ADVANCEMENT IN BIOTECHNOLOGY IN LIVESTOCK PRODUCTION TO COMBAT CLIMATE CHANGE

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ABSTRACT

Climate change, which is gradually leading to global warming has become one of the biggest challenges of today's world. It is a high time to deal with it, in a scientific way, so that it does not become an obstacle in the sustainable development of this world in years to come. To combat with these global challenges, many biotechnological tools have been discovered in different developing areas along with livestock production which will aid in sustainable development of mother nature.

Biotechnological tools have potential impact on livestock farming. It has increased its productivity by various ways, most significantly, by controlling and reducing the emission of harmful gasses to the globe. Those developments have not only enhanced the animal production but also have provided food security to the world. Another milestone achieved by biotechnological tools is the development of genetically modified organisms (GMOs), having many positive impacts over the climatic challenges.

Massive investment for development of new biotechnological tools and technologies in is the need of the time at all levels, in general and in livestock science, in particular. Although several climate-related problems can be solved by biotechnology but at the same time it also carries several challenges like cost-effectiveness, adaptation and acceptance by the society, lack of knowledge on the subject, etc. However, those challenges can be dealt with various ways like organization of mass awareness programmes, workshops, trainings, etc. For sustainable utilization of new products and process, funding agencies should take more initiatives by funding in projects related to climate change.

KEYWORDS: Biotechnology, Climate change, Global warming, Livestock production

INTRODUCTION

Climate change, regarded as one of the burning topics on environment, has become the biggest challenges in today's generation. It is an issue of concern everywhere, irrespective of any boundaries and borders. Without any second thought, it can be mentioned that human-induced activities have affected the climatic challenges tremendously which have also restricted the socio-economic development of the globe. The temperature of the atmosphere is rising at an alarming rate, mostly due to the increase levels of greenhouse gases and livestock farming is one of the major contributors of this greenhouse gases. This increase in temperature of the atmosphere is called as global warming. Extreme weather events, rising sea levels, other biological systems like spread of infectious disease, causing disruption of ecosystems and food systems etc. are the effects of global warming.

There is an urgent need to take action against the climate change and global warming. Advance biotechnological tools need to be formulated not only to take care of the harmful climate challenges but also to reduce the severity of the effect of human-induced activities on the global warming.

BIOTECHNOLOGY IN LIVESTOCK PRODUCTION

Biotechnology is a technology based on biology having significant potential to address climate change in many ways like helping to mitigate greenhouse gas (GHG) emissions, improving resource efficiency, enabling sustainable practices across various sectors (animal farming being one of them), etc.

Emission of harmful gases like methane, carbon dioxide, nitrous oxide and ammonia from livestock farming are the important factors which have tremendous effect on the climate change and also influences the social and economic development. Control and reduction in emission of those harmful gases is one of the important solutions for environmental protection. Many significant improvements in respect to livestock farming have been made with the use of biotechnology.

Livestock farming contributes a significant amount of global methane to the environment, particularly from the enteric fermentation of ruminant animals like cows and sheep. Advancements in the genetic engineering have made it possible for the development of livestock with genetic traits (by altering the microbiome of ruminant animals that produce less methane or greater feed efficiency) which reduces methane emissions. Research activities are going on to exploit feed additives, such as *3-Nitrooxypropanol* which is a methane inhibitor, that can reduce methane production in the stomach during digestion. Tannins, which modifies the microbial communities in the animals' digestive systems, are also used to reduce methane emissions. Such approaches have shown a significant reduction in the emission of toxic gases due to animal farming and has helped in minimising the overall carbon footprint.

Naqvi, 2007, have highlighted some other areas where biotechnology has shown its potential to regulate the climate change in livestock sector. Advancements made in the field of biotechnology has made it possible to improve the animal health by management of diseases and their control. Animal disease is one of the significant reasons that reduces productivity and reproductivity. However, various technologies in the area of gene manipulation for improvement of reproduction efficiency and animal productivity has shown the ability of biotechnology to enhance animals' potential to withstand harsh and extreme climate changes.

Today, it is possible to diagnose disease more accurately, precisely and in a very less time, all due to the discoveries made in the development of many biotechnological tools. Biotechnology has showed its proficiency not only in the level of identification of disease-causing agents in livestock, but also in assisting the identification at the level of sub-species, strain and bio-type. Those advancement has improved the livestock rearing making it more profitable and less toxic to the environment.

Production of recombinant vaccine is another product of biotechnology which is a need of the present time. Many advances are made in this field and it has proved to be advantageous in livestock farming. Such vaccines are easy to use and even the livestock farmers farming at extreme climatic challenges can take the advantages of those vaccines conveniently. Moreover, those vaccines are cheaper than the conventional ones.

Plants are the natural source of nutrition for livestock for their survival. IFPRI (2009), observed that in the coming years, availability of plants will be greatly affected due to climate change and it won't be sufficient for the livestock to depend significantly on the green crops for their survival. In this regard, biotechnology is playing a major role to modify the components of the plants, their fermentation process and also altering the metabolism of the feed in the rumen. This would further help in establishing profitable entrepreneurship in livestock rearing and management with less space and less crops.

Biotechnology have shown its capacity in the making various significant advancements in the field of animal breeding and genetics,

like accurate identification of the genes, their mapping, genetic polymorphisms, QTL detection, etc. The molecular genetic information can be utilized for carrying out the marker assisted selections in breeding programs to get high genetic gain.

CONCLUSION

Global warming is a burning issue of today's world having significant impact on the climate change and there is an urgent need to address this issue. Biotechnology plays an important role in combating these challenges by discovery of many advance technologies in all areas, including the area of livestock farming. These helps to mitigate the effects of climate change, leading to more developments and sustainable future.

Biotechnology has the ability to solve many climate-related challenges. However, the innovative technologies need to be adopted with caution, considering the social, economic and environmental effects. Investments in the field of biotechnological research and development for discovering newer technologies will be worthy enough to fight against the environmental challenges. There are many difficulties in relation to public perception and acceptance of the noble technologies such as Genetically Modified Organisms (GMOs). Organizing mass awareness programs, capacity building, intensive training, etc. can make it possible to make the public aware of biotechnological advancements and their benefits to the society.

It can be concluded that biotechnological tools and technologies, when regulated properly and monitored continuously for safety and effectiveness, has the potential to have positive impact on adaptation of sustainable livestock rearing practices making it as safe and profitable.

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