

The Potential Risks of Genetically Altered Animals on the Environment

Dr. Vinay Dwivedi ^{1*}, Dr A Mohamed Sikkander ²

¹ Department of Biotechnology Engineering & Food Technology, Chandigarh University, India.

² Velammal Engineering College, India.

*Corresponding Author Email: ¹ drvinay@yahoo.com

Abstract

The biotechnology is the technology with the research and innovation with the living cells and organisms. Introductory section deals with the The study has described the severe potential risk of environment that has been harmed by the GM technology of animals. Pros and cons both insights have been depicted in this study. On the basis of secondary data collected from peer reviewed journals has been interpreted here to justify the subject of the study. Biodiversity and ecological misbalance have been briefly discussed over here to evaluate the negative impact of GM technology in animals. Genetic modification also has been focused over here. Different disabilities of GM animals along with ecological misbalance also have been highlighted here. Strategies used by GM technology have been explored here to signify the study. Importance of the GM technology considering the development of current era also has been discussed over here. Risk assessment and risk management both are considered in this study to meet the objectives of the study. The study has significantly identified the potential risk factors conducted by the GM technology of animals that affect the environment.

Keywords

Animals, biodiversity, Ecological misbalance, Environment, GM technology.

INTRODUCTION

Modification of animal genetics with the implication of artificial DNA sequences can be considered as the genetically altered animals. Genetically engineered animals examples are the cattle's, pigs, chickens, goats, sheep, dogs, cats, rats, fishes and mice. Biodiversity of the environment affected by the genetically altered animals as overrunning of old species has been collapsing the existence of old species [1]. Independence of genetics acts of animals has harmed the environmental consequences that can decrease the potential of sustainability. Biodiversity of the environment symbolizes the variation of genetics considering the various living creatures of the earth. Therefore, the interruption of the stabilization of the genetics can affect the ecological balance of nature and enforcement of changing, removal or implication of DNA sequences can cause health hazards for living creatures including animals.

Disease resistance ability of animals can be hampered by the genetic modification of animals. Toxicity in the body of animals' increases that causes the death rate of animals and affects the ecological balance. Allergic reactions of genetic alteration in the animals can decrease the growth of animals [2]. Unanticipated effect on animals through this transformation of DNA sequences for altering animal genetics hampers the biodiversity of natures that affect the environment on earth. Transmission of animals also increases the probability of collapsing one particular gene in the environment along with creating survival risk for the existing animals.

Inbreeding chances are enhanced and natural adoption ability of animals has been decreased by this genetic transformation. Ecological systems also have been changed

considering the difficulties raised by genetically alteration of animals and simultaneously affecting the natural diverse approach of the environment. Natural mutation of genes can increase the biodiversity of nature; on the other hand, potential environmental harms have been increased by the cross contamination, increased weediness and gene transfer [3]. Modification of genetics can harm species that decrease the sustainability of the environment. Considering overall concepts of genetically altered animals has been affecting the biodiversity of the environment.

MATERIALS AND METHODS

Research design

Research design is the strategic interpretation of justification of the subject of research depending on empirical data. In this study qualitative research design has been selected to execute the research in the proper way. Establishing phenomenon justification of the subject of the study can be defined as the qualitative research design [4]. Meeting the objectives of the study is the main purpose of the qualitative research design. This particular study has focused on the evaluation of modification of genetics in animals that affect the environmental balance. Therefore, the qualitative research design of this study has executed the study to meet the objectives of the study.

Research types

Distinctive properties of research along with data collection techniques indicate the research types of a research. Secondary research types have been used in this research according to the scope of the subject of the research. Secondary research types increase the authenticity and reliability of the study that also enhance the quality of the

study. Study objectives also meet with the justification in a short period of time with a cost effective approach in secondary research type [5]. Empirical and existing data sources are used in this research type that creates trustworthiness for the readers. In this study secondary research types help to understand the intensity of the subject of the study.

Inclusion and exclusion criterion

The study has included the qualitative research types and excluded quantitative research types to justify the subject of the study. Peer reviewed journals are used in this study as data sources whereas survey and interview have been excluded from this study. Secondary data collection procedure has been included in this study and primary data collection procedure has been excluded from this study.

