the religious view that humanity should not cross the natural boundaries set by a higher power.

Other objections/believes towards manipulation of Animals

The use of animals in animal biotechnology can cause them to suffer, so we have a moral obligation to protect them from suffering in any way we can. Technology in any form is a product of our intellectual abilities; at its best, it allows us to overcome natural shortcomings. Particular consideration must be given to concerns about equal access and even limitations on the use of genetic engineering in cases where it could endanger the subordination of certain human beings. It would be unethical to utilize a gadget that impairs vital human abilities, such as cognitive functioning.

Risk Assessment

Risk assessment usually involves the evaluation of potential harms to health and overall environment, mainly focusing on identifying novel features, consequences, which primarily focuses on

safe handling of GMOs. intends to quantify risks and evaluate the probabilities of possible outcomes based on scientific data. Various agreements and protocols were formulated related to this: The international agreements such as Cartagena Protocol on Biosafety, Convention on Biological Diversity (CBD), and the International Plant Protection Convention (IPPC), Cartagena Protocol on Biosafety, address the environmental aspects of GMOs.

Other issues

Concerns around intellectual property and patenting produced animals and/or the methods utilized to produce them are also raised by genetic engineering. The scientific community may develop a culture of secrecy because of protecting intellectual property, which restricts the sharing of data and animals. Such restrictions on data and animal sharing could lead to scenarios where genetically modified animal lines are needlessly duplicated, which would go against the reduction principle. Given the diversity of opinions on genetic engineering, it is beneficial to include all interested parties in conversations about the technology's potential uses.

Conclusion

Biotechnology has progressed to such a point that virtually any kind of genetic manipulation, if not already possible, is just around the corner. But these breakthroughs also raise serious ethical and moral dilemmas that we are only now beginning to confront. In this contribution no particular ethical position on biotechnology is taken. It is about the preliminary question whether the ethical issues of genetic modification can, besides in terms of health and welfare of animals, reasonably be stated in terms of integrity. The core of animal biotechnology is addressed on transgenic animals produced through cloning and genetic engineering techniques which are nowadays becoming extremely advanced and common. While biotechnology advancements are lauded for their potential benefits to society, great care must be taken to ensure that modernization efforts prioritize safety and security. At this point, ethics should serve as a protective filter as an indispensable part of science. Conditional ethical blindness' is also a factor that can determine how individuals, organizations and society see and respond to the main ethical issues. For ethics to function in real terms, it is important to explain science and technology to the public with both its good and bad sides, and issues related to animal use and manipulation should be taken into consideration to create a balanced approach and environment.

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