Data collection techniques and analysis

Data collection is the path to signify the study aim with informative justification. A study is to some extent dependent on the data collection procedure for achieving the success by meeting the objectives with logical reasoning. Considering the consistency of the subject of the study, a secondary data collection procedure has been selected by the writer to meet the study significance with informative justifications. Peer reviewed journals are used in this study as the source of data. Already existing data in formation make the study more concrete as the data information is already verified and reliable [6]. Thematic data interpretation of the secondary collected data has been used in this study to ensure the justification of the study.

Themes are developed with the help of peer reviewed journals and realistic observation of the writer gathered from the real world relevant to the subject of the study. Flexible and independent approach of expressing thought of writer has enhanced the quality of the study. Time saving and cost effective characteristic of thematic data analysis has the scope to meet the objectives of the study [7]. The writer of this study has selected the thematic data analysis procedure to interpret the data based on logical reasoning relevant to the subject of the study. Impact of genetics alteration in animals can be evaluated with the proper interpretation of secondary collected data based on peer reviewed journals.

Choice of subject

Biodiversity and ecological systems of the environment plays an important role to maintain the sustainability of nature. This study has considered the factors that affect the ecological balance and biodiversity highlighting the genetically altered animal's impact on the environment. Disadvantages and risk potential of the modification of genetics prioritizing the DNA consequences also have been analyzed in this study. Realistic observations have been discussed in this study relevant to the subject of this study to justify.

RESULTS

An evaluation of genetically modified animals on the ecosystems

Different factors for the development of society have influenced the genetic alteration of animals that active and passive in both ways affect the environment. Pharmaceutical needs in favour of human activities, adoption of animal's organs and cells for humans and research purposes are the major factors that accelerate the genetic transformation of the animals. However, the modifications of genetics considering the DNA sequences are affecting the health of the animals that hampers the ecological balance [8]. Development of medical fields decreases the disease resistance ability of animals. A number of animals have died by this experimental transformation of genetics. Transmission is also a major factor for health hazards of the animals and affecting ecological balance. Collapsing of species has been influenced by the genetic alteration of animals.

Toxicity in animals can be increased through the procedure of genetic modification of animals. Natural adoption ability of the animals has been hampered by the implication of genetic modifications. The procedure of modification of the genetics in animals enforces the invasiveness that sometimes involves sacrificing animals for the completion of the procedure. Unanticipated welfare has been devastated by this procedure and ecological misbalance has been increased. Animal biodiversity has been reduced by this genetic alteration process for animals [9]. Transfer of antibiotics resistance slows the movement of animals along with shorter lifespan and increases the probability of disease actions. Allergenicity is also a major issue for the animals considering the artificial genetic transformation of the wild creatures of the environment.

Adoption and survival ability of the animals has been affected by this genetic alteration that minimizes and isolates the specific creature's gene and impacts the ecological balance in a negative way. Rare mutation of animals has been increased and biodiversity has been decreased. Evolvment of environmental variables has been obstructed due to the ecological misbalance. Risk of extinction has been increased by this implication of artificial modifications of genetics and new disease potential has been explored in the wildlife of the environment [10]. Selection of genes for the transformation of the genetics decreases the ability of disease resistant power. Evaluation of genetically altered animals in the ecology of the environment depicted the negative consequences that harm the environment.

Potential risk factors caused by modified genetically altered animals that affect the environment

The ethical issues and welfare concerns about the animals have been mostly considered due to increasing genetic engineering of animals. All stakeholders including veterinarians have to be concerned about the animal's welfare that can help to evaluate the risk factors of genetic modification of animals. Ethical values along with social

values also have been prioritized by the stakeholders that can make a sustainable socio-ecological balance. Environmental benefits also have been highlighted through this ethical issues consideration. Risk assessment and risk management are the both consecutive perspectives to evaluate the pros and cons of the genetically altered animals. According to the Canadian Council on Animal Care a genetically altered animal is used for science considering the nuclear or mitochondrial DNA modification of animals with human technology intervention [11]. Induced mutation of animals has been focused for genetic alteration of animals.

Some ethical issues are identified following the CCAC guidelines such as invasiveness of procedures, a large segment of animals has been used in this procedure, unanticipated welfare concerns, ethical limitation establishment. Following these crucial ethical issues, risk assessments and risk management can be conducted. Risk assessment of use of genetically altered animals in the environment has been followed by some steps such as formulation of problems considering identification of hazard and exposure pathways, and then identified hazards and exposure also have been characterized [12]. The results reflect on risk characterisation and depending on it risk strategies have been decided in favour of animal welfare. Overall risk evaluation creates a path to sustain the ecological balance of the environment. Identification of animals for implication of GM procedure helps to problem formulation of risk assessment.

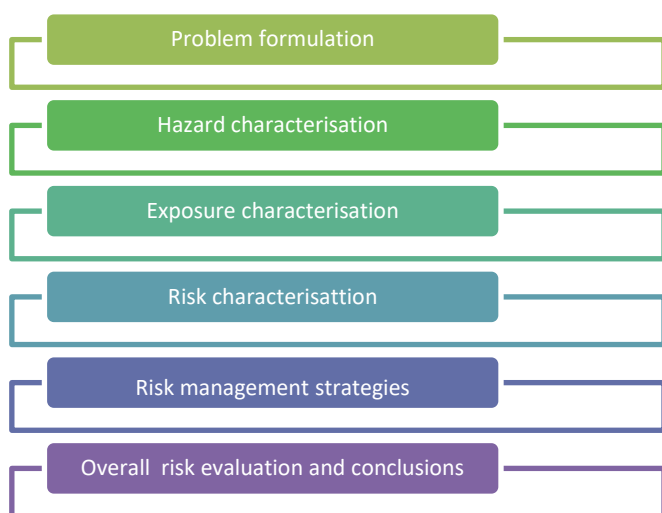


Figure 1: Different stages of risk assessment

Difference between normal animals and GM animals also recognises the potential risk factors of the environment and less environmental consequences in animal modification has been considered for the further procedure. Possible escape exposure pathways can help to resist the other receiving environmental effects due to GM animals. Changing of pests and pathogens are also considered by the problem formulation and exposure pathways to stop spreading

infections in the wild environment by GM animals suffering from accidental consequences [13]. Quantitative hypothesis evaluation of risk assessment considering natural resources and natural resources services also have to be prioritized to protect the environment from quantitative measured hazards coming out from GM animals.

Adverse effects of GM animals that harm the environment can be solved with the proper identification of exposure pathways. Biodiversity along with ecological balance also has been considered in the risk assessment and exposure pathways are detected to maintain the sustainability of the environment by minimizing the potential risk impact on the environment [14]. Considering the ethical issues created by the GM animals, governing bodies of different countries are developing policies relevant to the vigilance and potential animal welfare impacts. Veterinarians are playing a vital role in the welfare of animals by monitoring severe changes in genetically altered animals and taking essential initiative to protect wildlife along with the environment by implicating exposure pathways including risk removing strategies [15]. Strict rules and regulations considering GM animals have to be implicated in the technological procedure of genetic alteration of animals. Oversized animals, short lifespan, rare mutation of animals, difficulties in evolving of animals in the environment also have been highlighted as the negative effects of GM technology of animals on the environment.

Natural biodiversity has been affected by this technology that creates an imbalance of ecology. Farm livestock along with wildlife have to be considered in the risk evaluation of GM animals. The RS principles of CCAC have harmed the animal health along with integrity of the animals. The Rs principles of CCAC have considered the reduction, replacement and refinement that can harm animal welfare, therefore, ethical limitation has to be prioritized in the GM technology for animals [16]. Cloning technology under the GM procedure of animals can create some degree of abnormalities such as large birth weight, less placental formation and histological disorders in organs and tissues that severely affect the ecological balance of the environment. Human and animals relationship also can be deteriorated by the interference of genetics alteration procedure of animals.

Asymmetry of animals and human relationship troubling the ecological balance along with creates ambivalence. Genetic transformation techniques of animals are unpredictable and indifferent, causing health hazards of animals which lead to the death of animals and destroying the natural mutation habits of animals [17]. Genetically transformed animals have created gene manipulation that creates variation of phenotypes that has an adverse effect on animal welfare along with misbalancing the ecological misbalance. Monitoring of genetically altered animals has to be concerned with avoiding the unanticipated welfare concerns. Establishment of ethical limitation after analyzing the concerned ethical issues can help to protect the animal's welfare along with environmental benefits.

Importance of genetically altered animals

Adverse effect of genetically altered animals on the environment has prioritized the evaluation of importance of GM animals. Advanced technological era has focused on the development of different significant areas that can lead the progression of a country. Considering the beneficial impact of different segments such as human health, agriculture, scientific research has highlighted the use of genetic altered animals. Most influential impact of GM technology in animals is the production of disease resistance components for human health. The D procedure of gene alteration technology has reduced the severe pain and distress in animals used in this procedure [18]. Enhancing food production, human health improvement, reduction of environmental impacts along with customization of animal health and increasing production of industrial applications is focused by this gene modification technology. Curable disease medical procurement is produced from genetically altered animals. Firm livestock are intervened with this technology to increase the food production along with enhancing the nutrient quality of the food products.

Agriculture pollution also can be controlled by GM animals that have a positive impact on the environment. Faster growing of animals integrated the food production through the gene modification technology. Initial cost of GM technology also accelerates the tendency of using this technology in animals and developing the scientific infrastructure of various fields in a cost effective manner. Genetic diversity has been enhanced with the implication of gene alteration in animals [19]. Traits based gene alteration of animals increased the production of industrial segments. Considering the beneficial aspects of gene modified animals the technology has been vastly used in development of different fields. However, nature has been affected by this particular technology as the food chain related to the species has been affected by the gene alteration. The ecological disturbance due to these uncertainties affects the environment.

Irreversible impact on the environment has hampered the biodiversity of wildlife including domestic animals. Survival crisis along with evolving with nature have been difficult for the animals after the gene transformation. Therefore, the collapsing rate of rare species can create adverse impacts on the environment considering bio diverse impact. In comparison it can be stated that considering the ethical limitation in favour of animal welfare, some strategies have to be used by the veterinarian to implicate the human invented technology in the animals. The strategies have been developed on the basis of characterisation of receiving environments considering biotic and abiotic factors [20]. Food sources, mate confirmation, feeding, breeding, climate preference, chemical and physical factors along with security assurance are the basic strategies to manage the risk factors regarding ecosystems that are affected by the GM animals. Conspecifics, predators and consumers pests and disease control measures also have to be focused by the procedure of

GM technology in animals.

The attribute of abiotic ecosystems, organic waste products and habitat restructuring plays a vital role in maintaining the ecological balance in the environment focusing on genetically altered animals. Balancing the food chain through planting trees is another way to maintain the ecological balance of the environment in favour of GM animals [21]. The mobility rate and population of GM animals have to be concerned by the government of different countries by implicating laws and regulations in favour of animal welfare to maintain the sustainability of the environment. After evaluation of potential risk factors of genetically alteration procedure of animals on the environment, the importance of GM technology in this era has been highlighted along with its impact on the biodiversity and ecological balance of the environment.

DISCUSSION

The results of evaluation of the potential risks of genetically altered animals on the environment has depicted that biodiversity of the environment has severely affected the environment. On the other hand, ecological misbalance of nature has a negative impact on the environment. The difficulties of genetic modification have highlighted the oversize, weak and susceptible disease effect on the animals that increase the risk of collapsing species from the earth. The different aspects of using genetically altered animals have been discussed over here. Death ratio of animals has been increased by the implication of transformation of DNA sequences in the animal's body along with abnormalities in future generations also has been explored in this scenario. Adverse effects of modified genetic animals are the decreased ability of antibody resistance power, increased toxicity in the body and tend to Allergenicity that harm the health of animals.

The passive effect of modification of genetics in animals has been shown on biodiversity of the environment. Gene editing also decreases the live birth rate along with increasing the probability of heart disease, cardiac disease and respiratory problems. The normal movements of the animals has been changed that results in the incapability of the animals to evolve in the environment. Natural mutation procedure of genetically altered animals has been collapsed that affects the ecological misbalance of the earth. The procedure of genetic modification is using the microinjection to inject DNA in an animal's body considering the nuclear cells utilizing viral vectors.

The study also analyzes the advantages and disadvantages of the genetics alteration procedure of the animals to meet the subject of the study with justification. Animal populations also have been affected by this advanced medical technological approach that also harms the natural changes of the environment. Environmental sustainability also gets hampered by the implication of modified genes of the animals. Unanticipated welfare of the ecosystem also has been affected introducing the genetic alteration of animals.

Rare mutation of rare creatures has been increased and the biodiversity of the environment has been decreased. Overall impact of gene editing leads to environmental sustainability in a negative way.

Analysing the importance of GM animals in the progression of nations, potential risk factors have also been identified in this study prioritizing the environmental impact. Identification of the potential risk factors has been followed by the risk assessment and risk management procedure. Problem formulation along with finding the exposure pathways have been developed in the risk assessment of GM animals. Hazard characterisation, risk characterisations have been considered in the risk assessment and depending on this risk strategies are developed to resolve the associated problems with the environment. Disabilities of GM animals, survival risks, evolving difficulties along with low power of natural mutation have been discussed over here to evaluate the negative consequences of biodiversity of the environment. On the other hand, strategies also have been highlighted here to minimize the adverse impact of GM technology on animals in ecological balancing.

Biotic and abiotic attributes have been prioritized to develop strategies and implicating it to protect the environment including ecological system and animal health. Governing contribution for animal welfare and veterinarian initiative in animal favour also has been focused over here. Human-animal relationship, natural food chain circle also has been considered in the result to evaluate the impact of GM technology in animals. The CCAC's R's principles have focused on the receiving of environments that also misbalancing the ecological system of the environment. The overall interpretation of the result has highlighted the potential risk factors that can be mitigated by the proper risk management strategies.

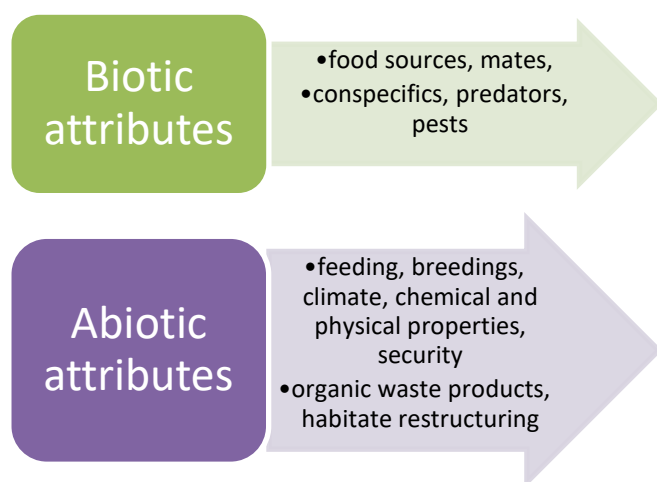


Figure 2: Ecological attributes required for animals

CONCLUSION

The study has evaluated the different aspects of genetically altered animals' impact on the environment. Secondary data collection methods and thematic data analysis procedure has been discussed over here to meet the objectives of the study

with informative justifications. Peer reviewed journals published after 2019 have been used in this study as the source of data information that makes the study more reliable and validated. Secondary research type has been selected by the writer of the study and the qualitative research design has been used in this study to increase the quality of the study. Themes are developed in this study to interpret the data information relevant to the subject of the study with an independent thought process of the writer considering realistic observation along with a flexible approach to justify the subject of the study.

Significance of the study has been also depicted in this study to meet the purpose of the subject. The Advantages and Disadvantages of gene editing have been discussed over here. Passive effect of the gene alteration in animals on the environment also has been considered in this study to signify the study. Purpose of modifications of DNA sequences in the animal's body also has been focused over here. Techniques used by this procedure also have been depicted here. Ecological variation through genetically altered animals has been focused in this study to analyze the pros and cons of modification of the genetics in animals.

Government contribution and veterinarians also play a vital role to maintain the animal welfare and conserving the biodiversity of the environment. Importance of GM technology also has been highlighted over here to analyze the risk factors that harm the environment. The study also depicted the strategies that can be used to mitigate the adverse effect of GM technology in animals on the environment. Risk assessment and risk management procedures also help to make a sustainable environment prioritizing the biodiversity and ecological balance.

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